# Ultra High Efficiency LCH036U through 074U

LCH036U, 048U, 060U, and 074U are ultra high efficiency packaged units equipped with variable speed direct drive blowers, an inverter-driven variable speed compressor, and a variable speed outdoor fan.

Optional electric heat is factory or field installed . Electric heat operates in single stage depending on the kW input size. 7.5kW through 22.5 kW heat sections are available for the LCH unit.

Information contained in this manual is intended for use by qualified service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes.

If the unit must be lifted for service, rig unit by attaching four cables to the holes located in the unit base rail (two holes at each corner). Refer to the installation instructions for the proper rigging technique.

**⚠WARNING**

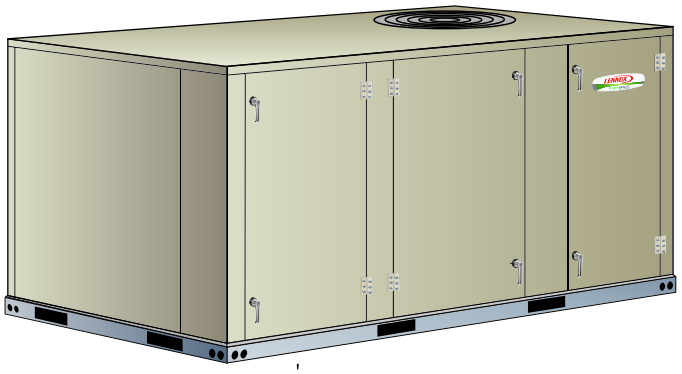
**Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional installer (or equivalent) or service agency.**

**⚠IMPORTANT**

**The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC's and HCFC's) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.**

**⚠WARNING**

**Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.**



**⚠CAUTION**

**As with any mechanical equipment, contact with sharp sheet metal edges can result in personal injury. Take care while handling this equipment and wear gloves and protective clothing.**

**⚠CAUTION**

**Electrostatic discharge can affect electronic components. Take precautions to neutralize electrostatic charge by touching your hand and tools to metal prior to handling the control.**

**Table of Contents**

## OPTIONS / ACCESSORIES

| Item | Model Number | Catalog Number | Unit 036 | 048 | 060 | 074 |
|---|---|---|---|---|---|---|
| **COOLING SYSTEM** | | | | | | |
| Condensate Drain Trap | PVC - C1TRAP20AD2 | 76W26 | OX | OX | OX | OX |
| | Copper - C1TRAP10AD2 | 76W27 | OX | OX | OX | OX |
| Drain Pan Overflow Switch | E1SNSR71AD1 | 68W88 | OX | OX | OX | OX |
| Service Valves | | Factory | O | O | O | O |
| **BLOWER - SUPPLY AIR** | | | | | | |
| Motors | Direct Drive - 0.50 hp | Factory | O | | | |
| | Direct Drive - 0.75 hp | Factory | | O | | |
| | Direct Drive - 1 hp | Factory | | | O | O |
| **CABINET** | | | | | | |
| Combination Coil/Hail Guards | C1GARD51AT1 | 13T03 | X | X | X | X |
| Corrosion Protection (indoor coil / outdoor coil) | | Factory | O | O | O | O |
| **CONTROLS** | | | | | | |
| Commercial Controls | CPC Einstein Integration | Factory | O | O | O | O |
| | Prodigy® Control System - BACnet® Module - C0CTRL60AE1L | **59W51** | OX | OX | OX | OX |
| | Prodigy® Control System - LonTalk® Module - C0CTRL65FF1 | 54W27 | OX | OX | OX | OX |
| | Novar® 2051 - C0CTRL40AA1 | 14U39 | OX | OX | OX | OX |
| | Novar® LSE | Factory | O | O | O | O |
| | L Connection® Building Automation System | - - - | X | X | X | X |
| Dirty Filter Switch | E1SNSR55AP1 | 53W66 | OX | OX | OX | OX |
| General Purpose Control Kit | E1GPBK30C1 | 13J78 | X | X | X | X |
| Fresh Air Tempering | C1SNSR75AD1 | 58W63 | OX | OX | OX | OX |
| Smoke Detector - Supply or Return (Power board and one sensor) | C1SNSR44AP1 | 53W78 | OX | OX | OX | OX |
| Smoke Detector - Supply and Return (Power board and two sensors) | C1SNSR43AP1 | 53W79 | OX | OX | OX | OX |
| **ELECTRICAL** | | | | | | |
| Voltage 60 hz | 208/230V - 3 phase | Factory | O | O | O | O |
| | 460V - 3 phase | Factory | O | O | O | O |
| HACR Circuit Breakers | | Factory | O | O | O | O |
| Disconnect Switch (See Electrical / Electric Heat Tables for selection) | 80 amp - T2DISC080NH1 | 20W24 | OX | OX | OX | OX |
| | 150 amp - T2DISC150NH1 | 20W25 | | OX | OX | OX |
| GFI Service Outlets | 15 amp non-powered, field-wired LTAGFIK10/15 | 74M70 | OX | OX | OX | OX |
| Weatherproof Cover for GFI | C1GFCI99FF1 | 10C89 | X | X | X | X |

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

## OPTIONS / ACCESSORIES

| Item | Model Number | Catalog Number | Unit 036 | 048 | 060 | 074 |
|---|---|---|---|---|---|---|
| **ELECTRIC HEAT** | | | | | | |
| 7.5 kW | 208/230V-3ph - E1EH0075AN1Y | 46W31 | OX | OX | OX | OX |
| | 460V-3ph - E1EH0075AN1G | 46W35 | OX | OX | OX | OX |
| 15 kW | 208/230V-3ph - E1EH0150AN1Y | 46W32 | OX | OX | OX | OX |
| | 460V-3ph - E1EH0150AN1G | 46W36 | OX | OX | OX | OX |
| 22.5 kW | 208/230V-3ph - E1EH0225N1Y | 46W33 | | | OX | OX |
| | 460V-3ph - E1EH0225N1G | 46W37 | | | OX | OX |
| SCR (Silicon Controlled Rectifier) Electric Heat Control | | Factory | O | O | O | O |
| Thermostat (required) | | Y9682 | X | X | X | X |
| Duct Sensor (required) | | Y9683 | X | X | X | X |
| **ECONOMIZER** | | | | | | |
| Standard Economizer With Outdoor Air Hood (Sensible Control) (Not for Title 24) | | | | | | |
| Standard Economizer - Includes Barometric Relief Dampers and Exhaust Hood | E1ECON30A-2- | 90W59 | OX | OX | OX | OX |
| Standard Economizer - Includes Barometric Relief Dampers and Exhaust Hood and Power Exhaust | | Factory | O | O | O | O |
| Standard Economizer - No Exhaust Option | | Factory | O | O | O | O |
| High Performance Economizer With Outdoor Air Hood (Sensible Control) (Approved for California Title 24 Building Standards / AMCA Class 1A Certified) | | | | | | |
| High Performance Economizer - Includes Barometric Relief Dampers and Exhaust Hood | E1ECON17A-1 | 10U54 | OX | OX | OX | OX |
| Economizer Accessories | | | | | | |
| Horizontal Economizer Conversion Kit | T1HECK00AN1 | 17W45 | X | X | X | X |
| Economizer Controls | | | | | | |
| Differential Enthalpy (Not for Title 24) | Order 2 - C1SNSR64FF1 | 53W64 | OX | OX | OX | OX |
| Sensible Control | Sensor is Furnished | Factory | O | O | O | O |
| Single Enthalpy (Not for Title 24) | C1SNSR64FF1 | 53W64 | OX | OX | OX | OX |
| Global Control | Sensor Field Provided | Factory | O | O | O | O |
| Building Pressure Control | E1GPBK10C1 | 13J77 | X | X | X | X |
| Outdoor Air CFM Control | E1GPBK20C1 | 13J76 | X | X | X | X |
| **OUTDOOR AIR** | | | | | | |
| Outdoor Air Dampers With Outdoor Air Hood | | | | | | |
| Motorized | C1DAMP21A-1 | 15D17 | OX | OX | OX | OX |
| Manual | C1DAMP11A-2 | 15D18 | OX | OX | OX | OX |
| **POWER EXHAUST FAN (DOWNFLOW ONLY)** | | | | | | |
| Standard Static | 208/230V-3ph - C1PWRE10A-1P | 79W87 | OX | OX | OX | OX |
| *Note: Factory installed Power Exhaust Fan includes Exhaust Hood. Barometric Relief Dampers without Exhaust Hood are required (order separately).* | 460V-3ph - C1PWRE10A-1G | 79W88 | OX | OX | OX | OX |
| *Note: Field installed Power Exhaust Fans do not include Exhaust Hood. Barometric Relief Dampers with Exhaust Hood are required (order separately).* | | | | | | |

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

## OPTIONS / ACCESSORIES

| Item | Model Number | Catalog Number | Unit 036 | 048 | 060 | 074 |
|---|---|---|---|---|---|---|
| **BAROMETRIC RELIEF** | | | | | | |
| [1] Barometric Relief Dampers with Exhaust Hood | C1DAMP50A-1- | 74W38 | X | X | X | X |
| [2] Barometric Relief Dampers without Exhaust Hood | C1DAMP50A-2- | 72W89 | X | X | X | X |
| **INDOOR AIR QUALITY** | | | | | | |
| Air Filters | | | | | | |
| Healthy Climate® High Efficiency Air Filters<br>Order 4 per unit | MERV 8 (20 x 20 x 2 in.) - C1FLTR15D-1- | 54W21 | OX | OX | OX | OX |
| | MERV 13 (20 x 20 x 2 in.) - C1FLTR40D-1- | 52W39 | OX | OX | OX | OX |
| Replaceable Media Filter With Metal Mesh Frame (includes non-pleated filter media) | 20 x 20 x 2 in. (Order 4) - K1FLTR30A-2 | 44N60 | OX | OX | OX | OX |
| Indoor Air Quality ($CO_2$) Sensors | | | | | | |
| Sensor - Wall-mount, off-white plastic cover with LCD display | C0SNSR50AE1L | 77N39 | X | X | X | X |
| Sensor - Wall-mount, off-white plastic cover, no display | C0SNSR52AE1L | 87N53 | X | X | X | X |
| Sensor - Black plastic case with LCD display, rated for plenum mounting | C0SNSR51AE1L | 87N52 | X | X | X | X |
| Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting | C0MISC19AE1 | 87N54 | X | X | X | X |
| $CO_2$ Sensor Duct Mounting Kit - for downflow applications | C0MISC19AE1- | 85L43 | X | X | X | X |
| Aspiration Box - for duct mounting non-plenum rated $CO_2$ sensors (**87N53** or **77N39**) | C0MISC16AE1- | 90N43 | X | X | X | X |
| UVC Germicidal Lamps | | | | | | |
| [3] Healthy Climate® UVC Light Kit (208/230V-1ph) | C1UVCL10AN1- | 50W90 | OX | OX | OX | OX |
| **ROOF CURBS** | | | | | | |
| Hybrid Roof Curbs, Downflow | | | | | | |
| 8 in. height | C1CURB70A-1 | 11F50 | X | X | X | X |
| 14 in. height | C1CURB71A-1 | 11F51 | X | X | X | X |
| 18 in. height | C1CURB72A-1 | 11F52 | X | X | X | X |
| 24 in. height | C1CURB73A-1 | 11F53 | X | X | X | X |
| Adjustable Pitched Curb | | | | | | |
| 14 in. height | C1CURB55AT1 | 43W27 | X | X | X | X |
| Transition Curb | | | | | | |
| Matches Energence® 036-074 Units to existing L Series® Curbs | E1CURB60A-1 | 20W06 | X | X | X | X |
| **CEILING DIFFUSERS** | | | | | | |
| Step-Down - Order one | RTD11-95S | 13K61 | X | X | X | X |
| Flush - Order one | FD11-95S | 13K56 | X | X | X | X |
| Transitions (Supply and Return) - Order one | T1TRAN20N-1 | 17W54 | X | X | X | X |

[1] Required when Economizer is factory installed (no exhaust option) with field installed Power Exhaust Fan option.

[2] Required when Economizer is factory installed with factory installed Power Exhaust Fan option.

[3] Lamps operate on 110-230V single-phase power supply. Step-down transformer may be ordered separately for 460V units. Alternately, 110V power supply may be used to directly power the UVC ballast(s)

NOTE - Catalog and model numbers shown are for ordering field installed accessories.
OX - Configure To Order (Factory Installed) or Field Installed
O = Configure To Order (Factory Installed)
X = Field Installed

SPECIFICATIONS

| | | | | | |
|---|---|---|---|---|---|
| General Data | Nominal Tonnage | 3 Ton | 4 Ton | 5 Ton | 6 Ton |
| | Model Number | LCH036U4E | LCH048U4E | LCH060U4E | LCH074U4E |
| | Efficiency Type | Ultra | Ultra | Ultra | Ultra |
| | Blower Type | MSAV (Multi-Stage Air Volume) Direct Drive | MSAV (Multi-Stage Air Volume) Direct Drive | MSAV (Multi-Stage Air Volume) Direct Drive | MSAV (Multi-Stage Air Volume) Direct Drive |
| Cooling Performance | Gross Cooling Capacity - Btuh | 35,300 | 48,500 | 59,500 | 72,000 |
| | [1] Net Cooling Capacity - Btuh | 34,500 | 47,000 | 58,000 | 70,000 |
| | AHRI Rated Air Flow - cfm | 1200 | 1550 | 1800 | 2050 |
| | Total Unit Power - kW | 2.3 | 3.4 | 4.5 | 5.8 |
| | SEER (Btuh/Watt) - 208/230V-3ph | [1] 23.5 | [1] 21.0 | [1] 20.0 | - - - |
| | SEER (Btuh/Watt) - 460V-3ph | [1] 22.5 | [1] 20.2 | [1] 19.5 | - - - |
| | EER (Btuh/Watt) - 208/230V-3ph | [1] 15.0 | [1] 14.0 | [1] 13.0 | [2] 12.0 |
| | EER (Btuh/Watt) - 460V-3ph | [1] 14.5 | [1] 13.7 | [1] 12.5 | [2] 12.0 |
| | IEER (Btuh/Watt) - 208/230V-3ph | - - - | - - - | - - - | [2] 22.0 |
| | IEER (Btuh/Watt) - 460V-3ph | - - - | - - - | - - - | [2] 22.0 |
| AHRI Reference No. | 208/230V-3 ph | 8935239 | 8931551 | 8931553 | 202089010 |
| | 460V-3 ph | 8935240 | 8931552 | 8931554 | |
| Refrigerant Charge | Refrigerant Type | R-410A | R-410A | R-410A | R-410A |
| | | 17 lbs. 0 oz. | 17 lbs. 0 oz. | 16 lbs. 11 oz. | 16 lbs. 11 oz. |
| Electric Heat Available - Page 9 | | 7.5 and 15 kW | 7.5 and 15 kW | 7.5, 15 and 22.5 kW | 7.5, 15 and 22.5 kW |
| Compressor Type (number) | | Variable Capacity Scroll (1) | Variable Capacity Scroll (1) | Variable Capacity Scroll (1) | Variable Capacity Scroll (1) |
| Outdoor Coil | Net face area (total) - sq. ft. | 19.3 | 19.3 | 19.3 | 19.3 |
| | Tube diameter - in. | 3/8 | 3/8 | 3/8 | 3/8 |
| | Number of rows | 2 | 2 | 2 | 2 |
| | Fins per inch | 20 | 20 | 20 | 20 |
| Outdoor Coil Fan | Motor - (No.) horsepower | (1) 1/3 (ECM) | (1) 1/3 (ECM) | (1) 1/3 (ECM) | (1) 1/3 (ECM) |
| | Motor rpm | 550 - 850 | 600 - 900 | 700 - 950 | 700 - 1050 |
| | Total Motor Input - watts | 50 - 200 | 80 - 236 | 120 - 272 | 120 - 360 |
| | Diameter - (No.) in. | (1) 24 | (1) 24 | (1) 24 | (1) 24 |
| | Number of blades | 3 | 3 | 3 | 3 |
| | Total air volume - cfm | 2500 - 3850 | 2750 - 4100 | 3200 - 4300 | 3200 - 4700 |
| Indoor Coil | Net face area (total) - sq. ft. | 9.72 | 9.72 | 9.72 | 9.72 |
| | Tube diameter - in. | 3/8 | 3/8 | 3/8 | 3/8 |
| | Number of rows | 3 | 3 | 4 | 4 |
| | Fins per inch | 14 | 14 | 14 | 14 |
| | Drain connection (Number) and size - in. | 1 in. NPT coupling | 1 in. NPT coupling | 1 in. NPT coupling | 1 in. NPT coupling |
| | Expansion device type | Balance port TXV, removable head | | | |
| [3] Indoor Blower | Nominal motor HP | 0.50 (ECM) | 0.75 (ECM) | 1 (ECM) | 1 (ECM) |
| | Blower wheel nominal diameter x width - in. | (1) 10 x 10 | (1) 10 x 10 | (1) 11 x 10 | (1) 11 x 10 |
| Filters | Type of filter | Disposable | | | |
| | Number and size - in. | (4) 20 x 20 x 2 | (4) 20 x 20 x 2 | (4) 20 x 20 x 2 | (4) 20 x 20 x 2 |
| Electrical characteristics | | 208/230V or 460V - 60 hz -3 phase | | | |

NOTE - Net capacity includes evaporator blower motor heat deduction. Gross capacity does not include evaporator blower motor heat deduction.

[1, 2] AHRI Certified to AHRI Standard [1] 210/240 or [2] 340/360: 95°F outdoor air temperature and 80°F db/67°F wb entering evaporator air; minimum external duct static pressure.

[2] Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished are shown. In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

## BLOWER DATA - DIRECT DRIVE - 3 TON

036 DIRECT DRIVE BLOWER - BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:
1 - Any factory installed options air resistance (heat section, economizer, etc.).
2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See Page 9 for blower motors and drives and wet coil and options/accessory air resistance data.

DOWNFLOW

| External Static Press. in. w.g. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 459 | 29 | 380 | 698 | 47 | 414 | 903 | 76 | 475 | 1069 | 110 | 539 | 1224 | 153 | 598 | 1374 | 195 | 632 | 1500 | 248 | 677 | 1617 | 312 | 723 | 1729 | 375 | 763 | 1821 | 447 | 803 |
| 0.2 | 357 | 32 | 464 | 596 | 55 | 520 | 828 | 86 | 563 | 1023 | 120 | 597 | 1180 | 165 | 634 | 1331 | 210 | 685 | 1461 | 264 | 727 | 1590 | 325 | 757 | 1704 | 387 | 796 | 1796 | 460 | 835 |
| 0.3 | 255 | 36 | 554 | 521 | 61 | 596 | 772 | 94 | 607 | 977 | 130 | 654 | 1137 | 177 | 706 | 1302 | 220 | 720 | 1435 | 274 | 776 | 1550 | 344 | 808 | 1666 | 406 | 843 | 1772 | 473 | 866 |
| 0.4 | 166 | 39 | 637 | 445 | 67 | 669 | 716 | 102 | 694 | 916 | 143 | 728 | 1108 | 185 | 740 | 1258 | 235 | 772 | 1397 | 289 | 808 | 1523 | 356 | 841 | 1641 | 417 | 874 | 1735 | 492 | 911 |
| 0.5 | --- | --- | --- | 369 | 72 | 739 | 661 | 111 | 759 | 869 | 153 | 782 | 1050 | 200 | 807 | 1214 | 249 | 822 | 1358 | 304 | 855 | 1483 | 372 | 889 | 1603 | 434 | 919 | 1710 | 504 | 940 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 823 | 162 | 834 | 1006 | 212 | 856 | 1171 | 262 | 872 | 1319 | 318 | 900 | 1456 | 383 | 920 | 1565 | 450 | 962 | 1674 | 521 | 983 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 762 | 175 | 901 | 963 | 223 | 903 | 1127 | 275 | 920 | 1280 | 331 | 944 | 1416 | 398 | 966 | 1540 | 460 | 991 | 1637 | 536 | 1024 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 716 | 184 | 950 | 905 | 237 | 964 | 1083 | 287 | 968 | 1241 | 344 | 986 | 1376 | 412 | 1011 | 1502 | 474 | 1032 | 1612 | 546 | 1050 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 670 | 193 | 997 | 862 | 247 | 1007 | 1040 | 299 | 1014 | 1202 | 356 | 1027 | 1336 | 425 | 1054 | 1464 | 488 | 1072 | 1576 | 560 | 1088 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 623 | 202 | 1043 | 818 | 257 | 1049 | 981 | 314 | 1074 | 1151 | 371 | 1079 | 1296 | 437 | 1095 | 1426 | 501 | 1110 | 1539 | 573 | 1125 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 938 | 325 | 1118 | 1112 | 382 | 1117 | 1256 | 447 | 1135 | 1388 | 513 | 1147 | 1490 | 589 | 1171 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1215 | 457 | 1174 | 1344 | 526 | 1188 | 1453 | 600 | 1204 |

HORIZONTAL

| External Static Press. in. w.g. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 432 | 29 | 395 | 674 | 49 | 443 | 882 | 79 | 511 | 1053 | 115 | 567 | 1211 | 156 | 617 | 1334 | 205 | 676 | 1463 | 260 | 725 | 1583 | 322 | 769 | 1692 | 391 | 813 | 1791 | 466 | 852 |
| 0.2 | 334 | 32 | 479 | 581 | 56 | 537 | 822 | 87 | 582 | 1021 | 122 | 609 | 1178 | 165 | 659 | 1308 | 215 | 712 | 1439 | 270 | 758 | 1560 | 333 | 801 | 1670 | 402 | 843 | 1771 | 477 | 877 |
| 0.3 | 217 | 36 | 578 | 517 | 61 | 603 | 763 | 96 | 651 | 953 | 137 | 696 | 1128 | 179 | 720 | 1265 | 230 | 768 | 1400 | 286 | 809 | 1522 | 350 | 850 | 1634 | 420 | 888 | 1737 | 494 | 920 |
| 0.4 | 149 | 39 | 636 | 436 | 68 | 684 | 703 | 105 | 719 | 918 | 145 | 738 | 1079 | 193 | 781 | 1237 | 239 | 805 | 1374 | 297 | 842 | 1498 | 361 | 881 | 1611 | 431 | 917 | 1714 | 505 | 947 |
| 0.5 | --- | --- | --- | 372 | 73 | 749 | 644 | 114 | 786 | 867 | 155 | 799 | 1046 | 201 | 820 | 1194 | 254 | 858 | 1335 | 312 | 891 | 1460 | 377 | 927 | 1576 | 447 | 960 | 1680 | 521 | 987 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 816 | 166 | 858 | 997 | 214 | 879 | 1152 | 267 | 909 | 1296 | 326 | 938 | 1435 | 387 | 957 | 1552 | 457 | 987 | 1645 | 536 | 1026 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 765 | 176 | 915 | 948 | 227 | 936 | 1109 | 280 | 959 | 1257 | 339 | 983 | 1398 | 401 | 1000 | 1517 | 471 | 1026 | 1611 | 550 | 1063 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 714 | 185 | 970 | 915 | 235 | 974 | 1081 | 288 | 991 | 1231 | 348 | 1013 | 1360 | 415 | 1041 | 1482 | 484 | 1064 | 1588 | 558 | 1087 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 663 | 194 | 1022 | 866 | 247 | 1030 | 1024 | 304 | 1052 | 1179 | 364 | 1070 | 1322 | 427 | 1081 | 1434 | 500 | 1112 | 1542 | 575 | 1133 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 611 | 203 | 1073 | 816 | 259 | 1085 | 981 | 315 | 1096 | 1140 | 376 | 1112 | 1285 | 438 | 1118 | 1399 | 511 | 1146 | 1508 | 586 | 1165 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 939 | 325 | 1138 | 1101 | 387 | 1152 | 1235 | 452 | 1166 | 1364 | 521 | 1178 | 1474 | 596 | 1197 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1198 | 461 | 1200 | 1323 | 532 | 1214 | 1439 | 606 | 1227 |

## BLOWER DATA - DIRECT DRIVE - 4 TON

048 DIRECT DRIVE BLOWER - BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (heat section, economizer, etc.).

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See Page 9 for blower motors and drives and wet coil and options/accessory air resistance data.

