PACKAGED ELECTRIC / ELECTRIC

LCH

Energence® Ultra-High Efficiency Rooftop Units

60 HZ

Bulletin No. 210686
July 2015
Supersedes April 2015

PRODUCT SPECIFICATIONS

ENERGENCE™
Saving Energy with Intelligence

PRODIGY™ CONTROL SYSTEM

SMARTWIRE™ SYSTEM

SUNSOURCE® Commercial Energy System

MSAV™ MULTI-STAGE AIR VOLUME

L Connection® NETWORK

ASHRAE 90.1 COMPLIANT

ENERGY STAR

7.5 to 12.5 Tons

Net Cooling Capacity – 92,000 to 138,000 Btuh

Optional Electric Heat - 7.5 to 60 kW

MODEL NUMBER IDENTIFICATION

L C H 122 U 4 E N 1 Y

Brand/Family
L = Energence®

Unit Type
C = Packaged Electric Cooling w/ optional Electric Heat

Major Design Sequence
H = 1st Generation

Nominal Cooling Capacity - Tons
094 = 7.5 Tons
122 = 10 Tons
152 = 12.5 Tons

Cooling Efficiency
U = Ultra High Efficiency

Refrigerant Type
4 = R-410A

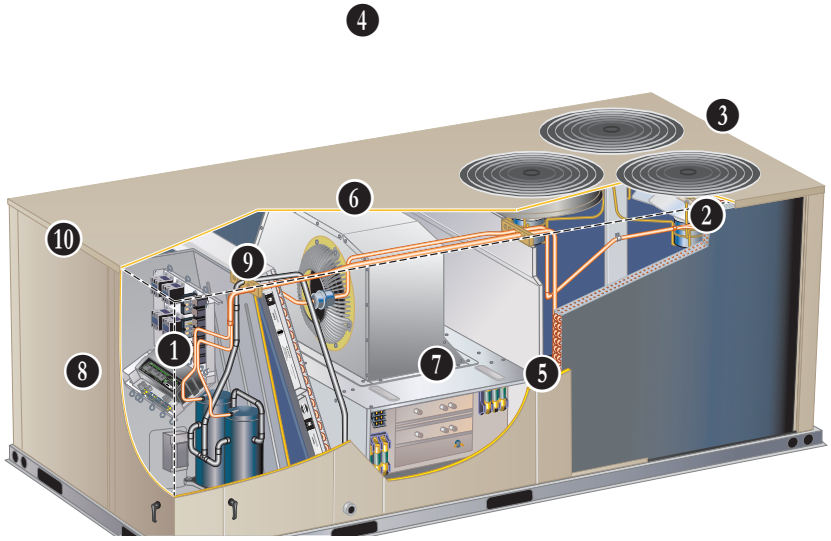
Blower Type
E = MSAV® (Multi-Stage Air Volume) Supply Air Blower Option, DirectPlus™ Blower System (Direct Drive)
M = MSAV® (Multi-Stage Air Volume) Supply Air Blower Option, Belt Drive

Factory Installed Electric Heat
N = No Heat
C = 7.5 kW Electric Heat
E = 15 kW Electric Heat
G = 22.5 kW Electric Heat
J = 30 kW Electric Heat
K = 45 kW Electric Heat
L = 60 kW Electric Heat

Minor Design Sequence
1 = 1st Revision
2 = 2nd Revision
3 = 3rd Revision

Voltage
Y = 208/230V-3 phase-60hz
G = 460V-3 phase-60hz
J = 575V-3 phase-60hz

FEATURES AND BENEFITS



Lennox' Energence® Ultra-High Efficiency packaged rooftop unit product line was created to save energy with intelligence by offering some of the highest energy efficiency ratings available with a powerful, easy to use unit controller. This makes Energence rooftop units perfect for business owners looking for an HVAC product with the lowest total cost of ownership. Energence rooftop units feature:

- **Hinged Access Panels -** Provide quick access to components and protect panels and roof from damage during servicing.
- **Isolated Compressor Compartment -** Allows performance check during normal compressor operation without disrupting airflow.
- **Corrosion-Resistant Removable, Reversible Drain Pan -** Provides application flexibility, durability and improved serviceability.
- **Dual-Flow Thermal Expansion Valve System -** Provide peak cooling performance across the entire application range.
- **Ultra-High Efficiency Cooling System With Tandem Scroll Compressors -** Tandem Scroll Compressors are standard on all units for reliable, long-term operation. Advanced compressor control system operation for full or part-load conditions.
- **DirectPlus™ Blower System (Direct Drive Models) -** High-efficiency, variable-speed ECM motor combined with an aerodynamically optimized impeller for quiet operation.
- **MSAV® (Multi-Stage Air Volume) Supply Air Blower -** Allows multi-staged air delivery.
- **Auto-Tensioner for Blower Belt (Belt Drive Models) -** Factory option ensures blower is delivering the proper airflow for comfort, while maximizing efficiency and belt life.
- **MERV 13 Filters -** Available as factory or field option, provide an enhanced level of indoor air quality, and can help the building qualify for additional LEED credits.
- **Foil-Faced Insulation -** Insulation on all internal surfaces that have contact with airflow helps minimize airborne fibers and improve IAQ.
- **Common Components -** Many maintenance items are standard throughout the entire product line, reducing the need to carry different parts to the job or maintain in inventory.

Prodigy® Control System

Standard on every Energence rooftop unit, the Prodigy® 2.0 unit controller is the center of the Prodigy Control System. The intuitive user interface makes setup, troubleshooting and service easier than ever. Each unit tracks the runtime of every major component and records the date and time when service or maintenance is performed.

SmartWire™ System

The SmartWire system simplifies field sensor or thermostat installation through advanced connectors that are keyed and color-coded to help prevent miswiring. Not only is the wire coloring scheme standardized across all models, each connection is intuitively labeled to make troubleshooting and servicing quick and easy.

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APPROVALS

AHRI Certified to AHRI Standard 340/360-2007.

ETL listed.

Efficiency ratings are certified by CSA.

Components are bonded for grounding to meet safety standards for servicing required by UL, ULC and National and Canadian Electrical Codes.

All models are ASHRAE 90.1-2010 energy efficiency compliant and meet or exceed requirements of Section 6.8.

All models meet California Code of Regulations, Title 24 and ASHRAE 90.1-2010 Section 6.4.3.10 requirements for staged airflow.

ENERGY STAR® certified units are designed to use less energy, help save money on utility bills, and help protect the environment.

The ENERGY STAR® Partner of the Year Award signifies that Lennox has made outstanding contributions to design energy efficient units that will lower energy bills, while meeting industry standards for comfort and indoor air quality. Lennox was the first HVAC manufacturer to win this award and has been a four-time recipient since 2003.

ISO 9001 Registered Manufacturing Quality System.

WARRANTY

Limited five years on compressors.

Limited three years on Prodigy® 2.0 unit controller.

Limited five years on Optional High Performance Economizers.

Limited one year all other covered components.

COOLING SYSTEM

Designed to maximize sensible and latent cooling performance at design conditions.

System can operate from 0°F to 125°F without any additional controls.

R-410A Refrigerant
Non-chlorine based, ozone friendly, R-410A.

❶ **Tandem Scroll Compressors**
Scroll compressors on all models for high performance, reliability and quiet operation.

Advanced cooling system design features tandem compressors arranged in one single circuit system operate together or independently depending on load requirements.

Compressors utilize the maximum area of the coils for maximum heat transfer.

Advanced algorithms in the Prodigy® Control System manage compressor run-times to even the load between the system when running at part-load conditions.

Slide-out compressor tray allows easy access for servicing.

Compressors and tray are resiliently mounted on rubber grommets for quiet operation.

Compressor Crankcase Heaters

Protects against refrigerant migration that can occur during low ambient operation or during extended off cycles.

Dual-Flow Thermal Expansion Valve System
Assures optimal performance throughout the application range. Removable element head.

Dual valve assembly with flow control.

Filter/Drier
High capacity filter/drier protects the system from dirt and moisture.

High Pressure Switches
Protects the compressors from overload conditions such as dirty condenser coils, blocked refrigerant flow, or loss of outdoor fan operation.

Low Pressure Switch
Protects the compressors from low pressure conditions such as low refrigerant charge, or low/no airflow.

Freezestat
Protects the evaporator coil from damaging ice build-up due to conditions such as low/no airflow, or low refrigerant charge.

❷ **Condenser Coil**
Copper tube construction, enhanced rippled-edge aluminum fins, flared shoulder tubing connections, silver soldered construction.

COOLING SYSTEM (continued)

Evaporator Coil
Copper tube construction, enhanced rippled-edge aluminum fins, flared shoulder tubing connections, silver soldered construction for improved heat transfer.

Cross row circuiting with rifled copper tubing optimizes both sensible and latent cooling capacity.

Condensate Drain Pan
Plastic pan, sloped to meet drainage requirements per ASHRAE 62.1.

Side or bottom drain connections.

Reversible to allow connection at back of unit.

❸ **Variable-Speed ECM Outdoor Coil Fan Motors**
Fan speed is directly controlled by the Prodigy 2.0 unit controller.

Thermal overload protected, totally enclosed, permanently lubricated ball bearings, shaft up, wire basket mount.

Outdoor Coil Fans
PVC coated fan guard furnished.

Required Selections

Cooling Capacity
Specify nominal cooling capacity of the unit

Options/Accessories

Factory or Field Installed

Condensate Drain Trap
Available in copper or PVC.

Field installed only, may be factory ordered to ship with unit.

Drain Pan Overflow Switch
Monitors condensate level in drain pan, shuts down unit if drain becomes clogged.

CABINET

❹ **Construction**
Heavy-gauge steel panels and full perimeter heavy-gauge galvanized steel base rail provides structural integrity for transportation, handling, and installation.

Base rails have rigging holes.

Three sides of the base rail have forklift slots.

Raised edges around duct and power entry openings in the bottom of the unit provide additional protection against water entering the building.

Airflow Choice
Units are shipped in downflow (vertical) configuration, can be field converted to horizontal airflow with optional Horizontal Discharge Kit.

Duct Flanges
Provided for horizontal duct attachment.

Power Entry
Electrical lines can be brought through the unit base or through horizontal access knock-outs

Exterior Panels
Constructed of heavy-gauge, galvanized steel with a two-layer enamel paint finish.

Insulation
All panels adjacent to conditioned air are fully insulated with non-hygroscopic fiberglass insulation.

Unit base is fully insulated. The insulation also serves as an air seal to the roof curb, eliminating the need to add a seal during installation.

❺ **Hinged Access Panels**
Hinged tool-less access panels are provided for the filter section, blower/heating section and compressor/controls section.

All hinged panels have seals and quarter-turn latching handles to provide a tight air and water seal.

Required Selections

Airflow Configuration
Specify downflow or horizontal.

Options/Accessories

Factory or Field Installed

Return Air Adaptor Plate
For same size LC/LG/LH and TC/TG/TH unit replacement.

Installs on return air opening in unit to match return air opening on existing roof curbs. Also see Accessory Air Resistance table.

Factory Installed

Corrosion Protection
A completely flexible immersed coating with an electrodeposited dry film process. (AST ElectroFin E-Coat) Meets Mil Spec MIL-P-53084, ASTM B117 Standard Method Salt Spray Testing.

Indoor Corrosion Protection:
- Coated coil
- Painted blower housing
- Painted base

Outdoor Corrosion Protection:
- Coated coil
- Painted base

Field Installed

Combination Coil/Hail Guards
Heavy gauge steel frame painted to match cabinet with expanded metal mesh to protect the outdoor coil from damage.

Horizontal Discharge Kit
Consists of duct covers to block off downflow supply and return air openings for horizontal applications.

Also includes return air duct flanges for end return air when economizer is used in horizontal applications.

NOTE - When configuring unit for horizontal application with economizer, a separate Horizontal Barometric Relief Damper with Hood must be ordered separately for installation in the return air duct.

❻ BLOWER

A wide selection of supply air blower options are available to meet a variety of airflow requirements.

DirectPlus™ Blower System

High-efficiency, variable-speed ECM (electronically commutated) motor with an aerodynamically optimized impeller with backward curved blades mounted directly onto the rotor.

Design combines the motor and electronics into one unit, eliminating the need for a variable-frequency drive.

Maintains the ability to ramp up or down the blower to meet comfort needs.

Blower assembly slides out of unit for servicing.

Air inlet grill reduces indoor sound levels without affecting air performance.

Belt Drive Blower System

Overload protected, equipped with ball bearings. Belt drive motors are offered on all models and are available in several different sizes to maximize air performance.

All blower motors 5 hp and above meet minimum energy efficiency standards in accordance with the Energy Independence and Security Act (EISA) of 2007.

Forward curved blades, double inlet, blower wheel is statically and dynamically balanced. Equipped with ball bearings and adjustable pulley (allows speed change during commissioning).

Blower assembly slides out of unit for servicing.

Required Selections

Select DirectPlus™ or Belt Drive Option with MSAV® (Multi-Stage Air Volume) Supply Air Blower

MSAV (Multi-Stage Air Volume) supply air blower stages the amount of airflow according to compressor stages, heating demand, ventilation demand or smoke alarm.

NOTE - Part load airflow in cooling mode should not be set below 160 cfm/nominal full load ton to reduce the risk of evaporator coil freeze-up.

Belt Drive MSAV option utilizes a Variable Frequency Drive (VFD) to stage the supply blower airflow. The VFD alters the frequency and voltage of the power supply to the blower to control blower speed.

The amount of airflow for each stage can be set according to a parameter in the Prodigy 2.0 unit controller. Unit is shipped from the factory with preset airflow.

The MSAV® belt drive supply air blower option can be ordered with or without an Electronic Bypass Control. If equipped with the bypass control the MSAV features manual (default) or automatic electronic bypass control of the VFD. In case of a VFD malfunction, a VFD alarm is generated by the Prodigy® 2.0 unit controller. The VFD can be manually bypassed to continue unit operation at full blower speed. Or the unit controller can be set to automatically switch to full blower speed if a VFD alarm is generated.

The VFD has an operational range of 0 to 125°F outdoor air ambient temperature.

Lower operating costs are obtained when the blower is operated on lower speeds.

Ordering Information

Specify motor horsepower and drive kit number when base unit is ordered.

Options/Accessories

Factory Installed

Blower Belt Auto-Tensioner

Provides proper tension to belt drive blower belt without the need for regular adjustments. Maintains airflow and proper performance.

FEATURES AND BENEFITS

ELECTRICAL

SmartWire™ System
Advanced wiring connectors are keyed and color-coded to prevent miswiring. Wire coloring scheme is standardized across all models. Each connection is intuitively labeled to make troubleshooting and servicing quick and easy.

Electrical Plugs
Positive connection electrical plugs are used to connect common accessories or maintenance parts for easy removal or installation.

Phase/Voltage Detection
Phase detection monitors power supply to assure phase is correct at unit start-up. If phase is incorrect, the unit will not start and an alarm code is reported to the unit controller. Protects unit from being started with incorrect phasing which could lead to issues such as compressors running backwards.

Voltage detection monitors power supply voltage to assure proper voltage. If voltage is not correct (over/under voltage conditions) the unit will not start and an alarm code is reported to the unit controller.

Required Selections

Voltage Choice
Specify when ordering base unit.

Options/Accessories

Factory Installed

Circuit Breakers
HACR type. For overload and short circuit protection. Factory wired and mounted in the power entry panel. Current sensitive and temperature activated. Manual reset.

SCR (Silicon Controlled Rectifier) Electric Heat Control
The SCR Electric Heat Control modulates small, precise increments of power to the electric heat load eliminating temperature fluctuations associated with mechanical controls.

Almost instantaneous operation with no moving parts.

Zero-Cross (fast cycling) feature improves electric heater life with less contraction and expansion of the heating elements.

The SCR operates when there is no call for heat from the building control system or thermostat. SCR air tempering is controlled by a secondary thermostat and remote duct sensor (ordered separately). A call for heat overrides the SCR and modulates the SCR to 100% heat output. A call for cooling overrides the SCR.

NOTE - The SCR option is not available with 45 kW and 60 kW electric heat (208/230V) models.

NOTE - Blower Proving Switch is required and must be ordered separately for factory installation. See Controls in the Options/ Accessories table.

NOTE - Available for use with conventional thermostat controls or Novar® control systems only.

Factory or Field Installed

Disconnect Switch
Accessible from outside of unit, spring loaded weatherproof cover furnished.

❼ **Electric Heat**
Helix wound nichrome elements, individual element limit controls, wiring harness. Unit fuse block is furnished as standard. See Options / Accessories tables for ordering information.

❽ **GFI Service Outlets (2)**
115V ground fault circuit interrupter (GFCI) type, non-powered, field-wired.

Field Installed

GFI Weatherproof Cover
Single-gang cover.

Heavy-duty UV-resistant polycarbonate case construction.

Hinged base cover with gasket.

INDOOR AIR QUALITY

❾ **Air Filters**
Disposable 2-inch filters furnished as standard.

Options/Accessories

Factory or Field Installed

Healthy Climate® High Efficiency Air Filters
Disposable MERV 8 or MERV 13 (Minimum Efficiency Reporting Value based on ASHRAE 52.2) efficiency 2-inch pleated filters.

Healthy Climate® UVC Germicidal Lamps

Germicidal lamps emit ultra-violet (UV-C) energy, which has been proven to be effective in reducing microbes such as viruses, bacteria, yeasts, and molds. This process either destroys the organism or controls its ability to reproduce.

UV-C energy greatly reduces the growth and proliferation of mold and other bioaerosols (bacteria and viruses) on illuminated surfaces (particularly coil and drain pan).

Lamps are field installed in the blower/evaporator coil section.

All necessary hardware for installation is included.

Lamps operate on 208/230V power supply. Step-down transformer must be field supplied when used with 460V and 575V rooftop units.

Magnetic safety interlock terminates power when access panels are removed.

Approved by ETL

Field Installed

Replacement Filter Media Kit With Frame
Replaces existing pleated filter media. Includes washable metal mesh screen and metal frame with clip for holding replaceable non-pleated filter.

Indoor Air Quality (CO_2) Sensors
Monitors CO_2 levels, reports to the Prodigy® 2.0 unit controller which adjusts economizer dampers as needed.

⑩ PRODIGY 2.0 UNIT CONTROLLER

The Prodigy 2.0 unit controller is a microprocessor-based controller that provides flexible control of all unit functions.

Features:

LCD Display - Easy to read menu with buttons for menu navigation. during setup and diagnostics. 4 lines x 20 character display.

Menu LEDs - Four LEDs (*Data, Setup, Service, Settings*) aid in menu navigation.

Main Menu and Help Buttons - Quick navigation to home screen and built-in help functions.

Scroll, Value Adjustment Select and Save Buttons

Simplified Setup Procedure - SETUP menu insures proper installation and setup of the rooftop unit.

Profile Setup - Copy key settings between units with the same configuration greatly reducing setup time.

USB Port - Allows a technician to download and transfer unit information to help verify service was performed.

USB drive will also allow updating software on the Prodigy Control System to obtain enhanced functionality without the need to change components.

Unit Controller Software

Unit Self-Test - Unit Controller can perform a rooftop unit self-test to verify individual critical component and system performance. Included is an economizer test function that helps assure the economizer is operating correctly.

Time Clock with Run-time Information

Built-In Functions Include:

Adjustable Blower On/Off Delay

Built-in Control Parameter Defaults

Compressor Time-Off Delay

DDC Compatible

Dirty Filter Switch Input

Discharge Air Temperature Control

Display/Sensor Readout

Economizer Control Options - See Economizer / Outdoor Air / Exhaust Options.

Fresh Air Tempering

Extensive Unit Diagnostics - Over 100 diagnostic and status messages in English.

Exhaust Fan Control Modes - Fresh air damper position.

Permanent Diagnostic Code Storage

Field Adjustable Control Parameters - Over 200 different control settings.

Indoor Air Quality Input - Demand Control Ventilation ready

Low Ambient Controls - Cooling operation down to 40°F.

Gas Valve Time Delay Between First and Second Stage

Minimum Compressor Run Time

Network Capable - Can be daisy chained to other units or controls.

Night Setback Mode

Return Air Temperature Limit Control

Safety Switch Input - Allows Controller to respond to a external safety switch trip.

Service Relay Output

Smoke Alarm Mode - Four choices (unit off, positive pressure, negative pressure, purge).

Staging - Up to 2 heat/2 cool (standard Prodigy 2.0 unit controller thermostat input). Up to 3 cool with additional relay. Up to 4 cool with room sensor or network operation.

"Strike Three" Protection

Gas Reheat Control - Simultaneous heating and cooling operation for controlling humidity for process air applications such as supermarkets.

NOTE - Prodigy Control System features shown vary with the type of rooftop unit the control is installed in.

NOTE - See separate Prodigy Control System Product Specifications Bulletin for additional information.

Thermostat Bounce Delay

Warm Up Mode Delay

LED Indicators

PC Interface - Connect to the Prodigy 2.0 unit controller from a PC with the Lennox Unit Controller Software.

Room Sensor Operation - Controls temperature.

Options / Accessories

Factory or Field Installed

Blower Proving Switch
Monitors blower operation, shuts down unit if blower fails.

Dirty Filter Switch

Senses static pressure increase indicating dirty filter condition.

Controls Options

Factory or Field Installed

Fresh Air Tempering
Used in applications with high outside air requirements. The Controller energizes the first stage heat as needed to maintain a minimum supply air temperature for comfort, regardless of the thermostat demand. When ordered as a factory option, the sensor ships with the unit but must be field installed.

General Purpose Control Kit
Plug-in control provides additional analog and digital inputs/outputs for field installed options.

Smoke Detector
Photoelectric type, installed in supply air section, return air section or both sections. Available with power board and single sensor (supply or return) or power board and two sensors (supply and return). Power board located in unit control compartment.

Interoperability via BACnet® or LonTalk® Protocols
Communication compatible with third-party automation systems that support the BACnet Application Specific Controller device profile, LonMark® Space Comfort Controller functional profile, or LonMark Discharge Air Controller functional profile.

OPTIONS / ACCESSORIES

Controls Options (continued)

Commercial Control Systems

L Connection® Network Control System
Complete building automation control system for single or multi-zone applications. Options include local interface, software for local or remote communication, and hardware for networking other control functions. See L Connection Network Control System Product Specifications Bulletin for details.

Aftermarket DDC
Novar® ETM Modules and options.

Thermostats
Control system and thermostat options. Aftermarket unit controller options.

Field Installed

Humidity Sensor Kit
Humidity sensor required with Supermarket reheat field selectable option.

ECONOMIZER OPTIONS

Standard and High Performance Models available.

Economizer operation is set and controlled by the Prodigy 2.0 unit controller.

Simple plug-in connections from economizer to unit controller for easy installation.

All Energence rooftop units are equipped with factory installed CEC Title 24 approved sensors for outside, return and discharge air temperature monitoring.

Optional sensors may be used instead of unit sensors to determine whether outdoor air is suitable for free cooling. See Options/Accessories table.

Factory or Field Installed

Economizer
(Standard and High Performance Common Features)
Downflow or Horizontal with Outdoor Air Hood.

Outdoor Air Hood is included when economizer is factory installed and is furnished with economizer when ordered for field installation.

Downflow Barometric Relief Dampers with Exhaust Hood is also furnished.

Standard Economizer Features (Not for Title 24)
Parallel gear-driven action, return air and outdoor air dampers, plug-in connections to unit, nylon bearings, neoprene seals, 24-volt, fully-modulating spring return motor.

NOTE: The Free Cooling default setting for outdoor air temperature sensor is 55°F.

High Performance Economizer Features
Approved for California Title 24 building standards.

ASHRAE 90.1-2010 compliant.

Parallel gear-driven action, high torque 24-volt fully-modulating spring return damper motor, return air and outdoor air dampers, plug-in connections to unit, stainless steel bearings, enhanced neoprene blade edge seals and flexible stainless steel jamb seals to minimize air leakage.

NOTE - High Performance Economizers are not approved for use with enthalpy controls in Title 24 applications.

NOTE - The Free Cooling setpoint for Title 24 applications must be set based on the Climate Zone where the system is installed. See Section 140.4 "Prescriptive Requirements for Space Conditioning Systems" of the California Energy Commission's 2013 Building Energy Efficiency Standards.

Refer to Installation Instructions for complete setup information.

Differential Sensible Control
Factory setting. Uses outdoor air and return air sensors that are furnished with the unit. The Prodigy 2.0 unit controller compares outdoor air temperature with return air. When the outdoor air is below the configured setpoint and cooler than return air, the controller activates the economizer.

NOTE - Differential Sensible Control can be configured in the field to provide Offset Differential Sensible Control or Single Sensible Control.

In Offset Differential Sensible Control mode, the economizer is enabled if the temperature differential (offset) between outdoor air and return air reaches the configured setpoint.
In Single Sensible Control mode, the economizer is enabled when outdoor air temperature falls below the configured setpoint.

Global Control
The unit controller communicates with a DDC system with one global sensor (enthalpy or sensible) to determine whether outside air is suitable for free cooling on all units connected to the control system. Sensor must be field provided.

NOTE - Global control with enthalpy is not approved for Title 24 applications.

Economizer Control Options

Factory or Field Installed

Single Enthalpy Temperature Control
(Not for Title 24)
Outdoor air enthalpy sensor enables Economizer if the outdoor enthalpy is less than the setpoint of the control.

Differential Enthalpy Control
(Not for Title 24)
Order two Single Enthalpy Controls. One is field installed in the return air section, the other in the outdoor air section. Allows the economizer control to select between outdoor air or return air, whichever has lower enthalpy.

OPTIONS / ACCESSORIES

ECONOMIZER OPTIONS (continued)

Economizer Control Options

Field Installed

Outdoor Air CFM Control
Maintains constant outdoor air volume levels on the supply air fan and varying unit airflows. Using information from a velocity sensor located in the rooftop unit outdoor air section, the Prodigy® 2.0 unit controller changes the economizer position to help minimize the effect of supply fan speed changes on outdoor air volume levels. Setpoint for outdoor air volume is established by field testing.

NOTE - Not available with Demand Control Ventilation (CO_2 Sensor) or Building Pressure Control.

Building Pressure Control
Maintains constant building pressure level.

Using information from a differential pressure between the outdoor air and the building air, the Prodigy® 2.0 unit controller changes the economizer position to help maintain a constant building pressure.

NOTE - Not available with Demand Control Ventilation (CO_2 Sensor) or Outdoor Air CFM Control.

EXHAUST OPTIONS

Factory or Field Installed

Power Exhaust Fans
Installs internal to unit for downflow applications only with Economizer option. Provides exhaust air pressure relief. Interlocked to run when supply air blower is operating, fans run when outdoor air dampers are 50% open (adjustable), motor is overload protected. Requires Economizer and Downflow Barometric Relief Dampers. Fan is 20 in. diameter with 5 blades (K1PWRE10B) WITH 1/3 hp motor.

Field Installed

Horizontal Low Profile Barometric Relief Dampers
For use when unit is configured for horizontal applications requiring an economizer.

Allows relief of excess air. Aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle.

Field installed in return air duct.

Bird screen and exhaust hood furnished.

Requires Horizontal Discharge Kit.

OUTDOOR AIR OPTIONS

Factory or Field Installed

Outdoor Air Damper - Downflow or Horizontal With Air Hood
Linked mechanical dampers, 0 to 25% (fixed) outdoor air adjustable, installs in unit. Includes outdoor air hood.
Automatic model features fully modulating spring return damper motor with plug-in connection.

Manual model features a slide damper.

Maximum mixed air temperature in cooling mode: 100°F.

ROOF CURBS

Nailer strip furnished, mates to unit, US National Roofing Contractors Approved, shipped knocked down.

Hybrid Roof Curbs, Downflow
Roof curb can be assembled using interlocking tabs to fasten corners together. No tools required.

Curb can also be fastened together with furnished hardware.

Available in 8, 14, 18, and 24 inch heights.

Adjustable Pitch Curb
Fully adjustable pitch curbs (3/4 in. per foot in any direction) provide a level platform for rooftop units allowing flexible installations on roofs with uneven or sloped angles.

Uses interlocking tabs to fasten corners together. No tools required.

Hardware is furnished to connect upper curb with lower curb.

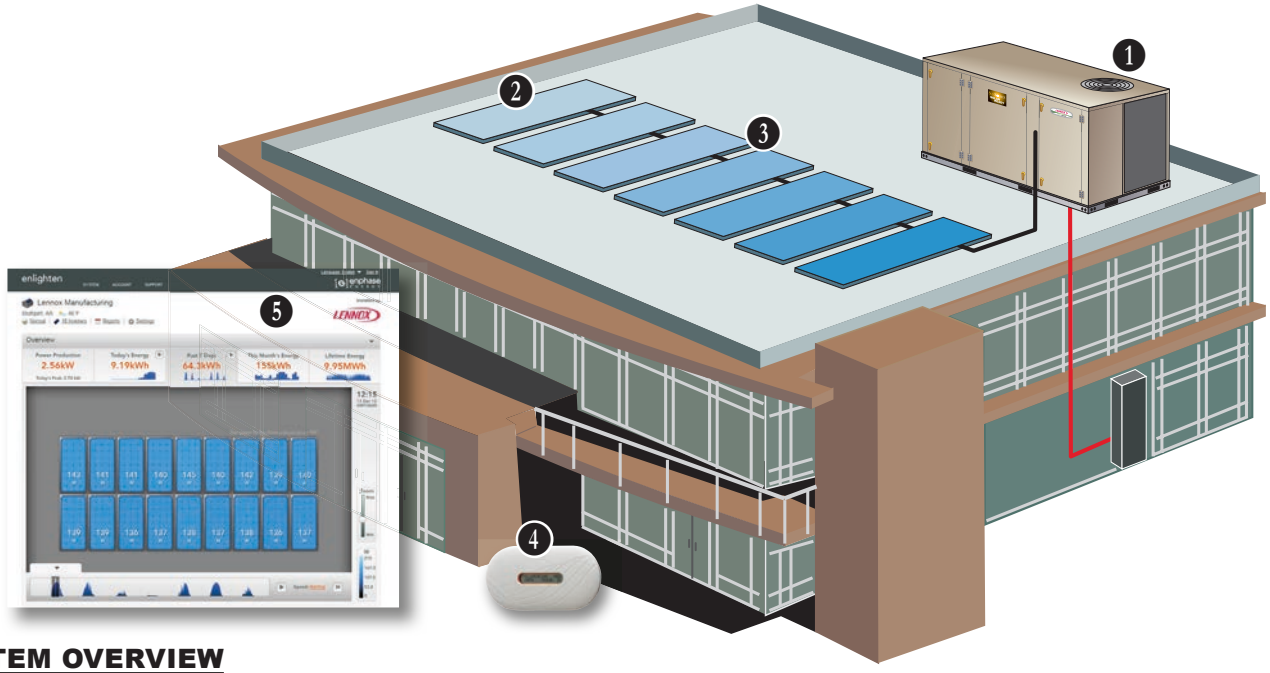
Available in 14 inch height.

CEILING DIFFUSERS

Ceiling Diffusers (Flush or Step-Down)
Aluminum grilles, large center grille, insulated diffuser box with flanges, hanging rings furnished, interior transition (even air flow), internally sealed (prevents recirculation), adapts to T-bar ceiling grids or plaster ceilings.

Transitions (Supply and Return)
Used with diffusers, installs in roof curb, galvanized steel construction, flanges furnished for duct connection to diffusers, fully insulated.

SUNSOURCE® COMMERCIAL ENERGY SYSTEM



SYSTEM OVERVIEW

All Energence® 7.5 through 12.5 ton commercial rooftop units are upgradable to the SunSource® Commercial Energy System.

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

The SunSource® Commercial Energy System consists of the following components:

1. Energence® 7.5 to 12.5 ton commercial rooftop units with factory installed Solar Power Entry Option (circuit protection for solar power and line voltage wiring).
2. Solarworld Solar Modules (up to 24 modules) may be used to vary the amount of electricity generated).
3. Enphase Microinverter, converts Direct Current to Alternating Current power.
4. Enphase Envoy Communications Gateway that monitors energy usage.
5. Enphase Enlighten™ Performance Monitoring Website

Wiring from the roof mounted solar modules is routed to the rooftop unit.

NOTE - Refer to separate Product Specifications Bulletin for the **SunSource® Commercial Energy System** for more detailed information.
See section *Solar - Kits/Accessories*.

Also refer to ***SunSource® Commercial Energy System Applications and Design Guidelines*** Manual (Corp. 1303-L1) for complete information on designing, sizing and installing a complete system.

APPROVALS

SunSource® Commercial Energy System is listed by ETL to UL 1995 and can be installed to comply with the NEC.

The SunSource® Energy System for Commercial Rooftop Units meets the requirements for federal tax credits listed under the U.S. Emergency Economic Stabilization Act of 2008, covering 30% of the cost of the solar modules, including installation.

BASIC SYSTEM REQUIREMENTS

Sufficient south-facing open roof space.

Broadband Internet connection.

208V three-phase or 460V three-phase.

NOTE: Transformers must be ordered for voltages other than 208V three-phase WYE.

Grid Interconnection Agreement.

SOLAR POWER ENTRY OPTION

A factory installed power entry option is available for Energence® rooftop units that provides a connection point for SunSource® solar modules.

The option provides circuit protection (fuses) for the solar connection and rooftop unit components.

An externally accessible disconnect (non-fused) is also included to shutdown the system for service. Field wiring connections are made directly to the disconnect for the utility connection and to pigtails for easy solar connection.

Local codes may require a field provided solar disconnect and/or a field provided fused HVAC disconnect.

SOLAR MODULES

Captures solar energy to convert into AC power through the Enphase Microinverter.

Laminated solar module structure consists of the solar glass, two ethylene vinyl acetate (EVA) sheets, the solar cell matrix and a back sheet.

Thick low-iron safety glass withstands extreme weather conditions and heavy snow loads.

Solar modules are ETL/Intertek listed for the US and Canada to UL Standard 1703 and meet National and Canadian Electrical Code requirements.

Solar Module Frame
Clear anodized aluminum frame with cast aluminum corner keys.

Low profile with extended flange.

Compatible with “top-down” and “bottom-up” mounting methods.

Eight grounding locations (Four corners of the frame and four locations along the length of the module in the extended flange).

Extended cable lengths for easier installation.

ENPHASE MICROINVERTER

Converts Direct Current (DC), captured by a solar module, to Alternating Current (AC) power. Each solar module is paired with one Enphase Microinverter.

Installed beneath each solar module on the roof.

Enphase Microinverters operate independently from each other allowing solar modules that are not shaded or dirty to operate with optimum performance.

Supports low-light and low-voltage operation.

FLAT ROOF MOUNTING SYSTEM

PanelClaw® Polar Bear III roof mounting system is designed to maximize array construction speed.

Innovative system consists of three major components (Support, Ballast Tray and Claw).

Modular, adaptable design with single module tilt-up feature to facilitate access to roof, wiring and maintenance.

10 degree nominal tilt angle.

Fully ballasted or mechanically attached.

- **Support -** Galvanized steel tubing. (1) Support unit with pre-installed integrated recycled rubber pads and mounting hardware.
- **Ballast Tray** - Angled fit with locking end-tab to fully capture ballast blocks. Hemmed edges and chamfered corners prevent wiring from coming into contact with sharp edges. Ballast blocks are field provided.
- **Claw -** Attachment to module using standard module mounting holes. UL 2703 certified for electric bonding and grounding. G90 galvanized steel.

ENPHASE ENGAGE CABLE SYSTEM

- **Enphase Engage Cable** - Enphase Engage Cable (shown with connector) is a 12 AWG cable with pre-installed connectors that plug into the Enphase Microinverter.

- Five wire cable (208V three-phase)
- **Enphase Engage Cable Terminator** - Each Enphase Engage Cable is terminated at a junction or combiner box. The opposite end of the cable must be terminated with an Enphase Engage Cable Terminator cap.

- **Enphase Engage Disconnect Tool** - Spe**c**ialized tool that disconnects ble from an Enphase Microinverter or watertight sealing cap.

- **Enphase Water-tight Sealing Cap** - Use when open connections on the Enphase Engage Cable are not mated to an Enphase Microinverter.

SYSTEM MONITORING

Enphase Envoy Communications Gateway (with Wireless Capability)

The Enphase Envoy Communications Gateway monitors Enphase Microinverter (on solar modules) performance and can be connected to a broadband internet connection to send data to the Enphase Enlighten™ web site for online monitoring. The Enphase Envoy Communications Gateway is not required, but must be used if system performance monitoring is desired.

Limited system monitoring is also available locally with the Envoy and a personal computer if no internet connection is available.

Various Event Messages are also available when monitoring the system via a personal computer locally.

Connection options include:

- Wireless N USB adaptor (802.11b/g/n)
- Ethernet RJ45 (cable included)

NEMA 1 indoor enclosure.

Contents - (1) Envoy Communications Gateway, (1) Wireless N USB adaptor (1) 6 ft. power cord, (1) 10 ft. orange Ethernet RJ45 cable.

CSA (US/C) listed.

Line Communications Filter

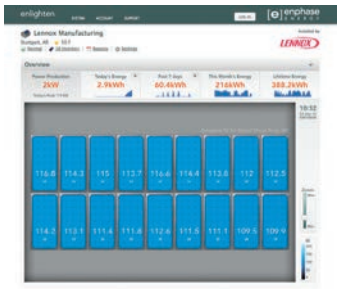
Envoy Communications Gateway mounted in a weatherproof NEMA 4 enclosure.

For outdoor installations, installations with transformers, or when multiple communications modules are used on one building.

Contains the Enphase Envoy Communications Gateway and terminal blocks for easy power hookup from the Enphase Microinverter branch circuits distribution to the electrical meter or distribution panel. A filter removes any electrical interference from other devices or multiple Envoy Communication Gateways in the same building.

Unit is UL listed for the US and Canada and meet National Electrical Code requirements.

Enphase Enlighten™ Performance Monitoring Website



Powered by the Enphase Envoy Communications Gateway, the Enphase Enlighten™ Performance Monitoring website allows the user to keep track of building energy usage and see environmental benefits in real time.

See demos, view reference installations and other additional information at: http://enlighten.enphaseenergy.com/

SYSTEM ORDERING

- Specify the number of Solar Module CE (Custom Engineered) Kits required. The system will be shipped as a complete package.

  Each kit includes:

  - One Solarworld Solar Module
  - One Enphase Microinverter
  - One Enphase Engage Cable (no. of connectors are determined by total number of Solar Module Kits ordered)
  - One PanelClaw® Polar Bear III Mounting System for the Solar Module
  - Hardware for mounting
  - Custom engineering drawings and full design for solar system
- Energence® 7.5 to 12.5 ton packaged rooftop unit must be ordered with the factory installed Solar Power Entry Option.
- Enphase Envoy Communications Gateway or Line Communications Filter must be ordered separately.
- Transformers must be ordered separately. See Options/Accessories table.

Contact your nearest Lennox Sales Representative for ordering information.

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 094	122	152
COOLING SYSTEM					
Condensate Drain Trap	PVC - C1TRAP20AD2	**76W26**	OX	OX	OX
	Copper - C1TRAP10AD2	**76W27**	OX	OX	OX
Corrosion Protection		Factory	O	O	O
Drain Pan Overflow Switch	E1SNSR71AD1	**68W88**	OX	OX	OX
Refrigerant Type		R-410A	O	O	O
BLOWER - SUPPLY AIR					
Blower	DirectPlus™ (Direct Drive) MSAV (Multi-Stage Air Volume) supply air blower	Factory	O	O	O
	Belt Drive MSAV (Multi-Stage Air Volume) supply air blower (With VFD Bypass Control)	Factory	O	O	O
	Belt Drive MSAV (Multi-Stage Air Volume) supply air blower (Without VFD Bypass Control)	Factory	O	O	O
Motors - MSAV® Multi-Stage Air Volume supply air	DirectPlus™ (direct drive) ECM 3.75 hp	Factory	O	O	O
	Belt Drive (high efficiency) - 2 hp	Factory	O	O	O
	Belt Drive (standard or high efficiency) - 3 hp	Factory	O	O	O
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O	O
Drive Kits See Blower Data Tables for selection	Kit #1 590-890 rpm	Factory	O	O	O
	Kit #2 800-1105 rpm	Factory	O	O	O
	Kit #3 795-1195 rpm	Factory	O	O	O
	Kit #4 730-970 rpm	Factory	O	O	O
	Kit #5 940-1200 rpm	Factory	O	O	O
	Kit #6 1015-1300 rpm	Factory	O	O	O
	Kit #7 730-970 rpm	Factory	O	O	O
	Kit #8 940-1200 rpm	Factory	O	O	O
	Kit #9 1015-1300 rpm	Factory	O	O	O
	Kit #10 900-1135 rpm	Factory	O	O	O
	Kit #11 1040-1315 rpm	Factory	O	O	O
	Kit #12 1125-1425 rpm	Factory	O	O	O
	Blower Belt Auto-Tensioner	Factory	O	O	O
CABINET					
Combination Coil/Hail Guards	E1GARD51BP1	**13T06**	X	X	X
Horizontal Discharge Kit	K1HECK00B-1	**51W25**	X	X	X
Return Air Adaptor Plate (for LC/LG and TC/TG/TH unit replacement)	C1CONV10B-1	**54W96**	OX	OX	OX

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 094	122	152
CONTROLS					
Blower Proving Switch	C1SNSR35FF1	**53W65**	OX	OX	OX
Commercial Controls — L Connection® Building Automation System		Factory	X	X	X
Prodigy® Control System - BACnet® Module - C0CTRL60AE1L		**59W51**	OX	OX	OX
Prodigy® Control System - LonTalk® Module - C0CTRL65FF1		**54W27**	OX	OX	OX
Novar® ETM-2051 - E0CTRL30B1		**64W73**	OX	OX	OX
Novar® LSM		Factory	O	O	O
Dirty Filter Switch	E1SNSR55B-1	**53W67**	OX	OX	OX
Fresh Air Tempering	C1SNSR75AD1	**58W63**	OX	OX	OX
General Purpose Control Kit	E1GPBK30C1	**13J78**	X	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44B-2	**11K76**	OX	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43B-2	**11K80**	OX	OX	OX
INDOOR AIR QUALITY					
Air Filters					
Healthy Climate® High Efficiency Air Filters 20 x 25 x 2 (Order 4 per unit) — MERV 8	C1FLTR15B-1	**50W61**	OX	OX	OX
MERV 13	C1FLTR40B-1	**52W41**	OX	OX	OX
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30B-1-	**Y3063**	X	X	X
Indoor Air Quality (CO_2) Sensors					
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	**77N39**	X	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	**87N53**	X	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	**87N52**	X	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	**87N54**	X	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	**85L43**	X	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**87N53** or **77N39**)	C0MISC16AE1-	**90N43**	X	X	X
UVC Germicidal Lamps					
[1] Healthy Climate® UVC Light Kit (208/230v-1ph)	C1UVCL10B-1	**54W62**	OX	OX	OX
ELECTRICAL					
Voltage 60 hz — 208/230V - 3 phase		Factory	O	O	O
460V - 3 phase		Factory	O	O	O
575V - 3 phase		Factory	O	O	O
HACR Circuit Breakers		Factory	O	O	O
Disconnect Switch - See Electrical/Electric Heat tables for selection — 80 amp	C1DISC080B-1	**54W56**	OX	OX	OX
150 amp	C1DISC150B-1	**54W57**	OX	OX	OX
GFI Service Outlets — 15 amp non-powered, field-wired (208/230V, 460V only)	LTAGFIK10/15	**74M70**	OX	OX	OX
20 amp non-powered, field-wired (575V only)	C1GFCI20FF1	**67E01**	OX	OX	OX
Weatherproof Cover for GFI	C1GFCI99FF1	**10C89**	X	X	X

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer may be ordered separately for 460V and 575V units. Alternately, 110V power supply may be used to directly power the UVC ballast(s)

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 094	122	152
ELECTRIC HEAT - DIRECT DRIVE UNITS					
7.5 kW	208/230V-3ph - E1EHO075BP1Y	**10U96**	OX		
	460V-3ph - E1EHO075BP1G	**10U97**	OX		
	575V-3ph - E1EHO075BP1J	**11J19**	OX		
15 kW	208/230V-3ph - E1EHO150BP1Y	**10U99**	OX	OX	OX
	460V-3ph - E1EHO150BP1G	**10X01**	OX	OX	OX
	575V-3ph - E1EHO150BP1J	**10X02**	OX	OX	OX
22.5 kW	208/230V-3ph - E1EHO225BP1Y	**10X03**	OX	OX	OX
	460V-3ph - E1EHO225BP1G	**10X04**	OX	OX	OX
	575V-3ph - E1EHO225BP1J	**10X05**	OX	OX	OX
30 kW	208/230V-3ph - E1EHO300BP1Y	**10X06**	OX	OX	OX
	460V-3ph - E1EHO300BP1G	**10X07**	OX	OX	OX
	575V-3ph - E1EHO300BP1J	**10X08**	OX	OX	OX
45 kW	208/230V-3ph - E1EHO450BP1Y	**10X09**	OX	OX	OX
	460V-3ph - E1EHO450BP1G	**10X11**	OX	OX	OX
	575V-3ph - E1EHO450BP1J	**10X12**	OX	OX	OX
60 kW	208/230V-3ph - E1EHO600BP1Y	**10X13**		OX	OX
	460V-3ph - E1EHO600BP1G	**10X14**		OX	OX
	575V-3ph - E1EHO600BP1J	**10X15**		OX	OX
ELECTRIC HEAT - BELT DRIVE UNITS					
7.5 kW	208/230V-3ph - C1EHO075B-1Y	**56W38**	OX		
	460V-3ph - C1EHO075B-1G	**56W39**	OX		
	575V-3ph - C1EHO075B-1J	**56W40**	OX		
15 kW	208/230V-3ph - C1EHO015B-1Y	**56W41**	OX	OX	OX
	460V-3ph - C1EHO150B-1G	**56W42**	OX	OX	OX
	575V-3ph - C1EHO150B-1J	**56W43**	OX	OX	OX
22.5 kW	208/230V-3ph - C1EHO225B-1Y	**56W44**	OX	OX	OX
	460V-3ph - C1EHO225B-1G	**56W45**	OX	OX	OX
	575V-3ph - C1EHO225B-1J	**56W46**	OX	OX	OX
30 kW	208/230V-3ph - C1EHO300B-1Y	**56W47**	OX	OX	OX
	460V-3ph - C1EHO300B-1G	**56W48**	OX	OX	OX
	575V-3ph - C1EHO300B-1J	**56W49**	OX	OX	OX
45 kW	208/230V-3ph - C1EHO450B-1Y	**56W50**	OX	OX	OX
	460V-3ph - C1EHO450B-1G	**56W51**	OX	OX	OX
	575V-3ph - C1EHO450B-1J	**56W52**	OX	OX	OX
60 kW	208/230V-3ph - C1EHO600B-1Y	**55W02**		OX	OX
	460V-3ph - C1EHO600B-1G	**55W03**		OX	OX
	575V-3ph - C1EHO600B-1J	**55W04**		OX	OX
SCR (Silicon Controlled Rectifier) Electric Heat Control NOTE - The SCR option is not available with 45 kW and 60 kW electric heat (208/230V) models.		Factory	O	O	O
Thermostat (required)		**45N59**	X	X	X
Duct Sensor (required)		**45N60**	X	X	X

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 094	122	152
ECONOMIZER					
Standard Economizer (Not for Title 24)					
Standard Economizer Downflow or Horizontal - Includes Outdoor Air Hood and Downflow Barometric Relief Dampers with Exhaust Hood Order Horizontal Barometric Relief Dampers separately	E1ECON15B-1	**55W05**	OX	OX	OX
High Performance Economizer (Approved for California Title 24 Building Standards)					
High Performance Economizer Downflow or Horizontal - Includes Outdoor Air Hood and Downflow Barometric Relief Dampers with Exhaust Hood Order Horizontal Barometric Relief Dampers separately	E1ECON17B-1	**10U59**	OX	OX	OX
Economizer Controls					
Differential Enthalpy (Not for Title 24)	Order 2 - C1SNSR64FF1	**53W64**	OX	OX	OX
Sensible Control	Sensor is Furnished	Factory	O	O	O
Single Enthalpy (Not for Title 24)	C1SNSR64FF1	**53W64**	OX	OX	OX
Global Control	Sensor Field Provided	Factory	O	O	O
Building Pressure Control	E1GPBK20C1	**13J77**	X	X	X
Outdoor Air CFM Control	E1GPBK10C1	**13J76**	X	X	X
Horizontal Barometric Relief Dampers					
Horizontal Low Profile Barometric Relief Dampers With Exhaust Hood	LAGEDH03/15	**53K04**	X	X	X
OUTDOOR AIR					
Outdoor Air Dampers					
Motorized Dampers (Hood furnished)	E1DAMP20B-1	**63W60**	OX	OX	OX
Manual Dampers (Hood furnished)	C1DAMP10B-1	**53W48**	OX	OX	OX
POWER EXHAUST					
Standard Static	208/230V-3ph - K1PWRE10B-1Y	**53W44**	OX	OX	OX
	460V-3ph - K1PWRE10B-1G	**53W45**	OX	OX	OX
	575V-3ph - K1PWRE10B-1J	**53W46**	OX	OX	OX

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OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No 094	122	152
ROOF CURBS					
Hybrid Roof Curbs, Downflow					
8 in. height	C1CURB70B-1	**11F54**	X	X	X
14 in. height	C1CURB71B-1	**11F55**	X	X	X
18 in. height	C1CURB72B-1	**11F56**	X	X	X
24 in. height	C1CURB73B-1	**11F57**	X	X	X
Adjustable Pitch Curb					
14 in. height	C1CURB55B-1	**54W50**	X	X	X
CEILING DIFFUSERS					
Step-Down - Order one	RTD11-95	**29G04**	X		
	RTD11-135	**29G05**		X	
	RTD11-185	**29G06**			X
Flush - Order one	FD11-95	**29G08**	X		
	FD11-135	**29G09**		X	
	FD11-185	**29G10**			X
Transitions (Supply and Return) - Order one	C1DIFF30B-1	**12X65**	X		
	C1DIFF31B-1	**12X66**		X	
	C1DIFF32B-1	**12X67**			X
SUNSOURCE® COMMERCIAL ENERGY SYSTEM					
Solar Module CE Kit — One 285W Solar Module (silver frame), One PanelClaw Polar Bear III Mounting System and One Enphase M250 Microinverter		**10U67**	X	X	X
Solar Power Entry with Disconnect		Factory	O	O	O
Enphase Envoy Communications Gateway (with Wireless Capability)		**13L89**	X	X	X
Line Communication Filter (external)	C1C400D11A	**10F93**	X	X	X
Transformer (6 kW)	E1TRFM15AD3Y (208Y to 208 VAC Delta)	**11H71**	X	X	X
	E1TRFM15AD2Y (230 VAC Delta)	**11H28**	X	X	X
	E1TRFM15AD3G (460 VAC Delta or Wye)	**11H29**	X	X	X

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SEQUENCE OF OPERATION

HEATING MODE

NOTE - Heating Mode Is The Same For All Control Options.

W1 Demand:

Electric heat energized (stage 1 on units with 2-stage) and supply air blower operates at heating speed.

W2 Demand:

Electric heat energized (stage 2 on units with 2-stage) and supply air blower operates at heating speed.

MODULATING OUTDOOR AIR DAMPER

The minimum damper position for “occupied low blower” and “occupied high blower” is adjusted during unit setup to provide minimum fresh air requirements per ASHRAE 62.1 at the corresponding supply air blower speeds.

When supply air blower is off or the unit is in unoccupied mode, the outdoor air damper is closed.

When unit is in occupied mode and supply air blower is operating at a speed below the “midpoint” blower speed, the outdoor air damper is at minimum “low blower” position.

When unit is in occupied mode and supply air blower is operating at a speed equal to or above the “midpoint” blower speed, the outdoor air damper is at minimum “high blower” position.

NOTE - The “midpoint” blower speed is an average of the minimum and maximum blower speed (minimum speed + maximum speed divided by 2).

THERMOSTAT MODE

The thermostat mode has specific sequence-of-operation scenarios for Lennox’ LGH Ultra-High Efficiency product line. The standard thermostat mode will typically allow 2 stages of heating and cooling operation. Units with a globally-controlled economizer option can have 2 stages of mechanical cooling and free cooling economizer operation. The MSAV® (Multi-Stage Air Volume) blower will also allow up to 5 different supply blower CFM values: 2 CFM values for cooling mode, 1 CFM value for heating mode, 1 CFM value for ventilation, and an extra speed for when one of the smoke alarm options is used. When using the factory default, the smoke alarm mode will turn off the blower. It is important to note that the unit controller merely passes along the instructions to provide heating, cooling, or other unit operations.

SEQUENCE OF OPERATION

THERMOSTAT MODE - MSAV® (MULTI-STAGE AIR VOLUME)

OPERATION WITH 2-STAGE THERMOSTAT

Supply Air Blower CFM

Unit has following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Cooling - Thermostat Mode (Y1, Y2)

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, and economizer modulates to maintain parameter 159 setting (supply air temperature).

Parameter 164 dictates when compressor 1 is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressor is energized the economizer stays at maximum open.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Y1 Demand:

One compressor operates and supply air blower operates at low cooling CFM.

Y2 Demand:

All compressors operate and supply air blower operates at high cooling CFM.

THERMOSTAT MODE - MSAV® (MULTI-STAGE AIR VOLUME) (CONTINUED)

OPERATION WITH 3-STAGE THERMOSTAT

Supply Air Blower CFM

Unit has following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Cooling - Thermostat or Zone Sensor Mode (Y1, Y2, Y3)

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, and economizer modulates to maintain Parameter 159 setting (supply air temperature).

Parameter 164 dictates when one compressor is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressors are energized the economizer stays at maximum open.

Y3 Demand:

Both compressors are energized and the supply air blower stays on high cooling CFM.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Y1 Demand:

One compressor operates and the supply air blower operates at low cooling CFM.

Y2 or Y3 Demand:

All compressors operate and supply air blower operates at high cooling CFM.

SEQUENCE OF OPERATION

ZONE SENSOR MODE

When in zone sensor mode, the unit can modulate four stages of cooling or two stages of heating operation. In this case, the unit controller will control all unit staging operations. While in zone sensor mode, multi-stage air volume applications can use up to 4 different supply blower CFM values for cooling. Zone sensor mode takes full advantage of the unit controller's features, increasing staging and control capabilities. To operate correctly, the unit must receive information from a temperature sensor. It may also receive setpoint information from a network device. Based on this information, the unit controller will either turn on or off various cooling and heating stages to maintain comfort control.

In zone sensor mode, it is possible to operate the unit without a network device. In this case the unit controller will control the zone temperature based on the backup occupied and unoccupied setpoints stored in the unit controller. The unit controller decides which setpoints to use based on the status of the occupied input. For example, if the unit is in occupied mode, the unit controller will use the occupied backup setpoints and if the unit is not in unoccupied mode the unit controller will use the unoccupied backup setpoints. In this scenario the unit controller not only records diagnostic information and makes sure the unit maintains safe operation limits,. It also controls all staging and unit operations.

ZONE SENSOR MODE HEATING

For heating, the unit controller monitors space temperature from the zone sensor. Based on this information and the setpoints sent to the unit controller from the Lennox or third-party network device, the unit controller turns on or off the heating stages to maintain the desired temperature setpoint.

The LGH Ultra-High Efficiency product line features up to four independent heat stages in larger equipment. The exact percent of heating capacity used will vary depending on the size of the unit and the heating capacity. Regardless of how many stages are present, the unit controller will seek to provide the right amount of heat to satisfy the demand.

The sequence of operation for increasing and decreasing heating stages is best shown by the staging chart on page 41. As you can see from the chart, the unit will activate the heating stages if the space temperature drops to certain temperatures. If the temperature continues to drop, the unit will continue to add heating stages until the unit reaches full heating capacity. Notice that the example heating setpoint is 70°F with a 1° deadband. Also notice that the stage-up timer is 15 minutes. The unit controller will call for the next heating stage if the space temperature has been in the stage-up timer deadband region for 15 continuous minutes. The stage-up timer deadband region is the range between the temperature at which the current heating stage was called, and the temperature at which the next heating stage would be called. Heating stages will deactivate immediately after the space temperature has been satisfied. These are all default setpoints and can be changed to customize the unit to the specific application.

It is important to note that units with multi-stage air volume supply blowers operate at the selected heating speed for all stages of heating. The supply blower speed will not change as heat stages increase or decrease because there is only one heating supply blower speed setpoint.

ZONE SENSOR MODE COOLING

For cooling, the unit controller monitors space temperature from the zone sensor. Based on this information and the setpoints sent to the unit controller from an optional Lennox or third-party network device, the unit controller turns on or off cooling stages to maintain the desired temperature setpoint.

The LGH Ultra-High Efficiency product line features up to four independent cooling stages in larger equipment. Regardless of how many stages are available, the unit controller will seek to provide the right amount of cooling to satisfy the demand. This helps provide great comfort control and to minimize energy consumption. The sequence of operation for increasing and decreasing cooling stages is best shown by the staging chart on page 41. As you can see from the chart, the unit will activate cooling stages if the space temperature rises above certain setpoints. If the temperature continues to rise, the unit will continue to add cooling stages until the unit reaches full cooling capacity. Notice that the example cooling setpoint is 75°F with a 1° deadband. Notice that the stage-up timer is 15 minutes. The unit controller will call for the next cooling stage if the space temperature has been in the stage-up timer deadband region for 15 continuous minutes. The stage-up timer deadband region is the range between the temperature at which the current cooling stage was called, and the temperature at which the next cooling stage would be called. Cooling mode has a stage-down delay default that keeps the next lower stage on for 15 minutes after a higher stage has ended. This feature is to make sure the unit doesn't prematurely shut off a cooling stage. These are all default setpoints and can be changed to customize the unit to the specific application.

ZONE SENSOR MODE (continued)

ZONE SENSOR MODE COOLING WITH/WITHOUT ECONOMIZER

If the outdoor air is suitable and the unit features an economizer, instead of using mechanical cooling to meet the first cooling demand, the unit controller will try to meet the demand by opening the economizer and using outdoor air. The economizer damper will modulate to maintain Parameter 159 setting (supply air temperature) to meet the cooling demand.

If mechanical cooling is locked out because of low ambient outside air temperature, then mechanical cooling will not come on and the unit will attempt to satisfy any demand by modulating the economizer's damper position to maintain Parameter 159 setting (supply air temperature). The setpoints at which mechanical cooling locks out and the economizer maintains supply air temperature are adjustable.

If mechanical cooling is not locked out and if the unit is able to satisfy the room temperature requirements using outdoor air, then the unit will close the economizer to the minimum setpoint and cease cooling operation. If the unit is unable to satisfy the room temperature requirements using outdoor air, then the unit will react to a second cooling demand, which will trigger the first stage of mechanical cooling and bring the economizer to the full open position. The unit will continue turning on stages of mechanical cooling until the unit has satisfied the space temperature setpoint. Because the unit can provide up to 4 stages of cooling, and the economizer now qualifies as the first stage of cooling, the unit controller will group the remaining two compressors in a four compressor unit together in the event that two compressors are already energized. This means that to address the fourth stage cooling demand the unit will increase the mechanical cooling from two compressors energized to all compressors energized.