DOWNFLOW

| External Static Press. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| in. w.g. | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 682 | 46 | 420 | 894 | 79 | 499 | 1148 | 131 | 579 | 1366 | 192 | 651 | 1551 | 268 | 726 | 1725 | 348 | 781 | 1885 | 445 | 840 | 2031 | 550 | 893 | 2165 | 669 | 950 | 2290 | 790 | 993 |
| 0.2 | 583 | 52 | 510 | 836 | 87 | 562 | 1105 | 142 | 635 | 1329 | 204 | 697 | 1530 | 279 | 756 | 1695 | 368 | 827 | 1856 | 466 | 883 | 2006 | 567 | 925 | 2149 | 683 | 972 | 2271 | 813 | 1023 |
| 0.3 | 484 | 59 | 601 | 778 | 96 | 629 | 1062 | 152 | 688 | 1292 | 217 | 744 | 1500 | 294 | 800 | 1675 | 380 | 856 | 1837 | 479 | 910 | 1981 | 585 | 958 | 2125 | 704 | 1005 | 2252 | 834 | 1051 |
| 0.4 | 410 | 64 | 666 | 720 | 105 | 697 | 1019 | 162 | 739 | 1255 | 231 | 792 | 1469 | 309 | 841 | 1645 | 397 | 898 | 1808 | 498 | 950 | 1956 | 603 | 992 | 2100 | 723 | 1036 | 2233 | 851 | 1076 |
| 0.5 | --- | --- | --- | 662 | 114 | 764 | 961 | 176 | 805 | 1218 | 244 | 840 | 1428 | 327 | 895 | 1615 | 414 | 937 | 1780 | 515 | 987 | 1931 | 622 | 1025 | 2076 | 741 | 1066 | 2205 | 874 | 1111 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1182 | 257 | 887 | 1398 | 341 | 934 | 1585 | 429 | 974 | 1751 | 532 | 1022 | 1906 | 641 | 1058 | 2052 | 758 | 1095 | 2186 | 886 | 1131 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1145 | 270 | 933 | 1367 | 354 | 972 | 1555 | 443 | 1009 | 1722 | 548 | 1056 | 1874 | 663 | 1098 | 2028 | 774 | 1122 | 2148 | 903 | 1167 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1096 | 287 | 992 | 1326 | 372 | 1021 | 1515 | 462 | 1056 | 1693 | 564 | 1090 | 1850 | 679 | 1129 | 1996 | 792 | 1157 | 2111 | 913 | 1196 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1047 | 302 | 1047 | 1296 | 385 | 1058 | 1485 | 476 | 1090 | 1664 | 579 | 1123 | 1824 | 693 | 1157 | 1963 | 807 | 1188 | 2073 | 916 | 1219 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1010 | 312 | 1085 | 1255 | 403 | 1107 | 1455 | 491 | 1125 | 1635 | 594 | 1155 | 1787 | 710 | 1195 | 1931 | 818 | 1216 | 2036 | 912 | 1236 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1425 | 505 | 1160 | 1606 | 609 | 1188 | 1762 | 717 | 1216 | 1883 | 828 | 1250 | 1960 | 890 | 1260 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1687 | 715 | 1254 | 1834 | 827 | 1275 | 1848 | 834 | 1274 |

HORIZONTAL

| External Static Press. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| in. w.g. | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 641 | 46 | 443 | 875 | 82 | 522 | 1127 | 137 | 614 | 1334 | 202 | 691 | 1524 | 280 | 762 | 1694 | 367 | 827 | 1866 | 470 | 881 | 1997 | 581 | 955 | 2119 | 699 | 1010 | 2241 | 830 | 1058 |
| 0.2 | 568 | 50 | 505 | 831 | 90 | 582 | 1097 | 144 | 650 | 1310 | 211 | 723 | 1504 | 290 | 793 | 1671 | 379 | 859 | 1829 | 484 | 921 | 1977 | 600 | 986 | 2106 | 715 | 1032 | 2227 | 846 | 1080 |
| 0.3 | 483 | 56 | 584 | 778 | 98 | 647 | 1050 | 155 | 706 | 1269 | 225 | 777 | 1470 | 308 | 844 | 1642 | 396 | 900 | 1799 | 498 | 957 | 1953 | 621 | 1022 | 2079 | 743 | 1072 | 2199 | 873 | 1118 |
| 0.4 | 398 | 62 | 661 | 724 | 106 | 707 | 1004 | 167 | 764 | 1228 | 240 | 831 | 1436 | 325 | 891 | 1612 | 413 | 941 | 1777 | 511 | 985 | 1930 | 640 | 1055 | 2062 | 758 | 1096 | 2181 | 888 | 1140 |
| 0.5 | --- | --- | --- | 671 | 113 | 763 | 957 | 179 | 822 | 1201 | 250 | 867 | 1413 | 335 | 921 | 1588 | 427 | 973 | 1748 | 530 | 1025 | 1906 | 657 | 1087 | 2036 | 777 | 1129 | 2153 | 904 | 1170 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1161 | 265 | 919 | 1378 | 350 | 964 | 1552 | 447 | 1019 | 1718 | 549 | 1064 | 1874 | 676 | 1124 | 2000 | 796 | 1166 | 2115 | 917 | 1202 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1120 | 279 | 970 | 1344 | 365 | 1006 | 1529 | 459 | 1049 | 1696 | 564 | 1093 | 1850 | 688 | 1150 | 1974 | 805 | 1189 | 2078 | 922 | 1228 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1093 | 288 | 1003 | 1310 | 379 | 1047 | 1493 | 477 | 1091 | 1667 | 583 | 1131 | 1818 | 700 | 1180 | 1930 | 812 | 1220 | 2040 | 919 | 1246 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1052 | 302 | 1051 | 1275 | 393 | 1087 | 1469 | 488 | 1118 | 1644 | 595 | 1158 | 1779 | 711 | 1213 | 1896 | 812 | 1239 | 1984 | 903 | 1265 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1012 | 314 | 1096 | 1241 | 407 | 1128 | 1434 | 502 | 1155 | 1615 | 610 | 1191 | 1747 | 715 | 1235 | 1843 | 802 | 1259 | 1910 | 865 | 1276 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1386 | 516 | 1201 | 1571 | 625 | 1232 | 1684 | 713 | 1266 | 1738 | 760 | 1277 | 1760 | 775 | 1282 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1620 | 697 | 1282 | 1633 | 707 | 1283 | 1667 | 736 | 1296 |

## BLOWER DATA - DIRECT DRIVE - 4 TON

048 DIRECT DRIVE BLOWER - BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 - Any factory installed options air resistance (heat section, economizer, etc.).

2 - Any field installed accessories air resistance (duct resistance, diffuser, etc.).

See Page 9 for blower motors and drives and wet coil and options/accessory air resistance data.

DOWNFLOW

| External Static Press. in. w.g. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 682 | 46 | 420 | 894 | 79 | 499 | 1148 | 131 | 579 | 1366 | 192 | 651 | 1551 | 268 | 726 | 1725 | 348 | 781 | 1885 | 445 | 840 | 2031 | 550 | 893 | 2165 | 669 | 950 | 2290 | 790 | 993 |
| 0.2 | 583 | 52 | 510 | 836 | 87 | 562 | 1105 | 142 | 635 | 1329 | 204 | 697 | 1530 | 279 | 756 | 1695 | 368 | 827 | 1856 | 466 | 883 | 2006 | 567 | 925 | 2149 | 683 | 972 | 2271 | 813 | 1023 |
| 0.3 | 484 | 59 | 601 | 778 | 96 | 629 | 1062 | 152 | 688 | 1292 | 217 | 744 | 1500 | 294 | 800 | 1675 | 380 | 856 | 1837 | 479 | 910 | 1981 | 585 | 958 | 2125 | 704 | 1005 | 2252 | 834 | 1051 |
| 0.4 | 410 | 64 | 666 | 720 | 105 | 697 | 1019 | 162 | 739 | 1255 | 231 | 792 | 1469 | 309 | 841 | 1645 | 397 | 898 | 1808 | 498 | 950 | 1956 | 603 | 992 | 2100 | 723 | 1036 | 2233 | 851 | 1076 |
| 0.5 | --- | --- | --- | 662 | 114 | 764 | 961 | 176 | 805 | 1218 | 244 | 840 | 1428 | 327 | 895 | 1615 | 414 | 937 | 1780 | 515 | 987 | 1931 | 622 | 1025 | 2076 | 741 | 1066 | 2205 | 874 | 1111 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1182 | 257 | 887 | 1398 | 341 | 934 | 1585 | 429 | 974 | 1751 | 532 | 1022 | 1906 | 641 | 1058 | 2052 | 758 | 1095 | 2186 | 886 | 1131 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1145 | 270 | 933 | 1367 | 354 | 972 | 1555 | 443 | 1009 | 1722 | 548 | 1056 | 1874 | 663 | 1098 | 2028 | 774 | 1122 | 2148 | 903 | 1167 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1096 | 287 | 992 | 1326 | 372 | 1021 | 1515 | 462 | 1056 | 1693 | 564 | 1090 | 1850 | 679 | 1129 | 1996 | 792 | 1157 | 2111 | 913 | 1196 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1047 | 302 | 1047 | 1296 | 385 | 1058 | 1485 | 476 | 1090 | 1664 | 579 | 1123 | 1824 | 693 | 1157 | 1963 | 807 | 1188 | 2073 | 916 | 1219 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1010 | 312 | 1085 | 1255 | 403 | 1107 | 1455 | 491 | 1125 | 1635 | 594 | 1155 | 1787 | 710 | 1195 | 1931 | 818 | 1216 | 2036 | 912 | 1236 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1425 | 505 | 1160 | 1606 | 609 | 1188 | 1762 | 717 | 1216 | 1883 | 828 | 1250 | 1960 | 890 | 1260 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1687 | 715 | 1254 | 1834 | 827 | 1275 | 1848 | 834 | 1274 |

HORIZONTAL

| External Static Press. in. w.g. | Percentage of Total Motor Torque | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10% | | | 20% | | | 30% | | | 40% | | | 50% | | | 60% | | | 70% | | | 80% | | | 90% | | | 100% | | |
| | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM | Cfm | Watts | RPM |
| 0.1 | 641 | 46 | 443 | 875 | 82 | 522 | 1127 | 137 | 614 | 1334 | 202 | 691 | 1524 | 280 | 762 | 1694 | 367 | 827 | 1866 | 470 | 881 | 1997 | 581 | 955 | 2119 | 699 | 1010 | 2241 | 830 | 1058 |
| 0.2 | 568 | 50 | 505 | 831 | 90 | 582 | 1097 | 144 | 650 | 1310 | 211 | 723 | 1504 | 290 | 793 | 1671 | 379 | 859 | 1829 | 484 | 921 | 1977 | 600 | 986 | 2106 | 715 | 1032 | 2227 | 846 | 1080 |
| 0.3 | 483 | 56 | 584 | 778 | 98 | 647 | 1050 | 155 | 706 | 1269 | 225 | 777 | 1470 | 308 | 844 | 1642 | 396 | 900 | 1799 | 498 | 957 | 1953 | 621 | 1022 | 2079 | 743 | 1072 | 2199 | 873 | 1118 |
| 0.4 | 398 | 62 | 661 | 724 | 106 | 707 | 1004 | 167 | 764 | 1228 | 240 | 831 | 1436 | 325 | 891 | 1612 | 413 | 941 | 1777 | 511 | 985 | 1930 | 640 | 1055 | 2062 | 758 | 1096 | 2181 | 888 | 1140 |
| 0.5 | --- | --- | --- | 671 | 113 | 763 | 957 | 179 | 822 | 1201 | 250 | 867 | 1413 | 335 | 921 | 1588 | 427 | 973 | 1748 | 530 | 1025 | 1906 | 657 | 1087 | 2036 | 777 | 1129 | 2153 | 904 | 1170 |
| 0.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1161 | 265 | 919 | 1378 | 350 | 964 | 1552 | 447 | 1019 | 1718 | 549 | 1064 | 1874 | 676 | 1124 | 2000 | 796 | 1166 | 2115 | 917 | 1202 |
| 0.7 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1120 | 279 | 970 | 1344 | 365 | 1006 | 1529 | 459 | 1049 | 1696 | 564 | 1093 | 1850 | 688 | 1150 | 1974 | 805 | 1189 | 2078 | 922 | 1228 |
| 0.8 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1093 | 288 | 1003 | 1310 | 379 | 1047 | 1493 | 477 | 1091 | 1667 | 583 | 1131 | 1818 | 700 | 1180 | 1930 | 812 | 1220 | 2040 | 919 | 1246 |
| 0.9 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1052 | 302 | 1051 | 1275 | 393 | 1087 | 1469 | 488 | 1118 | 1644 | 595 | 1158 | 1779 | 711 | 1213 | 1896 | 812 | 1239 | 1984 | 903 | 1265 |
| 1.0 | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1012 | 314 | 1096 | 1241 | 407 | 1128 | 1434 | 502 | 1155 | 1615 | 610 | 1191 | 1747 | 715 | 1235 | 1843 | 802 | 1259 | 1910 | 865 | 1276 |
| 1.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1386 | 516 | 1201 | 1571 | 625 | 1232 | 1684 | 713 | 1266 | 1738 | 760 | 1277 | 1760 | 775 | 1282 |
| 1.2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 1620 | 697 | 1282 | 1633 | 707 | 1283 | 1667 | 736 | 1296 |

## BLOWER DATA

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE - in. w.g.

| Air Volume cfm | Wet Indoor Coil | | Electric Heat | Economizer | Filters | |
|---|---|---|---|---|---|---|
| | 036, 048 | 060, 074 | | | MERV 8 | MERV 13 |
| 800 | 0.01 | - - - | 0.01 | 0.04 | 0.04 | 0.05 |
| 1000 | 0.02 | 0.02 | 0.03 | 0.04 | 0.04 | 0.07 |
| 1200 | 0.03 | 0.04 | 0.06 | 0.04 | 0.04 | 0.07 |
| 1400 | 0.04 | 0.05 | 0.09 | 0.04 | 0.04 | 0.07 |
| 1600 | 0.05 | 0.07 | 0.12 | 0.04 | 0.04 | 0.07 |
| 1800 | 0.06 | 0.08 | 0.15 | 0.05 | 0.04 | 0.07 |
| 2000 | 0.08 | 0.10 | 0.18 | 0.05 | 0.05 | 0.08 |
| 2200 | - - - | 0.11 | 0.18 | 0.05 | 0.05 | 0.08 |
| 2400 | - - - | 0.13 | 0.20 | 0.05 | 0.05 | 0.08 |

POWER EXHAUST FAN PERFORMANCE

| Return Air System Static Pressure in. w.g. | Air Volume Exhausted cfm |
|---|---|
| 0.00 | 2000 |
| 0.05 | 1990 |
| 0.10 | 1924 |
| 0.15 | 1810 |
| 0.20 | 1664 |
| 0.25 | 1507 |
| 0.30 | 1350 |
| 0.35 | 1210 |

CEILING DIFFUSERS AIR RESISTANCE (in. w.g.)

| Air Volume - cfm | RTD11-95S Step-Down Diffuser | | | FD11-95S Flush Diffuser |
|---|---|---|---|---|
| | 2 Ends Open | 1 Side & 2 Ends Open | All Ends & Sides Open | |
| 1800 | 0.13 | 0.11 | 0.09 | 0.09 |
| 2000 | 0.15 | 0.13 | 0.11 | 0.10 |
| 2200 | 0.18 | 0.15 | 0.12 | 0.12 |
| 2400 | 0.21 | 0.18 | 0.15 | 0.14 |
| 2600 | 0.24 | 0.21 | 0.18 | 0.17 |
| 2800 | 0.27 | 0.24 | 0.21 | 0.20 |
| 3000 | 0.32 | 0.29 | 0.25 | 0.25 |

CEILING DIFFUSER AIR THROW DATA

| Air Volume - cfm | [1] Effective Throw - ft. | |
|---|---|---|
| | RTD11-95S | FD11-95S |
| 2600 | 24 - 29 | 19 - 24 |
| 2800 | 25 - 30 | 20 - 28 |
| 3000 | 27 - 33 | 21 - 29 |

[1] Effective throw based on terminal velocities of 75 ft. per minute.

## ELECTRICAL / ELECTRIC HEAT DATA — 3 TON

**3 TON Ultra EFFICIENCY (R-410A)** — **LCH036U4E**

| | | | | |
|---|---|---|---|---|
| [1] Voltage - 60hz | | | 208/230V - 3 Ph | 460V - 3 Ph |
| Compressor | Rated Load Amps | | 9.1 | 5.1 |
| Outdoor Fan Motor | Full Load Amps | | 4.1 | 2.1 |
| Power Exhaust (1) 0.33 HP | Full Load Amps | | 2.4 | 1.3 |
| Service Outlet 115V GFI (amps) | | | 15 | 15 |
| Indoor Blower Motor | Horsepower | | 0.5 | 0.5 |
| | Full Load Amps | | 4.3 | 2.2 |
| [2] Maximum Overcurrent Protection | Unit Only | | 25 | 15 |
| | With (1) 0.33 HP Power Exhaust | | 30 | 15 |
| [3] Minimum Circuit Ampacity | Unit Only | | 20 | 11 |
| | With (1) 0.33 HP Power Exhaust | | 23 | 12 |

### ELECTRIC HEAT DATA

| | | | | | |
|---|---|---|---|---|---|
| Electric Heat Voltage | | | 208V | 240V | 480V |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat | 7.5 kW | 30 | 30 | 15 |
| | | 15 kW | [4] 45 | 60 | 30 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat | 7.5 kW | 25 | 28 | 15 |
| | | 15 kW | 45 | 51 | 26 |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 35 | 35 | 20 |
| | | 15 kW | [4] 50 | 60 | 30 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 28 | 31 | 16 |
| | | 15 kW | 48 | 54 | 27 |

### ELECTRICAL ACCESSORIES

| | | | | |
|---|---|---|---|---|
| Disconnect | 7.5 kW | 20W24 | 20W24 | 20W24 |
| | 15 kW | 20W24 | 20W24 | 20W24 |

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.

[1] Extremes of operating range are plus and minus 10% of line voltage.

[2] HACR type breaker or fuse.

[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

[4] Factory installed circuit breaker not available.

## ELECTRICAL / ELECTRIC HEAT DATA — 4 TON

### 4 TON ultra EFFICIENCY (R-410A) — LCH048U4E

| | | | | |
|---|---|---|---|---|
| [1] Voltage - 60hz | | | 208/230V - 3 Ph | 460V - 3 Ph |
| Compressor | Rated Load Amps | | 13.8 | 6.5 |
| Outdoor Fan Motor | Full Load Amps | | 4.1 | 2.1 |
| Power Exhaust (1) 0.33 HP | Full Load Amps | | 2.4 | 1.3 |
| Service Outlet 115V GFI (amps) | | | 15 | 15 |
| Indoor Blower Motor | Horsepower | | 0.75 | 0.75 |
| | Full Load Amps | | 6.1 | 3.1 |
| [2] Maximum Overcurrent Protection | Unit Only | | 40 | 15 |
| | With (1) 0.33 HP Power Exhaust | | 40 | 20 |
| [3] Minimum Circuit Ampacity | Unit Only | | 28 | 14 |
| | With (1) 0.33 HP Power Exhaust | | 30 | 15 |

### ELECTRIC HEAT DATA

| | | | | | |
|---|---|---|---|---|---|
| Electric Heat Voltage | | | 208V | 240V | 480V |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat | 7.5 kW | 40 | 40 | 20 |
| | | 15 kW | [4] 50 | 60 | 30 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat | 7.5 kW | 28 | 31 | 16 |
| | | 15 kW | 47 | 53 | 27 |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 40 | 40 | 20 |
| | | 15 kW | [4] 50 | 60 | 30 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 31 | 34 | 17 |
| | | 15 kW | 50 | 56 | 29 |

### ELECTRICAL ACCESSORIES

| | | | | |
|---|---|---|---|---|
| Disconnect | 7.5 kW | 20W24 | 20W24 | 20W24 |
| | 15 kW | 20W24 | 20W24 | 20W24 |

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.

[1] Extremes of operating range are plus and minus 10% of line voltage.

[2] HACR type breaker or fuse.

[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

[4] Factory installed circuit breaker not available.