See table for unit operation without an economizer.

ZONE SENSOR MODE COOLING

Cooling Demand	Unit with Economizer	Unit Without Economizer or Outdoor Air is Unsuitable
One	Economizer	One Compressor
Two	Economizer + One Compressor	Two Compressors
Three	Economizer + Two Compressors	Three Compressors
Four	Economizer + All Compressors	All Compressors

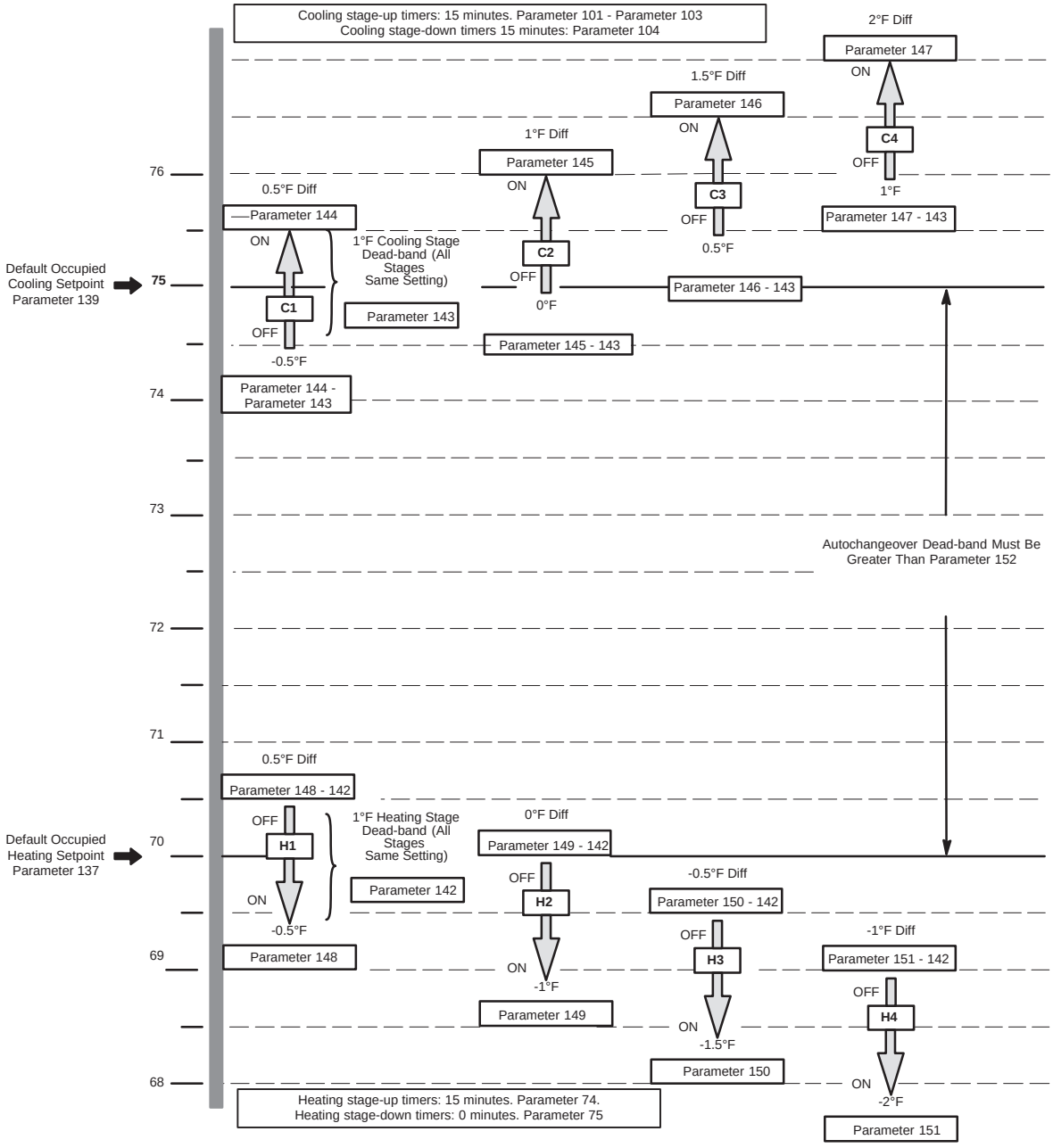
ZONE SENSOR MODE (continued)

ROOM SENSOR STAGES FOR GAS / ELECTRIC UNITS
Default Values Shown

Units With Economizer:
C1=Free Cooling
C2=Compressor 1
C3=Compressor 2
C4=Compressor 3 + 4

C1=Cooling Stage 1
C2=Cooling Stage 2
C3=Cooling Stage 3
C4=Cooling Stage 4

H1=Heating Stage 1
H2=Heating Stage 2
H3=Heating Stage 3
H4=Heating Stage 4



SEQUENCE OF OPERATION

ZONE SENSOR MODE - MSAV® (MULTI-STAGE AIR VOLUME)

Supply Air Blower CFM

Unit has following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Parameter 164 dictates when compressor 1 is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressors are energized the economizer stays at maximum open.

Y3 Demand:

Compressors 1 and 2 are energized and supply air blower stays on high cooling CFM.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Y1 Demand:

One compressor operates and supply air blower operates at low cooling CFM.

Y2 Demand:

One compressor operates and supply air blower operates at medium cooling CFM.

Y3 Demand:

All compressors operate and supply air blower operates at high cooling CFM.

SPECIFICATIONS - DIRECTPLUS™ (DIRECT DRIVE) MODELS

General Data		Nominal Tonnage	7.5 Ton	10 Ton	12.5 Ton
		Model Number	**LCH094U4E**	**LCH122U4E**	**LCH152U4E**
		Efficiency Type	**Ultra**	**Ultra**	**Ultra**
		Blower Type	MSAV (Multi-Stage Air Volume) DirectPlus™ (Direct Drive)	MSAV (Multi-Stage Air Volume) DirectPlus™ (Direct Drive)	MSAV (Multi-Stage Air Volume) DirectPlus™ (Direct Drive)
Cooling Performance		Gross Cooling Capacity - Btuh	93,700	119,000	141,900
		[1] Net Cooling Capacity - Btuh	92,000	116,000	138,000
		AHRI Rated Air Flow - cfm	2800	3600	4000
		Total Unit Power - kW	6.6	8.8	11.2
		[1] EER (Btuh/Watt)	13.9	13.1	12.3
		[2] IEER (Btuh/Watt)	21.5	20.0	18.9
		Refrigerant Type	R-410A	R-410A	R-410A
Refrigerant Charge		Circuit 1	29 lbs. 0 oz.	29 lbs. 0 oz.	29 lbs. 0 oz.
Electric Heat Available - See page 15			7.5, 15, 22.5, 30, 45 kW	15, 22.5, 30, 45, 60 kW	
Compressor Type (number)			Tandem Scroll (2)	Tandem Scroll (2)	Tandem Scroll (2)
Outdoor Coils		Net face area (total) - sq. ft.	40.8	40.8	40.8
		Number of rows	2	2	2
		Fins per inch	20	20	20
Outdoor Coil Fans		Motor - (No.) hp	(3) 1/3 ECM	(3) 1/3 ECM	(3) 1/3 ECM
		Motor rpm	520 - 900	640 - 900	640 - 900
		Total Motor watts	160 - 650	280 - 650	280 - 650
		Diameter - (No.) in.	(3) 24	(3) 24	(3) 24
		Number of blades	3	3	3
		Total Air volume - cfm	5160 - 10,250	7100 - 10,250	7100 - 10,250
Indoor Coil		Net face area (total) - sq. ft.	13.54	13.54	13.54
		Tube diameter - in.	3/8	3/8	3/8
		Number of rows	4	4	4
		Fins per inch	14	14	14
		Drain connection - Number and size	(1) 1 in. NPT coupling		
		Expansion device type	Dual-Flow Thermal Expansion Valve System Dual with Flow Control Balance port, removable head		
Indoor Blower		Nominal motor output	3.75 HP (ECM)	3.75 HP (ECM)	3.75 HP (ECM)
		Blower wheel nominal diameter x width - in.	(1) 22 x 9	(1) 22 x 9	(1) 22 x 9
Filters		Type of filter	Disposable		
		Number and size - in.	(4) 20 x 25 x 2		
Electrical characteristics			208/230V or 460V - 60 hertz - 3 phase		

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

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

[2] Integrated Energy Efficiency Ratio certified and tested according to AHRI Standard 340/360.

SPECIFICATIONS - BELT DRIVE MODELS

General Data		Nominal Tonnage	7.5 Ton	10 Ton	12.5 Ton
		Model Number	**LCH094U4M**	**LCH122U4M**	**LCH152U4M**
		Efficiency Type	**Ultra**	**Ultra**	**Ultra**
		Blower Type	MSAV (Multi-Stage Air Volume) Belt Drive	MSAV (Multi-Stage Air Volume) Belt Drive	MSAV (Multi-Stage Air Volume) Belt Drive
Cooling Performance		Gross Cooling Capacity - Btuh	93,700	119,000	141,900
		[1] Net Cooling Capacity - Btuh	92,000	116,000	136,000
		AHRI Rated Air Flow - cfm	2800	3600	4000
		Total Unit Power - kW	6.9	8.8	11.5
		[1] EER (Btuh/Watt)	13.4	12.6	12.0
		[2] IEER (Btuh/Watt)	20.7	19.2	18.1
		Refrigerant Type	R-410A	R-410A	R-410A
Refrigerant Charge		Circuit 1	29 lbs. 0 oz.	29 lbs. 0 oz.	29 lbs. 0 oz.
Electric Heat Available - See page 15			7.5, 15, 22.5, 30, 45 kW	15, 22.5, 30, 45, 60 kW	
Compressor Type (number)			Tandem Scroll (2)	Tandem Scroll (2)	Tandem Scroll (2)
Outdoor Coils		Net face area (total) - sq. ft.	40.8	40.8	40.8
		Number of rows	2	2	2
		Fins per inch	20	20	20
Outdoor Coil Fans		Motor - (No.) hp	(3) 1/3 ECM	(3) 1/3 ECM	(3) 1/3 ECM
		Motor rpm	520 - 900	640 - 900	640 - 900
		Total Motor watts	160 - 650	280 - 650	280 - 650
		Diameter - (No.) in.	(3) 24	(3) 24	(3) 24
		Number of blades	3	3	3
		Total Air volume - cfm	5160 - 10,250	7100 - 10,250	7100 - 10,250
Indoor Coil		Net face area (total) - sq. ft.	13.54	13.54	13.54
		Tube diameter - in.	3/8	3/8	3/8
		Number of rows	4	4	4
		Fins per inch	14	14	14
		Drain connection - Number and size	(1) 1 in. NPT coupling		
		Expansion device type	Dual-Flow Thermal Expansion Valve System Dual with Flow Control Balance port, removable head		
[3] **Indoor Blower and Drive Selection**		Nominal motor output	2 hp, 3 hp, 5 hp		
		Motor - Drive kit number	2 hp **Kit 1** 590-890 rpm (std. and high efficiency) **Kit 2** 800-1105 rpm (std. and high efficiency) **Kit 3** 795-1195 rpm (std. and high efficiency) 3 hp **Kit 4** 730-970 rpm (std. efficiency) **Kit 5** 940-1200 rpm (std. efficiency) **Kit 6** 1015-1300 rpm (std. efficiency) **Kit 7** 730-970 rpm (high efficiency) **Kit 8** 940-1200 rpm (high efficiency) **Kit 9** 1015-1300 rpm (high efficiency) 5 hp **Kit 10** 900-1135 rpm (std. efficiency) **Kit 11** 1040-1315 rpm (std. efficiency) **Kit 12** 1125-1425 rpm (std. efficiency)		
		Blower wheel nominal diameter x width - in.	(1) 15 X 15	(1) 15 X 15	(1) 15 X 15
Filters		Type of filter	Disposable		
		Number and size - in.	(4) 20 x 25 x 2		
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase		

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

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

[2] Integrated Energy Efficiency Ratio certified and tested according to AHRI Standard 340/360.

[3] 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.

RATINGS

NOTE − For Temperatures and Capacities not shown in tables, see bulletin − Cooling Unit Rating Table Correction Factor Data in Miscellaneous Engineering Data section.

7.5 TON LCH094U4E AND LCH094U4M (1ST STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	1680	56.2	1.85	0.69	0.87	1	52.2	2.11	0.7	0.9	1	47.9	2.39	0.7	0.93	1	43.5	2.71	0.71	0.96	1
	2100	59.6	1.85	0.75	0.99	1	55.8	2.11	0.76	1	1	51.8	2.39	0.78	1	1	47.6	2.7	0.81	1	1
	2520	63.5	1.85	0.83	1	1	59.4	2.11	0.86	1	1	55.2	2.39	0.9	1	1	50.8	2.7	0.94	1	1
67°F	1680	60.5	1.85	0.54	0.68	0.82	56.2	2.11	0.54	0.68	0.85	51.8	2.39	0.52	0.69	0.88	47.4	2.7	0.52	0.69	0.9
	2100	63.9	1.85	0.57	0.73	0.93	59.3	2.11	0.57	0.74	0.99	54.7	2.39	0.57	0.76	1	49.8	2.7	0.58	0.78	1
	2520	66.2	1.85	0.61	0.8	1	61.5	2.11	0.62	0.83	1	56.6	2.39	0.63	0.86	1	51.7	2.7	0.63	0.92	1
71°F	1680	65.1	1.85	0.4	0.53	0.66	60.7	2.11	0.39	0.53	0.66	56	2.39	0.37	0.52	0.67	51.3	2.7	0.34	0.52	0.67
	2100	68.5	1.85	0.39	0.57	0.71	63.7	2.11	0.42	0.57	0.73	58.9	2.39	0.39	0.57	0.74	53.6	2.7	0.4	0.58	0.76
	2520	70.7	1.85	0.42	0.61	0.77	65.7	2.11	0.43	0.62	0.8	60.7	2.38	0.43	0.62	0.83	55.6	2.69	0.42	0.63	0.88

7.5 TON LCH094U4E AND LCH094U4M (2ND STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		85°F					95°F					105°F					115°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2400	89.7	4.87	0.62	0.78	0.97	83.6	5.51	0.62	0.8	1	77.3	6.25	0.63	0.82	1	70.5	7.12	0.65	0.87	1
	3000	95.4	4.88	0.67	0.89	1	88.9	5.51	0.69	0.92	1	82.1	6.25	0.71	0.97	1	75	7.11	0.73	1	1
	3600	99.8	4.88	0.74	0.98	1	93.3	5.52	0.76	1	1	87	6.25	0.79	1	1	80.3	7.1	0.82	1	1
67°F	2400	96.5	4.88	0.48	0.6	0.74	90.2	5.52	0.48	0.6	0.76	83.3	6.25	0.48	0.62	0.78	76.2	7.11	0.48	0.63	0.82
	3000	102	4.88	0.52	0.65	0.83	95.1	5.51	0.52	0.66	0.87	88	6.25	0.52	0.68	0.91	80.1	7.1	0.52	0.7	0.96
	3600	105.9	4.89	0.55	0.72	0.94	98.5	5.52	0.55	0.74	0.98	91.4	6.24	0.56	0.76	1	83.5	7.1	0.57	0.8	1
71°F	2400	103.2	4.88	0.36	0.47	0.58	96.7	5.52	0.35	0.47	0.58	89.5	6.25	0.34	0.47	0.6	82	7.1	0.33	0.47	0.61
	3000	108.9	4.89	0.38	0.51	0.63	101.8	5.52	0.37	0.51	0.64	94.1	6.24	0.36	0.51	0.66	86.1	7.09	0.35	0.52	0.68
	3600	113	4.89	0.39	0.54	0.69	105.4	5.52	0.38	0.54	0.71	97.6	6.24	0.38	0.55	0.73	89.3	7.09	0.37	0.56	0.78

10 TON LCH122U4E AND LCH122U4M (1ST STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2240	72	2.44	0.67	0.86	1	67.7	2.82	0.68	0.9	1	63.2	3.21	0.68	0.94	1	58.4	3.65	0.68	0.98	1
	2800	75.9	2.46	0.73	1	1	72	2.84	0.74	1	1	67.7	3.24	0.76	1	1	63.3	3.68	0.8	1	1
	3360	80.4	2.48	0.81	1	1	76.1	2.86	0.85	1	1	71.5	3.26	0.9	1	1	66.8	3.7	0.95	1	1
67°F	2240	76.7	2.46	0.53	0.65	0.8	72.1	2.84	0.53	0.66	0.83	67.4	3.23	0.52	0.67	0.88	62.4	3.67	0.52	0.68	0.92
	2800	80.6	2.48	0.56	0.71	0.96	75.6	2.85	0.56	0.72	0.99	70.7	3.25	0.56	0.74	1	65.4	3.69	0.56	0.76	1
	3360	83.1	2.49	0.59	0.78	1	78.2	2.87	0.6	0.81	1	72.9	3.27	0.62	0.86	1	67.6	3.71	0.62	0.92	1
71°F	2240	82.1	2.48	0.39	0.52	0.63	77.5	2.86	0.39	0.52	0.64	72.4	3.26	0.38	0.52	0.66	67.2	3.7	0.35	0.52	0.67
	2800	85.8	2.5	0.41	0.55	0.69	80.7	2.88	0.4	0.56	0.71	75.5	3.28	0.4	0.56	0.72	70	3.72	0.38	0.56	0.74
	3360	88.4	2.51	0.42	0.59	0.75	83.1	2.89	0.42	0.6	0.78	77.5	3.29	0.42	0.61	0.82	71.9	3.73	0.42	0.62	0.88

10 TON LCH122U4E AND LCH122U4M (2ND STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		85°F					95°F					105°F					115°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	3200	115.6	6.41	0.65	0.81	0.99	108.7	7.28	0.66	0.84	1	101.6	8.26	0.67	0.86	1	93.7	9.39	0.68	0.91	1
	4000	121.9	6.46	0.7	0.91	1	114.5	7.32	0.72	0.95	1	107	8.31	0.74	0.98	1	99.1	9.43	0.77	1	1
	4800	126.7	6.5	0.77	1	1	119.8	7.37	0.8	1	1	112.3	8.35	0.82	1	1	104.9	9.48	0.87	1	1
67°F	3200	123.2	6.47	0.51	0.63	0.77	115.9	7.33	0.51	0.64	0.79	108.3	8.31	0.51	0.65	0.82	100.2	9.45	0.52	0.67	0.86
	4000	129.3	6.52	0.54	0.68	0.86	121.4	7.38	0.55	0.69	0.9	113.7	8.35	0.55	0.72	0.94	105	9.48	0.56	0.75	0.99
	4800	133.9	6.56	0.57	0.75	0.97	125.8	7.42	0.58	0.77	0.99	117.2	8.39	0.59	0.8	1	108.2	9.51	0.6	0.84	1
71°F	3200	131	6.53	0.38	0.49	0.61	123.6	7.4	0.38	0.5	0.62	115.4	8.37	0.37	0.5	0.63	106.7	9.49	0.37	0.51	0.65
	4000	136.8	6.58	0.4	0.53	0.66	128.9	7.44	0.39	0.54	0.67	120.4	8.42	0.39	0.54	0.69	111.7	9.54	0.39	0.55	0.72
	4800	141.6	6.63	0.41	0.57	0.72	133.3	7.49	0.41	0.57	0.74	124.4	8.46	0.41	0.58	0.77	115	9.57	0.4	0.59	0.81

RATINGS

NOTE − For Temperatures and Capacities not shown in tables, see bulletin − Cooling Unit Rating Table Correction Factor Data in Miscellaneous Engineering Data section.

12.5 TON LCH152U4E AND LCH152U4M (1ST STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2560	83.9	3.05	0.68	0.85	1	78.6	3.47	0.69	0.88	1	73.2	3.93	0.7	0.92	1	67.5	4.44	0.71	0.96	1
	3200	88.5	3.07	0.74	0.98	1	83.2	3.5	0.75	1	1	78.2	3.96	0.77	1	1	72.8	4.47	0.79	1	1
	3840	93.5	3.09	0.81	1	1	88.4	3.53	0.83	1	1	82.9	3.99	0.88	1	1	76.9	4.5	0.92	1	1
67°F	2560	89.7	3.07	0.53	0.66	0.8	84.1	3.5	0.53	0.67	0.81	78.4	3.96	0.53	0.68	0.86	72.4	4.47	0.53	0.69	0.9
	3200	94	3.1	0.57	0.72	0.94	88.2	3.53	0.57	0.73	0.97	82.1	3.99	0.57	0.75	1	75.8	4.49	0.58	0.77	1
	3840	97.4	3.11	0.6	0.78	1	91.2	3.54	0.6	0.81	1	85	4	0.61	0.84	1	78.6	4.51	0.63	0.89	1
71°F	2560	95.9	3.1	0.4	0.52	0.64	90.1	3.54	0.39	0.53	0.65	84.1	4	0.38	0.53	0.66	78	4.51	0.37	0.53	0.67
	3200	100.4	3.13	0.42	0.56	0.7	94.3	3.56	0.41	0.57	0.72	88	4.03	0.4	0.56	0.73	81.4	4.53	0.4	0.57	0.75
	3840	103.6	3.15	0.43	0.6	0.76	97.3	3.58	0.43	0.6	0.78	90.8	4.04	0.42	0.61	0.81	83.8	4.55	0.42	0.62	0.86

12.5 TON LCH152U4E AND LCH152U4M (2ND STAGE)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		85°F					95°F					105°F					115°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	3800	139.9	8.27	0.67	0.83	0.99	131.4	9.34	0.68	0.85	1	122.4	10.57	0.69	0.88	1	112.8	11.98	0.71	0.91	1
	4400	144.9	8.33	0.71	0.89	1	136.3	9.39	0.72	0.91	1	126.9	10.61	0.74	0.95	1	117.3	12.03	0.76	0.98	1
	5000	149.3	8.36	0.74	0.94	1	140	9.42	0.76	0.97	1	130.8	10.64	0.78	1	1	121.3	12.05	0.81	1	1
67°F	3800	149.1	8.35	0.53	0.65	0.79	140.3	9.42	0.53	0.66	0.81	130.9	10.65	0.53	0.67	0.84	120.9	12.05	0.53	0.69	0.87
	4400	154.1	8.41	0.55	0.68	0.85	145.2	9.47	0.55	0.69	0.87	135.3	10.69	0.55	0.71	0.9	125	12.09	0.56	0.74	0.95
	5000	158.3	8.45	0.57	0.72	0.9	148.8	9.51	0.57	0.74	0.94	138.8	10.72	0.58	0.76	0.97	128	12.12	0.59	0.79	1
71°F	3800	158.6	8.45	0.39	0.51	0.63	149.3	9.51	0.39	0.52	0.64	139.1	10.71	0.38	0.52	0.65	128.7	12.13	0.38	0.52	0.67
	4400	163.5	8.5	0.4	0.54	0.66	153.8	9.56	0.4	0.54	0.67	143.7	10.77	0.4	0.54	0.69	133	12.18	0.39	0.55	0.71
	5000	167.6	8.54	0.41	0.56	0.7	157.7	9.6	0.41	0.56	0.71	147.7	10.82	0.41	0.57	0.74	136.3	12.2	0.4	0.58	0.76

BLOWER DATA - DIRECTPLUS™ (DIRECT DRIVE) - ALL MODELS

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:

1 − Wet indoor coil air resistance of selected unit.
2 − Any factory installed options air resistance (heat section, economizer, etc.)
3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)
See page 32 for wet coil and option/accessory air resistance data.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT (Maximum Static Pressure - 2.0 in. w.g.)

094 Models - 7.5 kW - 1750 cfm
All Models - 15 kW, 22.5 kW, 30 kW, 45 kW - 2750 cfm
122 and 152 Models - 60 kW - 3500 cfm

Total Air Volume cfm	Total Static Pressure - in. w.g.													
	0.2		0.4		0.6		0.8		1.0		1.2		1.4	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
1750	711	188	771	279	836	366	905	453	975	544	1044	640	1109	737
2000	752	242	812	332	876	420	944	510	1011	606	1075	709	1138	812
2250	799	300	860	389	923	479	988	575	1052	678	1113	787	1171	896
2500	853	362	914	453	976	548	1038	650	1097	761	1154	877	1209	990
2750	914	434	974	529	1033	629	1091	739	1146	858	1199	979	1250	1098
3000	980	513	1037	614	1092	720	1146	837	1198	961	1247	1088	1295	1215
3250	1048	598	1101	705	1153	819	1203	941	1251	1071	1298	1206	1343	1343
3500	1116	693	1166	809	1214	931	1261	1060	1307	1198	1351	1341	1395	1489
3750	1185	806	1232	931	1277	1063	1322	1201	1365	1348	1407	1499	1448	1657
4000	1254	937	1299	1072	1341	1214	1383	1363	1424	1518	1464	1679	1503	1844
4250	1324	1089	1366	1234	1406	1386	1445	1545	1484	1708	1522	1876	1559	2046
4500	1395	1262	1433	1417	1471	1579	1508	1745	1544	1913	1581	2084	1616	2256
4750	1465	1455	1501	1619	1536	1787	1571	1957	1606	2128	1641	2299	1675	2470
5000	1534	1666	1568	1834	1602	2004	1635	2174	1668	2345	1701	2514	1735	2682
5250	1603	1887	1635	2055	1667	2224	1699	2392	1731	2559	1763	2724	- - -	- - -
5500	1671	2110	1702	2275	1733	2441	1764	2605	- - -	- - -	- - -	- - -	- - -	- - -
5750	1738	2325	1768	2488	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Total Air Volume cfm	Total Static Pressure - in. w.g.											
	1.6		1.8		2.0		2.2		2.4		2.6	
	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts	RPM	Watts
1750	1172	833	1231	932	1287	1039	1340	1156	1391	1283	1442	1426
2000	1197	913	1253	1019	1306	1135	1357	1261	1407	1398	1457	1547
2250	1227	1003	1280	1117	1330	1242	1379	1378	1428	1525	1477	1680
2500	1261	1103	1311	1226	1360	1361	1407	1507	1454	1663	1501	1826
2750	1299	1219	1347	1350	1394	1494	1440	1649	1485	1813	1530	1982
3000	1342	1346	1388	1487	1432	1640	1476	1803	1520	1973	1563	2146
3250	1388	1485	1432	1638	1475	1800	1517	1969	1558	2143	1600	2319
3500	1437	1643	1479	1805	1519	1975	1560	2148	1600	2325	1640	2502
3750	1489	1821	1528	1990	1567	2164	1605	2340	1645	2517	1685	2693
4000	1541	2014	1579	2187	1616	2364	1654	2540	1693	2715	1732	2887
4250	1596	2218	1632	2393	1668	2569	1705	2742	1743	2913	- - -	- - -
4500	1652	2429	1687	2603	1722	2775	1759	2944	- - -	- - -	- - -	- - -
4750	1709	2641	1743	2811	1778	2979	- - -	- - -	- - -	- - -	- - -	- - -
5000	1768	2850	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5250	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5500	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5750	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA - BELT DRIVE - 7.5 TON

094 BELT DRIVE BLOWER − BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:
1 − Wet indoor coil air resistance of selected unit.
2 − Any factory installed options air resistance (heat section, economizer, etc.)
3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)
Then determine from blower table blower motor output required.
See page 32 for blower motors and drives.
See page 32 for wet coil and option/accessory air resistance data.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT (Maximum Static Pressure - 2.0 in. w.g.)

7.5 kW, 15 kW, 22.5 kW, 30 kW and 45 kW - 2800 cfm

Total Air Volume cfm	Total Static Pressure − in. w.g.																									
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0		2.2		2.4		2.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
1750	481	0.21	549	0.4	618	0.57	688	0.7	758	0.82	824	0.93	885	1.08	941	1.23	991	1.39	1038	1.54	1082	1.68	1124	1.82	1166	1.95
2000	493	0.29	561	0.47	629	0.64	700	0.77	768	0.9	832	1.02	892	1.17	946	1.33	995	1.49	1041	1.66	1085	1.81	1126	1.97	1167	2.12
2250	507	0.37	574	0.56	643	0.72	712	0.86	779	0.99	842	1.13	900	1.28	953	1.44	1001	1.61	1045	1.78	1088	1.95	1128	2.12	1168	2.3
2500	521	0.46	588	0.64	657	0.81	727	0.95	792	1.09	853	1.24	909	1.4	960	1.57	1007	1.74	1050	1.93	1091	2.11	1130	2.29	1170	2.48
2750	537	0.56	604	0.74	674	0.91	743	1.06	806	1.21	865	1.36	920	1.53	969	1.71	1014	1.89	1055	2.08	1095	2.27	1133	2.47	1172	2.66
3000	554	0.67	622	0.86	692	1.02	760	1.18	822	1.34	878	1.5	931	1.68	979	1.86	1021	2.06	1061	2.26	1099	2.46	1136	2.65	1174	2.85
3250	572	0.78	641	0.98	712	1.15	778	1.32	838	1.49	892	1.66	943	1.84	989	2.03	1030	2.24	1068	2.45	1105	2.65	1141	2.85	1178	3.06
3500	592	0.9	663	1.12	733	1.3	798	1.47	855	1.65	907	1.83	956	2.02	1000	2.22	1039	2.44	1076	2.65	1111	2.86	1146	3.07	1183	3.27
3750	614	1.04	687	1.28	756	1.47	818	1.65	872	1.83	923	2.02	970	2.22	1011	2.43	1049	2.65	1084	2.87	1118	3.09	1152	3.29	1189	3.51
4000	639	1.22	713	1.48	780	1.66	838	1.83	890	2.02	939	2.22	984	2.44	1023	2.66	1059	2.89	1093	3.11	1126	3.33	1160	3.54	1197	3.77
4250	667	1.43	741	1.69	805	1.86	859	2.02	909	2.22	956	2.45	998	2.68	1036	2.92	1070	3.15	1103	3.37	1135	3.59	1169	3.81	1207	4.05

BLOWER DATA - BELT DRIVE - 10 AND 12.5 TON

122 AND 152 BELT DRIVE BLOWER − BASE UNIT

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY (NO HEAT SECTION) WITH DRY INDOOR COIL AND AIR FILTERS IN PLACE.

FOR ALL UNITS ADD:
1 − Wet indoor coil air resistance of selected unit.
2 − Any factory installed options air resistance (heat section, economizer, etc.)
3 − Any field installed accessories air resistance (duct resistance, diffuser, etc.)
Then determine from blower table blower motor output required.
See page 32 for blower motors and drives.
See page 32 for wet coil and option/accessory air resistance data.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT (Maximum Static Pressure - 2.0 in. w.g.)

15 kW, 22.5 kW, 30 kW and 45 kW - 2800 cfm

60 kW - 4000 cfm

Total Air Volume cfm	Total Static Pressure − in. w.g.																									
	0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6		1.8		2.0		2.2		2.4		2.6	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2000	497	0.25	558	0.44	624	0.6	694	0.74	764	0.85	830	0.99	889	1.16	943	1.34	994	1.52	1045	1.71	1096	1.89	1146	2.08	1197	2.27
2250	511	0.34	573	0.52	638	0.68	708	0.82	776	0.94	839	1.09	896	1.26	948	1.45	998	1.64	1048	1.83	1098	2.01	1149	2.2	1200	2.4
2500	527	0.44	589	0.62	654	0.78	723	0.91	789	1.05	850	1.21	904	1.39	955	1.58	1003	1.77	1052	1.96	1101	2.14	1152	2.33	1203	2.53
2750	545	0.55	606	0.72	672	0.88	740	1.03	804	1.17	861	1.34	914	1.53	962	1.72	1010	1.92	1057	2.10	1105	2.29	1154	2.47	1206	2.68
3000	564	0.66	626	0.84	692	1.01	759	1.16	819	1.32	874	1.49	924	1.68	971	1.88	1017	2.08	1063	2.26	1110	2.44	1158	2.63	1208	2.83
3250	585	0.79	648	0.98	714	1.14	778	1.31	836	1.48	887	1.66	935	1.86	981	2.06	1026	2.26	1071	2.45	1117	2.63	1163	2.80	1213	3.00
3500	607	0.93	672	1.13	737	1.31	798	1.48	852	1.66	901	1.85	948	2.05	993	2.26	1037	2.46	1081	2.65	1125	2.83	1171	3.01	1221	3.21
3750	632	1.10	698	1.31	762	1.50	819	1.67	869	1.86	915	2.05	961	2.25	1005	2.47	1049	2.68	1092	2.88	1136	3.05	1181	3.24	1231	3.45
4000	660	1.30	726	1.52	787	1.70	838	1.87	885	2.06	930	2.26	974	2.48	1018	2.71	1062	2.93	1105	3.12	1149	3.30	1194	3.49	1245	3.72
4250	691	1.53	755	1.75	810	1.91	857	2.07	901	2.27	945	2.50	990	2.74	1034	2.98	1077	3.20	1120	3.39	1163	3.58	1210	3.79	1262	4.03
4500	724	1.78	783	1.98	831	2.12	874	2.28	917	2.50	962	2.75	1006	3.02	1051	3.27	1094	3.49	1137	3.70	1181	3.89	1228	4.11	1281	4.38
4750	757	2.05	809	2.20	851	2.33	891	2.51	935	2.76	980	3.05	1025	3.33	1070	3.59	1113	3.82	1156	4.03	1201	4.24	1249	4.47	1303	4.75
5000	787	2.31	831	2.43	870	2.57	910	2.78	954	3.06	1000	3.38	1046	3.68	1091	3.95	1135	4.19	1178	4.40	1224	4.62	1272	4.86	1325	5.13
5250	814	2.55	852	2.66	889	2.83	930	3.09	975	3.41	1023	3.76	1070	4.08	1115	4.35	1159	4.59	1203	4.81	1248	5.03	1297	5.27	1350	5.53
5500	835	2.78	871	2.91	909	3.13	952	3.44	999	3.81	1049	4.18	1096	4.51	1142	4.79	1186	5.03	1229	5.24	1275	5.46	1324	5.69	- - -	- - -
5750	854	3.01	890	3.19	930	3.48	977	3.86	1027	4.27	1078	4.66	1126	4.99	1171	5.26	1214	5.49	1258	5.70	- - -	- - -	- - -	- - -	- - -	- - -
6000	871	3.26	910	3.53	955	3.90	1006	4.34	1060	4.80	1111	5.19	1158	5.51	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
6250	890	3.57	934	3.94	985	4.41	1041	4.91	1096	5.38	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Motor Efficiency	Nominal hp	Drive Kit Number	RPM Range
Standard & High	2	1	590 - 890
Standard & High	2	2	800 - 1105
Standard & High	2	3	795 - 1195
Standard	3	4	730 - 970
Standard	3	5	940 - 1200
Standard	3	6	1015 - 1300
High	3	7	730 - 970
High	3	8	940 - 1200
High	3	9	1015 - 1300
Standard	5	10	900 - 1135
Standard	5	11	1040 - 1315
Standard	5	12	1125 - 1425

NOTE - 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. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0	3175
0.05	2955
0.10	2685
0.15	2410
0.20	2165
0.25	1920
0.30	1420
0.35	1200

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

Air Volume cfm	Wet Indoor Coil		Electric Heat	Economizer	Filters		Return Air Adaptor Plate
	094	122, 152			MERV 8	MERV 13	
1750	0.04	0.04	0.03	0.05	0.01	0.03	0.00
2000	0.05	0.05	0.03	0.06	0.01	0.03	0.00
2250	0.06	0.06	0.04	0.08	0.01	0.04	0.00
2500	0.07	0.07	0.04	0.11	0.01	0.05	0.00
2750	0.08	0.08	0.05	0.12	0.02	0.05	0.00
3000	0.10	0.09	0.06	0.13	0.02	0.06	0.02
3250	0.11	0.10	0.06	0.15	0.02	0.06	0.02
3500	0.12	0.11	0.09	0.15	0.03	0.07	0.04
3750	0.14	0.13	0.09	0.15	0.03	0.08	0.07
4000	0.15	0.14	0.09	0.19	0.04	0.08	0.09
4250	0.17	0.15	0.13	0.19	0.04	0.09	0.11
4500	0.19	0.17	0.14	0.22	0.04	0.09	0.12
4750	0.20	0.18	0.17	0.25	0.05	0.10	0.16
5000	0.22	0.20	0.20	0.29	0.06	0.10	0.18
5250	0.24	0.22	0.22	0.32	0.06	0.11	0.19
5500	0.25	0.23	0.25	0.34	0.07	0.12	0.22
5750	0.27	0.25	0.31	0.45	0.07	0.12	0.25
6000	0.29	0.27	0.33	0.52	0.08	0.13	0.27

BLOWER DATA

CEILING DIFFUSERS AIR RESISTANCE - in. w.g.

Unit Size	RTD11 Step-Down Diffuser				FD11 Flush Diffuser
	Air Volume cfm	2 Ends Open	1 Side, 2 Ends Open	All Ends & Sides Open	
094 Models	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
	3200	0.41	0.37	0.32	0.31
	3400	0.50	0.45	0.39	0.37
	3600	0.61	0.54	0.48	0.44
	3800	0.73	0.63	0.57	0.51
122 Models	3600	0.36	0.28	0.23	0.15
	3800	0.40	0.32	0.26	0.18
	4000	0.44	0.36	0.29	0.21
	4200	0.49	0.40	0.33	0.24
	4400	0.54	0.44	0.37	0.27
	4600	0.60	0.49	0.42	0.31
	4800	0.65	0.53	0.46	0.35
	5000	0.69	0.58	0.50	0.39
	5200	0.75	0.62	0.54	0.43
152 Models	4200	0.22	0.19	0.16	0.10
	4400	0.28	0.24	0.20	0.12
	4600	0.34	0.29	0.24	0.15
	4800	0.40	0.34	0.29	0.19
	5000	0.46	0.39	0.34	0.23
	5200	0.52	0.44	0.39	0.27
	5400	0.58	0.49	0.43	0.31
	5600	0.64	0.54	0.47	0.35
	5800	0.70	0.59	0.51	0.39

CEILING DIFFUSER AIR THROW DATA

Model No.	Air Volume	[1] Effective Throw Range	
		RTD11 Step-Down	FD11 Flush
	cfm	ft.	ft.
094 Models	2600	24 - 29	19 - 24
	2800	25 - 30	20 - 28
	3000	27 - 33	21 - 29
	3200	28 - 35	22 - 29
	3400	30 - 37	22 - 30
122 Models	3600	25 - 33	22 - 29
	3800	27 - 35	22 - 30
	4000	29- 37	24 - 33
	4200	32 - 40	26 - 35
	4400	34 - 42	28 - 37
152 Models	5600	39 - 49	28 - 37
	5800	42 - 51	29 - 38
	6000	44 - 54	40 - 50
	6200	45 - 55	42 - 51
	6400	46 - 55	43 - 52
	6600	47 - 56	45 - 56

[1] Throw is the horizontal or vertical distance an air stream travels on leaving the outlet or diffuser before the maximum velocity is reduced to 50 ft. per minute. Four sides open.

ELECTRICAL/ELECTRIC HEAT DATA — 7.5 TON

DIRECTPLUS™ (DIRECT DRIVE) — LCH094U4E

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	13.1	6.1	4.4
	Locked Rotor Amps	83.1	41	33
Compressor 2	Rated Load Amps	13.1	6.1	4.4
	Locked Rotor Amps	83.1	41	33
Outdoor Fan Motors (3)	Full Load Amps	2.8	1.4	1.1
	(total)	(8.4)	(4.2)	(3.3)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	20
Indoor Blower Motor	Horsepower	3.75	3.75	3.75
	Full Load Amps	8.8	4.3	3.4
[2] Maximum Overcurrent Protection	Unit Only	60	30	20
	With (1) 0.33 HP Power Exhaust	60	30	20
[3] Minimum Circuit Ampacity	Unit Only	51	25	19
	With (1) 0.33 HP Power Exhaust	53	26	20

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**7.5 kW**	60	60	30	20
		15 kW	60	60	30	25
		22.5 kW	[4] 70	80	40	35
		30 kW	[4] 90	110	60	45
		45 kW	150	150	80	60
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**7.5 kW**	51	51	25	19
		15 kW	51	57	28	24
		22.5 kW	70	79	40	33
		30 kW	90	102	51	42
		45 kW	129	147	74	60
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	60	60	30	20
		15 kW	60	60	30	25
		22.5 kW	[4] 80	90	45	35
		30 kW	[4] 100	110	60	45
		45 kW	150	150	80	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	53	53	26	20
		15 kW	54	60	30	25
		22.5 kW	73	82	41	34
		30 kW	93	105	53	43
		45 kW	132	150	75	61

ELECTRICAL ACCESSORIES

Disconnect	**7.5 kW**	**54W56**	**54W56**	**54W56**	**54W56**
	15 kW	**54W56**	**54W56**	**54W56**	**54W56**
	22.5 kW	**54W56**	**54W56**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W56**	**54W56**
	45 kW	**54W57**	**54W57**	**54W56**	**54W56**

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 — 10 TON

DIRECTPLUS™ (DIRECT DRIVE) — LCH122U4E

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	16	7.8	5.7
	Locked Rotor Amps	110	52	38.9
Compressor 2	Rated Load Amps	16	7.8	5.7
	Locked Rotor Amps	110	52	38.9
Outdoor Fan Motors (3)	Full Load Amps	2.8	1.4	1.1
	(total)	(8.4)	(4.2)	(3.3)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	20
Indoor Blower Motor	Horsepower	3.75	3.75	3.75
	Full Load Amps	8.8	4.3	3.4
[2] Maximum Overcurrent Protection	Unit Only	70	35	25
	With (1) 0.33 HP Power Exhaust	70	35	25
[3] Minimum Circuit Ampacity	Unit Only	58	29	22
	With (1) 0.33 HP Power Exhaust	60	30	23

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	15 kW	70	70	35	25
		22.5 kW	[4] 70	80	40	35
		30 kW	[4] 90	110	60	45
		45 kW	150	150	80	60
		60 kW	[4] 150	175	80	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	15 kW	58	58	29	24
		22.5 kW	70	79	40	33
		30 kW	90	102	51	42
		45 kW	129	147	74	60
		60 kW	137	156	78	64
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	15 kW	70	70	35	25
		22.5 kW	[4] 80	90	45	35
		30 kW	[4] 100	110	60	45
		45 kW	150	150	80	70
		60 kW	[4] 150	175	80	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	15 kW	60	60	30	25
		22.5 kW	73	82	41	34
		30 kW	93	105	53	43
		45 kW	132	150	75	61
		60 kW	140	159	80	65

ELECTRICAL ACCESSORIES

Disconnect					
15 kW	**54W56**	**54W56**	**54W56**	**54W56**
22.5 kW	**54W56**	**54W56**	**54W56**	**54W56**
30 kW	**54W57**	**54W57**	**54W56**	**54W56**
45 kW	**54W57**	**54W57**	**54W56**	**54W56**
60 kW	**N/A**	**N/A**	**54W57**	**54W56**

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 — 12.5 TON

DIRECTPLUS™ (DIRECT DRIVE) — LCH152U4E

[1] Voltage - 60hz		208/230V - 3 Ph	460V - 3 Ph	575V - 3 Ph
Compressor 1	Rated Load Amps	19.6	8.2	6.6
	Locked Rotor Amps	136	66.1	55.3
Compressor 2	Rated Load Amps	19.6	8.2	6.6
	Locked Rotor Amps	136	66.1	55.3
Outdoor Fan Motors (3)	Full Load Amps	2.8	1.4	1.1
	(total)	(8.4)	(4.2)	(3.3)
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4	1.3	1
Service Outlet 115V GFI (amps)		15	15	20
Indoor Blower Motor	Horsepower	3.75	3.75	3.75
	Full Load Amps	8.8	4.3	3.4
[2] Maximum Overcurrent Protection	Unit Only	80	35	30
	With (1) 0.33 HP Power Exhaust	80	35	30
[3] Minimum Circuit Ampacity	Unit Only	66	30	24
	With (1) 0.33 HP Power Exhaust	68	31	25

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	480V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**15 kW**	80	80	35	30
		22.5 kW	80	80	40	35
		30 kW	[4] 90	110	60	45
		45 kW	150	150	80	60
		60 kW	[4] 150	175	80	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**15 kW**	66	66	30	24
		22.5 kW	70	79	40	33
		30 kW	90	102	51	42
		45 kW	129	147	74	60
		60 kW	137	156	78	64
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	80	80	35	30
		22.5 kW	[4] 80	90	45	35
		30 kW	[4] 100	110	60	45
		45 kW	150	150	80	70
		60 kW	[4] 150	175	80	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	68	68	31	25
		22.5 kW	73	82	41	34
		30 kW	93	105	53	43
		45 kW	132	150	75	61
		60 kW	140	159	80	65

ELECTRICAL ACCESSORIES

Disconnect					
15 kW	**54W56**	**54W56**	**54W56**	**54W56**
22.5 kW	**54W56**	**54W56**	**54W56**	**54W56**
30 kW	**54W57**	**54W57**	**54W56**	**54W56**
45 kW	**54W57**	**54W57**	**54W56**	**54W56**
60 kW	**N/A**	**N/A**	**54W57**	**54W56**

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 — 7.5 TON

BELT DRIVE — **LCH094U4M**

[1] Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Compressor 2	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Outdoor Fan Motors (3)	Full Load Amps	2.8			1.4			1.1		
	(total)	(8.4)			(4.2)			(3.3)		
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4			1.3			1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	2	3	5	2	3	5	2	3	5
	Full Load Amps	7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
[2] Maximum Overcurrent Protection	Unit Only	60	60	70	25	30	35	20	20	25
	With (1) 0.33 HP Power Exhaust	60	60	70	30	30	35	20	20	25
[3] Minimum Circuit Ampacity	Unit Only	50	53	60	24	25	28	18	19	22
	With (1) 0.33 HP Power Exhaust	52	55	62	25	27	30	19	20	23

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**7.5 kW**	60	60	60	60	70	70	25	30	35	20	20	25
		15 kW	60	60	60	60	70	70	30	30	35	25	25	30
		22.5 kW	[4]70	80	[4]80	90	[4]80	90	40	40	45	35	35	35
		30 kW	[4]90	100	[4]100	110	[4]100	125	50	60	60	40	45	45
		45 kW	150	150	150	150	[4]150	175	80	80	80	60	60	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**7.5 kW**	50	50	53	53	60	60	24	25	28	18	19	22
		15 kW	50	55	53	59	60	66	27	29	33	22	23	26
		22.5 kW	69	78	72	81	80	89	39	40	44	31	32	35
		30 kW	88	100	92	104	100	112	50	52	55	40	41	44
		45 kW	127	145	131	149	139	157	72	74	78	58	60	62
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	60	60	60	60	70	70	30	30	35	20	20	25
		15 kW	60	60	[4]60	70	70	70	30	35	35	25	25	30
		22.5 kW	[4]80	90	[4]80	90	[4]90	100	40	45	45	35	35	40
		30 kW	[4]100	110	[4]100	110	[4]110	125	60	60	60	45	45	45
		45 kW	150	150	[4]150	175	[4]150	175	80	80	80	60	70	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**7.5 kW**	52	52	55	55	62	62	25	27	30	19	20	23
		15 kW	52	58	56	62	63	69	29	31	34	23	25	27
		22.5 kW	72	81	75	84	83	92	40	42	45	32	34	36
		30 kW	91	103	95	107	103	115	51	53	57	41	43	45
		45 kW	130	148	134	152	142	160	74	76	79	59	61	64

ELECTRICAL ACCESSORIES

Disconnect	**7.5 kW**	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56
	15 kW	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56	54W56
	22.5 kW	54W56	54W56	54W56	54W56	54W57	54W57	54W56	54W56	54W56	54W56	54W56	54W56
	30 kW	54W57	54W57	54W57	54W57	54W57	54W57	54W56	54W56	54W56	54W56	54W56	54W56
	45 kW	54W57	54W57	54W57	54W57	54W57	54W57	54W56	54W56	54W56	54W56	54W56	54W56

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 — 10 TON

BELT DRIVE — **LCH122U4M**

[1] Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	16.5			7.2			5.5		
	Locked Rotor Amps	110			52			38.9		
Compressor 2	Rated Load Amps	16			7.8			5.7		
	Locked Rotor Amps	110			52			38.9		
Outdoor Fan Motors (3)	Full Load Amps	2.8			1.4			1.1		
	(total)	(8.4)			(4.2)			(3.3)		
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4			1.3			1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	2	3	5	2	3	5	2	3	5
	Full Load Amps	7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
[2] Maximum Overcurrent Protection	Unit Only	70	70	80	30	35	35	25	25	25
	With (1) 0.33 HP Power Exhaust	70	70	80	35	35	35	25	25	30
[3] Minimum Circuit Ampacity	Unit Only	57	60	66	27	29	31	21	22	24
	With (1) 0.33 HP Power Exhaust	59	62	69	28	30	33	22	23	25

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**15 kW**	70	70	70	70	80	80	30	35	35	25	25	30
		22.5 kW	[4]70	80	[4]80	90	[4]80	90	40	40	45	35	35	35
		30 kW	[4]90	100	[4]100	110	[4]100	125	50	60	60	40	45	45
		45 kW	150	150	150	150	[4]150	175	80	80	80	60	60	70
		60 kW	[4]150	175	[4]150	175	[4]150	175	80	80	90	70	70	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**15 kW**	57	57	60	60	66	66	27	29	33	22	23	26
		22.5 kW	69	78	72	81	80	89	39	40	44	31	32	35
		30 kW	88	100	92	104	100	112	50	52	55	40	41	44
		45 kW	127	145	131	149	139	157	72	74	78	58	60	62
		60 kW	135	154	139	158	146	166	77	79	82	62	63	66
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	70	70	70	70	80	80	35	35	35	25	25	30
		22.5 kW	[4]80	90	[4]80	90	[4]90	100	40	45	45	35	35	40
		30 kW	[4]100	110	[4]100	110	[4]110	125	60	60	60	45	45	45
		45 kW	150	150	[4]150	175	[4]150	175	80	80	80	60	70	70
		60 kW	[4]150	175	[4]150	175	[4]150	175	80	80	90	70	70	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	59	59	62	62	69	69	29	31	34	23	25	27
		22.5 kW	72	81	75	84	83	92	40	42	45	32	34	36
		30 kW	91	103	95	107	103	115	51	53	57	41	43	45
		45 kW	130	148	134	152	142	160	74	76	79	59	61	64
		60 kW	138	157	142	161	149	169	79	80	84	63	64	67

ELECTRICAL ACCESSORIES

Disconnect	**15 kW**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	22.5 kW	**54W56**	**54W56**	**54W56**	**54W56**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	45 kW	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	60 kW	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**

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.

[5] Disconnect must be field furnished.

ELECTRICAL/ELECTRIC HEAT DATA — 12.5 TON

BELT DRIVE — **LCH152U4M**

[1] Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Compressor 2	Rated Load Amps	19.6			8.2			6.6		
	Locked Rotor Amps	136			66.1			55.3		
Outdoor Fan Motors (3)	Full Load Amps (total)	2.8 (8.4)			1.4 (4.2)			1.1 (3.3)		
Power Exhaust (1) 0.33 HP	Full Load Amps	2.4			1.3			1		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	2	3	5	2	3	5	2	3	5
	Full Load Amps	7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
[2] Maximum Overcurrent Protection	Unit Only	80	80	90	35	35	40	25	30	30
	With (1) 0.33 HP Power Exhaust	80	80	90	35	35	40	25	30	30
[3] Minimum Circuit Ampacity	Unit Only	64	67	74	29	30	33	23	24	26
	With (1) 0.33 HP Power Exhaust	67	70	76	30	31	34	24	25	27

ELECTRIC HEAT DATA

Electric Heat Voltage			208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**15 kW**	80	80	80	80	90	90	35	35	40	25	30	30
		22.5 kW	80	80	[4]80	90	90	90	40	40	45	35	35	35
		30 kW	[4]90	100	[4]100	110	[4]100	125	50	60	60	40	45	45
		45 kW	150	150	150	150	[4]150	175	80	80	80	60	60	70
		60 kW	[4]150	175	[4]150	175	[4]150	175	80	80	90	70	70	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**15 kW**	64	64	67	67	74	74	29	30	33	23	24	26
		22.5 kW	69	78	72	81	80	89	39	40	44	31	32	35
		30 kW	88	100	92	104	100	112	50	52	55	40	41	44
		45 kW	127	145	131	149	139	157	72	74	78	58	60	62
		60 kW	135	154	139	158	146	166	77	79	82	62	63	66
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	80	80	80	80	90	90	35	35	40	25	30	30
		22.5 kW	[4]80	90	[4]80	90	[4]90	100	40	45	45	35	35	40
		30 kW	[4]100	110	[4]100	110	[4]110	125	60	60	60	45	45	45
		45 kW	150	150	[4]150	175	[4]150	175	80	80	80	60	70	70
		60 kW	[4]150	175	[4]150	175	[4]150	175	80	80	90	70	70	70
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (1) 0.33 HP Power Exhaust	**15 kW**	67	67	70	70	76	76	30	31	34	24	25	27
		22.5 kW	72	81	75	84	83	92	40	42	45	32	34	36
		30 kW	91	103	95	107	103	115	51	53	57	41	43	45
		45 kW	130	148	134	152	142	160	74	76	79	59	61	64
		60 kW	138	157	142	161	149	169	79	80	84	63	64	67

ELECTRICAL ACCESSORIES

Disconnect	**15 kW**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	22.5 kW	**54W56**	**54W56**	**54W56**	**54W56**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	30 kW	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	45 kW	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**	**54W56**
	60 kW	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**54W57**	**54W57**	**54W57**	**54W56**	**54W56**	**54W56**

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.

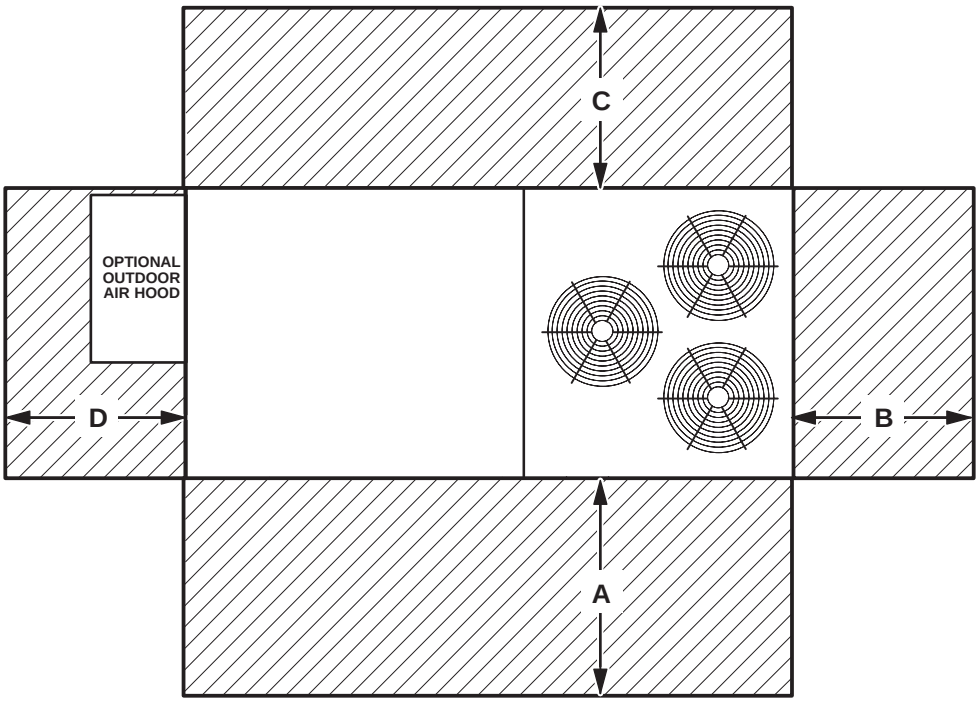
[4] Factory installed circuit breaker not available.

[5] Disconnect must be field furnished.

ELECTRIC HEAT CAPACITIES

Volts Input	7.5 kW			15 kW			22.5 kW			30 kW			45 kW			60 kW		
	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages
208	5.6	19,100	1	11.3	38,600	1	16.9	57,700	2	22.5	76,800	2	33.8	115,300	2	45.0	153,600	2
220	6.3	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
230	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
240	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2
440	6.9	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
460	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
480	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2
550	6.3	21,500	1	12.6	43,000	1	18.9	64,500	2	25.2	86,000	2	37.8	129,000	2	50.4	172,000	2
575	6.9	23,600	1	13.8	47,100	1	20.7	70,700	2	27.5	93,900	2	41.3	141,000	2	55.1	188,000	2
600	7.5	25,600	1	15.0	51,200	1	22.5	76,800	2	30.0	102,400	2	45.0	153,600	2	60.0	204,800	2

UNIT CLEARANCES - INCHES (MM)



[1] Unit Clearance	A		B		C		D		Top Clearance
	in.	mm	in.	mm	in.	mm	in.	mm	
Service Clearance	60	1524	36	914	36	934	60	1524	Unobstructed
Minimum Operation Clearance	36	914	36	914	36	914	36	914	

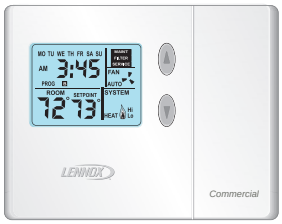
NOTE - Entire perimeter of unit base requires support when elevated above the mounting surface.

[1] Service Clearance - Required for removal of serviceable parts.
Minimum Operation Clearance - Required clearance for proper unit operation.