## ELECTRICAL / ELECTRIC HEAT DATA — 5 TON

### 5 TON ultra EFFICIENCY (R-410A) — LCH060U4E

| | | | | |
|---|---|---|---|---|
| [1] Voltage - 60hz | | | 208/230V - 3 Ph | 460V - 3 Ph |
| Compressor | Rated Load Amps | | 14.6 | 7 |
| Outdoor Fan Motor | Full Load Amps | | 4.1 | 2.1 |
| Power Exhaust (1) 0.33 HP | Full Load Amps | | 2.4 | 1.3 |
| Service Outlet 115V GFI (amps) | | | 15 | 15 |
| Indoor Blower Motor | Horsepower | | 1 | 1 |
| | Full Load Amps | | 7.4 | 3.7 |
| [2] Maximum Overcurrent Protection | Unit Only | | 40 | 20 |
| | With (1) 0.33 HP Power Exhaust | | 45 | 20 |
| [3] Minimum Circuit Ampacity | Unit Only | | 30 | 15 |
| | With (1) 0.33 HP Power Exhaust | | 33 | 16 |

### ELECTRIC HEAT DATA

| | | | | | |
|---|---|---|---|---|---|
| Electric Heat Voltage | | | 208V | 240V | 480V |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat | 7.5 kW | 45 | 45 | 20 |
| | | 15 kW | [4] 50 | 60 | 30 |
| | | 22.5 kW | [4] 70 | 80 | 40 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat | 7.5 kW | 33 | 33 | 16 |
| | | 15 kW | 49 | 55 | 28 |
| | | 22.5 kW | 68 | 77 | 39 |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 50 | 50 | 20 |
| | | 15 kW | 60 | 60 | 30 |
| | | 22.5 kW | 80 | 80 | 45 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 35 | 35 | 18 |
| | | 15 kW | 52 | 58 | 29 |
| | | 22.5 kW | 71 | 80 | 41 |

### ELECTRICAL ACCESSORIES

| | | | | |
|---|---|---|---|---|
| Disconnect | 7.5 kW | 20W24 | 20W24 | 20W24 |
| | 15 kW | 20W24 | 20W24 | 20W24 |
| | 22.5 kW | 20W25 | 20W25 | 20W24 |

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.
[1] Extremes of operating range are plus and minus 10% of line voltage.
[2] HACR type breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
[4] Factory installed circuit breaker not available.

| ELECTRICAL / ELECTRIC HEAT DATA | | | | | 6 TON |
|---|---|---|---|---|---|
| **6 TON HIGH EFFICIENCY (R-410A)** | | | | | **LCH074U4E** |
| [1] Voltage - 60hz | | | 208/230V - 3 Ph | | 460V - 3 Ph |
| Compressor | Rated Load Amps | | 16.9 | | 8.3 |
| | Locked Rotor Amps | | - - - | | - - - |
| Outdoor Fan Motor | Full Load Amps | | 4.1 | | 2.1 |
| Power Exhaust (1) 0.33 HP | Full Load Amps | | 2.4 | | 1.3 |
| Service Outlet 115V GFI (amps) | | | 15 | | 16 |
| Indoor Blower Motor | Horsepower | | 1 | | 1 |
| | Full Load Amps | | 7.4 | | 3.7 |
| [2] Maximum Overcurrent Protection | Unit Only | | 45 | | 20 |
| | With (1) 0.33 HP Power Exhaust | | 50 | | 25 |
| [3] Minimum Circuit Ampacity | Unit Only | | 33 | | 17 |
| | With (1) 0.33 HP Power Exhaust | | 36 | | 18 |
| **ELECTRIC HEAT DATA** | | | | | |
| Electric Heat Voltage | | | 208V | 240V | 480V |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat | 7.5 kW | 45 | 45 | 20 |
| | | 15 kW | [4] 50 | 60 | 30 |
| | | 22.5 kW | [4] 70 | 80 | 40 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat | 7.5 kW | 33 | 33 | 16 |
| | | 15 kW | 49 | 55 | 28 |
| | | 22.5 kW | 68 | 77 | 39 |
| [2] Maximum Overcurrent Protection | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 50 | 50 | 20 |
| | | 15 kW | 60 | 60 | 30 |
| | | 22.5 kW | 80 | 80 | 45 |
| [3] Minimum Circuit Ampacity | Unit+ Electric Heat and (1) 0.33 HP Power Exhaust | 7.5 kW | 35 | 35 | 18 |
| | | 15 kW | 52 | 58 | 29 |
| | | 22.5 kW | 71 | 80 | 41 |
| **ELECTRICAL ACCESSORIES** | | | | | |
| Disconnect | | 7.5 kW | 20W24 | 20W24 | 20W24 |
| | | 15 kW | 20W24 | 20W24 | 20W24 |
| | | 22.5 kW | 20W25 | 20W25 | 20W24 |

NOTE - All units have a minimum Short Circuit Current Rating (SCCR) of 5000 amps.
[1] Extremes of operating range are plus and minus 10% of line voltage.
[2] HACR type breaker or fuse.
[3] Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
[4] Factory installed circuit breaker not available.

## ELECTRIC HEAT CAPACITIES

| Input Voltage | 7.5 kW | | | 15 kW | | | 22.5 kW | | |
|---|---|---|---|---|---|---|---|---|---|
| | No of Stages | kW input | Btuh Output | No of Stages | kW input | Btuh Output | No of Stages | kW input | Btuh Output |
| 208 | 1 | 5.6 | 19,200 | 1 | 11.2 | 38,200 | 1 | 16.9 | 57,700 |
| 220 | 1 | 6.3 | 21,500 | 1 | 12.6 | 43,000 | 1 | 18.9 | 64,500 |
| 230 | 1 | 6.9 | 23,500 | 1 | 13.8 | 47,000 | 1 | 20.7 | 70,700 |
| 240 | 1 | 7.5 | 25,600 | 1 | 15 | 51,200 | 1 | 22.5 | 76,800 |
| 440 | 1 | 6.3 | 21,500 | 1 | 12.6 | 43,000 | 1 | 18.9 | 64,500 |
| 460 | 1 | 6.9 | 23,500 | 1 | 13.8 | 47,000 | 1 | 20.7 | 70,700 |
| 480 | 1 | 7.5 | 25,600 | 1 | 15 | 51,200 | 1 | 22.5 | 76,800 |

## LCH PARTS ARRANGEMENT

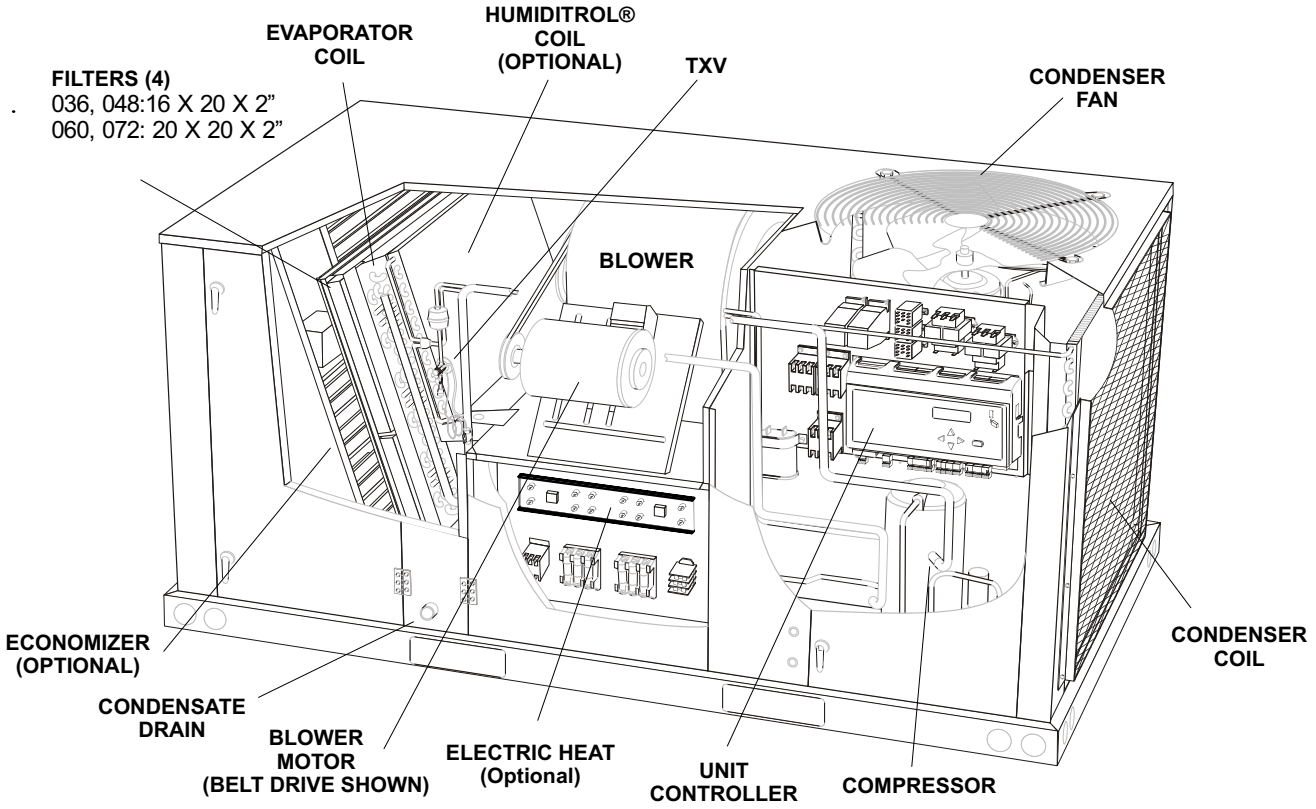
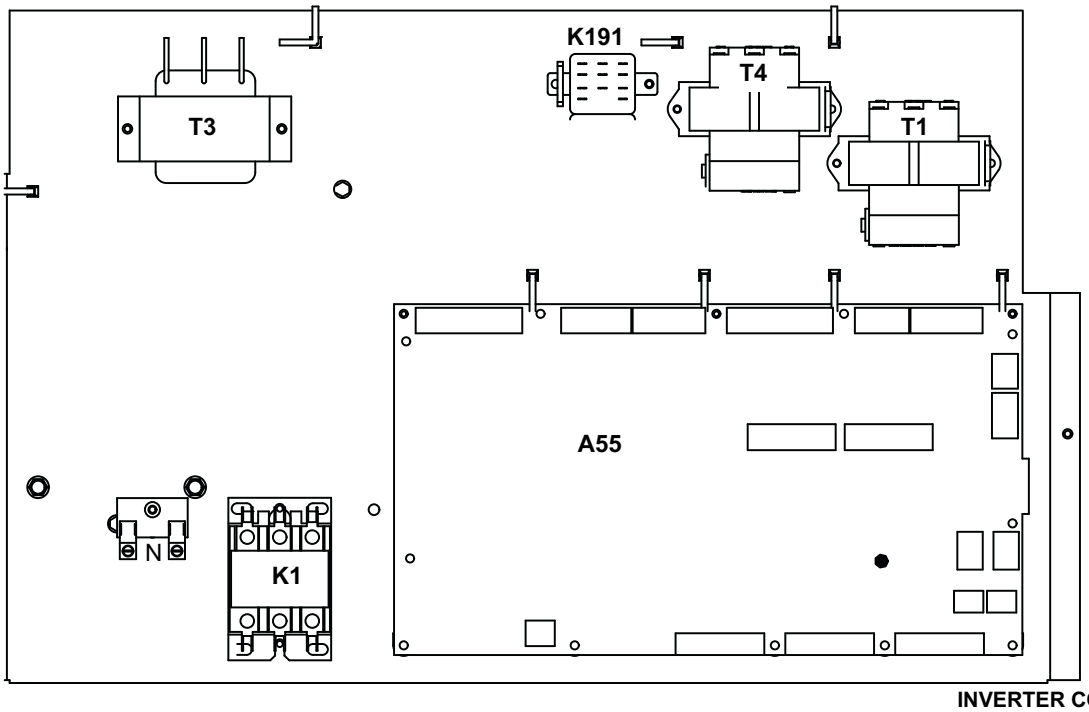



**FIGURE 1**

## LCH CONTROL BOX




**INVERTER CONTROLS ARE LOCATED BEHIND THE HINGED PANEL. SEE FIGURE 8**

**FIGURE 2**

## I-UNIT COMPONENTS

All 3 through 6 ton (7 through 21 kW) units are configure to order units (CTO). The LCH unit components are shown in figure 1. All units come standard with removable unit panels. All L1, L2, and L3 wiring is color coded; L1 is red/pink, L2 is yellow, and L3 is blue.

### A-Control Box Components

LCH control box components are shown in figure 2. The control box is located in the upper right portion of the compressor compartment.

### 1-Control Transformer T1

All use a single line voltage to 24VAC transformer mounted in the control box. Transformer supplies power to control circuits in the unit. The transformer is rated at 70VA and is protected by a 3.5 amp circuit breaker (CB8). The 208/230 (Y) voltage transformers use two primary voltage taps as shown in figure 3, while 460 (G) and 575 (J) voltage transformers use a single primary voltage tap.

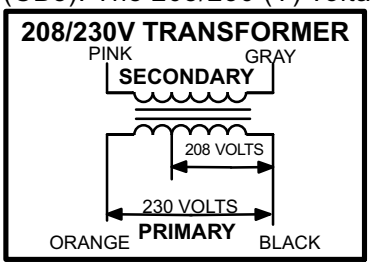



**FIGURE 3**

### 2-Transformer T4 (G, J voltage)

All (G, J) 460, 575 voltage direct drive units use transformer T4 mounted in the control box. T4 is a line voltage to 230V transformer to power the indoor blower and outdoor fan motor. It is connected to line voltage and is powered at all times.

### 3-Unit Controller A55

The Unit Controller uses input from a zone/room sensor cooling, a thermostat, or a third-party controller to operate the unit. When a zone/room sensor (most efficient) is used, the compressor, blower, and condenser fan motor speed is variable. The motor speed depends on how far room/zone temperature is from setpoint. When a thermostat or third-party controller are used, the compressor, blower, and condenser fan motor speed is 2-stage. Zone/room sensor, thermostat, and third-party controller wires are connected to J297 on the Unit Controller.

Many default Unit Controller settings are adjustable. Refer to the unit installation instruction or the Unit Controller manual provided with the unit.

The Unit Controller is configured to identify optional kits and accessories for proper function. Each character in the configuration ID represents a different option. Refer to the unit installation instruction or the Unit Controller manual provided with the unit.

The Unit Controller provides all unit control functions, unit status information, unit diagnostics, programmable parameters, and USB verification and profile sharing. Refer to the Unit Controller guide provided with the unit.

Thermostat wires are connected to J297 on the Unit Controller.

### 4-Compressor Contactor K1

In all LCH units, K1 energizes compressor B1 in response to Unit Controller demand. Three phase units use three pole double break contactors with a 24 volt coil. Single phase units use single pole double break contactors with a 24 volt coil.

### 5-Crankcase Heater Relay K191

All units use relay K191 to control crnkcase heater HR1.

### B-Cooling Components

All units use a single cooling circuit consisting of a variable speed compressor, fin/tube condenser coil and evaporator coil. See figure 4. All units use one draw-through type condenser fan and a single direct drive blower. The blower draws air across the evaporator during unit operation.

Cooling may be supplemented by a factory- or field-installed economizer. The evaporator coil is slab type and uses a thermostatic expansion valve as the primary refrigerant metering device. The evaporator is also equipped with enhanced fins and rifled tubing. The compressor is protected by a freezestat (S49) on the evaporator coil, a high pressure switch (S4) on the discharge line, a high temperature limit switch (S5) on the compressor, and a low pressure switch (S87) on the suction line. See figure 4. A low ambient switch (S11) and a supply air temperature sensor (RT6) are standard.

### 1-Freezestat S49

Each unit is equipped with a low temperature switch (freezestat) located on a return bend of each evaporator coil.

The freezestat is wired to the A55 Unit Controller. The freezestat is a SPST N.C. auto-reset switch which opens at 29°F ± 3°F (-1.7°C ± 1.7°C) on a temperature drop and closes at 58°F ± 4°F (14.4°C ± 2.2°C) on a temperature rise. To prevent coil icing, freezestats open during compressor operation to temporarily disable the compressor until the coil temperature rises.

If the freezestat is tripping frequently due to coil icing, check the airflow / filters , economizer position and unit charge before allowing unit back in operation. Make sure to eliminate conditions which might promote evaporator ice buildup.

## 2-High Pressure Switch S4

The high pressure switch is an auto-reset SPST N.C. switch which opens on a pressure rise.

S4 is located in the compressor discharge line and wired to the A55 Unit Controller.

When discharge pressure rises to 640 ± 10 psig (4412 ± 69 kPa) (indicating a problem in the system) the switch opens and the compressor inverter is de-energized (the economizer can continue to operate). The switch automatically resets at 475 ± 10 psig.

## 3-Low Pressure Switch S87

The compressor circuit is protected by a loss of charge switch located on the suction line. Switch opens at 40 psig ± 5 psig (276 ± 34 kPa) and automatically resets at 90 psig ± 5 psig (621 kPa ± kPa).

## 4-High Temperature Limit Switch S5

Each variable speed compressor is equipped with a compressor-mounted normally closed temperature switch that prevents compressor damage due to overheating caused by internal friction. The switch is located on top of the compressor casing. This switch senses the compressor casing temperature and opens at 239-257°F to shut-off compressor operation. The auto-reset switch closes when the compressor casing temperature falls to 151-187°F, and the compressor is re-energized. This switch is a single-pole, single-throw (SPST) bi-metallic switch and is wired to the A55 Unit Controller.

## 5-Low Ambient Switch S11

The low ambient switch is an auto-reset SPST N.O. pressure switch and is located in the liquid line prior to the indoor coil section. The switch is wired to the A55 Unit Controller which uses the S11 input to control the outdoor fan when outdoor temperatures drop below 62°F. S11 opens when the liquid pressure drops below 240 ± 10 psig (1655 ± 69 kPa). S11 closes when the liquid pressure rises to 450 ± 10 psig (3102 ± 69 kPa) psig.

The low ambient switch is used to cycle outdoor fan operation between low speed and off during low ambient temperatures. The reduced heat transfer across the outdoor coil results in higher refrigerant temperatures and prevents indoor coil icing.

The following is a summary of low ambient operation assuming there is a cooling demand:

***Outdoor Temperature Initiated Low Ambient Operation* –***

When outdoor air temperature drops below 62°F, the Unit Controller will operate the outdoor fan at low speed.

*Assuming S11 low ambient pressure switch it closed.

***Low Ambient Operation Cycles Between Outdoor Fan Off & Low Speed* -***

If S11 low ambient switch opens, indicating liquid pressure has dropped below 240psig, the Unit Controller will de-energize the outdoor fan but continue mechanical cooling. If S11 closes, indicating liquid pressure has risen to 450psig, the Unit Controller will operate the outdoor fan at low speed.

*Assuming outdoor temperature remains below 65°F.

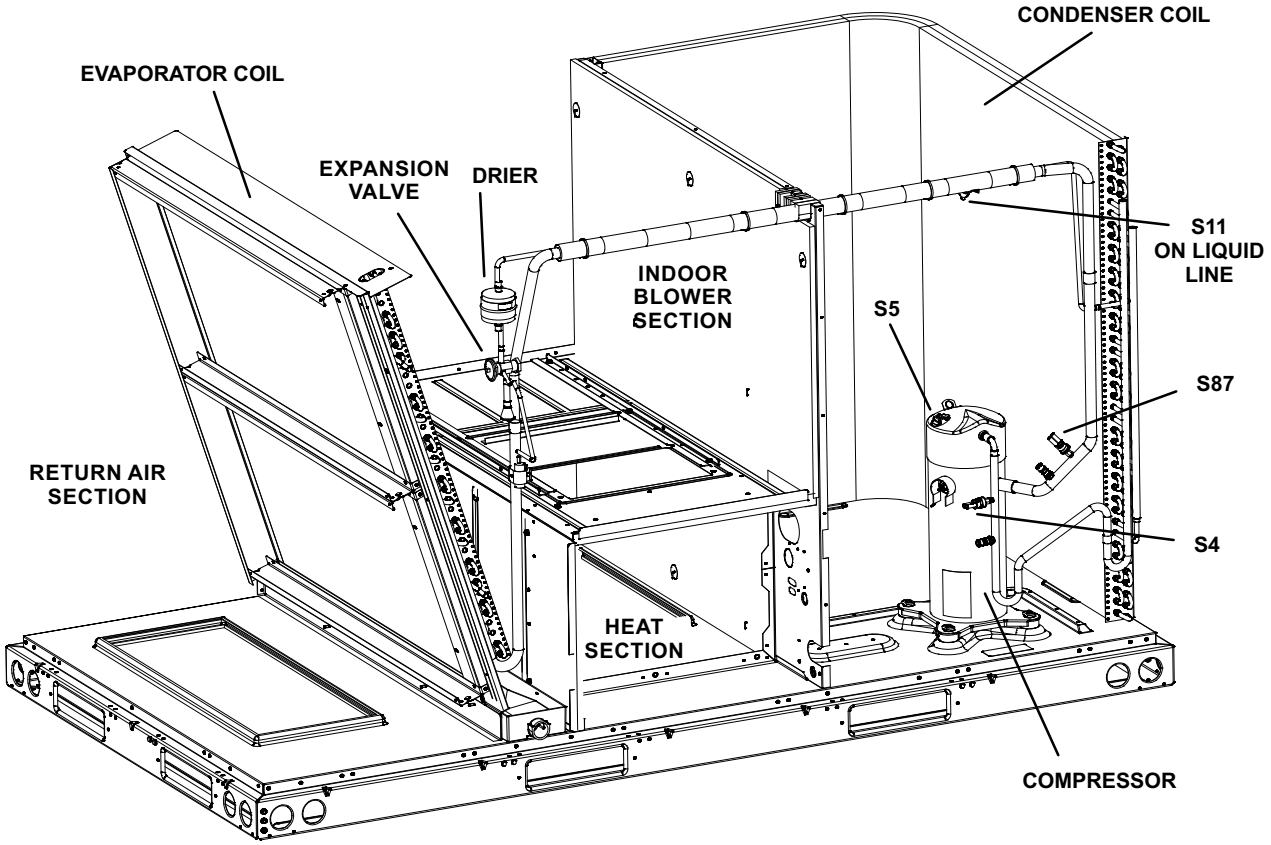
***Low Ambient Operation Termination -***

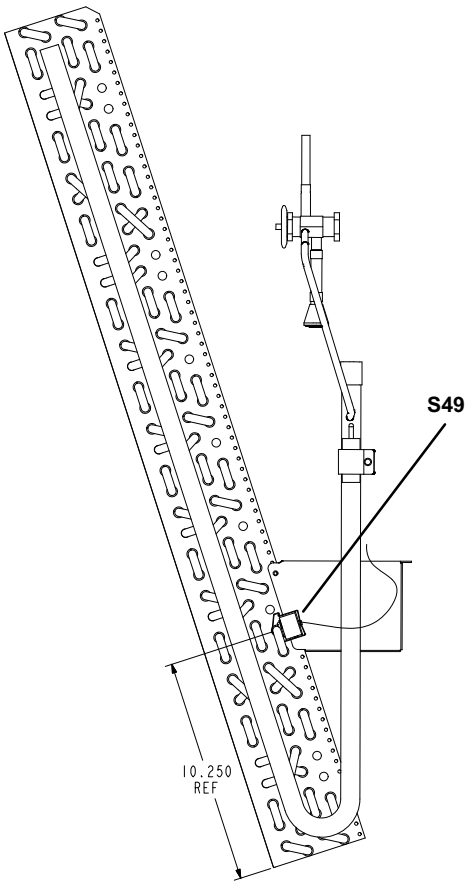
If outdoor air temperature rises above 65°F (62°F + 3°F deadband), the Unit Controller will operate the outdoor fan at the customary variable speed until the outdoor temperature drops below 62°F.

## 6-Variable Speed Compressor B1

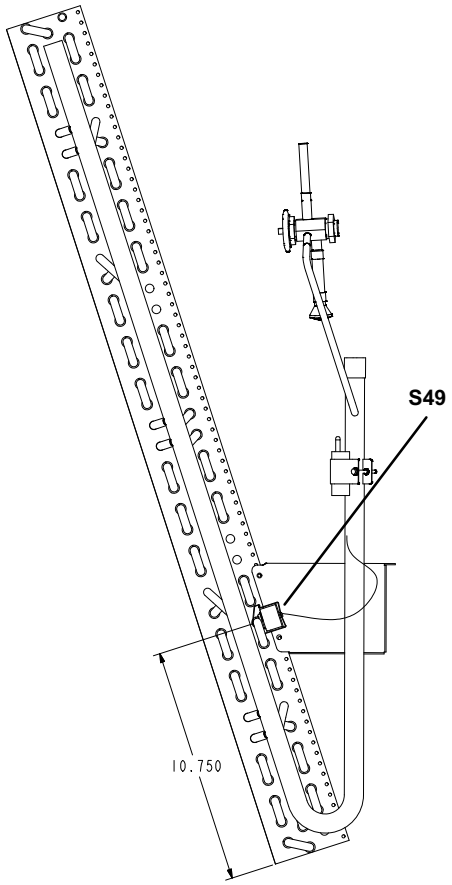
All units use one variable speed scroll compressor. See “SPECIFICATIONS” and “ELECTRICAL DATA” (table of contents) or compressor nameplate for compressor specifications. Refer to figure 5 for compressor safety devices and figure 6 for compressor diagnostics.

## PLUMBING AND COMPRESSOR PROTECTION COMPONENTS



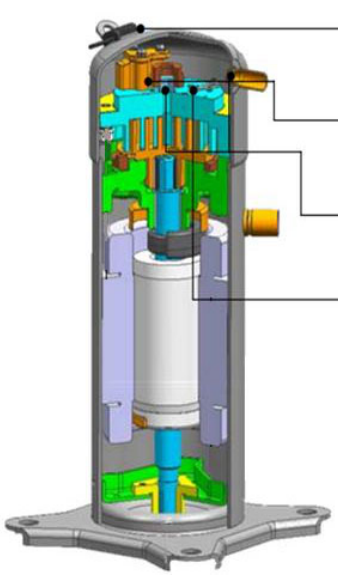

060, 074U




036, 048U

**FIGURE 4**

## COMPRESSOR SAFETY DEVICES



**Thermal Protector** — Temperature protection: Opens 248±9°F; Closes 168.8 ±18°F

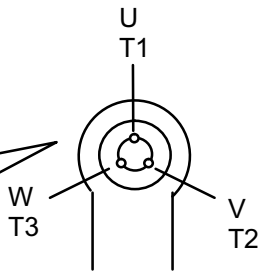
**Vacuum Protector** — Low suction pressure protection: Opens below 20 psig

**Check Valve** — Prevents reverse rotation after stop and increased Cd value

**By-pass Valve** — By-passes liquids during compression.

**FIGURE 5**

## COMPRESSOR DIAGNOSTICS




**Motor Winding Resistance at 77°F (+/-7%)**

| Unit Size | U-V | V-W | W-U |
|---|---|---|---|
| 036 | 0.64 | 0.63 | 0.63 |
| 048 | 0.70 | 0.70 | 0.70 |
| 060/074 | 0.62 | 0.62 | 0.62 |

**FIGURE 6**

## 7-Compressor Inverter A192

**⚠WARNING**

**Electrical Hazard**
**High Voltage**
**Wait 7 Minutes**
**Electrical components may hold charge. Do not remove this panel or service this area for 7 minutes after the power has been removed.**

See figure 8 for compressor inverter controls located behind the hinged control panel.

The inverter varies the compressor speed (capacity) by converting an AC input signal to a pulse width modulation (PWM) output. To initiate cooling operation, the Unit Controller (A55) supplies a control signal to the inverter (A192) via a MODBUS protocol. Inverter status and diagnostics are continuously monitored and reported to the Unit Controller such as:

-Improper Unit Controller input voltage compared to unit model number

-High input voltage

-Low input voltage

-Imbalanced input voltage

-A communication issue - check MODBUS communication wire for good connections between the Unit Controller and the inverter board.

An example of the Unit Controller displaying alarm 187 is shown in figure 7. See table 1 for inverter-related alarms.

Inverter component wire routing is shown in figure 9.

**⚠WARNING**

**Electrical shock hazard. Variable speed compressor components must be grounded. Failure to follow these precautions could cause electrical shock resulting in injury or death.**

### UNIT CONTROLLER ALARM DISPLAY

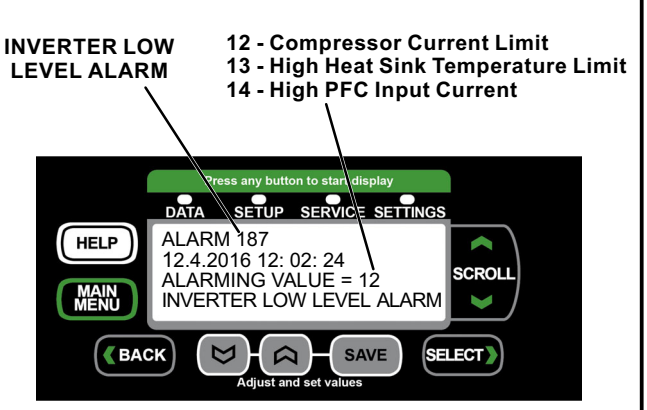



**FIGURE 7**

### INVERTER CONTROLS BEHIND THE HINGED CONTROL PANEL

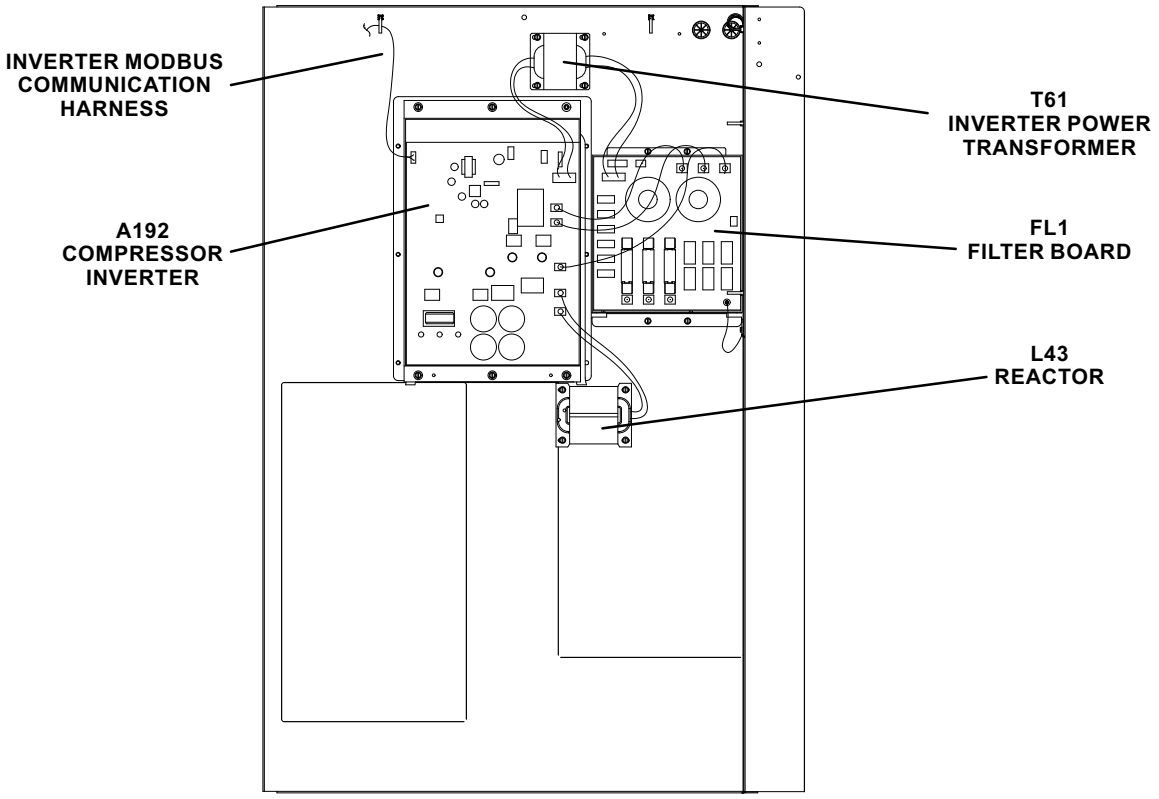



**FIGURE 8**

**TABLE 1**

| INVERTER-RELATED ALARMS | | |
|---|---|---|
| **ALARM CODE** | **DISPLAY MESSAGE** | **EVENT ACTION** |
| 187 | INVERTER LOW LEVEL ALARM | Possible alarming values for Prodigy Alarm 187 are:<br>12 - High compressor input current<br>13 - High heat sink temperature<br>14 - High PFC input current<br>Alarm might be caused by outdoor fan abnormal operation, high ambient conditions, dirty outdoor coil, refrigerant overcharge, or a blocked heat sink.<br>The compressor speed will slow down until the temperature or current lowers, then the compressor will speed up again.<br>If the alarm continues after outdoor conditions have moderated, check the fan, charge and coil. Alarm 187 will automatically clear when minimum off time expires.<br>**REFER TO TROUBLE SHOOTING GUIDE IN SERVICE MANUAL FOR MORE INFORMATION.** |
| 188 | INVERTER HIGH LEVEL ALARM | Possible alarming values for Prodigy Alarm 188 are:<br>21 - Peak DC current - Intelligent Power Module (IPM) fault condition (follow 12)<br>22 - Maximum current reached lockout<br>23 - DC link low voltage<br>26 - Locked rotor<br>28 - DC link high voltage<br>29 - Compressor over-current<br>61 - Low outdoor ambient inverter lockout<br>62 - High heat sink temperature lockout<br>75 - Low input voltage<br>No action required. Compressor stops for the duration of the minimum run time (anti-short-cycle delay of 180 seconds). Unit shuts down after ten occurrences in one hour and Alarm 189 is initiated. Alarm 188 will automatically clear when inverter error clears.<br>**REFER TO TROUBLE SHOOTING GUIDE IN SERVICE MANUAL FOR MORE INFORMATION.** |
| 189 | INVERTER FATAL ALARM | Possible alarming values for Prodigy Alarm 189 are the same as alarm 188.<br>Alarm 189 will clear upon manual reset.<br>**REFER TO TROUBLE SHOOTING GUIDE IN SERVICE MANUAL FOR MORE INFORMATION.** |
| 190 | INVERTER COMMUNICATION ERROR | Unable to communicate with inverter. Unit Controller will disable compressor operation. Replace communication cable between inverter and M3 unit controller. If alarm continues, replace M3 unit controller or inverter. |
| 191 | INVERTER VOLTAGE MISMATCH | Unit Controller will disable compressor operation. Replace with correct inverter part. |

## 8-Filter Board FL1

The filter, also called a line or noise filter, is used to prevent static interference from outside sources. In addition, the filter prevents electrical interference from transferring to other appliances. The input voltage should read the same value as the output voltage. The same filter is used on all unit sizes and voltages.

## 9-Inverter Transformer T61

This transformer is used to supply power to the inverter's low voltage logic circuit. It also provides electrical isolation to protect sensitive components from electrical surges.

## 10-Reactor L43

The reactor (inductor or choke) is used to improve the power factor. This passive, two-terminal electrical component has a magnetic field that stores energy. Reactors are one of the basic components used in electronics where current and voltage change with time (due to the ability of inductors to delay and reshape alternating currents). This component is connected to the compressor inverter A192. A 2mH reactor is used on 208/230V units and a 13mH reactor is used on 460V units.

## 11-Inverter Heat Sink

An inverter heat sink is located on the back side of the wall between the compressor and outdoor fan sections. The outdoor fan draws air across the heat sink to cool inverter control board components. See figure 10.

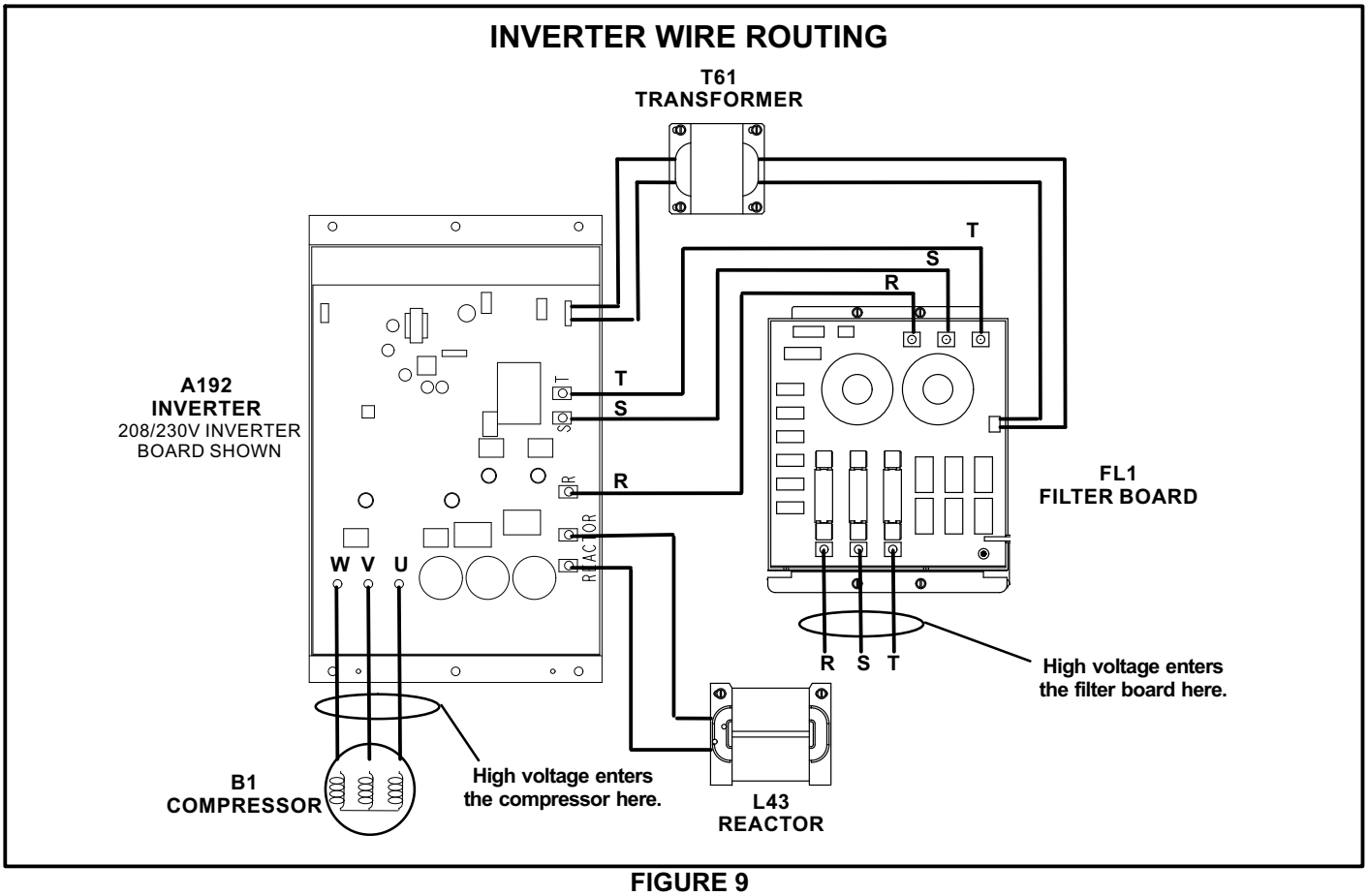



**FIGURE 9**

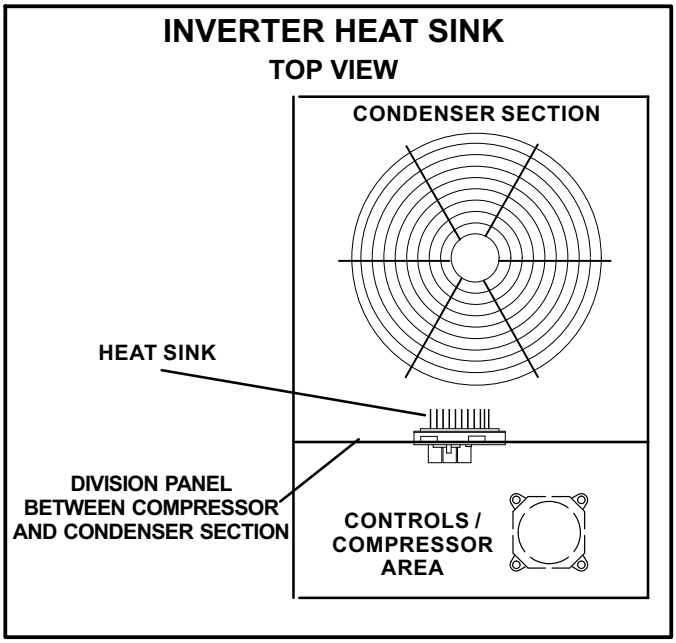



**FIGURE 10**

## C-Blower Compartment

Ultra high efficiency units are equipped with a variable speed, direct drive blower. The installer is able to enter the design-specified supply air CFM into the Unit Controller for optimal efficiency. The Unit Controller calibrates the supply air volume which eliminates the need to manually take duct static measurements.

## 1-Blower Wheels

See table 2 for blower wheel type and size.

**TABLE 2**

| BLOWER WHEELS | | |
|---|---|---|
| LCH Unit | Type | Size - in. (mm) |
| 036U, 048U | Direct | 10 X 10 (254 X 254) |
| 060U, 074U | Direct | 11 X 10 (279 X 254) |

## 2-Indoor Blower Motor B3

All direct drive blower motors are electronically commutated, brushless, DC motors. Low speed is approximately 2/3 of high speed. CFM adjustments are made by changing Unit Controller parameters. Motors are equipped with sealed ball bearings. All motor specifications are listed in the SPECIFICATIONS (table of contents) in the front of this manual. Units may be equipped with motors manufactured by various manufacturers, therefore electrical FLA and LRA specifications will vary. See unit rating plate for information specific to your unit.

**⚠IMPORTANT**

**Three phase scroll compressors must be phased sequentially for correct compressor and blower rotation. Follow "COOLING START-UP" section of installation instructions to ensure proper compressor and blower operation.**

### A-Blower Operation

Refer to the Unit Controller Installation and Setup Guide to energize blower. Use the menu navigation arrows and select button; see *Service - Test*.

### B-Determining Unit CFM

1- The following measurements must be made with air filters in place.

*IMPORTANT - A low speed adjustment less than 2/3 of high speed will improve humidity removal; refer to product data for more information.*

2- With all access panels in place, measure static pressure external to unit (from supply to return). Blower performance data is based on static pressure readings taken in locations shown in figure 11.

*Note - Static pressure readings can vary if not taken where shown.*

3- Measure the indoor blower wheel RPM. RPM can be read from the A55 Unit Controller display on direct drive blowers. See Unit Controller manual.

4- Referring to the blower tables in the front of this manual, use static pressure and RPM readings to determine unit CFM. Apply the optional accessory air resistance.

### C-Adjusting Unit CFM

The supply CFM can be adjusted by changing Unit Controller settings. Refer to table 3 for menu paths and default settings. Record any CFM changes on the parameter settings label located on the inside of the compressor access panel.

**⚠CAUTION**

**The BLOWER CALIBRATION process starts the indoor blower at operational speeds and closes the economizer damper blades. Before starting this process, replace any access panels and close all unit doors except compressor compartment door.**

Blower calibration is required only on units that are newly installed or if there is a change in the duct work or air filters after installation. After the new CFM values are entered, use the down and up arrow buttons to select START CALIBRATION. Push SAVE to start calibration. The blower calibration status is displayed as a % complete. Upon successful completion, the Unit Controller will display CALIBRATION SUCCESS and go back to the blower calibration screen. Press the MAIN MENU button to go to the main menu and press the BACK button to go to the status screen.

If only the CFM values are updated, use the down and up arrow buttons to select "CALIBRATION DONE". Push SAVE to enter the updated values. This selection will not initiate calibration, resulting in less setup time. Press the MAIN MENU button to go to the main menu and press the BACK button to go to the status screen.