OPTIONAL CONVENTIONAL TEMPERATURE CONTROL SYSTEMS

Item	Model No.	Catalog No.
COMFORTSENSE® 7500 COMMERCIAL 7-DAY PROGRAMMABLE THERMOSTAT		
• Four-Stage Heating / Two-Stage Cooling Universal Multi-Stage • Intuitive Touchscreen Interface • Remote Indoor Temperature Sensing with Averaging • Outside or Discharge Air Temperature Display • Full Seven-Day Programming • Four Time Periods Per Day • Occupancy Scheduling with Economizer Relay Control • Away Mode • Holiday Scheduling • Smooth Setback Recovery (SSR) • Performance Reports • Notifications/Reminders • Dehumidification/Humiditrol® Control for Split Systems and Rooftop Units • Economizer Relay Control • Backlit Display • Wallplate Furnished	C0STAT06FF1L	**13H15**
Optional Accessories		
[1] Remote non-adjustable wall mount 20k temperature sensor	C0SNZN01AE2-	**47W36**
[1] Remote non-adjustable wall mount 10k temperature sensor	C0SNZN73AE1-	**47W37**
Remote non-adjustable discharge air (duct mount) temperature sensor	C0SNDC00AE1-	**19L22**
Outdoor temperature sensor	C0SNSR03AE1-	**X2658**
Locking cover (clear)	C0MISC15AE1-	**39P21**

[1] Remote sensors can be applied in any of the following combinations:
One Sensor - (1) 47W36
Two Sensors - (2) 47W37
Three Sensors - (2) 47W36 and (1) 47W37
Four Sensors - (4) 47W36
Five Sensors - (3) 47W36 and (2) 47W37

COMFORTSENSE® 3000 COMMERCIAL 5-2 DAY PROGRAMMABLE THERMOSTAT		
 • Two-Stage Heating / Two-Stage Cooling Conventional Systems • Intuitive Interface • 5-2 Day Programming • Program Hold • Remote Indoor Temperature Sensing • Smooth Setback Recovery (SSR) • Economizer Relay Control • Maintenance/Filter/Service Reminders • Backlit Display • Wallplate Furnished • Simple Up and Down Temperature Control.	C0STAT05FF1L	**11Y05**
Optional Accessories		
Remote non-adjustable wall mount 10k averaging temperature sensor	C0SNZN73AE1-	**47W37**
Optional wall mounting plate	C0MISC17AE1-	**X2659**
DIGITAL NON-PROGRAMMABLE THERMOSTAT		
• One-Stage Heating / Cooling Conventional Systems • Intuitive Interface • Automatic Changeover • Backlit Display • Simple Up and Down Temperature Control.	C0STAT12AE1L	**51M32**
Optional Accessories		
Outdoor temperature sensor	C0SNSR04AE1-	**X2658**
Optional wall mounting plate	C0MISC17AE1-	**X2659**

OUTDOOR SOUND DATA

Unit Model	Octave Band Linear Sound Power Levels dB, re 10^{-12} Watts - Center Frequency - Hz							[1] Sound Rating Number (SRN) (dBA)
	125	250	500	1000	2000	4000	8000	
All Models	85	81	80	76	70	65	62	81

Note - The octave sound power data does not include tonal corrections.

[1] Sound Rating Number according to ARI Standard 270-95 or ARI Standard 370-2001 (includes pure tone penalty). “SRN” is the overall A-Weighted Sound Power Level, (LWA), dB (100 Hz to 10,000 Hz).

WEIGHT DATA

Model Number	Net		Shipping	
	lbs.	kg	lbs.	kg
094U4E Base Unit	1212	550	1297	588
094U4E Max. Unit	1369	621	1454	660
122U4E Base Unit	1222	598	1307	636
122U4E Max. Unit	1386	554	1471	667
152U4E Base Unit	1232	559	1317	597
152U4E Max. Unit	1396	633	1481	672
094U4M Base Unit	1212	550	1297	588
094U4M Max. Unit	1369	621	1454	660
122U4M Base Unit	1222	598	1307	636
122U4M Max. Unit	1386	554	1471	667
152U4M Base Unit	1232	559	1317	597
152U4M Max. Unit	1396	633	1481	672

WEIGHT DATA - OPTIONS / ACCESSORIES

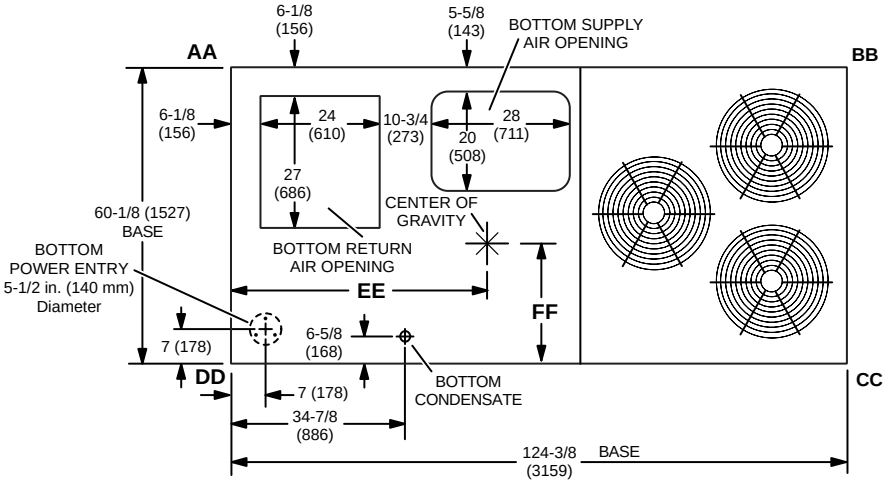
Description	Shipping Weight	
	lbs.	kg
ECONOMIZER / OUTDOOR AIR / EXHAUST		
Economizer		
Economizer Dampers	60	27
Outdoor Air Hood (downflow)	23	10
Barometric Relief Dampers (downflow)	8	4
Barometric Relief Dampers (low profile horizontal)	20	9
Outdoor Air Dampers		
Outdoor Air Damper Section (downflow) - Automatic	9	4
Outdoor Air Damper Section (downflow) - Manual	2	1
Outdoor Air Damper Hood (downflow)	9	4
Power Exhaust	31	14
ELECTRIC HEAT		
7.5 kW	50	23
15 kW	50	23
22.5 kW	57	26
30 kW	57	26
45 kW	59	27
60 kW	68	31
ROOF CURBS		
Hybrid Roof Curbs, Downflow		
8 in. height	60	27
14 in. height	85	39
18 in. height	100	45
24 in. height	125	57
Adjustable Pitch Curb, Downflow		
14 in. height	191	82
CEILING DIFFUSERS		
Step-Down		
RTD11-95	88	40
RTD11-135	205	93
RTD11-185	392	178
Flush		
FD11-95	75	34
FD11-135	174	79
FD11-185	289	131
Transitions		
C1DIFF30B-1	30	14
C1DIFF31B-1	32	15
C1DIFF32B-1	36	16
PACKAGING		
LTL Packaging (less than truck load)	105	48

DIMENSIONS - INCHES (MM)

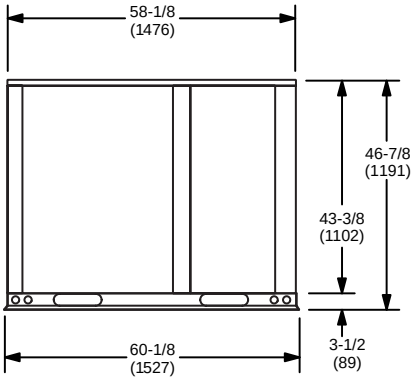
Model No.	CORNER WEIGHTS																CENTER OF GRAVITY							
	AA				BB				CC				DD				EE				FF			
	Base		Max.		Base		Max.		Base		Max.		Base		Max.		Base		Max.		Base		Max.	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm	in.	mm	in.	mm
094	296	134	353	160	214	97	247	112	294	133	317	144	407	185	453	205	52.25	1327	51.25	1302	25.25	641	26.25	667
122	299	136	357	162	216	98	250	113	297	135	321	146	411	186	459	208	52.25	1327	51.25	1302	25.25	641	26.25	667
152	301	137	359	163	218	99	251	114	299	136	323	147	414	188	462	210	52.25	1327	51.25	1302	25.25	641	26.25	667

Base Unit - The unit with NO INTERNAL OPTIONS.

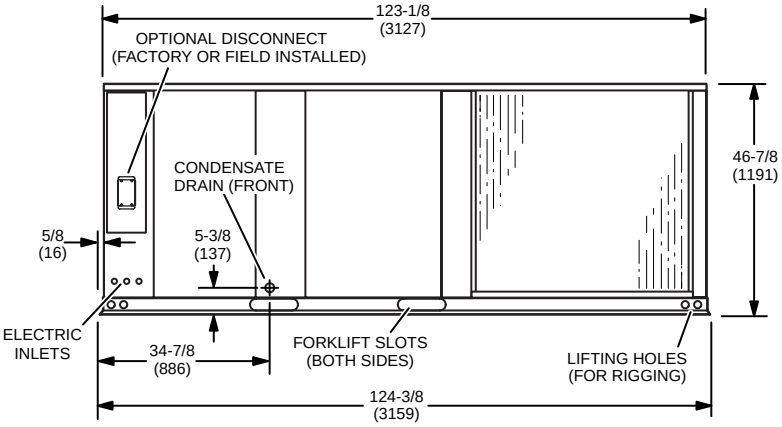
Max. Unit - The unit with ALL INTERNAL OPTIONS Installed. (Economizer, Standard Static Power Exhaust Fans, Controls, etc.). Does not include accessories external to unit or high static power exhaust.



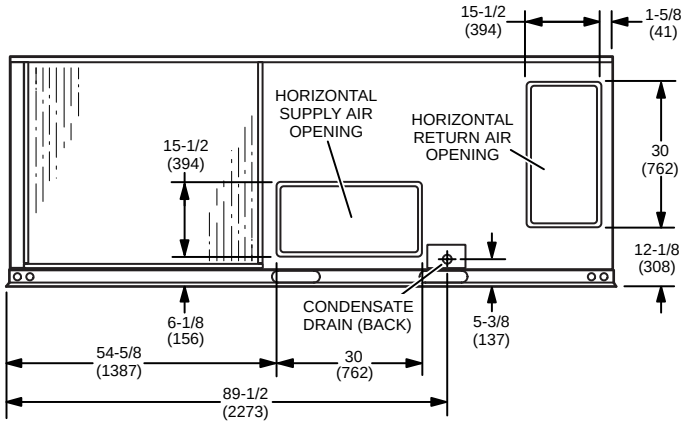
TOP VIEW



END VIEW

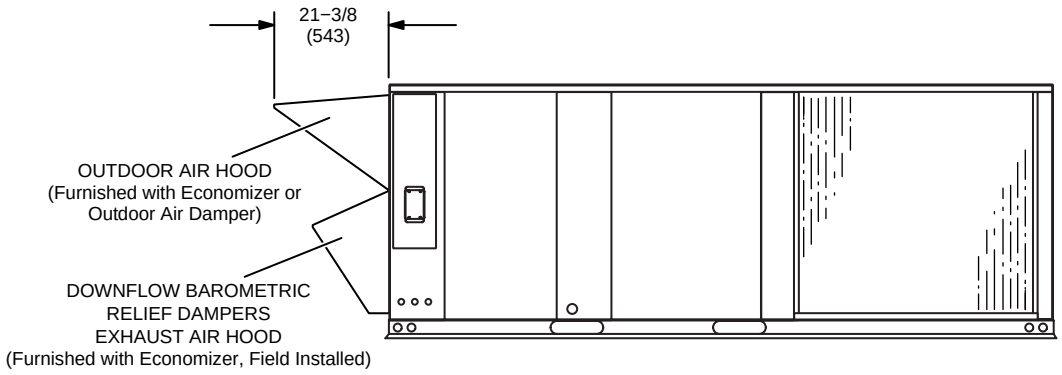


SIDE VIEW

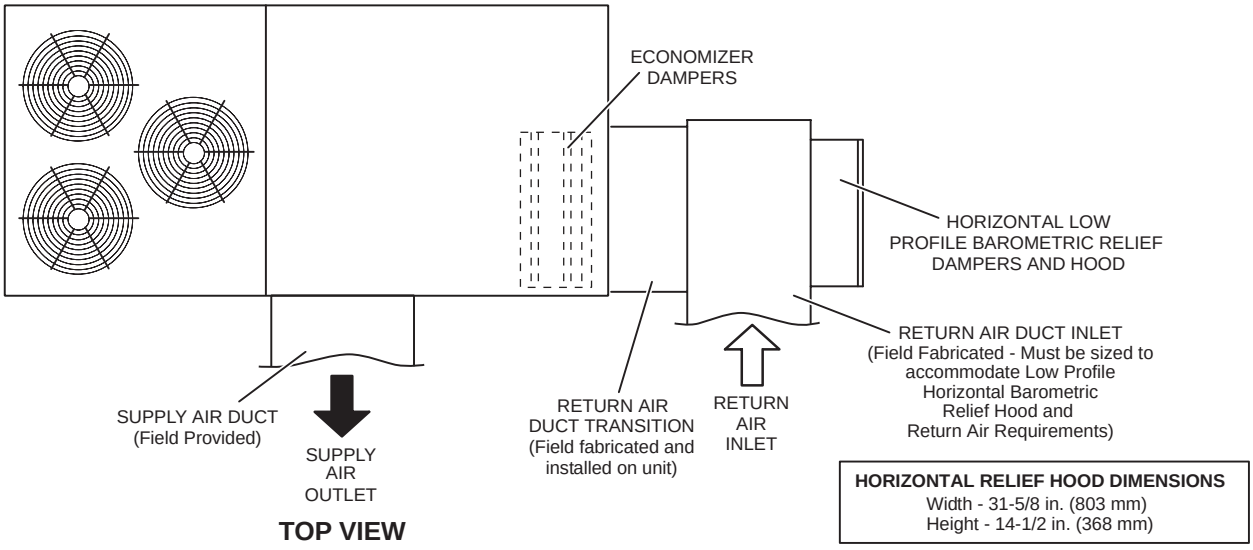


SIDE VIEW
(Horizontal Openings)

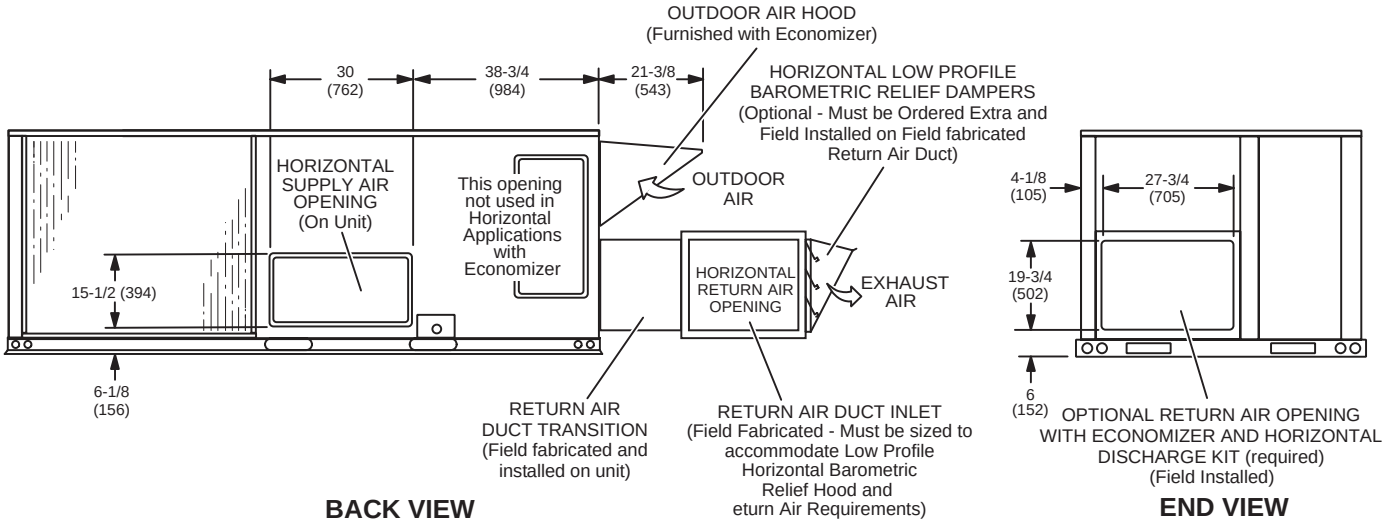
OUTDOOR AIR HOOD DETAIL



OPTIONAL HORIZONTAL ECONOMIZER APPLICATION
(with Optional Low Profile Horizontal Barometric Relief Dampers and Horizontal Discharge Kit)



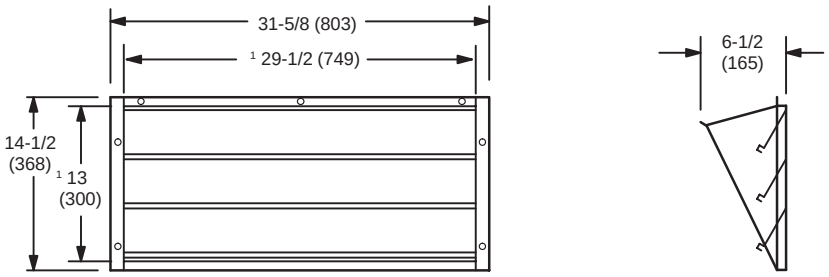
TOP VIEW



BACK VIEW **END VIEW**

NOTE - Return Air Duct and Transition must be supported.

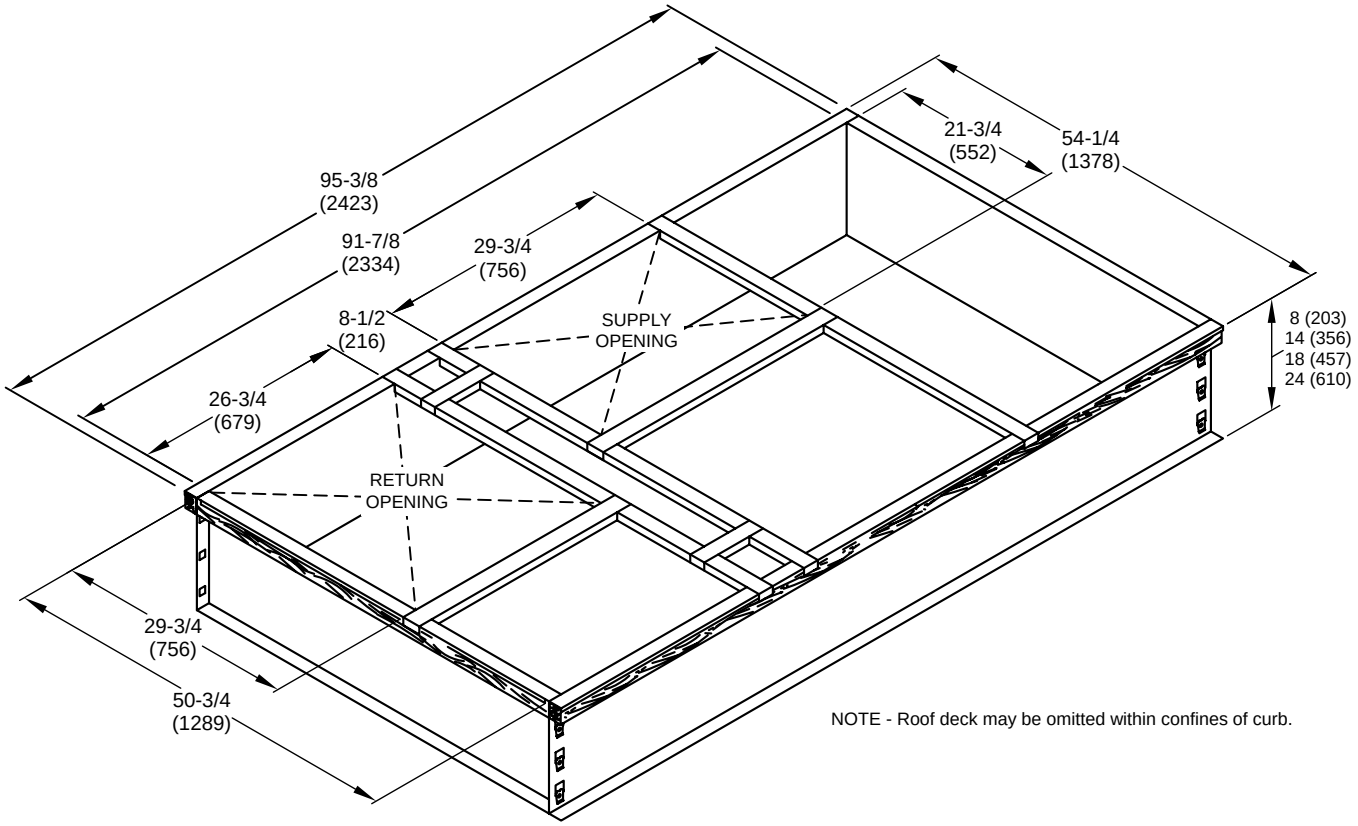
HORIZONTAL LOW PROFILE BAROMETRIC RELIEF DAMPERS
(Field installed in horizontal return air duct adjacent to unit)



FRONT VIEW **SIDE VIEW**

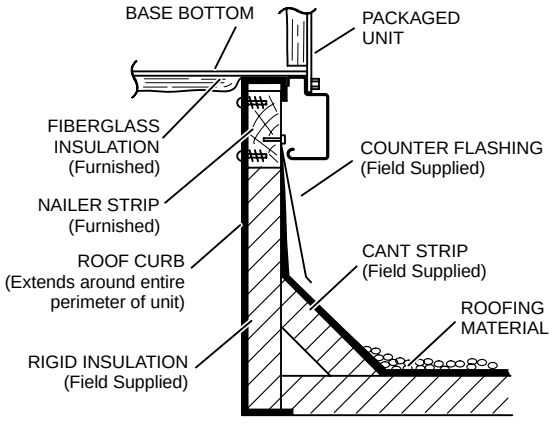
[1] NOTE - Opening size required in return air duct.

HYBRID ROOF CURBS - DOUBLE DUCT OPENING

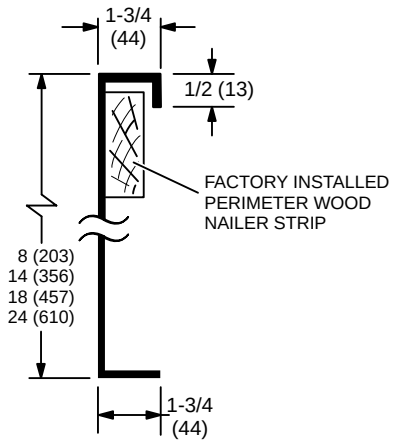


NOTE - Roof deck may be omitted within confines of curb.

TYPICAL FLASHING DETAIL FOR ROOF CURB

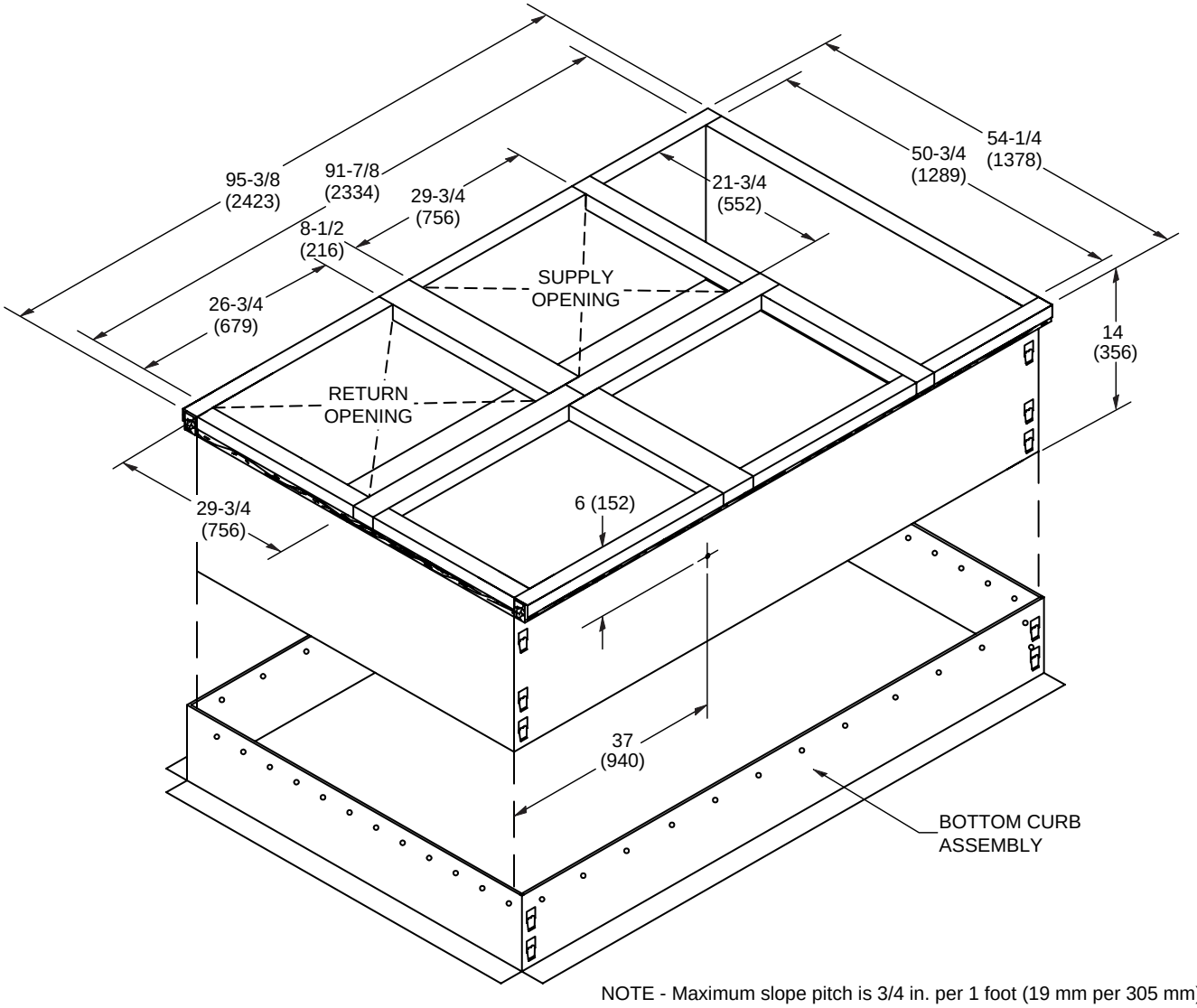


DETAIL ROOF CURB



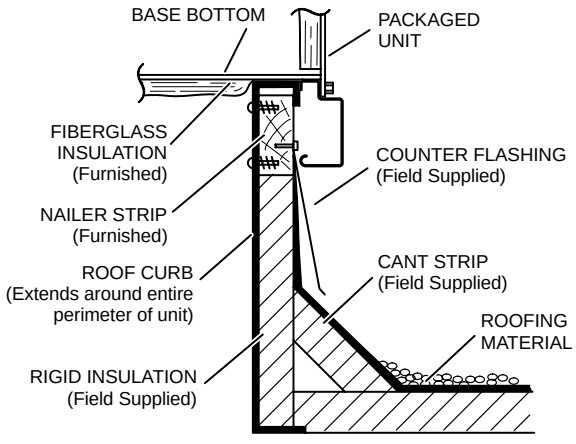
ACCESSORY DIMENSIONS - INCHES (MM)

ADJUSTABLE PITCH CURBS - DOUBLE DUCT OPENING

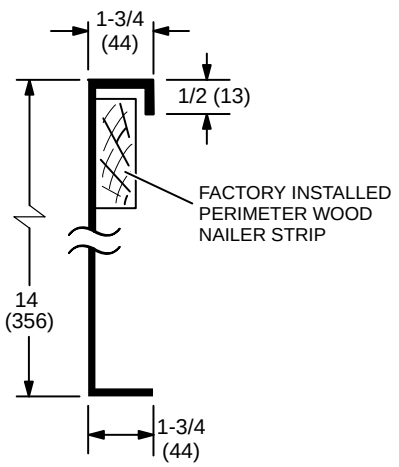


NOTE - Maximum slope pitch is 3/4 in. per 1 foot (19 mm per 305 mm) in any one direction.