*IMPORTANT - The default value for Cooling Low CFM is lower than a traditional singe- or two-speed unit. If operating the unit with a 2- or 3-stage controller (2- or 3-stage thermostat, DDC controller, etc.), it is recommended to increase the Cooling Low CFM default value to a suitable level for part load cooling (typically 60% of full load CFM).*

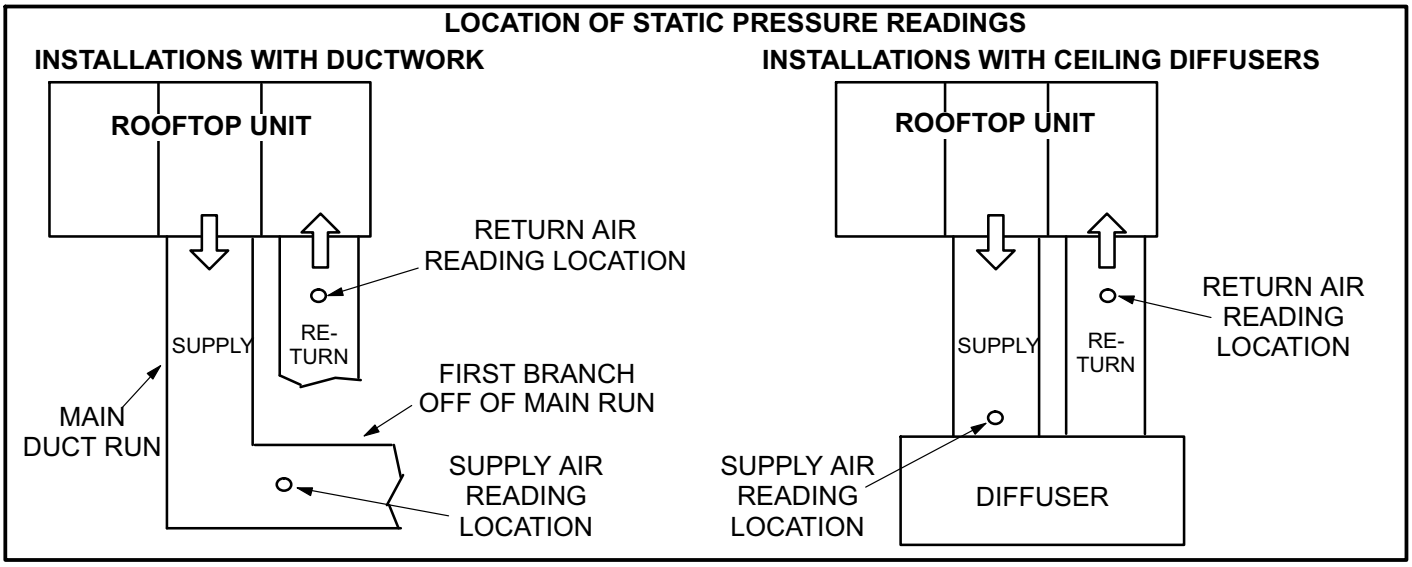



**FIGURE 11**

**TABLE 3**
**036, 048, 060, 074U DIRECT DRIVE PARAMETER SETTINGS**

| LGH/LCH036-074U4E Default Parameter Settings | | | | | | |
|---|---|---|---|---|---|---|
| Parameter | Factory Setting | | | | Field Setting | Description |
| | 036 | 048 | 060 | 074 | | |
| **Note: Any changes to Smoke CFM setting must be adjusted before the other CFM settings. Use SETTINGS > RTU OPTIONS > EDIT PARAMETERS = 12** | | | | | | |
| BLOWER SMOKE CFM | 1200 | 1600 | 2000 | 2400 | CFM | Smoke blower speed |
| **SETUP > TEST & BALANCE > BLOWER** | | | | | | |
| BLOWER HEATING HIGH CFM | 1200 | 1600 | 2000 | 2000 | CFM | High heat blower speed |
| BLOWER HEATING LOW CFM | N/A | 1250 | 1250 | 1250 | CFM | Low heat blower speed (applies to 150kBtuh 4-stg. gas heat only) |
| BLOWER COOLING HIGH CFM | 1100 | 1450 | 1825 | 2200 | CFM | High cooling blower speed |
| BLOWER COOLING LOW CFM | 575 | 750 | 950 | 950 | CFM | Low cooling blower speed |
| BLOWER VENTILATION CFM | 575 | 750 | 950 | 1150 | CFM | Ventilation blower speed |
| **SETUP > TEST & BALANCE > DAMPER** | | | | | | |
| BLOWER HIGH CFM DAMPER POS % | 0% | 0% | 0% | 0% | % | Minimum damper position for high speed blower operation. |
| BLOWER LOW CFM DAMPER POS % | 0% | 0% | 0% | 0% | % | Minimum damper position for low speed blower operation. |
| POWER EXHAUST DAMPER POS % | 50% | 50% | 50% | 50% | % | Minimum damper position for power exhaust operation. |
| **SETTINGS > RTU OPTIONS > EDIT PARAMETERS = 216** | | | | | | |
| POWER EXHAUST DEAD-BAND % | 10% | 10% | 10% | 10% | % | Deadband % for power exhaust operation. |
| **SETTINGS > RTU OPTIONS > EDIT PARAMETER = 10 (Applies to Thermostat Mode ONLY)** | | | | | | |
| FREE COOLING STAGE-UP DELAY | 300 sec. | 300 sec. | 300 sec. | 300 sec. | sec | Number of seconds to hold indoor blower at low speed before switching to indoor blower at high speed. |

**Installer**: Circle applicable unit model number and record any parameter changes under “Field Setting” column. Settings need to be recorded by installer for use when Unit Controller is replaced or reprogrammed.

## D-ELECTRIC HEAT COMPONENTS

Electric heat match-ups are found in the ELECTRICAL DATA tables. See table of contents.

All electric heat sections consist of electric heating elements exposed directly to the air stream. See figure 12. See figure 13 for vestibule parts arrangement.

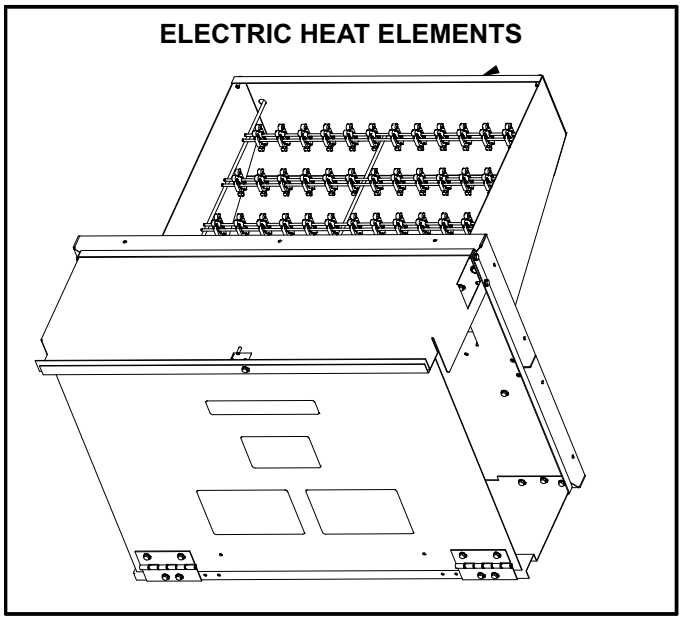



**FIGURE 12**

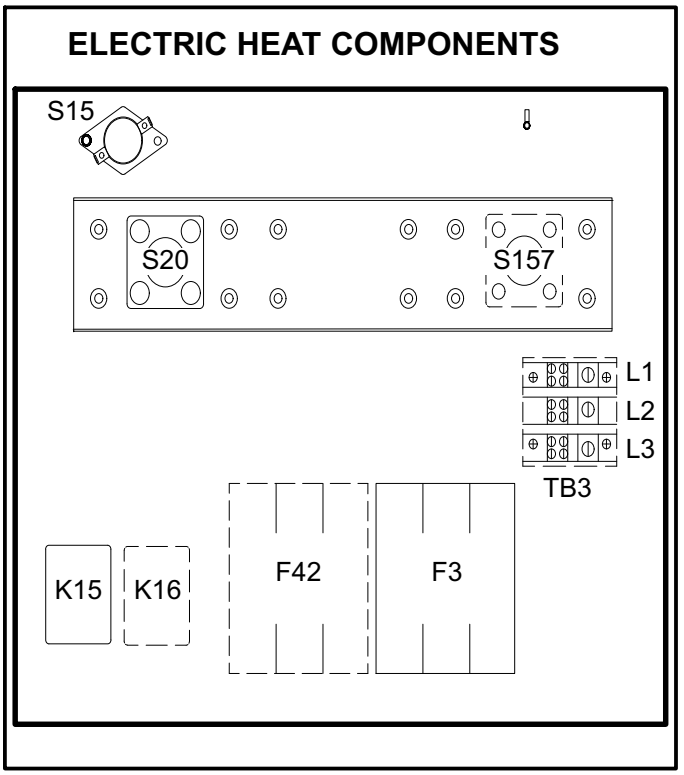



**FIGURE 13**

**1-Contactors K15, K16**

All contactors are double break and either single, double or three pole (see diagram) and equipped with a 24VAC coil. The coils in the K15 and K16 contactors are energized by the indoor thermostat. In all units K15 energizes the heating elements, while in the 22.5 kW units, K15 and K16 energize the heating elements simultaneously.

**2-High Temperature Limits S15 (Primary)**

S15 is a SPST N.C. auto-reset thermostat located on the back panel of the electric heat section above the heating elements. S15 is the high temperature limit for the electric heat section. When S15 opens, indicating a problem in the system, contactor K15 is de-energized (including K16 in 22.5 kW units). When K15 is de-energized, all stages of heat are de-energized. See table 4 for S15 set points. Set points are factory set and not adjustable.

**TABLE 4**

| Unit kW (Voltage) | S15 Opens ° F | S15 Closes ° F |
|---|---|---|
| 7.5 (Y, G, J, P) | 160 | 120 |
| 15 (Y) | 170 | 130 |
| 15 (G, J, P) | 160 | 120 |
| 22.5 (Y, G, J) | 160 | 120 |
| 22.5 (P) | 150 | 110 |
| 30 (Y, G, J) | 150 | 110 |

**3-High Temperature Limit S20 and S157 (Secondary)**

S20 and S157 are SPST N.C. manual-reset thermostat s. S20 and S157 are wired in series with the heating elements. See E1EH wiring diagrams. When S20 or S157 open, power is interrupted to the heating elements which are wired in series with the limits. K15/K16 are only de-energized when S15 opens. When the contactors are de-energized, all stages of heat are de-energized. The thermostat is factory set to open at 220°F ± 6°F (104°C ± 3.3°C) on a temperature rise and can be manually reset when temperature falls below 160°F (71.0°C). See figure 13 for location.

**4-Terminal Strip TB2**

Terminal strip TB2 is used for single point power installations only. TB2 distributes power to TB3. Units with multi-point power connections will not use TB2.

**5-Terminal Strip TB3**

P and Y voltage units are equipped with terminal strip TB3. Electric heat line voltage connections are made to TB3, which distributes power to the electric heat components and is located on the vestibule. See figure 13.

**6-Heating Elements HE1 through HE6**

Heating elements are composed of helix wound bare nichrome wire exposed directly to the air stream. Three elements are connected in a three-phase arrangement. The elements in 208/230V units are connected in a “Delta” arrangement. Elements in 460 and 575V units are connected in “Wye” arrangement. Each stage is energized independently by the corresponding contactors located on the electric heat vestibule panel. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and redundant high temperature limits and overcurrent protection is provided by fuses.

**7-Fuse F3**

Fuse F3 is housed in a fuse block which holds two or three fuses. Each F3 fuse is connected in series with each leg of electric heat. Figure 13 and table 5 show the fuses used with each electric heat section.

**8-Unit Fuse Block & Fuse F4**

Three line voltage fuses F4 provide short circuit and ground fault protection to all cooling components in the LCH units with electric heat. The fuses are rated in accordance with the amperage of the cooling components. The F 4 fuse block is located inside a sheet metal enclosure .

## II-PLACEMENT AND INSTALLATION

Make sure the unit is installed in accordance with the installation instructions and all applicable codes. See accessories section for conditions requiring use of the optional roof mounting curb (C1CURB).

## III-START UP - OPERATION

### A-Preliminary and Seasonal Checks

1- Make sure the unit is installed in accordance with the installation instructions and applicable codes.

2- Inspect all electrical wiring, both field and factory installed for loose connections. Tighten as required. Refer to unit diagram located on inside of unit compressor access panel.

3- Check to ensure that refrigerant lines are in good condition and do not rub against the cabinet or other refrigerant lines.

4- Check voltage at the disconnect switch. Voltage must be within the range listed on the nameplate. If not, consult the power company and have the voltage corrected before starting the unit.

5- Recheck voltage and amp draw with unit running. If voltage is not within range listed on unit nameplate, stop unit and consult power company. Refer to unit nameplate for maximum rated load amps.

**TABLE 5**

| Unit | Voltage-Phase | FUSE F3 | Qty each | Qty total |
|---|---|---|---|---|
| E1EH0075 | 208/230V-1P | 40 A-250V | 2 | 2 |
| | 208/230V-3P | 25 A-250V | 3 | 3 |
| | 460V-3P | 15 A-600V | 3 | 3 |
| | 575V-3P | 15 A-600V | 3 | 3 |
| E1EH0150 | 208/230V-1P | 40 A-250V | 2 | 4 |
| | 208/230V-3P | 50 A-250V | 3 | 3 |
| | 460V | 25 A-600V | 3 | 3 |
| | 575V | 20 A-600V | 3 | 3 |
| E1EH0225 | 208/230V-1P | 40 A-250V | 3 | 6 |
| | 208/230V-3P | 45 A-250V | 3 | 6 |
| | 460V-3P | 35 A-600V | 3 | 3 |
| | 575V-3P | 30 A-600V | 3 | 3 |
| E1EH0300 | 208/230V-3P | 60 A-250V | 3 | 6 |
| | 460V-3P | 50 A-600V | 3 | 3 |
| | 575V-3P | 40 A-600V | 3 | 3 |

## B-Cooling Start up
## LCH036-074U Sequence of Operation Summary - Default Unit Controller Parameters Only

### Blower

Unit Controller A55 energizes the blower motor B3 by sending a PWM signal from P259.

**Zone Sensor:**

Blower motor B3 modulates CFM between High Cool CFM and Low Cool CFM (based on the difference between the zone/room temperature and set point).

*Exception: If the cooling demand is very low (small difference between room setpoint and temperature), the Unit Controller will modulate the blower between off and Low Cool CFM.*

*Exception: If a dehumidification switch A91 is installed, there is no cooling demand, AND the room temperature is 2° F less than the room temperature setpoint (Over-cool limit default), the Unit Controller will energize the blower at Low Cool CFM.*

**2-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Blower Speed* |
|---|---|
| Y1 | Low |
| Y2 | High |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Blower Speed* |
|---|---|
| Y1 | Low |
| Y2 | Low |

**3-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Blower Speed* |
|---|---|
| Y1 | Low |
| Y2 | High |
| Y3 | High |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Blower Speed* |
|---|---|
| Y1 | Low |
| Y2 | Low |
| Y3 | High |

*70% when there is a dehumidification demand.

### Compressor

Unit Controller A55 communicates compressor speed to inverter A192 via P358 (MODBUS communication).

**Zone Sensor:**

Compressor B1 speed varies (based on the difference between discharge air temperature and setpoint).

**2-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Compressor Speed |
|---|---|
| Y1 | 60% of full speed |
| Y2 | Full speed |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Compressor Speed |
|---|---|
| Y1 | Off |
| Y2 | 60% of full speed |

**3-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Compressor Speed |
|---|---|
| Y1 | 60% of full speed |
| Y2 | Full speed |
| Y3 | Full speed |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Compressor Speed |
|---|---|
| Y1 | Off |
| Y2 | 60% of full speed |
| Y3 | Full speed |

### Outdoor Fan

Unit Controller A55 energizes outdoor fan B4 by sending a PWM signal from P259.

**Zone Sensor:**

Outdoor fan speed varies (with the compressor speed).

**2-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Fan Speed |
|---|---|
| Y1 | Low speed |
| Y2 | High speed |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Fan Speed |
|---|---|
| Y1 | Off |
| Y2 | Low speed |

**3-Stage Thermostat:**

No Economizer / Outdoor Air Not Suitable

| T'Stat Demand | Fan Speed |
|---|---|
| Y1 | Low speed |
| Y2 | High speed |
| Y3 | High speed |

Economizer / Outdoor Air Suitable

| T'Stat Demand | Fan Speed |
|---|---|
| Y1 | Off |
| Y2 | Low speed |
| Y3 | High speed |

**Three Phase Scroll Compressor Voltage Phasing**

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower rotation and operation. Compressor and blower are wired in phase at the factory.

1- Observe suction and discharge pressures and blower rotation on unit start-up.

2- Suction pressure must drop, discharge pressure must rise, and blower rotation must match rotation marking.

If pressure differential is not observed or blower rotation is not correct:

3- Disconnect all remote electrical power supplies.

4- Reverse any two field-installed wires connected to the line side of K1 contactor. Do not reverse wires at blower contactor.

5- Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.

## C-Safety or Emergency Shutdown

Turn off power to unit. Close manual and main gas valves.

## IV-CHARGING

**WARNING-Do not exceed nameplate charge under any condition.**

**D-Refrigerant Charge and Check - Fin/Tube Coil**

**WARNING-Do not exceed nameplate charge under any condition.**

This unit is factory charged and should require no further adjustment. If the system requires additional refrigerant, *reclaim the charge, evacuate the system,* and *add required nameplate charge.*

*NOTE - System charging is not recommended below 60°F (15°C). In temperatures below 60°F (15°C) , the charge* ***must*** *be weighed into the system.*

If weighing facilities are not available, or to check the charge, use the following procedure:

1- Operate unit in cooling mode on **HIGH SPEED**. Use Unit Controller menu path SERVICE > TEST > COOL > COOL 3 for 036, 048 and 060U units. Use COOL 4 for 074U units.

2- Attach gauge manifolds wait until system stabilizes (approximately five minutes). Make sure economizer is disabled and outdoor air dampers are closed.

3- Use a thermometer to accurately measure the outdoor ambient temperature.

4- Apply the outdoor temperature to tables 6 through 9 to determine normal operating pressures. Pressures are listed for sea level applications at 80°F dry bulb and 67°F wet bulb return air.

5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. **Correct any system problems before proceeding.**

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.

- Add or remove charge in increments.
- Allow the system to stabilize each time refrigerant is added or removed.

7- Use one of the following charge verification methods along with the normal operating pressures to confirm readings.

**TABLE 6**
**LCH 036U NORMAL OPERATING PRESSURES**

| Outdoor Coil Entering Air Temp | Discharge ±10 psig | Suction ± 5 psig |
|---|---|---|
| **65° F** | 238 | 146 |
| **75° F** | 277 | 149 |
| **85° F** | 317 | 150 |
| **95° F** | 363 | 151 |
| **105° F** | 416 | 151 |
| **115° F** | 474 | 154 |

**TABLE 7**
**LCH 048U NORMAL OPERATING PRESSURES**

| Outdoor Coil Entering Air Temp | Discharge ±10 psig | Suction ± 5 psig |
|---|---|---|
| **65° F** | 252 | 142 |
| **75° F** | 289 | 145 |
| **85° F** | 332 | 147 |
| **95° F** | 379 | 149 |
| **105° F** | 428 | 151 |
| **115° F** | 484 | 153 |

**TABLE 8**
**LCH 060U NORMAL OPERATING PRESSURES**

| Outdoor Coil Entering Air Temp | Discharge ±10 psig | Suction ± 5 psig |
|---|---|---|
| **65° F** | 261 | 135 |
| **75° F** | 299 | 138 |
| **85° F** | 341 | 140 |
| **95° F** | 388 | 142 |
| **105° F** | 441 | 144 |
| **115° F** | 499 | 146 |

**TABLE 9**
**LCH 074U NORMAL OPERATING PRESSURES**

| Outdoor Coil Entering Air Temp | Discharge ±10 psig | Suction ± 5 psig |
|---|---|---|
| **65° F** | 268 | 128 |
| **75° F** | 307 | 134 |
| **85° F** | 351 | 137 |
| **95° F** | 399 | 140 |
| **105° F** | 450 | 142 |
| **115° F** | 505 | 144 |

**Subcooling Method**

1- Attach gauge manifold to the liquid line. With the economizer disabled, operate the unit in **cooling mode at high speed** using the following Unit Controller menu path:

SERVICE > TEST > COOL > COOL 3
(COOL 4 on 074U units)

2- Use the liquid line pressure and a PT chart to determine the saturated liquid temperature.

3- Measure the liquid line temperature at the condenser outlet.

Subcooling Temperature = Liquid Saturated Temperature Minus Liquid Temperature.

4- The subcooling temperature should be as shown in table 10. A subcooling temperature greater than this value indicates an overcharge. A subcooling temperature less than this value indicates an undercharge.

**TABLE10**
**SUBCOOLING TEMPERATURE**

| LCH Unit | Liquid Saturated Temp. Minus Liquid Temperature |
|---|---|
| **036U; 060U** | 15°F ± 1 (8.3°C ± 0.5) |
| **048U** | 15.5°F ± 1 (8.6°C ± 0.5) |
| **074U** | 16°F ± 1 (8.8°C ± 0.5) |

## V- SYSTEMS SERVICE CHECKS

### A-Cooling System Service Checks

LCH units are factory charged and require no further adjustment; however, charge should be checked periodically using the approach method. The approach method compares actual liquid temperature with the outdoor ambient temperature. See section IV- CHARGING.

*NOTE-When unit is properly charged discharge line pressures should approximate those in tables 6 through 9.*

## VI-MAINTENANCE

The unit should be inspected once a year by a qualified service technician.

**⚠WARNING**

**Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.**

**⚠CAUTION**

**Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.**

### A-Filters

Units are equipped with temporary filters which must be replaced prior to building occupation. See table NO TAG for correct filter size. Refer to local codes or appropriate jurisdiction for approved filters.

*NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.*

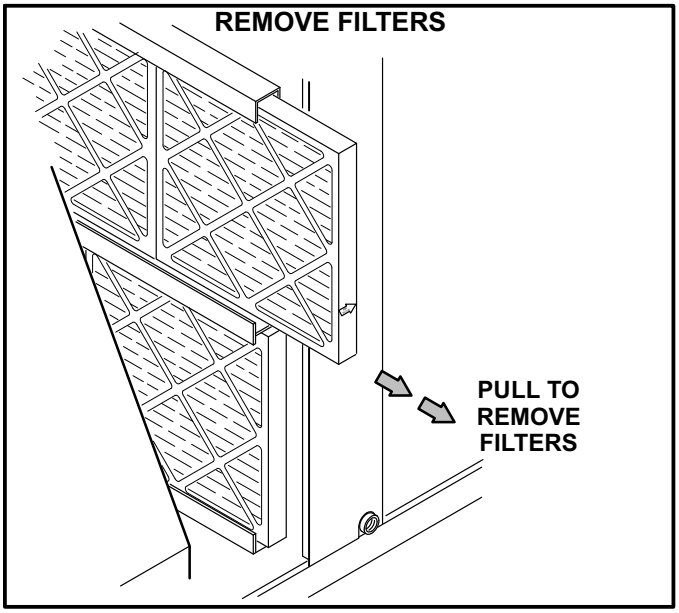



**FIGURE 14**

### B-Lubrication

All motors are lubricated at the factory. No further lubrication is required.

### C-Evaporator Coil

Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleanser. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

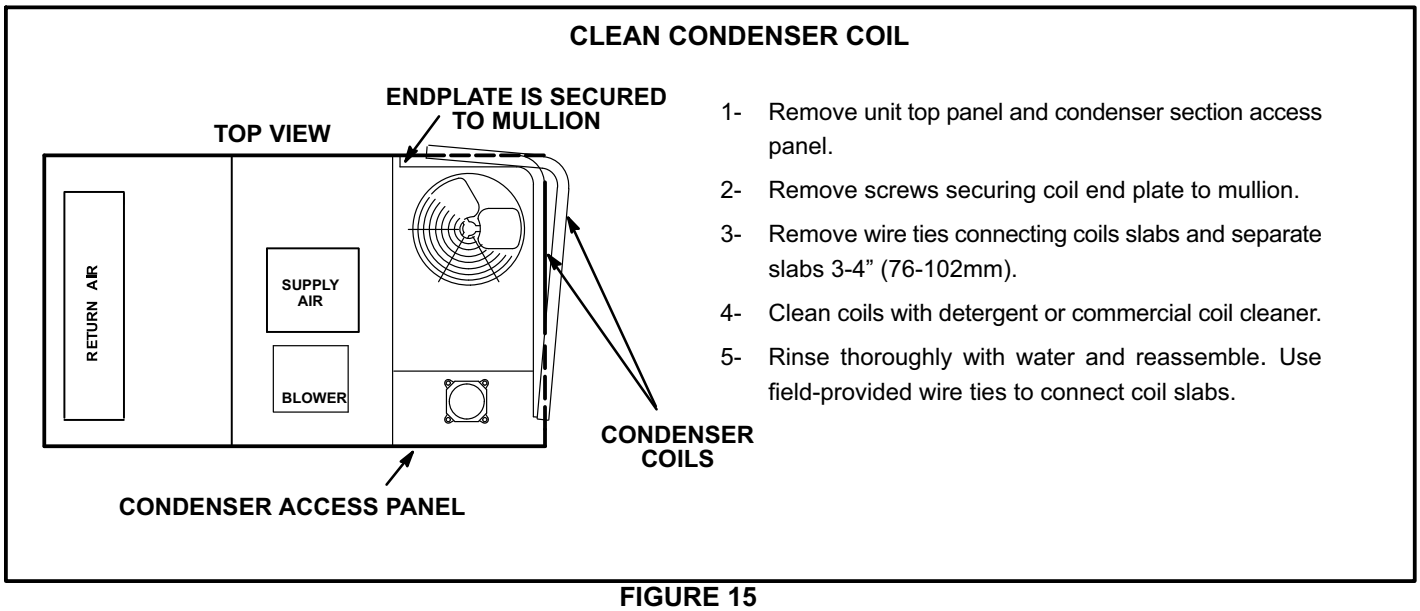



**FIGURE 15**

## D-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season.

Condenser coils are made of single and two formed slabs. On units with two slabs, dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs and wash them thoroughly. See figure 15. Flush coils with water following cleaning.

*Note - Remove all screws and gaskets prior to cleaning procedure and replace upon completion.*

## E-Supply Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.

## VII-ACCESSORIES

The accessories section describes the application of most of the optional accessories which can be factory- or field-installed to the LCH units. See accessories installation instructions for more detail.

## A-C1CURB

When installing the LCH units on a combustible surface for downflow discharge applications, the C1CURB 8 inch, 14-inch, 18 inch or 24-inch height roof mounting frame is used. The roof mounting frames are recommended in all other applications but not required. If the LCH units are not mounted on a flat (roof) surface, they MUST be supported under all edges and under the middle of the unit to prevent sagging. The units MUST be mounted level within 1/16" per linear foot or 5mm per meter in any direction.

The assembled mounting frame is shown in figure 16. Refer to the roof mounting frame installation instructions for details of proper assembly and mounting. The roof mounting frame MUST be squared to the roof and level before mounting. Plenum system MUST be installed before the unit is set on the mounting frame. Typical roof curbing and flashing is shown in figure 17. Refer to the roof mounting frame installation instructions for proper plenum construction and attachment.

## B-Transitions

Optional supply/return transitiions T1TRAN20N-1 is available for all units utilizing optional C1CURB roof mounting frames. Transition must be installed in the C1/T1CURB mounting frame before mounting the unit to the frame. Refer to the manufacturer's instructions included with the transition for detailed installation procedures.

## C-Supply and Return Diffusers

Optional flush mount diffuser/return FD11-95S and step-down mount diffuser/return RTD11-95S are available for use with all LCH units. Refer to manufacturer's instructions included with transition for detailed installation procedures.

## D-Outdoor Air Dampers

C1DAMP11A-2 manually operated outdoor air damper and C1DAMP21A-1 motorized outdoor air damper is available for all LCH units (see figure 18 or 19). Both sets include the outdoor air hood. The manual damper is set at a fixed point to bring outside air into the building anytime the blower is operating. The motorized damper opens when the blower is operating and the thermostat is sending an occupied signal to the Unit Controller. If the thermostat signal is unoccupied, the motorized damper will not open. Washable filter supplied with the outdoor air dampers can be cleaned with water and a mild detergent. It should be sprayed with Filter Handicoater when dry prior to reinstallation. Filter Handicoater is R.P. Products coating no. 418 and is available as Part No. P-8-5069

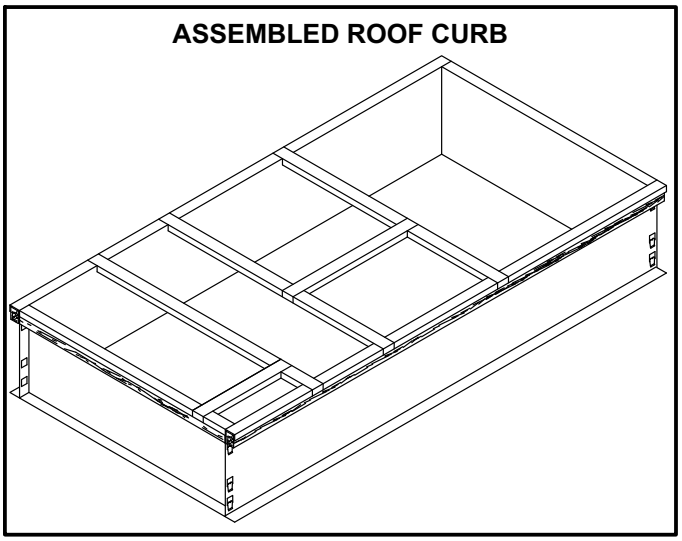



**FIGURE 16**

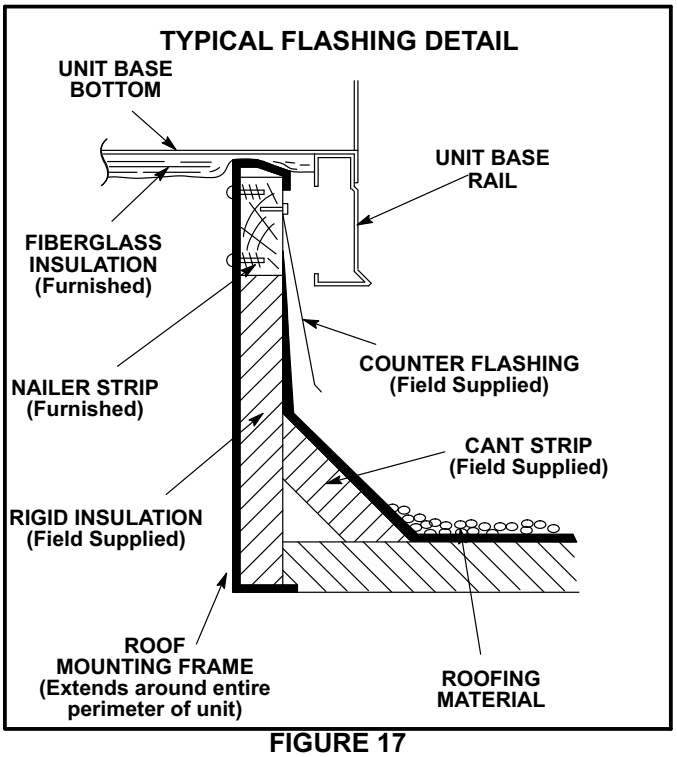



**FIGURE 17**

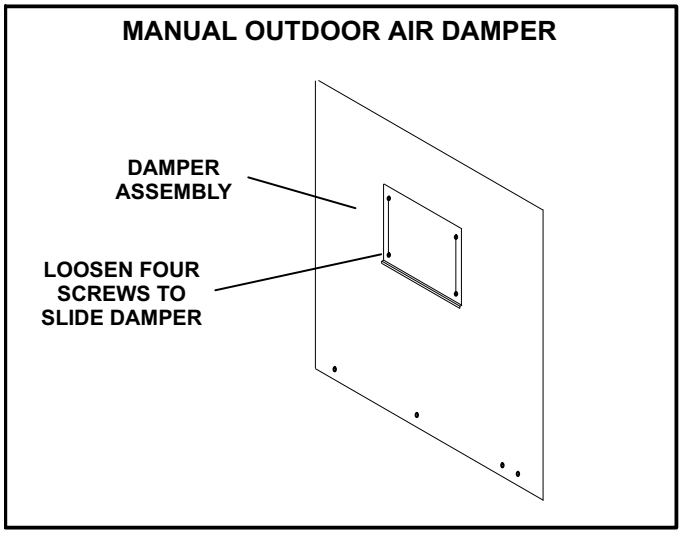



**FIGURE 18**

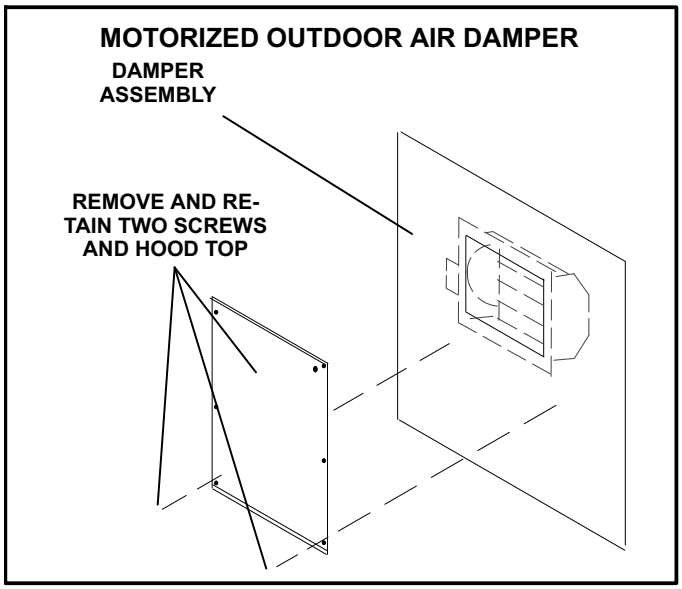



**FIGURE 19**

## E-Economizer

**(Field- or Factory-Installed)**

The economizer uses outdoor air for free cooling when temperature is suitable. See figure 20.

When outdoor air is suitable, the Unit Controller will modulate the economizer dampers to maintain 55°F discharge air (RT6). Use the following menu to adjust the discharge air temperature setpoint between 45-67°F.

RTU OPTION > DAMPER > FREE COOLING SUPPLY AIR SETPOINT = 55°F

***Sensors***

Units are equipped with the following factory-installed, CEC Title 24 approved sensors:

RT17 - Outside Air Temperature
RT16 - Return Air Temperature
RT6 - Discharge Air Temperature

See figure 21 for sensor location.

Optional field-provided sensors may be used instead of unit sensors to determine whether outdoor air is suitable for free cooling. Refer to table 11. TEMP OFFSET is the default mode.

*Note - Network OAS signal and California Title 24 Compliance options use either TEMPERATURE OFFSET or TEMPERATURE SETPT mode.*

***Minimum Position***

The Unit Controller will move the dampers to minimum position during the following:

Ventilation mode (G demand only)
Outdoor air is NOT suitable for free cooling

Two blower speeds are available during damper minimum position:

1-Minimum Position -
When blower CFM is closer to the High Cool/Heat CFM
**OR**
When Ventilation CFM is closer to the High Cool/Heat CFM

2-Minimum Position Low Blower -
When blower CFM is closer to the Low Cool/Heat CFM
**OR**
When Ventilation CFM is closer to the Low Cool/Heat CFM

***GED (Gravity Exhaust / Barometric Relief Dampers) Field-Installed Option***

The GED is located in the economizer except in downflow applications or when a PEF (power exhaust fan) is NOT installed. In horizontal airflow applications or when a PEF is installed, the GED is located in the exhaust air hood.

***Horizontal Air Discharge Economizers***

The economizer is located in the unit the same as downflow applications but note the position of the return air duct. The duct attaches to a duct transition and duct inlet on the end of the unit. An optional GED is located in the duct transition. See figure 22.

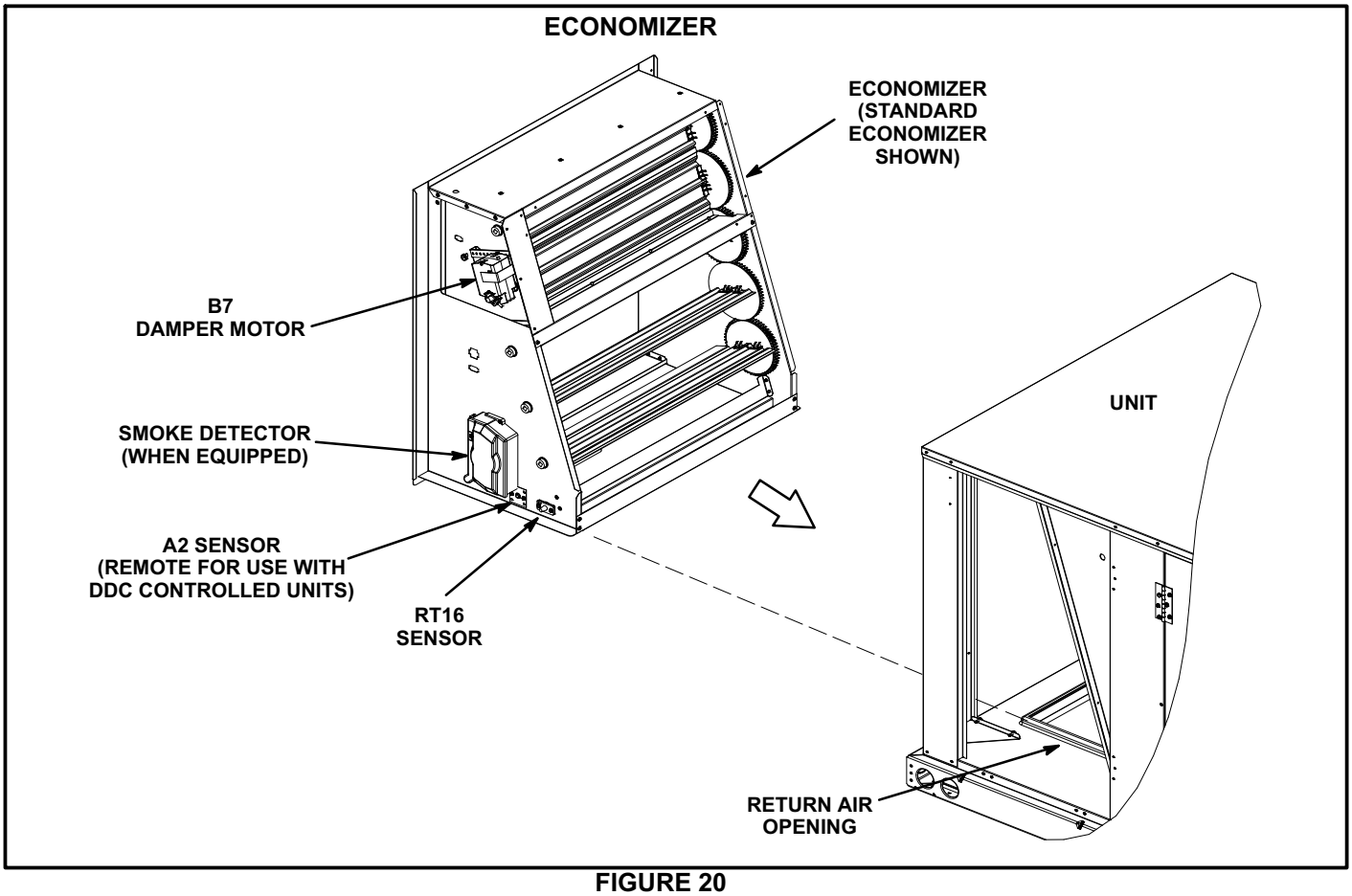



FIGURE 20

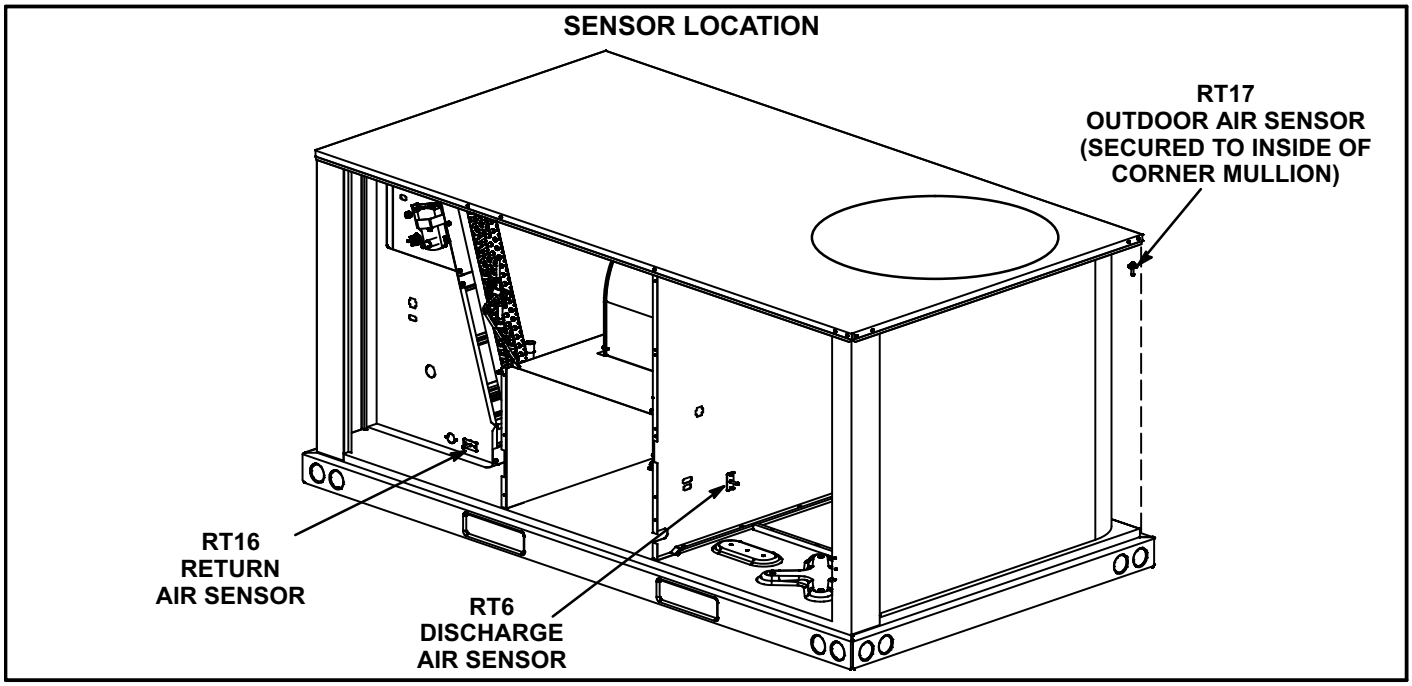



FIGURE 21

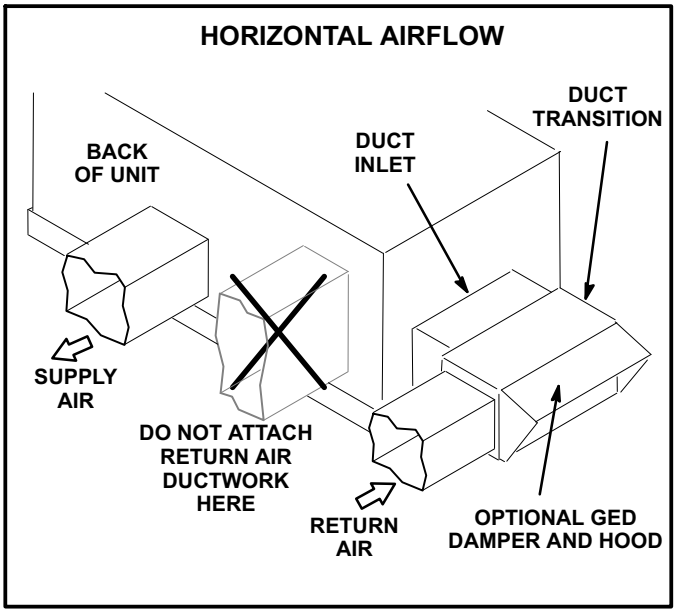



**FIGURE 22**

**TABLE 11**
**ECONOMIZER MODES AND SETPOINT**

| Free Cooling Mode | Free Cooling Setpoint | Field-Provided Sensors | Dampers will modulate to 55°F discharge air (RT6) when outdoor air is suitable: | Permitted Inputs |
|---|---|---|---|---|
| TEMP | OFFSET | None Needed | Outdoor air temperature (RT17) is less than return air temperature (RT16) by at least the OFFSET value. | 0-40°F |
| TEMP | OAT STPT | None Needed | Outdoor air temperature (RT17) is less than the OAT STPT value. | 41-75°F |
| Remote | Remote | Energy Management System** | Either of the TEMP modes can be used when a network OAS signal is provided by an energy management or building control system, via BACnet, LonTalk, or L Connection. The network can command OAS, NOT OAS, or AUTO. AUTO returns to local control of OAS, which is the selected TEMP mode. | NA |
| ENTH | DIFF OFFSET | (Two) C7400 | Outdoor air enthalpy* (A7) is less than return air enthalpy (A62) by at least the OFFSET value. | 0mA-4mA |
| ENTH | ODE STPT | C7400 | Outdoor air enthalpy (A7) is less than free cooling setpoint. | 12-19mA |
| GLOBAL | GLOBAL | 24VAC Input Signal | Global input is energized by (P297-9). This setting is also used for outdoor air damper applications. Global input also brings on the blower. (This mode is NOT used when OAS signal is provided via network connection. GLO is only used when a 24VAC signal is used to energize the P297-9 GLO input.) | NA |

*Enthalpy includes effects of both temperature and humidity.