TYPICAL FLASHING DETAIL FOR ROOF CURB

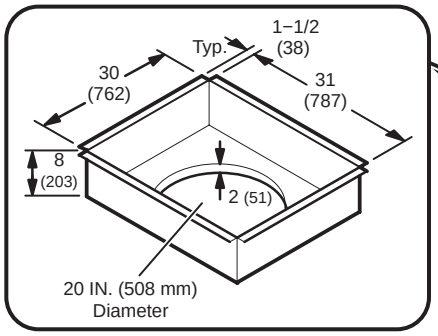


DETAIL ROOF CURB

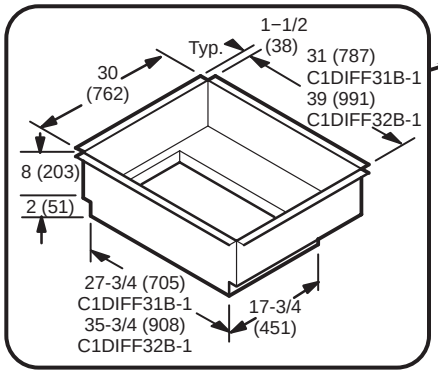


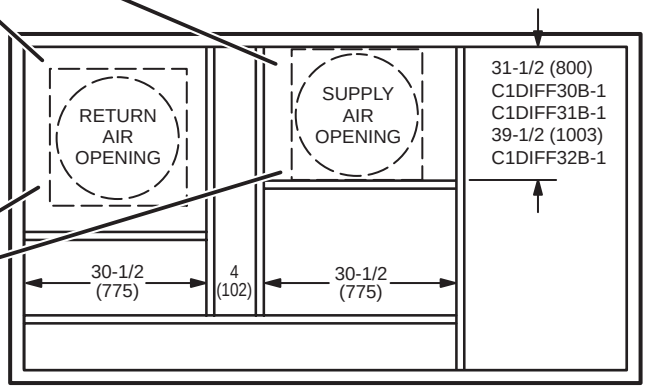
ROOF CURBS WITH SUPPLY & RETURN AIR TRANSITIONS FOR CEILING DIFFUSERS

C1DIFF30B-1 ROUND TRANSITIONS
(for 092 models with FD11-95, RTD11-95 Diffusers)



C1DIFF31B-1 & C1DIFF32B-1 RECTANGULAR TRANSITIONS
(for 102 thru 150 models with FD11-135-185, RTD11-135-185 Diffusers)



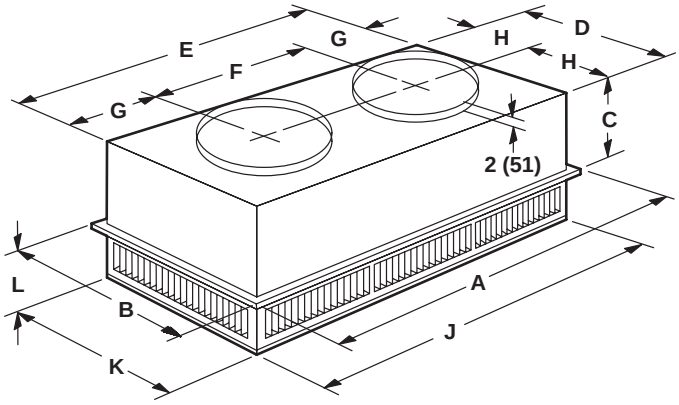


TOP VIEW

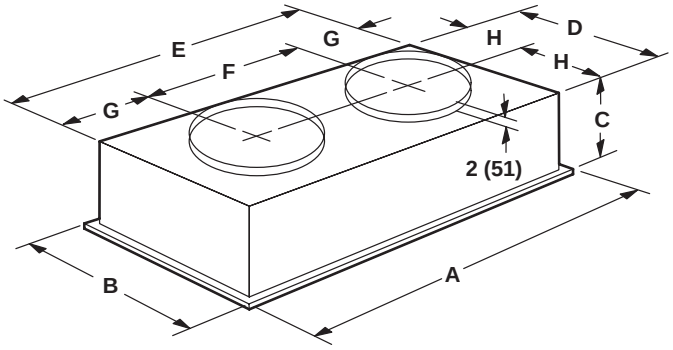
ACCESSORY DIMENSIONS - INCHES (MM)

COMBINATION CEILING SUPPLY AND RETURN DIFFUSERS

STEP-DOWN CEILING DIFFUSER



FLUSH CEILING DIFFUSER



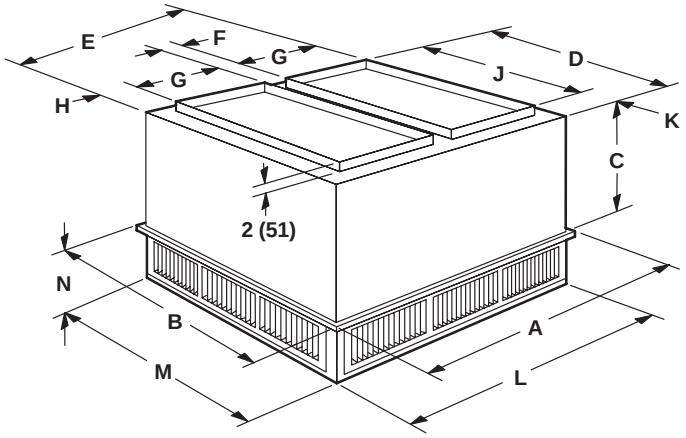
Model Number		RTD11-95
A	in.	47-5/8
	mm	1159
B	in.	29-5/8
	mm	752
C	in.	14-3/8
	mm	365
D	in.	27-1/2
	mm	699
E	in.	45-1/2
	mm	1158
F	in.	22-1/2
	mm	572
G	in.	11-1/2
	mm	292
H	in.	13-3/4
	mm	349
J	in.	45-1/2
	mm	1156
K	in.	27-1/2
	mm	699
L	in.	8-1/8
	mm	206
Duct Size	in.	20 round
	mm	508 round

Model Number		FD11-95
A	in.	47-5/8
	mm	1159
B	in.	29-5/8
	mm	752
C	in.	16-5/8
	mm	422
D	in.	27
	mm	686
E	in.	45
	mm	1143
F	in.	22-1/2
	mm	572
G	in.	11-1/4
	mm	286
H	in.	13-1/2
	mm	343
Duct Size	in.	20 round
	mm	508 round

ACCESSORY DIMENSIONS - INCHES (MM)

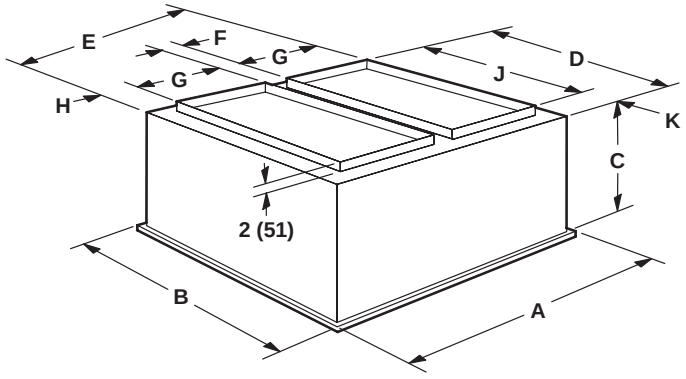
COMBINATION CEILING SUPPLY AND RETURN DIFFUSERS

STEP-DOWN CEILING DIFFUSER



Model Number		RTD11-135	RTD11-185
A	in.	47-5/8	47-5/8
	mm	1210	1210
B	in.	35-5/8	47-5/8
	mm	905	1210
C	in.	20-5/8	24-5/8
	mm	524	625
D	in.	33-1/2	45-1/2
	mm	851	1156
E	in.	45-1/2	45-1/2
	mm	1156	1156
F	in.	4-1/2	4-1/2
	mm	114	114
G	in.	18	18
	mm	457	457
H	in.	2-1/2	2-1/2
	mm	64	64
J	in.	28	36
	mm	711	914
K	in.	2-3/4	4-3/4
	mm	70	121
L	in.	45-1/2	45-1/2
	mm	1156	1156
M	in.	33-1/2	45-1/2
	mm	851	1156
N	in.	9-1/8	10-1/8
	mm	232	257
Duct Size	in.	18 x 28	18 x 36
	mm	457 x 711	457 x 914

FLUSH CEILING DIFFUSER



Model Number		FD11-135	FD11-185
A	in.	47-5/8	47-5/8
	mm	1210	1210
B	in.	35-5/8	47-5/8
	mm	905	1210
C	in.	23-1/4	29-1/4
	mm	591	743
D	in.	33	45
	mm	838	1143
E	in.	45	45
	mm	1143	1143
F	in.	4-1/2	4-1/2
	mm	114	114
G	in.	18	18
	mm	457	457
H	in.	2-1/4	2-1/4
	mm	57	57
J	in.	28	36
	mm	711	914
K	in.	2-1/2	4-1/2
	mm	64	114
Duct Size	in.	18 x 28	18 x 36
	mm	457 x 711	457 x 914

REVISIONS

Section	Description
Options/Accessories	Added new Combination Coil/Hail Guards.
Conventional Control Systems	Added new CS7500 and CS3000 Commercial Thermostats.

Visit us at www.lennox.com

For the latest technical information, www.lennoxcommercial.com

Contact us at 1-800-4-LENNOX

NOTE - Due to Lennox' ongoing commitment to quality, Specifications, Ratings and Dimensions subject to change without notice and without incurring liability.
Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury.
Installation and service must be performed by a qualified installer and servicing agency.

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PACKAGED ELECTRIC / ELECTRIC

LCH

Energence® Ultra-High Efficiency Rooftop Units

60 HZ

PRODUCT SPECIFICATIONS

Bulletin No. 210734
July 2015
Supersedes April 2015

ENERGENCE® Saving Energy with *Intelligence*™

SMARTWIRE™ SYSTEM PRODIGY™ CONTROL SYSTEM

L Connection® NETWORK

MSAV™ MULTI-STAGE AIR VOLUME

SUNSOURCE® Commercial Energy System

ASHRAE 90.1 COMPLIANT

ENERGY STAR

15 and 20 Tons

Net Cooling Capacity – 180,000 to 234,000 Btuh

Optional Electric Heat - 15 to 90 kW

MODEL NUMBER IDENTIFICATION

L C H 240 U 4 M N 1 Y

Brand/Family
L = Energence®

Unit Type
C = Packaged Electric Cooling w/ optional Electric Heat

Major Design Sequence
H = 1st Generation

Nominal Cooling Capacity - Tons
180= 15 Tons
240 = 20 Tons

Cooling Efficiency
U = Ultra-High Efficiency

Refrigerant Type
4 = R-410A

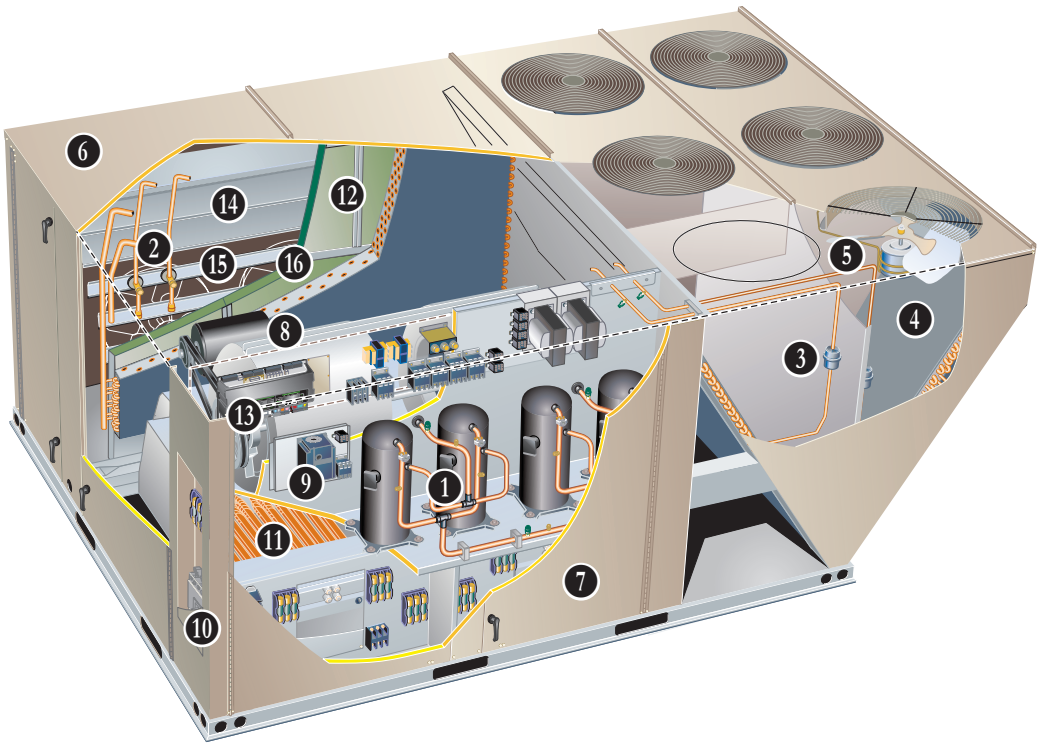
Blower Type
M = MSAV® (Multi-Stage Air Volume) Supply Air Blower, Belt Drive

Factory Installed Electric Heat
N = No Heat
E = 15 kW Electric Heat
J = 30 kW Electric Heat
K = 45 kW Electric Heat
L = 60 kW Electric Heat
P = 90 kW Electric Heat

Minor Design Sequence
1 = 1st Revision
2 = 2nd Revision
3 = 3rd Revision

Voltage
Y = 208/230V-3 phase-60hz
G = 460V-3 phase-60hz
J = 575V-3 phase-60hz

FEATURES AND BENEFITS



Lennox' Energence® Ultra-High Efficiency packaged rooftop unit product line was created to save energy with intelligence by offering some of the highest energy efficiency ratings available with a powerful, easy to use unit controller. This makes Energence rooftop units perfect for business owners looking for an HVAC product with the lowest total cost of ownership.

- **Hinged Access Panels -** Provide quick access to components and protect panels and roof from damage during servicing.
- **Isolated Compressor Compartment -** Allows performance check during normal compressor operation without disrupting airflow.
- **Corrosion-Resistant Removable Drain Pan -** End or bottom drain connection capability. Provides application flexibility, durability and improved serviceability.
- **Thermostatic Expansion Valves -** Provide peak cooling performance across the entire application range.
- **Ultra-High Efficiency Cooling System With Tandem Scroll Compressors -** Tandem Scroll Compressors are standard on all units for reliable, long-term operation. Advanced compressor control system operation for full or part-load conditions.
- **MSAV® (Multi-Stage Air Volume) Supply Air Blower -** Allows multi-staged air delivery.
- **Auto-Tensioner for Blower Belt -** Factory option ensures blower is delivering the proper airflow for comfort, while maximizing efficiency and belt life.
- **MERV 13 Filters -** Available as factory or field option, provide an enhanced level of indoor air quality, and can help the building qualify for additional LEED credits.
- **Foil-Faced Insulation -** Insulation on all internal surfaces that have contact with airflow helps minimize airborne fibers and improve IAQ.
- **Common Components -** Many maintenance items are standard throughout the entire product line, reducing the need to carry different parts to the job or maintain in inventory.

Prodigy® Control System

Standard on every Energence rooftop unit, the new Prodigy® 2.0 unit controller is the heart of the Lennox® controls offering. The intuitive user interface makes setup, troubleshooting and service easier than ever. Each unit tracks the runtime of every major component and records the date and time when service or maintenance is performed.

SmartWire™ System

The SmartWire system simplifies field sensor or thermostat installation through advanced connectors that are keyed and color-coded to help prevent miswiring. Not only is the wire coloring scheme standardized across all models, each connection is intuitively labeled to make troubleshooting and servicing quick and easy.

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APPROVALS

AHRI Certified to AHRI Standard 340/360-2007.

ETL and CSA listed.

Efficiency ratings are certified by CSA.

Components are bonded for grounding to meet safety standards for servicing required by UL, ULC and National and Canadian Electrical Codes.

All models are ASHRAE 90.1 compliant.

All models meet California Code of Regulations, Title 24 requirements for staged airflow.

ISO 9001 Registered Manufacturing Quality System.

ENERGY STAR® certified units are designed to use less energy, help save money on utility bills, and help protect the environment.

The ENERGY STAR® Partner of the Year Award signifies that Lennox has made outstanding contributions to design energy efficient units that will lower energy bills, while meeting industry standards for comfort and indoor air quality. Lennox was the first HVAC manufacturer to win this award and has been a four-time recipient since 2003.

WARRANTY

Limited five years on compressors.

Limited three years on Prodigy® 2.0 unit controller.

Limited five years Optional High Performance Economizers.

Limited one year all other covered components.

COOLING SYSTEM

Designed to maximize sensible and latent cooling performance at design conditions.

System can operate from 0°F to 125°F without any additional controls.

R-410A Refrigerant
Non-chlorine based, ozone friendly, R-410A.

1 Tandem Scroll Compressors
Scroll compressors on all models for high performance, reliability and quiet operation.

Advanced cooling system design features tandem compressors arranged in two single circuit systems that operate together or independently depending on load requirements.

Compressors utilize the maximum area of the coils for maximum heat transfer.

Advanced algorithms in the Prodigy® Control System manage compressor run-times to even the load between the system when running at part-load conditions.

Compressors are resiliently mounted on rubber grommets for quiet operation.

Compressor Crankcase Heaters
Protects against refrigerant migration that can occur during low ambient operation.

2 Thermal Expansion Valves
Assures optimal performance throughout the application range.

Removable element head.

3 Filter/Driers
High capacity filter/drier protects the system from dirt and moisture.

High Pressure Switches
Protects the compressors from overload conditions such as dirty condenser coils, blocked refrigerant flow, or loss of outdoor fan operation.

Low Pressure Switches
Protects the compressors from low pressure conditions such as low refrigerant charge, or low/no airflow.

Freezestats
Protects the evaporator coil from damaging ice build-up due to conditions such as low/no airflow, or low refrigerant charge.

4 Condenser Coil
Copper tube construction, enhanced rippled-edge aluminum fins, flared shoulder tubing connections, silver soldered construction.

COOLING SYSTEM (continued)

Evaporator Coil
Copper tube construction, enhanced rippled-edge aluminum fins, flared shoulder tubing connections, silver soldered construction for improved heat transfer. Factory leak tested. Cross row circuiting with rifled tubing optimizes both sensible and latent cooling capacity.

Condensate Drain Pan
Plastic pan, sloped to meet drainage requirements per ASHRAE 62.1.

Side or bottom drain connections.

5 Variable-Speed ECM Outdoor Coil Fan Motors
Fan speed is directly controlled by the Prodigy 2.0 unit controller.

Thermal overload protected, totally enclosed, permanently lubricated ball bearings, shaft up, wire basket mount.

Outdoor Coil Fans
PVC coated fan guards furnished.

Required Selections

Cooling Capacity
Specify nominal cooling capacity of the unit.

Options/Accessories

Factory or Field Installed

Condensate Drain Trap
Field installed only, may be factory enclosed to ship with unit.

Available in copper or PVC.

Drain Pan Overflow Switch
Monitors condensate level in drain pan, shuts down unit if drain becomes clogged.

CABINET

6 Construction
Heavy-gauge steel panels and full perimeter heavy-gauge galvanized steel base rail provides structural integrity for transportation, handling, and installation.

Base rails have rigging holes.

Three sides of the base rail have forklift slots.

Raised edges around duct and power entry openings in the bottom of the unit provide additional protection against water entering the building.

Airflow Choice
Units are available in downflow (vertical) or horizontal return air flow configuration.

Horizontal air flow requires Horizontal Roof Curb.

Horizontal Return Air Panel Kit is also required if converting a downflow configured unit to horizontal air flow.

Power Entry
Electrical lines can be brought through the unit base or through horizontal access knock-outs

Exterior Panels
Constructed of heavy-gauge, galvanized steel with a two-layer enamel paint finish.

Insulation
All panels adjacent to conditioned air are fully insulated with non-hygroscopic fiberglass insulation.

Unit base is fully insulated. The insulation also serves as an air seal to the roof curb, eliminating the need to add a seal during installation.

7 Hinged Access Panels
Hinged tool-less access panels are provided for the filter section, the blower section and compressor/ controls section.

All hinged panels have seals and quarter-turn latching handles to provide a tight air and water seal.

Required Selections

Airflow Configuration
Specify downflow or horizontal.

Options/Accessories

Factory Installed

Corrosion Protection
A completely flexible immersed coating with an electrodeposited dry film process. (AST ElectroFin E-Coat) Meets Mil Spec MIL-P-53084, ASTM B117 Standard Method Salt Spray Testing.

Indoor Corrosion Protection:
- Coated coil
- Painted blower housing
- Painted indoor base

Outdoor Corrosion Protection:
- Coated coil
- Painted outdoor base

Field Installed

Combination Coil/Hail Guards
Heavy gauge steel frame painted to match cabinet with expanded metal mesh to protect the outdoor coil from damage.

Horizontal Return Air Panel Kit
Required for horizontal applications with Horizontal Roof Curb, contains panel with return air opening for field replacement of existing unit panel and panel to cover bottom return air opening in unit, see dimension drawings.

❽ BLOWER

A wide selection of supply air blower options are available to meet a variety of airflow requirements.

Motor
Overload protected, equipped with ball bearings.

Belt drive motors are offered on all models and are available in several different sizes to maximize air performance.

Motor Efficiency
All blower motors 5 hp and above meet minimum energy efficiency standards in accordance with the Energy Independence and Security Act (EISA).of 2007.

Supply Air Blower
Forward curved blades, double inlet, blower wheel is statically and dynamically balanced. Equipped with ball bearings and adjustable pulley (allows speed change).

Blower assembly slides out of unit for servicing.

Grease fittings furnished.

Required Selections

Select MSAV® (Multi-Stage Air Volume) Supply Air Blower
MSAV (Multi-Stage Air Volume) supply air blower will stage the amount of airflow according to compressor stages, heating demand, ventilation demand or smoke alarm.

NOTE - Part load airflow in cooling mode should not be set below the following cfm/ton levels to reduce the risk of evaporator coil freeze-up.

- 130 cfm/ton - 1 compressor
- 160 cfm/ton - 2 compressors
- 190 cfm/ton - 3 compressors
- 220 cfm/ton - All compressors

❾ Utilizes a Variable Frequency Drive (VFD) to stage the supply air blower airflow. The VFD alters the frequency and voltage of the power supply to the blower to control blower speed.

The amount of airflow for each stage can be set according to a parameter in the Prodigy® 2.0 unit controller. Unit is shipped from the factory with preset airflow.

The MSAV supply air blower option can be ordered with or without an Electronic Bypass Control. If equipped with the bypass control the MSAV features manual (default) or automatic electronic bypass control of the VFD. In case of a VFD malfunction, a VFD alarm is generated by the Prodigy® 2.0 unit controller. The VFD can be manually bypassed to continue unit operation at full blower speed. Or the unit controller can be set to automatically switch to full blower speed if a VFD alarm is generated.

The VFD has an operational range of –40 to 125°F outdoor air ambient temperature.

Lower operating costs are obtained when the blower is operated on lower speeds.

Ordering Information
Specify motor horsepower and drive kit number when base unit is ordered.

Options/Accessories

Factory Installed

Blower Belt Auto-Tensioner
Provides proper tension to belt drive blower belt without the need for regular adjustments. Maintains airflow and proper performance.

ELECTRICAL

All units include terminal block and fuse block in power entry junction box for single power entry application.

SmartWire™ System
Advanced wiring connectors are keyed and color-coded to prevent miswiring. Wire coloring scheme is standardized across all models. Each connection is intuitively labeled to make troubleshooting and servicing quick and easy.

Electrical Plugs
Positive connection electrical plugs are used to connect common accessories or maintenance parts for easy removal or installation.

Phase/Voltage Detection Phase detection monitors power supply to assure phase is correct at unit start-up. If phase is incorrect, the unit will not start and an alarm code is reported to the unit controller. Protects unit from being started with incorrect phasing which could lead to issues such as compressors running backwards. Voltage detection monitors power supply voltage to assure proper voltage. If voltage is not correct (over/under voltage conditions) the unit will not start and an alarm code is reported to the unit controller.

Required Selections

Voltage Choice
Specify when ordering base unit.

ELECTRICAL (continued)

Options/Accessories

Factory Installed

Circuit Breakers
HACR type. For overload and short circuit protection. Factory wired and mounted in the power entry panel. Current sensitive and temperature activated. Manual reset.

SCR (Silicon Controlled Rectifier) Electric Heat Control
The SCR Electric Heat Control modulates small, precise increments of power to the electric heat load eliminating temperature fluctuations associated with mechanical controls.

Almost instantaneous operation with no moving parts.

Zero-Cross (fast cycling) feature improves electric heater life with less contraction and expansion of the heating elements.

The SCR operates when there is no call for heat from the building control system or thermostat. SCR air tempering is controlled by a secondary thermostat and remote duct sensor (ordered separately). A call for heat overrides the SCR and modulates the SCR to 100% heat output. A call for cooling overrides the SCR.

NOTE - The SCR option is not available with 45 kW, 60 kW and 90kW electric heat (208/230V) models.

NOTE - Blower Proving Switch is required and must be ordered separately for factory installation. See Controls in the Options/ Accessories table.

NOTE - Available for use with conventional thermostat controls or Novar® control systems only.

Factory or Field Installed

⑩ **Disconnect Switch**
Accessible from outside of unit, spring loaded weatherproof cover furnished.

⑪ **Electric Heat**
Helix wound nichrome elements, individual element limit controls, wiring harness. Unit fuse block is furnished as standard. See Options / Accessories tables for ordering information.

GFI Service Outlets (2)
115V ground fault circuit interrupter (GFCI) type, non-powered, field-wired or factory-wired and powerd.

Field Installed

GFI Weatherproof Cover
Single-gang cover.

Heavy-duty UV-resistant polycarbonate case construction.

Hinged base cover with gasket.

INDOOR AIR QUALITY

⑫ **Air Filters**
Disposable 2 inch filters furnished as standard.

Options/Accessories

Factory or Field Installed

Healthy Climate® High Efficiency Air Filters
Disposable MERV 8 or MERV 13 (Minimum Efficiency Reporting Value based on ASHRAE 52.2) efficiency 2 inch pleated filters.

Healthy Climate® UVC Germicidal Light Kit

Germicidal lamps emit ultra-violet (UV-C) energy, which has been proven to be effective in reducing microbes such as viruses, bacteria, yeasts, and molds. This process either destroys the organism or controls its ability to reproduce.

UV-C energy greatly reduces the growth and proliferation of mold and other bioaerosols (bacteria and viruses) on illuminated surfaces (particularly coil and drain pan).

Lamps are field installed in the blower/evaporator coil section.

All necessary hardware for installation is included.

Lamps operate on 110/230V, 1 phase power supply. Step-down transformer must be field supplied when used with 460V and 575V rooftop units. Step-down transformer is furnished with lamps when factory installed.

Approved by ETL.

Replacement Filter Media Kit With Frame
Replaces existing pleated filter media. Includes washable metal mesh screen and metal frame with clip for holding replaceable non-pleated filter.

Field Installed

Indoor Air Quality (CO_2) Sensors
Monitors CO_2 levels, reports to the Prodigy® 2.0 unit controller which adjusts economizer dampers as needed.

PRODIGY® CONTROL SYSTEM

⓭ PRODIGY 2.0 UNIT CONTROLLER

The Prodigy 2.0 unit controller is a microprocessor-based controller that provides flexible control of all unit functions.

Features:

LCD Display - Easy to read menu with buttons for menu navigation. during setup and diagnostics. 4 lines x 20 character display.

Menu LEDs - Four LEDs (*Data, Setup, Service, Settings*) aid in menu navigation.

Main Menu and Help Buttons - Quick navigation to home screen and built-in help functions.

Scroll, Value Adjustment Select and Save Buttons

Simplified Setup Procedure - SETUP menu insures proper installation and setup of the rooftop unit.

Profile Setup - Copy key settings between units with the same configuration greatly reducing setup time.

USB Port - Allows a technician to download and transfer unit information to help verify service was performed.

USB drive will also allow updating software on the Prodigy Control System to obtain enhanced functionality without the need to change components.

Unit Controller Software

Unit Self-Test - Unit Controller can perform a rooftop unit self-test to verify individual critical component and system performance. Included is an economizer test function that helps assure the economizer is operating correctly.

Time Clock with Run-time Information

Built-In Functions Include:

Adjustable Blower On/Off Delay

Built-in Control Parameter Defaults

Compressor Time-Off Delay

DDC Compatible

Dirty Filter Switch Input

Discharge Air Temperature Control

Display/Sensor Readout

Economizer Control Options - See Economizer / Outdoor Air / Exhaust Options.

Fresh Air Tempering

Extensive Unit Diagnostics - Over 100 diagnostic and status messages in English.

Exhaust Fan Control Modes - Fresh air damper position.

Permanent Diagnostic Code Storage

Field Adjustable Control Parameters - Over 200 different control settings.

Indoor Air Quality Input - Demand Control Ventilation ready

Low Ambient Controls - Cooling operation down to 40°F.

Gas Valve Time Delay Between First and Second Stage

Minimum Compressor Run Time

Network Capable - Can be daisy chained to other units or controls.

Night Setback Mode

Return Air Temperature Limit Control

Safety Switch Input - Allows Controller to respond to a external safety switch trip.

Service Relay Output

Smoke Alarm Mode - Four choices (unit off, positive pressure, negative pressure, purge).

Staging - Up to 2 heat/2 cool (standard Prodigy 2.0 unit controller thermostat input). Up to 3 cool with additional relay. Up to 4 heat/4 cool with room sensor mode.

"Strike Three" Protection

Gas Reheat Control - Simultaneous heating and cooling operation for controlling humidity for process air applications such as supermarkets.

NOTE - Prodigy Control System features shown vary with the type of rooftop unit the control is installed in.

NOTE - See separate Prodigy Control System Product Specifications Bulletin for additional information.

Thermostat Bounce Delay

Warm Up Mode Delay

LED Indicators

PC Interface - Connect to the Prodigy 2.0 unit controller from a PC with the Lennox Unit Controller Software.

Room Sensor Operation - Controls temperature.

Options / Accessories

Factory or Field Installed

Blower Proving Switch
Monitors blower operation, shuts down unit if blower fails.

Dirty Filter Switch
Senses static pressure increase indicating dirty filter condition.

Controls Options

Factory or Field Installed

Fresh Air Tempering
Used in applications with high outside air requirements. The Controller energizes the first stage heat as needed to maintain a minimum supply air temperature for comfort, regardless of the thermostat demand. When ordered as a factory option, the sensor ships with the unit but must be field installed.

General Purpose Control Kit
Plug-in control provides additional analog and digital inputs/outputs for field installed options.

Smoke Detector
Photoelectric type, installed in supply air section, return air section or both sections. Available with power board and single sensor (supply or return) or power board and two sensors (supply and return). Power board located in unit control compartment.

Interoperability via BACnet® or LonTalk® Protocols
Communication compatible with third-party automation systems that support the BACnet Application Specific Controller device profile, LonMark® Space Comfort Controller functional profile, or LonMark Discharge Air Controller functional profile.

Controls Options (continued)

Commercial Control Systems

L Connection® Network Control System
Complete building automation control system for single or multi-zone applications. Options include local interface, software for local or remote communication, and hardware for networking other control functions. See L Connection Network Control System Product Specifications Bulletin for details.

Aftermarket DDC
Novar® Unit ETM modules and options.

Thermostats
Control system and thermostat options. Aftermarket unit controller options.

Field Installed

Humidity Sensor Kit
Humidity sensor required with Supermarket reheat field selectable option.

14 ECONOMIZER OPTIONS

Economizer operation is set and controlled by the Prodigy 2.0 unit controller.

Simple plug-in connections from economizer to unit controller for easy installation.

All Energence rooftop units are equipped with factory installed CEC Title 24 approved sensors for outside, return and discharge air temperature monitoring.

Optional sensors may be used instead of unit sensors to determine whether outdoor air is suitable for free cooling. See Options/Accessories table.