**Energy management systems may require additional field-provided sensors; refer to manufacturer's instructions.

**DIRECT DRIVE DRIVE SYSTEM OPERATION:**

*Note: Direct drive units feature ECM condenser fans that are staged to match the compressor's capacity. When the compressor is operating at first stage, the condenser fan is operating at low speed. The condenser fan switches to high speed when the compressor switches to second stage to match operation.*

**Modulating Outdoor Air Damper:**

*Damper minimum positions #1 and 2 are adjusted during unit setup to provide minimum fresh air requirements at the indicated supply fan speeds per ASHRAE 62.1.*

-Supply fan is off and the outdoor air damper is closed

-Supply fan is on low speed and the outdoor air damper is at minimum position 1

-Supply fan is on high speed and the outdoor air damper is at minimum position 2

**[1]Outdoor Air is Suitable**

*Note: When outdoor air is not suitable during the occupied time period, damper modulates to minimum position. When outdoor air is not suitable during the unoccupied time period, damper modulates closed.*

Cooling - Thermostat or Zone Sensor Mode (Up to 3 stages Y1, Y2, Y3)

Y1 demand:

1st-Compressor is off, supply fan is on low speed, economizer modulates (minimum to maximum open position) to maintain 55°F supply air temperature (default unit controller setting)

2nd-After 5 minutes (default unit controller setting), supply fan switches to high speed. Economizer continues modulating with supply fan on high speed to maintain 55°F supply air temperature

Y2 demand:

1st-Compressor is off, supply fan is on high speed, and economizer modulates to maintain 55°F supply air temperature

2nd-Economizer opens to maximum. If economizer stays at maximum open for 3 minutes (default unit controller setting) compressor is energized and operates at first stage while supply fan stays on high speed.

*[1]Outdoor air suitability is determined by the energy state of outdoor ambient (enthalpy or sensible) and its ability to achieve the desired free cooling effects. Outdoor air suitability can also be determined by a third party controller and provided to the RTU via a network connection.*

Y3 demand:

1st-Economizer is at maximum open and compressor operates at first stage. If economizer stays at maximum open for 3 minutes (default unit controller setting) compressor switches to second stage operation while supply fan stays on high speed

## F-Power Exhaust Relay K65 (power exhaust units)

Power exhaust relay K65 is a DPDT relay with a 24VAC coil. K65 is used in all LCH units equipped with the optional power exhaust dampers. K65 is energized by the Unit Controller after the economizer dampers reach 50% open (adjustable). When K65 closes, exhaust fan B10 is energized.

## G-Power Exhaust Fans

C1PWRE10A available for LCH 3, 4, 5 and 6 ton units, provide exhaust air pressure relief. See figure 23 and installation instructions for more detail.

## H-Optional UVC Lights

The Healthy Climate® germicidal light emits ultraviolet (UVC) energy that has been proven effective in reducing microbial life forms (viruses, bacteria, yeasts, and molds) in the air.

UVC germicidal lamps greatly reduce the growth and proliferation of mold and other bio-aerosols (bacteria and viruses) on illuminated surfaces.

Germicidal lamps are NOT intended to be used for removal of active mold growth. Existing mold growth must be appropriately removed PRIOR to installation of the germicidal lamp.

Refer closely to UVC light installation instruction warnings when servicing units.

## I-Smoke Detectors A171 and A172

Photoelectric smoke detectors are a factory- or field-installed option. The smoke detectors can be installed in the supply air duct (A172), return air section (A171), or in both the supply duct and return air section.

## J-Control Systems

The A55 Unit Controller provides all control function for the rooftop unit. Default operation requires a standard room thermostat or direct digital controller (DDC). The A55 can also control the unit from a zone temperature sensor. The A55 Unit Controller is a network controller when daisy-chained to the L Connection® Network Control System. For ease of configuration, the A55 can be connected to a PC with Unit Controller PC software installed.

## K-Dirty Filter Switch S27

The dirty filter switch senses static pressure increase indicating a dirty filter condition. The switch is N.O. and closes at 1" W.C. (248.6 Pa) The switch is mounted in the supply air section on the evaporator coil seal.

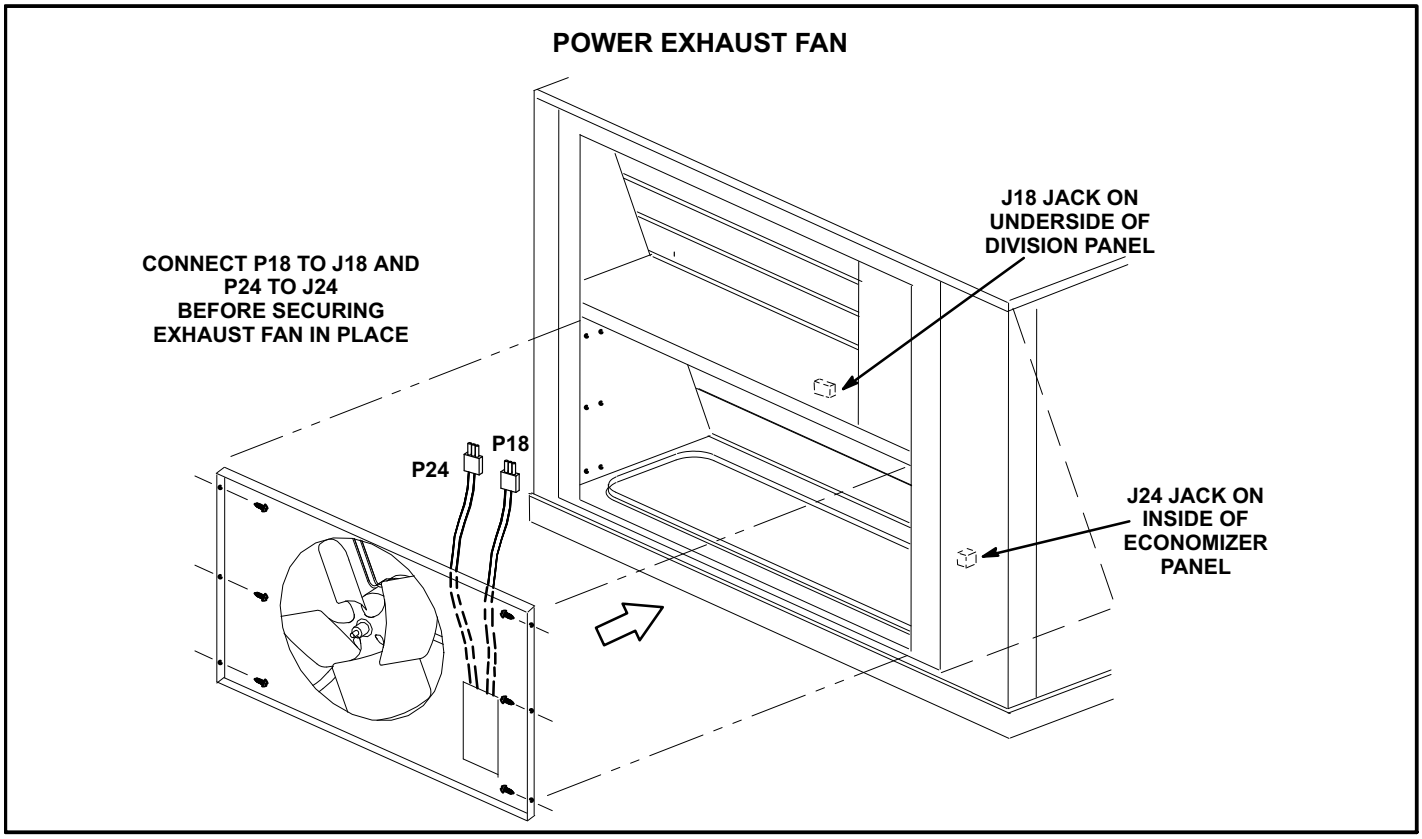



**FIGURE 23**

## L-Indoor Air Quality ($CO_2$) Sensor A63

The indoor air quality sensor monitors $CO_2$ levels and reports the levels to the Unit Controller. The Unit Controller adjusts the economizer dampers according to the $CO_2$ levels. The sensor is mounted next to the indoor thermostat or in the return air duct. Refer to the indoor air quality sensor installation instructions for proper adjustment.

## M-Drain Pan Overflow Switch S149 (optional)

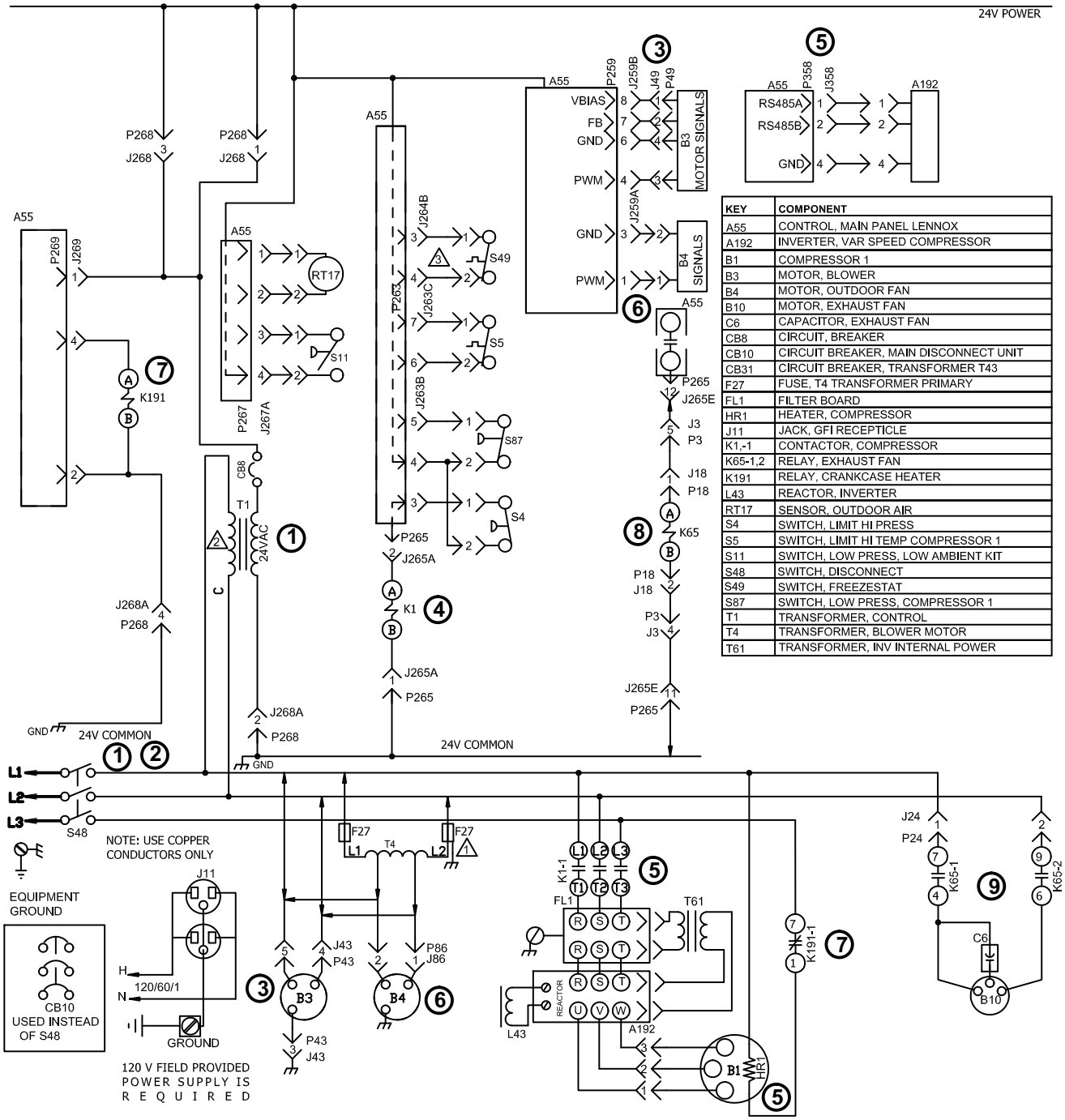
The overflow switch is used to interrupt cooling operation when excessive condensate collects in the drain pan. The N.O. overflow switch is controlled by K220 and DL46 relays, located in the unit control panel. When the overflow switch closes, 24VAC power is interrupted and after a five-second delay unit compressors are de-energized. Once the condensate level drops below the set level, the switch will open. After a five-minute delay the compressor will be energized.

## N-SunSource® Commercial Energy System

Optional, factory-installed S48 circuit breaker and F54 solar fuse block make units solar-ready. These specially-equipped units can be matched with solar modules and other optional equipment.

Solar energy is first used to meet cooling/heating demands. When the unit is not operating, the system powers lighting, appliances and other electronic devices in the building. Any surplus power is sent back to the utility company for a possible credit (check your local utility company for policies).

Wiring runs from the roof-mounted solar modules to the unit. From there, power travels to the electrical service panel using the existing HVAC unit power wiring.




| KEY | COMPONENT |
|---|---|
| A55 | CONTROL, MAIN PANEL LENNOX |
| A192 | INVERTER, VAR SPEED COMPRESSOR |
| B1 | COMPRESSOR 1 |
| B3 | MOTOR, BLOWER |
| B4 | MOTOR, OUTDOOR FAN |
| B10 | MOTOR, EXHAUST FAN |
| C6 | CAPACITOR, EXHAUST FAN |
| CB8 | CIRCUIT, BREAKER |
| CB10 | CIRCUIT BREAKER, MAIN DISCONNECT UNIT |
| CB31 | CIRCUIT BREAKER, TRANSFORMER T43 |
| F27 | FUSE, T4 TRANSFORMER PRIMARY |
| FL1 | FILTER BOARD |
| HR1 | HEATER, COMPRESSOR |
| J11 | JACK, GFI RECEPTICLE |
| K1,-1 | CONTACTOR, COMPRESSOR |
| K65-1,2 | RELAY, EXHAUST FAN |
| K191 | RELAY, CRANKCASE HEATER |
| L43 | REACTOR, INVERTER |
| RT17 | SENSOR, OUTDOOR AIR |
| S4 | SWITCH, LIMIT HI PRESS |
| S5 | SWITCH, LIMIT HI TEMP COMPRESSOR 1 |
| S11 | SWITCH, LOW PRESS, LOW AMBIENT KIT |
| S48 | SWITCH, DISCONNECT |
| S49 | SWITCH, FREEZESTAT |
| S87 | SWITCH, LOW PRESS, COMPRESSOR 1 |
| T1 | TRANSFORMER, CONTROL |
| T4 | TRANSFORMER, BLOWER MOTOR |
| T61 | TRANSFORMER, INV INTERNAL POWER |

1. T4 AND F27 USED ONLY ON G VOLTAGE UNITS
2. MOVE WIRE FROM 240 TO 208 TAP ON T1 TRANSFORMER FOR 208 LINE VOLTAGE APPLICTIONS
3. S49 IS PART OF A 5VDC CIRCUIT

| J/P # | JACK/PLUG DESCRIPTION |
|---|---|
| 3 | ECONOMIZER BYPASS |
| 18 | EXHAUST FAN |
| 24 | EXHAUST FAN |
| 43 | BLOWER MORTOR |
| 49 | MOTOR VARIABLE SPEED |
| 259 | ECM MOTORS |
| 263 | HIGH AND LOW PRESSURE SWITCHES |
| 264 | BLOWER DECK |
| 265 | CONTACTORS AND RELAYS |
| 267 | OUTDOOR FAN AREA |
| 268 | TRANSFORMER 1 POWER |
| 269 | REHEAT |
| 358 | MODBUS |

DENOTES OPTIONAL COMPONENTS
LINE VOLTAGE FIELD INSTALLED

NOTE - IF ANY WIRE IN THIS APPLIANCE IS REPLACED IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING, TERMINATION AND INSULATION THICKNESS

WARNING - ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH . UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES

DISCONNECT ALL POWER BEFORE SERVICING.

| 12/15 | WIRING DIAGRAM | 12/15 |
|---|---|---|
| | 537842-01 | |
| COOLING | | |
| ULTRA HIGH EFFICIENCY<br>LCH/LGH - 036U,048U,060U,074U - Y,G | | |
| SECTION B | | REV 0 |
| Supersedes | Form No. 537842-01 | |

## Cooling Sequence of Operation

**Using input from a room/zone sensor only. See Cooling Start-Up section operation summary for thermostat and third-party control operation.**

**Power:**

1. Line voltage from the unit disconnect, terminal block, or circuit breaker energizes transformer T1. T1 provides 24VAC power to the A55 Unit Controller. A55 provides 24VAC to the unit cooling, heating and blower controls.
2. Line voltage from unit disconnect, terminal block, or circuit breaker provides voltage to compressor crankcase heater relay K191-1 N.C. contacts, compressor contactor K1, blower motor B3, and outdoor fan motor B4 (on G volt units line voltage is supplied to two fuses F27, transformer T4, blower motor B3, and outdoor fan motor B4).

**Blower Operation:**

3. A55 Unit Controller P297 receives a cooling demand from the room/zone sensor. Unit Controller A55 energizes the blower motor B3 by sending a PWM signal from P259. The blower motor modulates between High Cool CFM and Low Cool CFM (based on the difference between the zone/room temperature A2 and setpoint).

**Cooling**

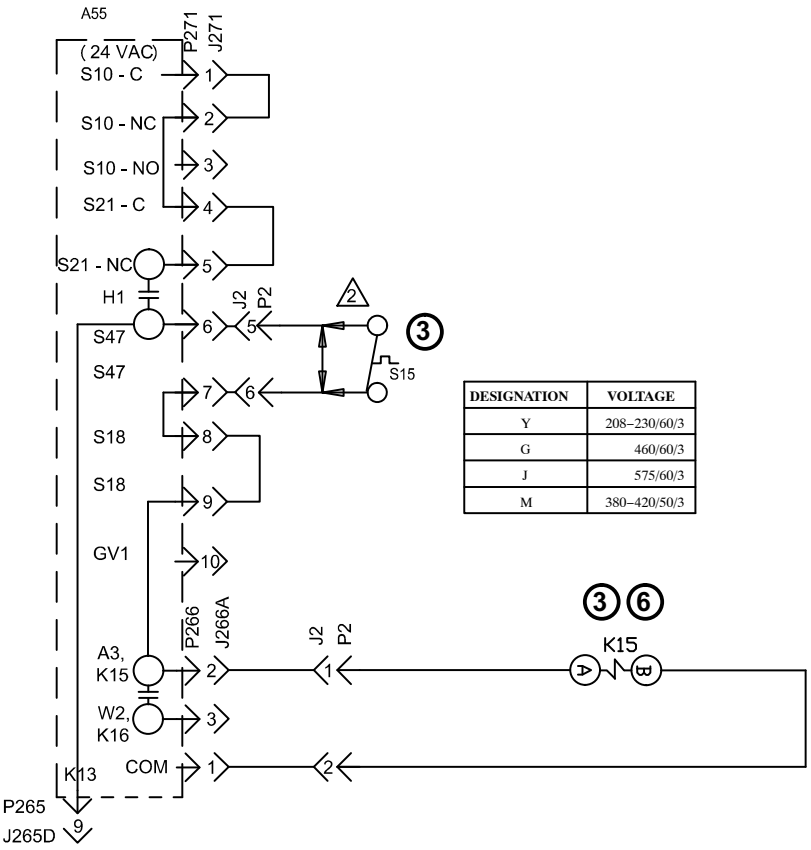
4. A55 proves N.C. freezestat S49, N.C. high temperature switch S5, N.C. low pressure switch S87, N.C. high pressure switch S4, and compressor contactor K1 is energized. A55 makes sure unit voltage and variable speed compressor inverter A192 voltage are equal. A55 also communicates the unit refrigeration tonnage to A192.
5. N.O. contacts K1-1 close providing voltage to A192 through FL1 filter board, T61 transformer, and L43 reactor. A192 varies B1 compressor speed based on a compressor demand from A55 P358 via MODBUS. The A55 compressor demand varies based on the difference between discharge air temperature (RT6) and discharge air temperature setting (default 55°F).

   Note - The A55 will start to reduce the three- through five-ton compressor speed at a heat sink temperature of 125°F. Typical competitor equipment reduces compressor speed at 115°F.
6. A55 modulates outdoor fan B4 speed by sending a PWM signal from P259 (based on the compressor speed).
7. During cooling operation, A55 energizes crankcase heater relay K191. K191-1 N.C. Contacts open to de-energize HR1 crankcase heater.

**Power Exhaust Fan Operation**

8. A55 receives a position feedback signal from the economizer damper motor and energizes exhaust fan relay K65 with 24VAC at 50% outside air damper open (adjustable).
9. N.O. contact K65-1 & 2 close, energizing exhaust fan motor B10.

# E1EH 7.5, 15, 22.5, 30 - G, J, M ELECTRIC HEAT




| DESIGNATION | VOLTAGE |
|---|---|
| Y | 208–230/60/3 |
| G | 460/60/3 |
| J | 575/60/3 |
| M | 380–420/50/3 |

| DESCRIPTION | |
|---|---|
| KEY | DESCRIPTION |
| A55 | PANEL, MAIN |
| F3 | FUSE, ELECTRIC HEAT |
| F4 | FUSE, UNIT |
| HE –1 | ELEMENT, ELECTRIC HEAT 1 |
| J2 | JACK, ELECTRIC HEAT |
| J265C | JACK, CONTACTOR RELAY |
| J266A | JACK, HEATING CONTROL STG 1 |
| J271A,B | JACK, HEATING SENSORS STG 1 |
| K15,–1 | CONTACTOR, ELECTRIC HEAT 1 |
| P2 | PLUG, ELECTRIC HEAT |
| P265 | PLUG, CONTACTOR RELAY |
| P266 | PLUG, HEATING CONTROL |
| P271 | PLUG, HEATING SENSORS STG 1 |
| S15 | SWITCH, LIMIT PRIMARY ELECTRIC HEAT |
| S20 | SWITCH, LIMIT SECONDARY ELECTRIC HEAT 1 |
| S157 | SWITCH, LIMIT SECONDARY ELECTRIC HEAT 2 |
| TB2 | TERMINAL STRIP, UNIT |

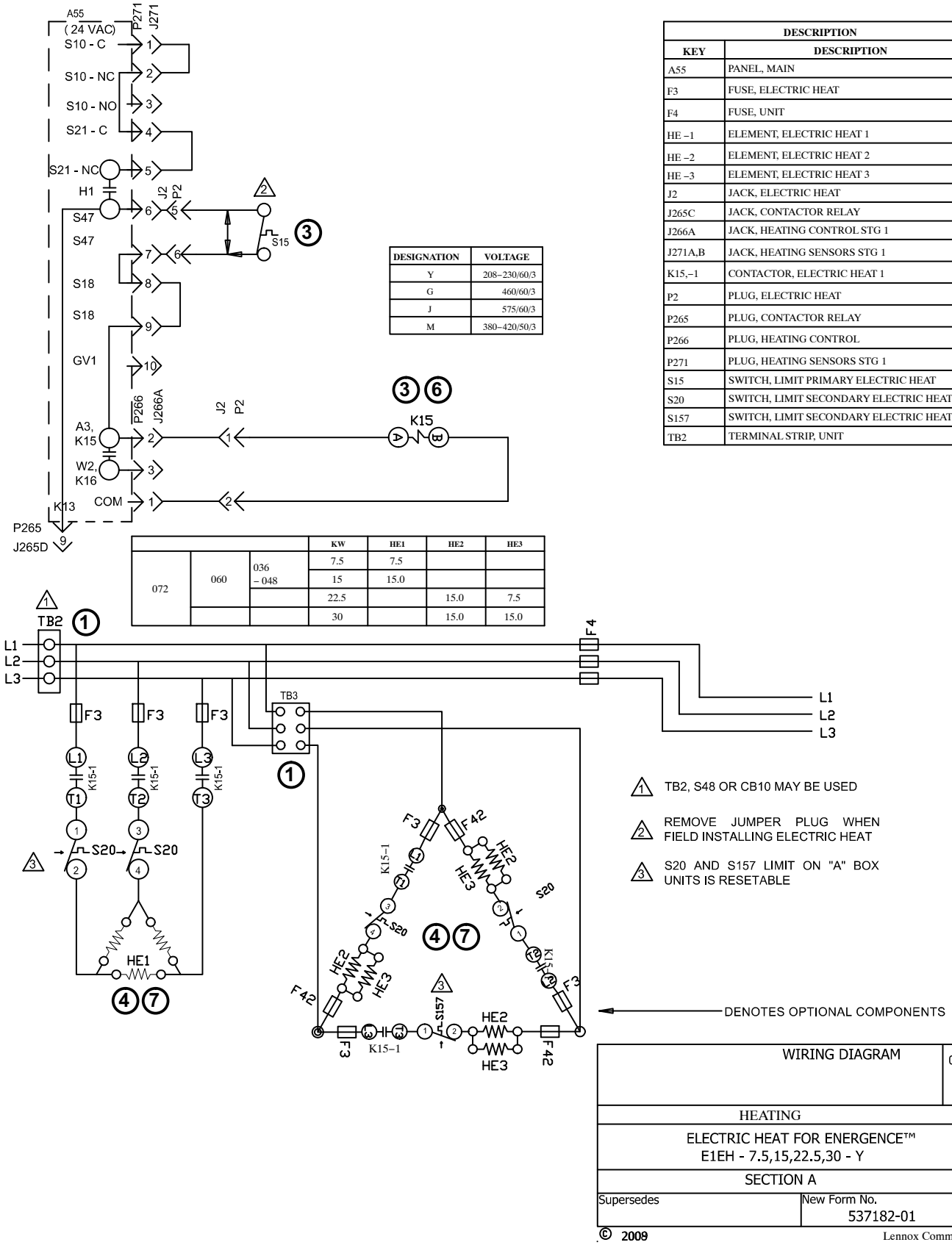
1. TB2, S48 OR CB10 MAY BE USED
2. REMOVEJUMPER PLUG WHEN FIELD INSTALLING ELECTRIC HEAT
3. S20 LIMIT ON "A" BOX UNITS IS RESETABLE

DENOTES OPTIONAL COMPONENTS

| | | KW | HE1 | HE2 |
|---|---|---|---|---|
| 072 | 060 | 7.5 | 7.5 | |
| | | 15 | 15 | |
| | 036 – 048 | 22.5 | 15 | 7.5 |
| | | 30 | 15 | 15 |

| | |
|---|---|
| WIRING DIAGRAM | 09/09 |
| HEATING | |
| ELECTRIC HEAT FOR ENERGENCE™<br>E1EH - 7.5, 15, 22.5, 30 -G,J,M | |
| SECTION A | |
| Supersedes | New Form No. 537180-01 |

# E1EH 7.5, 15, 22.5 -Y ELECTRIC HEAT




| DESIGNATION | VOLTAGE |
|---|---|
| Y | 208–230/60/3 |
| G | 460/60/3 |
| J | 575/60/3 |
| M | 380–420/50/3 |

| DESCRIPTION | |
|---|---|
| KEY | DESCRIPTION |
| A55 | PANEL, MAIN |
| F3 | FUSE, ELECTRIC HEAT |
| F4 | FUSE, UNIT |
| HE –1 | ELEMENT, ELECTRIC HEAT 1 |
| HE –2 | ELEMENT, ELECTRIC HEAT 2 |
| HE –3 | ELEMENT, ELECTRIC HEAT 3 |
| J2 | JACK, ELECTRIC HEAT |
| J265C | JACK, CONTACTOR RELAY |
| J266A | JACK, HEATING CONTROL STG 1 |
| J271A,B | JACK, HEATING SENSORS STG 1 |
| K15,–1 | CONTACTOR, ELECTRIC HEAT 1 |
| P2 | PLUG, ELECTRIC HEAT |
| P265 | PLUG, CONTACTOR RELAY |
| P266 | PLUG, HEATING CONTROL |
| P271 | PLUG, HEATING SENSORS STG 1 |
| S15 | SWITCH, LIMIT PRIMARY ELECTRIC HEAT |
| S20 | SWITCH, LIMIT SECONDARY ELECTRIC HEAT 1 |
| S157 | SWITCH, LIMIT SECONDARY ELECTRIC HEAT 2 |
| TB2 | TERMINAL STRIP, UNIT |

| | | | KW | HE1 | HE2 | HE3 |
|---|---|---|---|---|---|---|
| 072 | 060 | 036 – 048 | 7.5 | 7.5 | | |
| | | | 15 | 15.0 | | |
| | | | 22.5 | | 15.0 | 7.5 |
| | | | 30 | | 15.0 | 15.0 |

1. TB2, S48 OR CB10 MAY BE USED
2. REMOVE JUMPER PLUG WHEN FIELD INSTALLING ELECTRIC HEAT
3. S20 AND S157 LIMIT ON "A" BOX UNITS IS RESETABLE

| | |
|---|---|
| WIRING DIAGRAM | 09/09 |
| HEATING | |
| ELECTRIC HEAT FOR ENERGENCE™<br>E1EH - 7.5,15,22.5,30 - Y | |
| SECTION A | |
| Supersedes | New Form No.<br>537182-01 |

## Sequence of Operation -E1EH 7.5, 15, 22.5 - G, J, M Voltage

**HEATING ELEMENTS:**

1 - Terminal Strip TB2 is energized when the unit disconnect closes. TB2 supplies line voltage to electric heat elements HE1 and HE2. Elements are protected by fuse F3.

**FIRST STAGE HEAT:**

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC is routed to the A55 Unit Controller. After A55 proves N.C. primary limit S15, the electric heat contactor K15 is energized. A55 energizes the blower and economizer.

4 - *7.5kW, 15kW units* - N.O. contacts K15-1 close energizing HE1.
*22.5kW, units* - N.O. contacts K15-1 close energizing HE4, HE1 and HE2.

**END OF FIRST STAGE HEAT:**

5 - Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

6 - Electric heat contactor K15 is de-energized.

7 - *7.5kW, 15kW units* - N.O. contacts K15-1 open de-energizing HE1.
*22.5kW units* - N.O. contacts K15-1 open de-energizing HE1 and HE2.

## Sequence of Operation -E1EH 7.5, 15, 22.5 - Y Voltage

**HEATING ELEMENTS:**

1 - Terminal Strip TB2 is energized when the unit disconnect closes. TB2 supplies line voltage to electric heat elements HE1 and TB3. TB3 supplies line voltage to HE2 and HE3. Elements are protected by fuses F3 and or F42.

**FIRST STAGE HEAT:**

2 - Heating demand initiates at W1 in thermostat.

3 - 24VAC is routed to the A55 Unit Controller. After A55 proves N.C. primary limit S15, the electric heat contactor K15 is energized. A55 energizes the blower and economizer.

4 - *7.5kW and 15kW units* - N.O. contacts K15-1 close energizing HE1.
*22.5kW units* - N.O. contacts K15-1 close energizing HE2 and HE3.

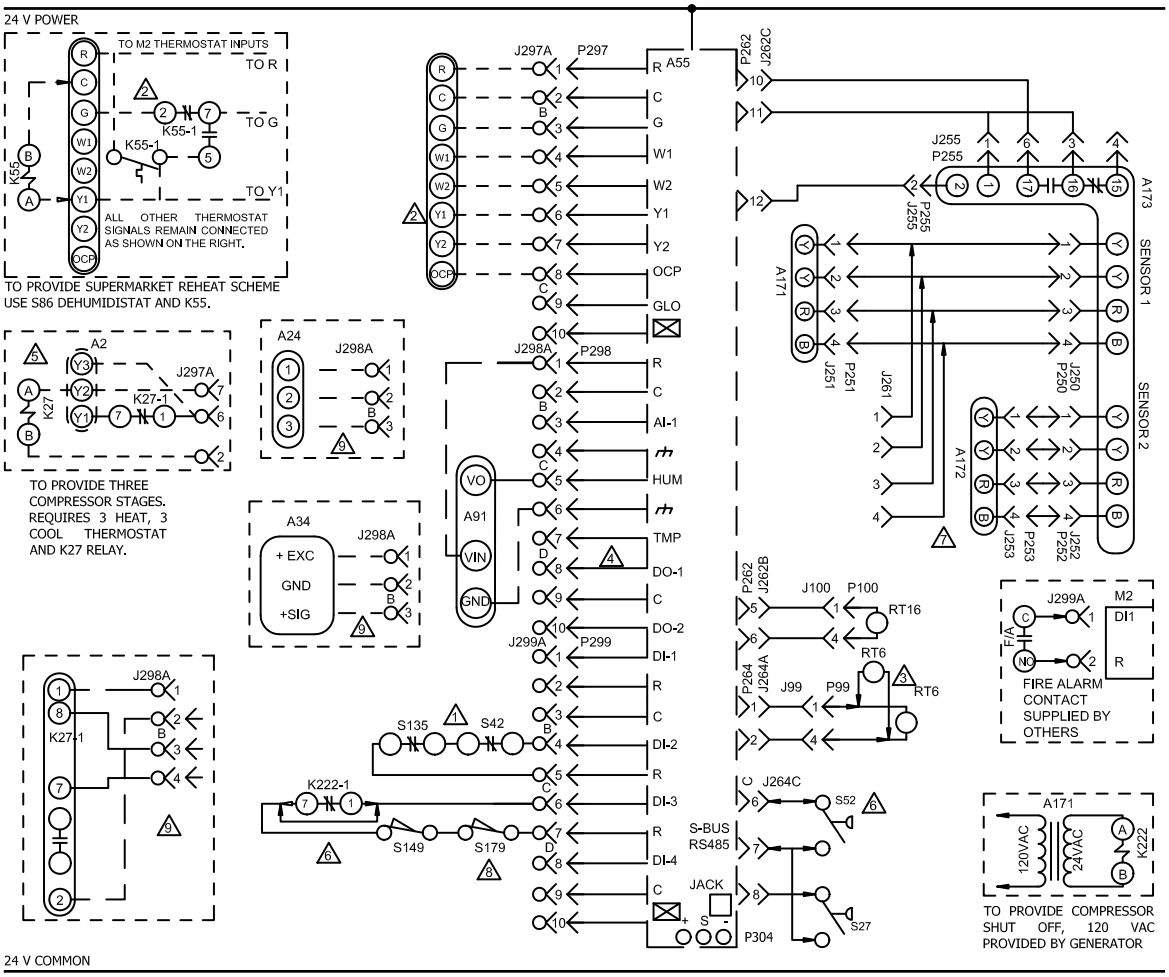
**END OF FIRST STAGE HEAT:**

5 - Heating demand is satisfied. Terminal W1 in the thermostat is de-energized.

6 - Electric heat contactor K15 is de-energized.

7 - *7.5kW, 15kW units* - N.O. contacts K15-1 open de-energizing HE1.
*22.5kW units* - N.O. contacts K15-1 open de-energizing HE2 and HE3.

# ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT




| DESCRIPTION | |
|---|---|
| KEY | COMPONENT |
| A2 | SENSOR, ELECTRONIC THERMOSTAT |
| A24 | CONTROL, OUTDOOR AIR CFM FLOW |
| A34 | DUCT STATIC PRESS |
| A55 | PANEL, MAIN |
| A63 | SENSOR, CO2 (IAQ) OPTIONAL |
| A91 | SENSOR, HUMIDITY |
| A171 | SENSOR ONE, SMOKE, RETURN AIR |
| A172 | SENSOR TWO, SMOKE, SUPPLY AIR |
| A173 | MODULE, CONTROL SMOKE DETECTION |
| J99 | JACK, RT16 RETURN AIR SENSOR |
| J100 | JACK, RT6 SUPPLY AIR SENSOR |
| J250 | JACK, SMOKE DETECTOR ONE |
| J251 | JACK, SMOKE DETECTOR ONE |
| J252 | JACK, SMOKE DETECTOR TWO |
| J253 | JACK, SMOKE DETECTOR TWO |
| J255 | JACK, MODULE, CONTROL SMOKE DETECTION |
| J261 | JACK, SUPPLY SMOKE DETECTOR JUMPER |
| J262 | JACK, ECONOMIZER |
| J264 | JACK, BLOWER DECK |
| J297 | JACK, THERMOSTAT - DDC INTERFACE |
| J298 | JACK, IAQ INTERFACE |
| J299 | JACK, SAFETY INTERFACE |
| K27, -1 | RELAY, TRANSFER |
| K55,-1 | RELAY, BLOWER |
| K222, -1 | RELAY, COMPRESSOR LOCKOUT |
| P99 | PLUG, RT16 RETURN AIR SENSOR |
| P100 | PLUG, RT6 SUPPLY AIR SENSOR |
| P250 | PLUG, SMOKE DETECTOR ONE |
| P251 | PLUG, SMOKE DETECTOR ONE |
| P252 | PLUG, SMOKE DETECTOR TWO |
| P253 | PLUG, SMOKE DETECTOR TWO |
| P255 | PLUG, MODULE, CONTROL SMOKE DETECTION |
| P262 | PLUG, ECONOMIZER |
| P264 | PLUG, BLOWER DECK |
| P297 | PLUG, THERMOSTAT - DDC INTERFACE |
| P298 | PLUG, IAQ INTERFACE |
| P299 | PLUG, SAFETY INTERFACE |
| P304 | PLUG, SYS BUS |
| RT6 | SENSOR, SUPPLY AIR TEMP |
| RT16 | SENSOR, RETURN AIR TEMP |
| S27 | SWITCH, FILTER |
| S52 | SWITCH, AIRFLOW |
| S42 | SWITCH, OVERLOAD RELAY BLOWER MOTOR |
| S86 | SWITCH, DEHUMIDISTAT |
| S135 | OVERLOAD,BLOWER MOTOR SUPPLY |
| S149 | SWITCH, OVERFLOW ONE |
| S179 | SWITCH, OVERFLOW TWO |
| T8 | TRANSFORMER, 120 V GENERATOR POWERED |

1. FOR MOTORS WITH S42 and S135 EXTERNAL OVERLOAD LESS INVERTER, SEE INVERTER WITH BY PASS FOR S42 HOOK UP
2. USE S86 DEHUMIDISTAT AND K55 FOR OPTIONAL SUPERMARKET REHEAT SCHEME, PRODIGY PARAMETERS NEED TO BE MODIFIED UNDER THE SETTINGS MENU OR VIA UC SOFTWARE FOR SIMULTANEOUS HEATING AND COOLING.
3. REMOTE LOCATION OF RT6
4. P298-8 (DO-1) IS SERVICE RELAY OUTPUT (24VAC) IF USED CONNECT TO AN INDICATOR LIGHT
5. THERMOSTAT HOOKUP FOR PROGRAMMABLE CONFIGURATION OF THE BOARD (A55).
6. PRODIGY SETTINGS MUST BE MODIFIED WHEN K222, S42, S52, S135, S149 OR S179 ARE INSTALLED
7. CONNECT A172 SENSOR TO J261 ON SUPPLY AIR SMOKE DETECTOR ONLY
8. S179, OVERFLOW SWITCH USED ON LGH/LCH 420-600 UNITS ONLY
9. A63, A34 & A24 ARE MUTUALLY EXCLUSIVE

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

| 05/16 | WIRING DIAGRAM 537108-03 | 05/16 |
|---|---|---|
| ACCESSORIES | | |
| ELECTRONIC OR ELECTROMECHANICAL THERMOSTAT FOR ENERGENCE | | |
| | SECTION C | REV. 2 |
| Supersedes | New Form No. 537108-03 | |

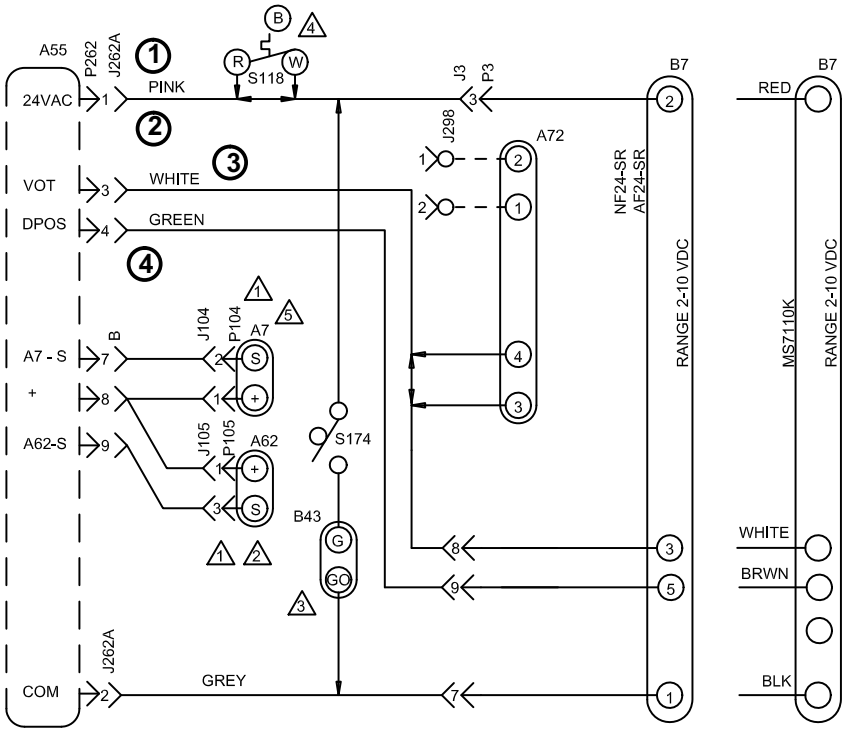
**POWER:**

1. A55 Unit Controller, located in the main control box, supplies thermostat components with 24VAC.

**OPERATION:**

2. A55 receives data from the room/zone sensor A2 and energizes the appropriate components for heat or cool demand.

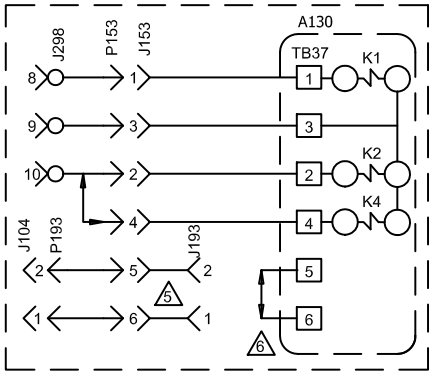
# ECONOMIZER




1. DELETE A7 AND A62 ( IF USED) FOR EITHER GLOBAL ENTHALPY OR SENSIBLE TEMPERATURE CONTROL
2. FOR UNIT DIFFERENTIAL ENTHALPY CONTROL, ADD A62 RETURN AIR ENTHALPY SENSOR
3. OPTIONAL EXHAUST DAMPER ACTUATOR TO HOLD EXHAUST DAMPER CLOSED WHEN OUTSIDE AIR DAMPER IS CLOSED
4. S118 USED ON 35 TO 50 TON ENERGENCE UNITS WITH ENERGY RECOVERY WHEEL ( ERW )
5. REPOSITION A7 ENTHALPY SENSOR FROM ROOFTOP UNIT ECONOMIZER INTO INTAKE HOOD OF THE ERW ROOFTOP UNIT
6. REMOVE JUMPER WHEN INSTALLING OPTIONAL LOW AMBIENT SWITCH

NOTE - THIS DIAGRAM USED ONLY WHEN ECONOMIZER OR MOTORIZED OUTDOOR AIR DAMPERS ARE INSTALLED.

| DESCRIPTION | |
|---|---|
| KEY | COMPONENT |
| A7 | SENSOR, SOLID STATE ENTHALPY |
| A130 | CONTROL, ERS |
| A55 | CONTROL, MAIN PANEL LENNOX |
| A62 | SENSOR, ENTHALPY INDOOR |
| A72 | CONTROL, REMOTE MIN POS (OPT) |
| B7 | MOTOR, DAMPER ECONOMIZER |
| B43 | MOTOR, EXHAUST DAMPER |
| J3 | JACK, UNIT ECONOMIZER |
| J104 | JACK, SENSOR OUTDOOR ENTHALPY |
| J105 | JACK, SENSOR RETURN AIR ENTHALPY |
| J153 | JACK, ENTHALPY / DAMPER MOTOR |
| J193 | JACK, ENTHALPY SENSOR |
| J298A | JACK, IAQ INTERFACE |
| J262A | JACK, DAMPER MOTOR |
| J262B | JACK, ENTHALPY SENSORS |
| P3 | PLUG, ECONOMIZER BYPASS |
| P153 | PLUG, ENTHALPY / DAMPER MOTOR |
| P193 | PLUG, ENTHALPY SENSOR |
| P262 | PLUG, ECONOMIZER OUTPUT |
| S118 | THERMOSTAT, DESICANT DEFROST |
| S174 | SWITCH, EXHAUST DAMPER |




ENERGY RECOVERY WHEEL HOOK UP

| WIRING DIAGRAM | 04/14 |
|---|---|
| ACCESSORIES | |
| ENERGENCE SERIES ECONOMIZER AND MOTORIZED OAD PIVOTING WHEEL ENERGY RECOVERY SYSTEM OPTION | |
| SECTION D | REV 2 |
| Supersedes | New Form No. 537189-01 |

DESIGNATES OPTIONAL WIRING
CLASS II FIELD WIRING

04/14

537189-01

## SEQUENCE OF OPERATION

**POWER:**

1. A55 Unit Controller energizes the economizer components with 24VAC.

**OPERATION:**

2. Sensor(s), a global input, or a communication signal communicates to A55 when to power the damper motor B7.
3. A55 supplies B7 with 0 - 10 VDC to control the positioning of economizer.
4. The damper actuator provides 2 to 10 VDC position feedback.