Factory or Field Installed

Economizer
(Standard and High Performance Common Features)
Outdoor Air Hood with mist elimination filter is furnished.

Outdoor Air Hood is included when economizer is factory installed and is furnished with economizer when ordered for field installation.

Standard Economizer Features (Not for Title 24)
Parallel gear-driven action, return air and outdoor air dampers, plug-in connections to unit, nylon bearings, neoprene seals, 24-volt, fully-modulating spring return motor.

NOTE: The Free Cooling default setting for outdoor air temperature sensor is 55°F.

High Performance Economizer Features
Approved for California Title 24 building standards.
ASHRAE 90.1-2013 compliant.

Gear-driven action, high torque 24-volt fully-modulating spring return damper motor, return air and outdoor air dampers, plug-in connections to unit, stainless steel bearings, enhanced neoprene blade edge seals and flexible stainless steel jamb seals to minimize air leakage.

NOTE - High Performance Economizers are not approved for use with enthalpy controls in Title 24 applications.

NOTE - The Free Cooling setpoint for Title 24 applications must be set based on the Climate Zone where the system is installed. See Section 140.4 "Prescriptive Requirements for Space Conditioning Systems" of the California Energy Commission's 2013 Building Energy Efficiency Standards.

Refer to Installation Instructions for complete setup information and menu parameters available.

Differential Sensible Control
Factory setting. Uses outdoor air and return air sensors that are furnished with the unit. The Prodigy 2.0 unit controller compares outdoor air and return air and using setpoints, enables the economizer when the outdoor air temperature is below the configured setpoint and cooler than return air.

NOTE - Differential Sensible Control can be configured in the field to provide Offset Differential Sensible Control or Single Sensible Control.

In Offset Differential Sensible Control mode, the economizer is enabled if the temperature differential (offset) between outdoor air and return air reaches the configured setpoint.
In Single Sensible Control mode, the economizer is enabled when outdoor air temperature falls below the configured setpoint.

Global Control
The unit controller communicates with a DDC system with one global sensor (enthalpy or sensible) to determine whether outside air is suitable for free cooling on all units connected to the control system. Sensor must be field provided.

NOTE - Global control with enthalpy is not approved for Title 24 applications.

Economizer Control Options

Factory or Field Installed

Single Enthalpy Temperature Control
(Not for Title 24)
Outdoor air enthalpy sensor enables Economizer if the outdoor enthalpy is less than the setpoint of the control.

Differential Enthalpy Control
(Not for Title 24)
Order two Single Enthalpy Controls. One is field installed in the return air section, the other in the outdoor air section. Allows the economizer control to select between outdoor air or return air, whichever has lower enthalpy.

Field Installed

Outdoor Air CFM Control
Maintains constant outdoor air volume levels on the supply air fan and varying unit airflows. Using information from a velocity sensor located in the rooftop unit outdoor air section, the Prodigy® 2.0 unit controller changes the economizer position to help minimize the effect of supply fan speed changes on outdoor air volume levels. Setpoint for outdoor air volume is established by field testing.

NOTE - Not available with Demand Control Ventilation (CO_2 Sensor) or Building Pressure Control.

ECONOMIZER OPTIONS (continued)

Economizer Control Options

Field Installed

Building Pressure Control
Maintains constant building pressure level.

Using information from a differential pressure between the outdoor air and the building air, the Prodigy® 2.0 unit controller changes the economizer position to help maintain a constant building pressure.

NOTE - Not available with Demand Control Ventilation (CO_2 Sensor) or Outdoor Air CFM Control.

EXHAUST OPTIONS

Factory or Field Installed

Downflow Barometric Relief Dampers
15 Allow relief of excess air, aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle, bird screen furnished.

Hood for downflow barometric relief dampers is factory installed when dampers are factory installed with economizer. Hood is furnished with dampers when ordered for field installation.

16 **Power Exhaust Fans**
Install internal to unit for downflow applications only with economizer option. Provides exhaust air pressure relief. Interlocked to run when supply air blower is operating, fans run when outdoor air dampers are 50% open (adjustable), motor is overload protected. Requires Economizer with Outdoor Air Hood and Downflow Barometric Relief Dampers. Dual fans are 20 in. diameter with 5 blades with (2) 1/3 hp motors.

NOTE - MSAV (Multi-Stage Air Volume) models are equipped with 2-stage power exhaust fans. Power exhaust operates in 1st stage (one fan) up to 70% of supply air blower speed. Both exhaust fans operate in 2nd stage when supply air blower speed is above 70% (adjustable) of full speed.

Field Installed

Horizontal Barometric Relief Dampers
For use when unit is configured for horizontal applications requiring an economizer.

Allows relief of excess air. Aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle.

Field installed in return air duct.

Bird screen and hood furnished.

OUTDOOR AIR OPTIONS

Factory or Field Installed

Outdoor Air Damper - Downflow or Horizontal With Air Hood
Linked mechanical dampers, 0 to 25% (fixed) outdoor air adjustable, installs in unit. Includes outdoor air hood.

Automatic model features fully modulating spring return damper motor with plug-in connection.

Manual model features parallel blade, gear-driven dampers with adjustable fixed position.

ROOF CURBS

Nailer strip furnished, mates to unit, US National Roofing Contractors Approved, shipped knocked down.

Downflow

Hybrid Roof Curbs
Roof curb can be assembled using interlocking tabs to fasten corners together. No tools required.

Curb can also be fastened together with furnished hardware.

Available in 8, 14, 18, and 24 inch heights.

See Options/Accessories table.

Adjustable Pitched Curb
Fully adjustable pitch curbs (3/4 in. per foot in any direction) provide a level platform for rooftop units allowing flexible installations on roofs with uneven or sloped angles.

Uses interlocking tabs to fasten corners together. No tools required.

Hardware is furnished to connect upper curb with lower curb.

Available in 14 inch height.

Horizontal
Converts unit from downflow to horizontal (side) air flow, return air is on unit, supply air is on curb, see dimension drawings. Curbs for rooftop applications meet National Roofing Code requirements. Requires Horizontal Return Air Panel Kit.

Available in 26 and 37 inch heights.

Optional Insulation Kit is available to help prevent sweating.

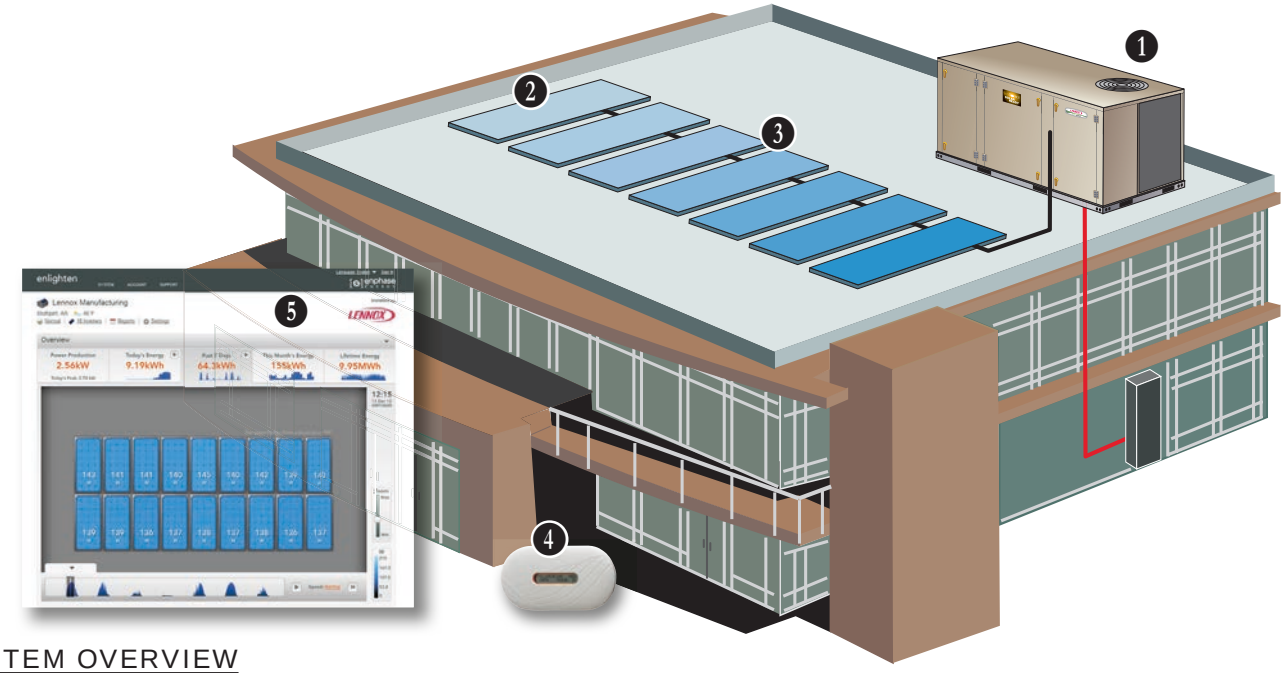
Adaptor Curbs (not shown)
Curbs are regionally sourced. Dimensions will vary based upon the source. Contact your local sales representative for a detailed cut sheet with applicable dimensions.

CEILING DIFFUSERS

Ceiling Diffusers (Flush or Step-Down)
Aluminum grilles, large center grille, insulated diffuser box with flanges, hanging rings furnished, interior transition (even air flow), internally sealed (prevents recirculation), adapts to T-bar ceiling grids or plaster ceilings.

Transitions (Supply and Return)
Used with diffusers, installs in roof curb, galvanized steel construction, flanges furnished for duct connection to diffusers, fully insulated.

SUNSOURCE® COMMERCIAL ENERGY SYSTEM



SYSTEM OVERVIEW

All Energence® 15 and 20 ton commercial rooftop units are upgradable to the SunSource® Commercial Energy System.

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

The SunSource® Commercial Energy System consists of the following components:

1. Energence® 15 and 20 ton commercial rooftop units with factory installed Solar Power Entry Option (circuit protection for solar power and line voltage wiring).
2. Solarworld Solar Modules (up to 48 modules) may be used to vary the amount of electricity generated).
3. Enphase Microinverter, converts Direct Current to Alternating Current power.
4. Enphase Envoy Communications Gateway that monitors energy usage.
5. Enphase Enlighten™ Performance Monitoring Website

Wiring from the roof mounted solar modules is routed to the rooftop unit.

NOTE - Refer to separate Product Specifications Bulletin for the **SunSource® Commercial Energy System** for more detailed information.
See section *Solar - Kits/Accessories*.

Also refer to ***SunSource® Commercial Energy System Applications and Design Guidelines*** Manual (Corp. 1303-L1) for complete information on designing, sizing and installing a complete system.

APPROVALS

SunSource® Commercial Energy System is listed by ETL to UL 1995 and can be installed to comply with the NEC.

The SunSource® Energy System for Commercial Rooftop Units meets the requirements for federal tax credits listed under the U.S. Emergency Economic Stabilization Act of 2008, covering 30% of the cost of the solar modules, including installation.

BASIC SYSTEM REQUIREMENTS

Sufficient south-facing open roof space.

Broadband Internet connection.

208V three-phase or 460V three-phase.

NOTE: Transformers must be ordered for voltages other than 208V three-phase WYE.

Grid Interconnection Agreement.

SOLAR POWER ENTRY OPTION

A factory installed power entry option is available for Energence® rooftop units that provides a connection point for SunSource® solar modules.

The option provides circuit protection (fuses) for the solar connection and rooftop unit components.

An externally accessible disconnect (non-fused) is also included to shutdown the system for service. Field wiring connections are made directly to the disconnect for the utility connection and to pigtails for easy solar connection.

Local codes may require a field provided solar disconnect and/or a field provided fused HVAC disconnect.

SOLAR MODULES

Captures solar energy to convert into AC power through the Enphase Microinverter.

Laminated solar module structure consists of the solar glass, two ethylene vinyl acetate (EVA) sheets, the solar cell matrix and a back sheet.

Thick low-iron safety glass withstands extreme weather conditions and heavy snow loads.

Solar modules are ETL/Intertek listed for the US and Canada to UL Standard 1703 and meet National and Canadian Electrical Code requirements.

Solar Module Frame
Clear anodized aluminum frame with cast aluminum corner keys.

Low profile with extended flange.

Compatible with “top-down” and “bottom-up” mounting methods.

Eight grounding locations (Four corners of the frame and four locations along the length of the module in the extended flange).

Extended cable lengths for easier installation.

ENPHASE MICROINVERTER

Converts Direct Current (DC), captured by a solar module, to Alternating Current (AC) power. Each solar module is paired with one Enphase Microinverter.

Installed beneath each solar module on the roof.

Enphase Microinverters operate independently from each other allowing solar modules that are not shaded or dirty to operate with optimum performance.

Supports low-light and low-voltage operation.

FLAT ROOF MOUNTING SYSTEM

PanelClaw® Polar Bear III roof mounting system is designed to maximize array construction speed.

Innovative system consists of three major components (Support, Ballast Tray and Claw).

Modular, adaptable design with single module tilt-up feature to facilitate access to roof, wiring and maintenance.

10 degree nominal tilt angle.

Fully ballasted or mechanically attached.

- **Support -** Galvanized steel tubing. (1) Support unit with pre-installed integrated recycled rubber pads and mounting hardware.
- **Ballast Tray** - Angled fit with locking end-tab to fully capture ballast blocks. Hemmed edges and chamfered corners prevent wiring from coming into contact with sharp edges. Ballast blocks are field provided.
- **Claw -** Attachment to module using standard module mounting holes. UL 2703 certified for electric bonding and grounding. G90 galvanized steel.

ENPHASE ENGAGE CABLE SYSTEM

- **Enphase Engage Cable** - Enphase Engage Cable (shown with connector) is a 12 AWG cable with pre-installed connectors that plug into the Enphase Microinverter.

- Five wire cable (208V three-phase)
- **Enphase Engage Cable Terminator** - Each Enphase Engage Cable is terminated at a junction or combiner box. The opposite end of the cable must be terminated with an Enphase Engage Cable Terminator cap.

- **Enphase Engage Disconnect Tool** - Spe**c**ialized tool that disconnects ble from an Enphase Microinverter or watertight sealing cap.

- **Enphase Water-tight Sealing Cap** - Use when open connections on the Enphase Engage Cable are not mated to an Enphase Microinverter.

SYSTEM MONITORING

Enphase Envoy Communications Gateway (with Wireless Capability)

The Enphase Envoy Communications Gateway monitors Enphase Microinverter (on solar modules) performance and can be connected to a broadband internet connection to send data to the Enphase Enlighten™ web site for online monitoring. The Enphase Envoy Communications Gateway is not required, but must be used if system performance monitoring is desired.

Limited system monitoring is also available locally with the Envoy and a personal computer if no internet connection is available.

Various Event Messages are also available when monitoring the system via a personal computer locally.

Connection options include:

- Wireless N USB adaptor (802.11b/g/n)
- Ethernet RJ45 (cable included)

NEMA 1 indoor enclosure.

Contents - (1) Envoy Communications Gateway, (1) Wireless N USB adaptor (1) 6 ft. power cord, (1) 10 ft. orange Ethernet RJ45 cable.

CSA (US/C) listed.

Line Communications Filter

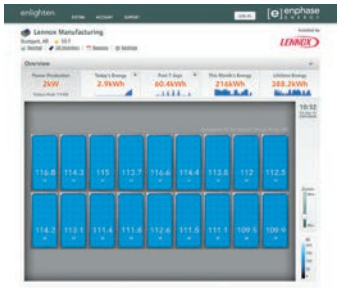
Envoy Communications Gateway mounted in a weatherproof NEMA 4 enclosure.

For outdoor installations, installations with transformers, or when multiple communications modules are used on one building.

Contains the Enphase Envoy Communications Gateway and terminal blocks for easy power hookup from the Enphase Microinverter branch circuits distribution to the electrical meter or distribution panel. A filter removes any electrical interference from other devices or multiple Envoy Communication Gateways in the same building.

Unit is UL listed for the US and Canada and meet National Electrical Code requirements.

Enphase Enlighten™ Performance Monitoring Website



Powered by the Enphase Envoy Communications Gateway, the Enphase Enlighten™ Performance Monitoring website allows the user to keep track of building energy usage and see environmental benefits in real time.

See demos, view reference installations and other additional information at: http://enlighten.enphaseenergy.com/

SYSTEM ORDERING

- Specify the number of Solar Module CE (Custom Engineered) Kits required. The system will be shipped as a complete package.

  Each kit includes:

  - One Solarworld Solar Module
  - One Enphase Microinverter
  - One Enphase Engage Cable (no. of connectors are determined by total number of Solar Module Kits ordered)
  - One PanelClaw® Polar Bear Mounting System for the Solar Module
  - Hardware for mounting
  - Custom engineering drawings and full design for solar system
- Energence® 15 and 20 ton packaged rooftop unit must be ordered with the factory installed Solar Power Entry Option.
- Enphase Envoy Communications Gateway or Line Communications Filter must be ordered separately.
- Transformers must be ordered separately. See Options/Accessories table.

Contact your nearest Lennox Sales Representative for ordering information.

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No. 180	Unit Model No. 240
COOLING SYSTEM				
Condensate Drain Trap	PVC - C1TRAP20AD2	**76W26**	OX	OX
	Copper - C1TRAP10AD2	**76W27**	OX	OX
Corrosion Protection		Factory	O	O
Drain Pan Overflow Switch	E1SNSR71AD1	**68W88**	OX	OX
Refrigerant Type		R-410A	O	O
BLOWER - SUPPLY AIR				
Blower MSAV (Multi-Stage Air Volume) supply air blower option (With VFD Bypass Control)		Factory	O	O
MSAV (Multi-Stage Air Volume) supply air blower option (Without VFD Bypass Control)		Factory	O	O
Motors - MSAV® Multi-Stage Air Volume	Belt Drive (standard or high efficiency) - 3 hp	Factory	O	
	Belt Drive (standard efficiency) - 5 hp	Factory	O	O
	Belt Drive (standard efficiency) - 7.5 hp	Factory	O	O
	Belt Drive (standard efficiency) - 10 hp	Factory		O
Drive Kits	Kit #1 535-725 rpm	Factory	O	
See Blower Data Tables for usage and selection	Kit #2 710-965 rpm	Factory	O	
	Kit #3 685-856 rpm	Factory	O	O
	Kit #4 850-1045 rpm	Factory	O	O
	Kit #5 945-1185 rpm	Factory	O	O
	Kit #6 850-1045 rpm	Factory	O	O
	Kit #7 945-1185 rpm	Factory	O	O
	Kit #8 1045-1285 rpm	Factory	O	O
	Kit #10 1045-1285 rpm	Factory		O
	Kit #11 1135-1365 rpm	Factory		O
	Blower Belt Auto-Tensioner	Factory	O	O
CABINET				
Combination Coil/Hail Guards	C1GARD51C21	**13T12**	X	X
CONTROLS				
Blower Proving Switch	C1SNSR35FF1	**53W65**	OX	OX
Commercial Controls	L Connection® Building Automation System	- - -	X	X
	Prodigy® Control Control System - BACnet® Module - C0CTRL60AE1L	**59W51**	OX	OX
	Prodigy® Control Control System - LonTalk® Module - C0CTRL65FF1	**54W27**	OX	OX
	Novar® ETM-2051 - E0CTRL30C1	**64W74**	OX	OX
	Novar® LSE	Factory	O	O
Dirty Filter Switch	E1SNSR55C-1	**53W68**	OX	OX
Fresh Air Tempering	C1SNSR75AD1	**58W63**	OX	OX
General Purpose Control Kit	E1GPBK30C1	**13J78**	X	X
Smoke Detector - Supply or Return (Power board and one sensor)	C1SNSR44C-1	**83W40**	OX	OX
Smoke Detector - Supply and Return (Power board and two sensors)	C1SNSR43C-1	**83W41**	OX	OX

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 Description	Model Number	Catalog Number	Unit Model No. 180	Unit Model No. 240
INDOOR AIR QUALITY				
Air Filters				
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 (Order 6 per unit)	MERV 8 - C1FLTR15C-1-	**54W67**	OX	OX
	MERV 13 - C1FLTR40C-1-	**52W40**	OX	OX
Replacement Media Filter With Metal Mesh Frame (includes non-pleated filter media)	C1FLTR30C-1-	**44N61**	OX	OX
Indoor Air Quality (CO_2) Sensors				
Sensor - Wall-mount, off-white plastic cover with LCD display	C0SNSR50AE1L	**77N39**	X	X
Sensor - Wall-mount, off-white plastic cover, no display	C0SNSR52AE1L	**87N53**	X	X
Sensor - Black plastic case with LCD display, rated for plenum mounting	C0SNSR51AE1L	**87N52**	X	X
Sensor - Wall-mount, black plastic case, no display, rated for plenum mounting	C0MISC19AE1	**87N54**	X	X
CO_2 Sensor Duct Mounting Kit - for downflow applications	C0MISC19AE1-	**85L43**	X	X
Aspiration Box - for duct mounting non-plenum rated CO_2 sensors (**87N53** or **77N39**)	C0MISC16AE1-	**90N43**	X	X
UVC Germicidal Light Kit				
[1] Healthy Climate® UVC Light Kit (110/230v-1ph)	C1UVCL10C-1	**54W65**	OX	OX
ELECTRICAL				
Voltage 60 hz	208/230V - 3 phase	Factory	O	O
	460V - 3 phase	Factory	O	O
	575V - 3 phase	Factory	O	O
Disconnect Switch (see Electric Heat Tables for usage, page 29)	80 amp - C1DISC080C-1	**54W85**	OX	OX
	150 amp - C1DISC150C-1	**54W86**	OX	OX
	250 amp - C1DISC250C-1	**54W87**	OX	OX
GFI Service Outlets	15 amp non-powered, field-wired (208/230V, 460V, 575V) LTAGFIK10/15	**74M70**	OX	OX
	15 amp factory-wired and powered (208/230V, 460V, 575V)	Factory	O	O
	20 amp non-powered, field-wired (575V only) C1GFCI20FF1	**67E01**	OX	OX
Weatherproof Cover for GFI	C1GFCI99FF1	**10C89**	X	X
ELECTRIC HEAT				
15 kW	208/230V-3ph - C1EH0150C-1Y	**53W84**	OX	OX
	460V-3ph - C1EH0150C-1G	**53W86**	OX	OX
	575V-3ph - C1EH0150C-1J	**53W87**	OX	OX
30 kW	208/230V-3ph - C1EH0300C21Y	**53W92**	OX	OX
	460V-3ph - C1EH0300C21G	**53W94**	OX	OX
	575V-3ph - C1EH0300C21J	**53W95**	OX	OX
45 kW	208/230V-3ph - C1EH0450C21Y	**54W00**	OX	OX
	460V-3ph - C1EH0450C21G	**54W02**	OX	OX
	575V-3ph - C1EH0450C21J	**54W03**	OX	OX
60 kW	208/230V-3ph - C1EH0600C21Y	**54W08**	OX	OX
	460V-3ph - C1EH0600C21G	**54W10**	OX	OX
	575V-3ph - C1EH0600C21J	**54W11**	OX	OX
90 kW	208/230V-3ph - C1EH0900C-1Y	**54W12**		OX
	460V-3ph - C1EH0900C-1G	**54W14**		OX
	575V-3ph - C1EH0900C-1J	**54W15**		OX
SCR (Silicon Controlled Rectifier) Electric Heat Control NOTE - The SCR option is not available with 45 kW, 60 kW and 90kW electric heat (208/230V) models.		Factory	O	O
Thermostat (required)		**45N59**	X	X
Duct Sensor (required)		**45N60**	X	X

[1] Lamps operate on 110-230V single-phase power supply. Step-down transformer must be field supplied for field installation in 460V and 575V rooftop units (transformer is furnished for factory installed light kits). Alternately, a separate 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

OPTIONS / ACCESSORIES

Item Description	Model Number	Catalog Number	Unit Model No. 180	Unit Model No. 240
ECONOMIZER				
Standard Economizer (Not for Title 24)				
Standard Economizer Downflow or Horizontal - Includes Outdoor Air Hood. Order Downflow or Horizontal Barometric Relief Dampers separately.	E1ECON15C-1	**54W75**	OX	OX
High Performance Economizer (Approved for California Title 24 Building Standards)				
High Performance Economizer Downflow or Horizontal - Includes Outdoor Air Hood. Order Downflow or Horizontal Barometric Relief Dampers separately.	E1ECON17C-1	**10U60**	OX	OX
Economizer Controls				
Differential Enthalpy (Not for Title 24)	Order 2 - C1SNSR64FF1	**53W64**	OX	OX
Sensible Control	Sensor is Furnished	Factory	O	O
Single Enthalpy (Not for Title 24)	C1SNSR64FF1	**53W64**	OX	OX
Global Control	Sensor Field Provided	Factory	O	O
Building Pressure Control	E1GPBK10C1	**13J77**	X	X
Outdoor Air CFM Control	E1GPBK20C1	**13J76**	X	X
Barometric Relief Dampers With Exhaust Hood				
Downflow Barometric Relief Dampers	C1DAMP50C	**54W78**	OX	OX
Horizontal Barometric Relief Dampers	LAGEDH18/24	**16K99**	X	X
OUTDOOR AIR				
Outdoor Air Dampers With Outdoor Air Hood				
Motorized	E1DAMP20C-1	**54W74**	OX	OX
Manual	C1DAMP10C-1	**54W76**	OX	OX
POWER EXHAUST				
Standard Static	208/230V - C1PWRE11C-1Y	**75W90**	OX	OX
	460V - C1PWRE11C-1G	**75W91**	OX	OX
	575V - C1PWRE11C-1J	**75W92**	OX	OX
ROOF CURBS				
Hybrid Roof Curbs, Downflow				
8 in. height	C1CURB70C-1	**11F58**	X	X
14 in. height	C1CURB71C-1	**11F59**	X	X
18 in. height	C1CURB72C-1	**11F60**	X	X
24 in. height	C1CURB73C-1	**11F61**	X	X
Adjustable Pitch Curb				
14 in. height	L1CURB55C	**43W26**	X	X
Standard Roof Curbs, Horizontal - Requires Horizontal Return Air Panel Kit				
26 in. height - slab applications	C1CURB14C-1	**11T89**	X	X
37 in. height - rooftop applications	C1CURB16C-1	**11T96**	X	X
Insulation Kit For Standard Horizontal Roof Curbs				
for C1CURB14C-1	C1INSU11C-1-	**73K32**	X	X
for C1CURB16C-1	C1INSU13C-1-	**73K34**	X	X
Horizontal Return Air Panel Kit				
Required for Horizontal Applications with Roof Curb	C1HRAP10C-1-	**87M00**	X	X
CEILING DIFFUSERS				
Step-Down - Order one	RTD11-185	**29G06**	X	
	RTD11-275-R	**29G07**		X
Flush - Order one	FD11-185	**29G10**	X	
	FD11-275-R	**29G11**		X
Transitions (Supply and Return) - Order one	C1DIFF33C-1	**12X68**	X	
	C1DIFF34C-1	**12X70**		X
SUNSOURCE® COMMERCIAL ENERGY SYSTEM				
Solar Module CE Kit	One 285W Solar Module (silver frame), One PanelClaw Polar Bear III Mounting System and One Enphase M250 Microinverter	**10U67**	X	X
Solar Power Entry with Disconnect		Factory	O	O
Enphase Envoy Communications Gateway (with Wireless Capability)		**13L89**	X	X
Line Communication Filter (external)	C1C400D11A	**10F93**	X	X
[1] Transformer (6 kW)	E1TRFM15AD3Y (208Y to 208 VAC Delta)	**11H71**	X	X
	E1TRFM15AD2Y (230 VAC Delta)	**11H28**	X	X
	E1TRFM15AD3G (460 VAC Delta or Wye)	**11H29**	X	X

[1] Order one 6 kW transformer per array (up to 24 solar modules each). Up to two arrays can be used per rooftop unit (total 48 modules). Arrays are field wired in parallel to the Solar Power Entry

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

SEQUENCE OF OPERATION

HEATING MODE

NOTE - Heating Mode Is The Same For All Control Options.

W1 Demand:

Electric heat energized (stage 1 on units with 2-stage) and supply air blower operates at heating speed.

W2 Demand:

Electric heat energized (stage 2 on units with 2-stage) and supply air blower operates at heating speed.

MODULATING OUTDOOR AIR DAMPER

The minimum damper position for “occupied low blower” and “occupied high blower” is adjusted during unit setup to provide minimum fresh air requirements per ASHRAE 62.1 at the corresponding supply air blower speeds.

When supply air blower is off or the unit is in unoccupied mode, the outdoor air damper is closed.

When unit is in occupied mode and supply air blower is operating at a speed below the “midpoint” blower speed, the outdoor air damper is at minimum “low blower” position.

When unit is in occupied mode and supply air blower is operating at a speed equal to or above the “midpoint” blower speed, the outdoor air damper is at minimum “high blower” position.

NOTE - The “midpoint” blower speed is an average of the minimum and maximum blower speed (minimum speed + maximum speed divided by 2).

THERMOSTAT MODE

The thermostat mode has specific sequence-of-operation scenarios for Lennox’ Energence® Ultra-High Efficiency product line. The standard thermostat mode will typically allow 2 stages of heating and cooling operation. Units with a globally-controlled economizer option can have 2 stages of mechanical cooling and free cooling economizer operation. The MSAV® (Multi-Stage Air Volume) blower will also allow up to 5 different supply blower CFM values: 2 CFM values for cooling mode, 1 CFM value for heating mode, 1 CFM value for ventilation, and an extra speed for when one of the smoke alarm options is used. When using the factory default, the smoke alarm mode will turn off the blower. It is important to note that the unit controller merely passes along the instructions to provide heating, cooling, or other unit operations.

THERMOSTAT MODE - MSAV® (MULTI-STAGE AIR VOLUME) (CONTINUED)

OPERATION WITH 2-STAGE THERMOSTAT

Supply Air Blower CFM

Unit has the following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, and economizer modulates to maintain Parameter 159 setting (supply air temperature).

Parameter 164 dictates when one compressor from each circuit is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressor is energized the economizer stays at maximum open.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Y1 Demand:

One compressor from each circuit operates and supply air blower operates at low cooling CFM.

Y2 Demand:

All compressors operate and supply air blower operates at high cooling CFM.

THERMOSTAT MODE - MSAV® (MULTI-STAGE AIR VOLUME) (CONTINUED)

OPERATION WITH 3-STAGE THERMOSTAT

Supply Air Blower CFM

Unit has following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Medium-Low Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Parameter 164 dictates when one compressor from each circuit is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressors are energized the economizer stays at maximum open.

Y3 Demand:

All compressors are energized and supply air blower stays on high cooling CFM.

Unit Does Not Feature An Economizer Or Outdoor Air Is Not Suitable

Y1 Demand:

One compressor operates and supply air blower operates at low cooling CFM.

Y2 Demand:

One compressor from each circuit operates and supply air blower operates at medium-low cooling CFM.

Y3 Demand:

All compressors from each circuit operate and supply air blower operates at high cooling CFM.

SEQUENCE OF OPERATION

ZONE SENSOR MODE

When in zone sensor mode, the unit can modulate four stages of cooling or two stages of heating operation. In this case, the unit controller will control all unit staging operations. While in zone sensor mode, multi-stage air volume applications can use up to 4 different supply blower CFM values for cooling. Zone sensor mode takes full advantage of the unit controller's features, increasing staging and control capabilities. To operate correctly, the unit must receive information from a temperature sensor. It may also receive setpoint information from a network device. Based on this information, the unit controller will either turn on or off various cooling and heating stages to maintain comfort control.

In zone sensor mode, it is possible to operate the unit without a network device. In this case the unit controller will control the zone temperature based on the backup occupied and unoccupied setpoints stored in the unit controller. The unit controller decides which setpoints to use based on the status of the occupied input. For example, if the unit is in occupied mode, the unit controller will use the occupied backup setpoints and if the unit is not in unoccupied mode the unit controller will use the unoccupied backup setpoints. In this scenario the unit controller not only records diagnostic information and makes sure the unit maintains safe operation limits,. It also controls all staging and unit operations.

ZONE SENSOR MODE HEATING

For heating, the unit controller monitors space temperature from the zone sensor. Based on this information and the setpoints sent to the unit controller from the Lennox or third-party network device, the unit controller turns on or off the heating stages to maintain the desired temperature setpoint.

The LGH Ultra-High Efficiency product line features up to four independent heat stages in larger equipment. The exact percent of heating capacity used will vary depending on the size of the unit and the heating capacity. Regardless of how many stages are present, the unit controller will seek to provide the right amount of heat to satisfy the demand.

The sequence of operation for increasing and decreasing heating stages is best shown by the staging chart on page 29. As you can see from the chart, the unit will activate the heating stages if the space temperature drops to certain temperatures. If the temperature continues to drop, the unit will continue to add heating stages until the unit reaches full heating capacity. Notice that the example heating setpoint is 70°F with a 1° deadband. Also notice that the stage-up timer is 15 minutes. The unit controller will call for the next heating stage if the space temperature has been in the stage-up timer deadband region for 15 continuous minutes. The stage-up timer deadband region is the range between the temperature at which the current heating stage was called, and the temperature at which the next heating stage would be called. Heating stages will deactivate immediately after the space temperature has been satisfied. These are all default setpoints and can be changed to customize the unit to the specific application.

It is important to note that units with multi-stage air volume supply blowers operate at the selected heating speed for all stages of heating. The supply blower speed will not change as heat stages increase or decrease because there is only one heating supply blower speed setpoint.

ZONE SENSOR MODE COOLING

For cooling, the unit controller monitors space temperature from the zone sensor. Based on this information and the setpoints sent to the unit controller from an optional Lennox or third-party network device, the unit controller turns on or off cooling stages to maintain the desired temperature setpoint.

The LGH Ultra-High Efficiency product line features up to four independent cooling stages in larger equipment. Regardless of how many stages are available, the unit controller will seek to provide the right amount of cooling to satisfy the demand. This helps provide great comfort control and to minimize energy consumption. The sequence of operation for increasing and decreasing cooling stages is best shown by the staging chart on page 29. As you can see from the chart, the unit will activate cooling stages if the space temperature rises above certain setpoints. If the temperature continues to rise, the unit will continue to add cooling stages until the unit reaches full cooling capacity. Notice that the example cooling setpoint is 75°F with a 1° deadband. Notice that the stage-up timer is 15 minutes. The unit controller will call for the next cooling stage if the space temperature has been in the stage-up timer deadband region for 15 continuous minutes. The stage-up timer deadband region is the range between the temperature at which the current cooling stage was called, and the temperature at which the next cooling stage would be called. Cooling mode has a stage-down delay default that keeps the next lower stage on for 15 minutes after a higher stage has ended. This feature is to make sure the unit doesn't prematurely shut off a cooling stage. These are all default setpoints and can be changed to customize the unit to the specific application.

ZONE SENSOR MODE (continued)

ZONE SENSOR MODE COOLING WITH/WITHOUT ECONOMIZER

If the outdoor air is suitable and the unit features an economizer, instead of using mechanical cooling to meet the first cooling demand, the unit controller will try to meet the demand by opening the economizer and using outdoor air. The economizer damper will modulate to maintain Parameter 159 setting (supply air temperature) to meet the cooling demand.

If mechanical cooling is locked out because of low ambient outside air temperature, then mechanical cooling will not come on and the unit will attempt to satisfy any demand by modulating the economizer's damper position to maintain Parameter 159 setting (supply air temperature). The setpoints at which mechanical cooling locks out and the economizer maintains supply air temperature are adjustable.

If mechanical cooling is not locked out and if the unit is able to satisfy the room temperature requirements using outdoor air, then the unit will close the economizer to the minimum setpoint and cease cooling operation. If the unit is unable to satisfy the room temperature requirements using outdoor air, then the unit will react to a second cooling demand, which will trigger the first stage of mechanical cooling and bring the economizer to the full open position. The unit will continue turning on stages of mechanical cooling until the unit has satisfied the space temperature setpoint. Because the unit can provide up to 4 stages of cooling, and the economizer now qualifies as the first stage of cooling, the unit controller will group the remaining two compressors in a four compressor unit together in the event that two compressors are already energized. This means that to address the fourth stage cooling demand the unit will increase the mechanical cooling from two compressors energized to all compressors energized.

See table for unit operation without an economizer.

ZONE SENSOR MODE COOLING

Cooling Demand	Unit with Economizer	Unit Without Economizer or Outdoor Air is Unsuitable
One	Economizer	One Compressor
Two	Economizer + One Compressor	Two Compressors
Three	Economizer + Two Compressors	Three Compressors
Four	Economizer + All Compressors	All Compressors

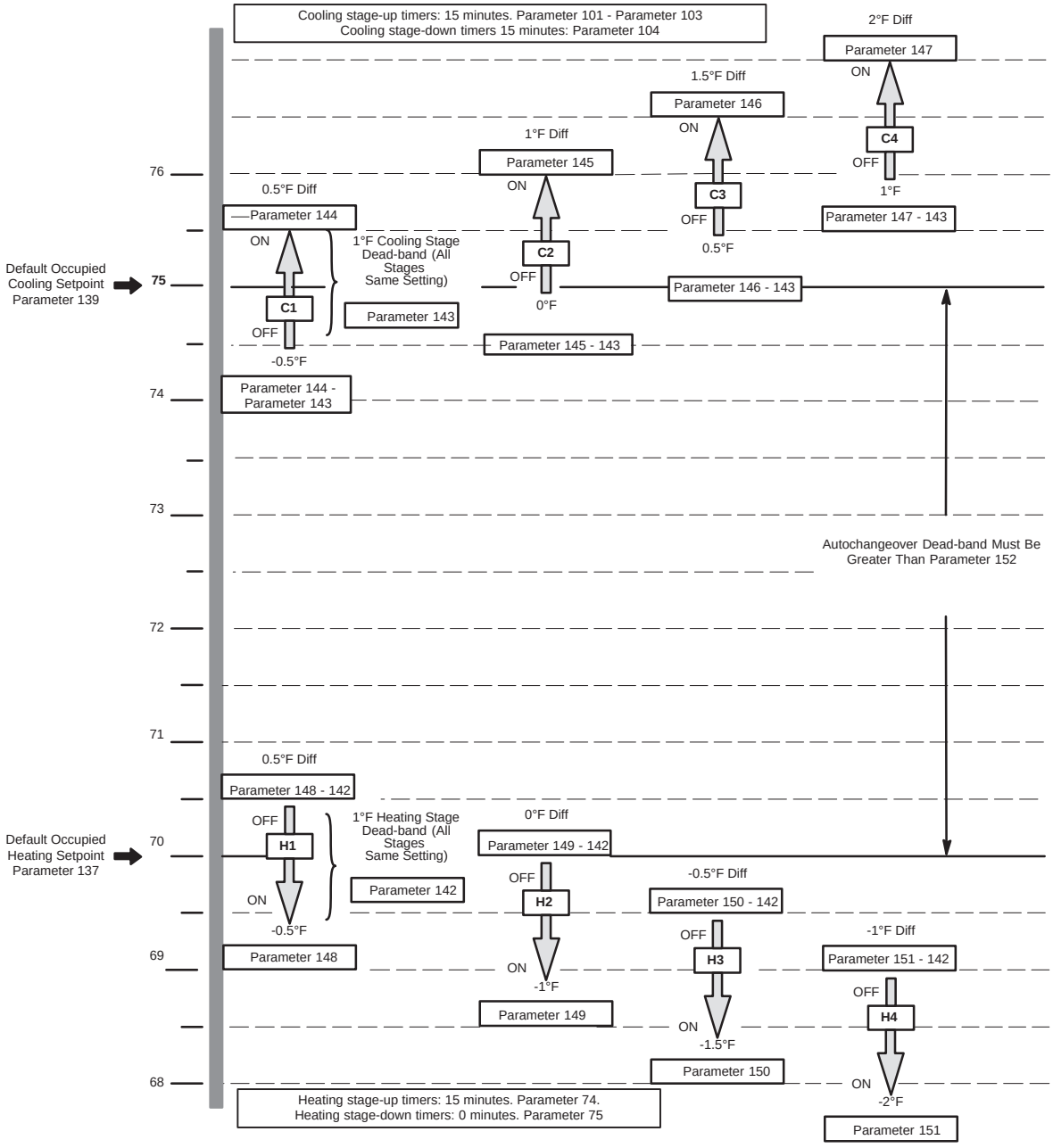
ZONE SENSOR MODE (continued)

ROOM SENSOR STAGES FOR GAS / ELECTRIC UNITS
Default Values Shown

Units With Economizer:
C1=Free Cooling
C2=Compressor 1
C3=Compressor 2
C4=Compressor 3 + 4

C1=Cooling Stage 1
C2=Cooling Stage 2
C3=Cooling Stage 3
C4=Cooling Stage 4

H1=Heating Stage 1
H2=Heating Stage 2
H3=Heating Stage 3
H4=Heating Stage 4



ZONE SENSOR MODE - MSAV® (MULTI-STAGE AIR VOLUME) (CONTINUED)

Supply Air Blower CFM

Unit has following supply air blower CFM settings:

- Heating CFM
- High Cooling CFM
- Medium-High Cooling CFM
- Medium-Low Cooling CFM
- Low Cooling CFM
- Ventilation CFM
- Blower Speed
- Smoke Speed (Used only in smoke removal option - not covered here)

Unit Features An Economizer And Outdoor Air Is Suitable

NOTE - 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 rooftop unit via a network connection.

Y1 Demand:

All compressors are off, supply air blower is on low cooling CFM to minimize blower power consumption, economizer modulates (minimum to maximum open position) to maintain Parameter 159 setting (supply air temperature).

Y2 Demand:

All compressors are off, supply air blower is on high cooling CFM providing higher cooling capacity, and economizer modulates to maintain Parameter 159 setting (supply air temperature).

Parameter 164 dictates when one compressor is energized while supply air blower stays on high cooling CFM providing maximum cooling capacity. After compressors are energized the economizer stays at maximum open.

Y3 Demand:

Two compressors are energized while supply air blower is on high cooling CFM providing even higher cooling capacity.

Y4 Demand:

All compressors are energized while supply air blower is on high cooling CFM providing maximum cooling capacity.

Unit Does Not Feature An Economizer (Or Outdoor Air Is Not Suitable)

Y1 Demand:

One compressor operates and supply air blower operates at low cooling CFM.

Y2 Demand:

Two compressors operate and supply air blower operates at medium-low cooling CFM.

Y3 Demand:

Three compressors operate and supply air blower operates at medium-high cooling CFM.

Y4 Demand:

All compressors operate and supply air blower operates at high cooling CFM.

SPECIFICATIONS

General Data		Nominal Tonnage	15 Ton	20 Ton
		Model Number	**LCH180U4M**	**LCH240U4M**
		Efficiency Type	**Ultra**	**Ultra**
		Blower Type	MSAV (Multi-Stage Air Volume)	MSAV (Multi-Stage Air Volume)
Cooling Performance		Gross Cooling Capacity - Btuh	185,300	241,000
		[1] Net Cooling Capacity - Btuh	180,000	234,000
		AHRI Rated Air Flow - cfm	5,200	6,400
		Total Unit Power - kW	14.2	19.5
		[1] EER (Btuh/Watt)	12.7	12.0
		[2] IEER (Btuh/Watt)	20.2	20.0
		Refrigerant Type	R-410A	R-410A
Refrigerant Charge		Circuit 1	20 lbs. 0 oz.	21 lbs. 4 oz.
		Circuit 2	20 lbs. 8 oz.	22 lbs. 0 oz.
Electric Heat Available - See page 14			15-30-45-60 kW	15-30-45-60-90 kW
Compressor Type (number)			Tandem Scroll (4)	Tandem Scroll (4)
Outdoor Coils		Net face area (total) - sq. ft.	55.2	55.2
		Tube Diameter - in.	3/8	3/8
		Number of rows	2	2
		Fins per inch	20	20
Outdoor Coil Fans		Motor - (No.) horsepower	(6) 1/3 ECM	(6) 1/3 ECM
		Motor rpm	530 - 895	590 - 955
		Total Motor watts	210 - 860	555 - 1740
		Diameter - (No.) in.	(6) 24	(6) 24
		Number of blades	3	3
		Total Air volume - cfm	16,000	20,000
Indoor Coils		Net face area (total) - sq. ft.	21.4	21.4
		Tube diameter - in.	3/8	3/8
		Number of rows	4	4
		Fins per inch	14	14
		Drain connection - No. and size	(1) 1 in. FPT	(1) 1 in. FPT
		Expansion device type	Balance port TXV, removable head	
[3] **Indoor Blower and Drive Selection**		Nominal motor output	3 hp, 5 hp, 7.5 hp	5 hp, 7.5 hp, 10 hp
		Maximum usable motor output (US Only)	3.45 hp, 5.75 hp, 8.62 hp	5.75 hp, 8.62 hp, 11.5 hp
		Motor - Drive kit number	**3 hp Std. Eff.** **Kit 1** 535-725 rpm **Kit 2** 710-965 rpm **3 hp High. Eff.** K**it 3** - 685-856 rpm **Kit 4** 850-1045 rpm **5 hp** **Kit 3** 685-856 rpm **Kit 4** 850-1045 rpm **Kit 5** 945-1185 rpm **7.5 hp** **Kit 6** 850-1045 rpm **Kit 7** 945-1185 rpm **Kit 8** 1045-1285 rpm	**5 hp** **Kit 3** 685-856 rpm **Kit 4** 850-1045 rpm **Kit 5** 945-1185 rpm **7.5 hp** **Kit 6** 850-1045 rpm **Kit 7** 945-1185 rpm **Kit 8** 1045-1285 rpm **10 hp** **Kit 7** 945-1185 rpm **Kit 10** 1045-1285 rpm K**it 11** 1135-1365 rpm
		Blower wheel nominal D x W - in.	(2) 15 x 15	(2) 15 x 15
Filters		Type of filter	Fiberglass, disposable	
		Number and size - in.	(6) 24 x 24 x 2	
Electrical characteristics			208/230V, 460V or 575V - 60 hertz - 3 phase	

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

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

[2] Integrated Energy Efficiency Ratio tested according to AHRI Standard 340/360.

[3] 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.

NOTE – MSAV® (Multi-Stage Air Volume) drive is limited to a motor service factor of 1.0.

RATINGS

NOTE − For Temperatures and Capacities not shown in tables, see bulletin − Cooling Unit Rating Table Correction Factor Data in Miscellaneous Product Data section.

15 TON ULTRA-HIGH EFFICIENCY LCH180U4M (1 COMPRESSOR OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2000	54.5	2.1	0.85	0.99	1	48.6	2.38	0.85	1	1	43	2.69	0.86	1	1	37.3	3.04	0.87	1	1
	2200	56.4	2.1	0.88	1	1	50.8	2.38	0.89	1	1	45.1	2.69	0.9	1	1	39.2	3.04	0.92	1	1
	2400	58.5	2.1	0.91	1	1	52.7	2.38	0.92	1	1	46.9	2.69	0.93	1	1	40.9	3.04	0.95	1	1
67°F	2000	58.7	2.1	0.65	0.83	0.97	52.6	2.38	0.63	0.83	0.98	46.4	2.69	0.61	0.84	1	39.8	3.04	0.59	0.85	1
	2200	60.2	2.1	0.67	0.86	0.99	54	2.38	0.66	0.87	1	47.6	2.69	0.64	0.89	1	41	3.04	0.62	0.9	1
	2400	61.5	2.1	0.69	0.89	1	55.1	2.39	0.68	0.91	1	48.7	2.69	0.67	0.92	1	42	3.04	0.65	0.94	1
71°F	2000	63.1	2.1	0.48	0.65	0.81	56.9	2.39	0.45	0.64	0.82	50.5	2.69	0.41	0.62	0.82	44	3.04	0.35	0.6	0.84
	2200	64.7	2.11	0.49	0.67	0.84	58.4	2.39	0.46	0.66	0.85	51.9	2.69	0.42	0.65	0.87	45.2	3.04	0.37	0.64	0.88
	2400	66.1	2.11	0.5	0.69	0.88	59.6	2.39	0.47	0.68	0.89	53	2.69	0.44	0.68	0.9	46.3	3.04	0.39	0.67	0.92

15 TON ULTRA-HIGH EFFICIENCY LCH180U4M (2 COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2400	100.5	3.88	0.68	0.82	0.95	92.9	4.4	0.68	0.83	0.96	85.1	4.98	0.68	0.83	0.99	76.8	5.64	0.68	0.85	1
	3000	107.4	3.89	0.74	0.89	1	99.5	4.41	0.74	0.91	1	91.1	4.98	0.75	0.93	1	82.6	5.64	0.76	0.95	1
	3600	113.3	3.9	0.79	0.96	1	104.6	4.42	0.8	0.98	1	96.2	4.99	0.81	1	1	88.3	5.64	0.83	1	1
67°F	2400	109.4	3.89	0.54	0.66	0.78	101.3	4.41	0.53	0.66	0.79	93.1	4.99	0.52	0.66	0.8	84.6	5.64	0.5	0.65	0.82
	3000	116.6	3.9	0.57	0.71	0.85	108.1	4.42	0.57	0.72	0.87	99.2	4.99	0.56	0.73	0.89	89.9	5.64	0.55	0.74	0.92
	3600	121.7	3.91	0.61	0.77	0.92	112.8	4.43	0.6	0.78	0.95	103.8	5	0.6	0.79	0.97	94.1	5.64	0.6	0.81	1
71°F	2400	118.2	3.9	0.41	0.53	0.64	110.1	4.42	0.4	0.52	0.64	101.5	4.99	0.38	0.51	0.64	92.5	5.64	0.35	0.5	0.64
	3000	125.9	3.91	0.43	0.56	0.69	117	4.43	0.42	0.56	0.7	107.9	5	0.4	0.55	0.71	98.5	5.64	0.38	0.55	0.72
	3600	131.3	3.92	0.44	0.6	0.75	122.2	4.44	0.43	0.6	0.76	112.4	5	0.42	0.6	0.77	102.8	5.65	0.4	0.6	0.78

15 TON ULTRA-HIGH EFFICIENCY LCH180U4M (3 COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	3600	149.1	5.97	0.7	0.83	0.95	139.5	6.75	0.7	0.84	0.97	129.5	7.61	0.7	0.85	0.99	118.9	8.6	0.71	0.87	1
	4500	158.3	6	0.75	0.89	1	148	6.77	0.75	0.92	1	137.7	7.64	0.76	0.94	1	126.5	8.63	0.78	0.96	1
	5400	165.7	6.02	0.8	0.96	1	155.2	6.8	0.81	0.98	1	144.6	7.66	0.82	1	1	134.2	8.64	0.84	1	1
67°F	3600	160.8	6.01	0.55	0.67	0.79	150.7	6.78	0.55	0.68	0.81	140.4	7.65	0.54	0.68	0.82	129.4	8.63	0.53	0.69	0.83
	4500	170.4	6.03	0.58	0.72	0.86	159.6	6.81	0.58	0.73	0.88	148.1	7.66	0.58	0.74	0.9	136.4	8.65	0.58	0.76	0.93
	5400	177	6.05	0.62	0.78	0.93	166	6.83	0.62	0.79	0.95	154.2	7.68	0.61	0.8	0.98	142.1	8.66	0.62	0.82	1
71°F	3600	172.4	6.04	0.42	0.54	0.65	162.1	6.81	0.42	0.53	0.65	151	7.68	0.4	0.53	0.66	139.8	8.66	0.39	0.53	0.66
	4500	182.5	6.07	0.44	0.57	0.7	171.4	6.84	0.43	0.57	0.71	159.8	7.7	0.41	0.57	0.72	147.6	8.68	0.41	0.57	0.74
	5400	189.7	6.09	0.45	0.61	0.76	177.9	6.86	0.45	0.61	0.77	165.6	7.72	0.44	0.61	0.79	152.9	8.69	0.43	0.62	0.8

15 TON ULTRA -HIGH EFFICIENCY LCH180U4M (ALL COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		85°F					95°F					105°F					115°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	4800	183	10.35	0.71	0.86	0.99	170	11.7	0.72	0.88	1	156.4	13.27	0.73	0.9	1	142.1	15.1	0.75	0.93	1
	6000	193.6	10.39	0.77	0.94	1	180	11.74	0.78	0.96	1	166.1	13.31	0.8	0.99	1	152	15.13	0.83	1	1
	7200	202.3	10.43	0.83	1	1	189.5	11.77	0.85	1	1	176.1	13.33	0.87	1	1	162	15.16	0.91	1	1
67°F	4800	197.1	10.41	0.55	0.69	0.82	183.6	11.75	0.55	0.7	0.84	169.4	13.32	0.55	0.71	0.86	154	15.13	0.55	0.73	0.9
	6000	207.7	10.44	0.59	0.75	0.9	193.1	11.78	0.59	0.76	0.93	177.7	13.34	0.6	0.78	0.96	161.9	15.16	0.6	0.81	0.99
	7200	215.4	10.47	0.63	0.81	0.97	199.9	11.81	0.63	0.83	1	184.1	13.36	0.64	0.85	1	167.7	15.18	0.65	0.88	1
71°F	4800	211.5	10.46	0.41	0.54	0.67	197.3	11.81	0.4	0.54	0.67	182.4	13.35	0.4	0.54	0.69	166.8	15.17	0.38	0.55	0.7
	6000	222.3	10.5	0.44	0.58	0.72	207.6	11.84	0.42	0.59	0.74	191.4	13.39	0.42	0.59	0.76	174.8	15.21	0.41	0.6	0.79
	7200	230.5	10.53	0.44	0.62	0.79	214.6	11.87	0.44	0.63	0.81	197.9	13.41	0.44	0.64	0.83	180.7	15.22	0.43	0.65	0.86

RATINGS

NOTE − For Temperatures and Capacities not shown in tables, see bulletin − Cooling Unit Rating Table Correction Factor Data in Miscellaneous Product Data section.

20 TON ULTRA-HIGH EFFICIENCY LCH240U4M (1 COMPRESSOR OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	2600	71.2	2.28	0.8	0.97	1	66.6	2.65	0.81	0.99	1	62	3.05	0.82	1	1	57.5	3.49	0.84	1	1
	2900	73.3	2.28	0.83	1	1	69	2.65	0.84	1	1	64.4	3.05	0.86	1	1	59.8	3.49	0.89	1	1
	3200	75.8	2.27	0.86	1	1	71.3	2.64	0.88	1	1	66.7	3.05	0.9	1	1	62	3.49	0.93	1	1
67°F	2600	75.7	2.27	0.62	0.78	0.94	70.9	2.65	0.62	0.79	0.96	65.8	3.05	0.62	0.8	0.98	60.7	3.49	0.62	0.82	1
	2900	77.8	2.27	0.64	0.81	0.98	72.7	2.64	0.64	0.82	1	67.5	3.05	0.64	0.84	1	62.1	3.49	0.65	0.86	1
	3200	79.4	2.26	0.66	0.84	1	74.2	2.64	0.66	0.86	1	68.9	3.04	0.66	0.88	1	63.5	3.48	0.67	0.9	1
71°F	2600	80.4	2.26	0.46	0.61	0.76	75.5	2.64	0.45	0.61	0.77	70.3	3.04	0.44	0.61	0.78	65.1	3.48	0.42	0.61	0.79
	2900	82.7	2.25	0.47	0.63	0.79	77.6	2.63	0.46	0.63	0.8	72.2	3.04	0.45	0.64	0.82	66.9	3.48	0.44	0.64	0.84
	3200	84.5	2.24	0.48	0.65	0.82	79.3	2.62	0.47	0.65	0.83	73.9	3.03	0.46	0.66	0.85	68.3	3.47	0.45	0.67	0.88

20 TON ULTRA-HIGH EFFICIENCY LCH240U4M (2 COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	3200	134.6	4.66	0.67	0.81	0.95	127.6	5.39	0.68	0.82	0.97	120.5	6.2	0.68	0.84	0.99	112.8	7.07	0.69	0.86	1
	4000	143.1	4.66	0.72	0.88	1	135.6	5.4	0.73	0.9	1	127.9	6.21	0.74	0.93	1	120.1	7.09	0.76	0.95	1
	4800	150	4.66	0.77	0.96	1	142.1	5.41	0.79	0.98	1	134.3	6.22	0.8	1	1	126.9	7.1	0.81	1	1
67°F	3200	145.1	4.66	0.53	0.65	0.77	137.6	5.41	0.53	0.66	0.78	130	6.21	0.53	0.66	0.8	122	7.09	0.53	0.67	0.81
	4000	154.2	4.66	0.56	0.69	0.84	146.2	5.41	0.57	0.71	0.86	137.6	6.22	0.57	0.72	0.88	129	7.1	0.57	0.73	0.91
	4800	160.4	4.64	0.59	0.75	0.92	151.9	5.4	0.6	0.76	0.94	143.5	6.22	0.59	0.78	0.97	134.3	7.1	0.61	0.79	0.99
71°F	3200	156	4.65	0.42	0.52	0.63	148.1	5.4	0.41	0.52	0.63	140.1	6.22	0.39	0.52	0.64	132.1	7.1	0.4	0.52	0.64
	4000	165.7	4.63	0.42	0.55	0.67	157.3	5.39	0.42	0.55	0.68	148.4	6.21	0.41	0.55	0.69	139.8	7.1	0.4	0.56	0.71
	4800	172.8	4.61	0.43	0.58	0.72	163.9	5.37	0.43	0.59	0.73	154.7	6.2	0.43	0.59	0.75	145.3	7.09	0.43	0.6	0.77

20 TON ULTRA-HIGH EFFICIENCY LCH240U4M (3 COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		65°F					75°F					85°F					95°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	4800	194	7.68	0.71	0.84	0.96	184.8	8.83	0.72	0.85	0.98	175.1	10.08	0.73	0.87	0.99	165.2	11.45	0.74	0.89	1
	6000	205.2	7.73	0.76	0.9	1	195.1	8.89	0.77	0.92	1	185.2	10.14	0.78	0.94	1	174.4	11.52	0.8	0.97	1
	7200	214.4	7.77	0.81	0.97	1	204	8.93	0.82	0.99	1	193.5	10.19	0.84	1	1	183.5	11.57	0.86	1	1
67°F	4800	208.3	7.75	0.57	0.69	0.81	198.3	8.9	0.57	0.69	0.82	188.4	10.16	0.57	0.7	0.83	177.6	11.54	0.57	0.71	0.85
	6000	220.3	7.78	0.6	0.73	0.87	209.3	8.94	0.6	0.74	0.88	198.6	10.21	0.6	0.76	0.91	186.7	11.59	0.61	0.77	0.93
	7200	229	7.81	0.62	0.78	0.93	217.4	8.97	0.63	0.8	0.95	206.1	10.24	0.64	0.82	0.98	193.7	11.62	0.65	0.83	1
71°F	4800	223	7.79	0.44	0.55	0.66	212.5	8.96	0.43	0.55	0.67	202	10.23	0.43	0.55	0.68	190.7	11.61	0.42	0.56	0.69
	6000	235.8	7.82	0.45	0.58	0.71	224.6	8.99	0.45	0.59	0.72	212.9	10.26	0.44	0.59	0.73	200.8	11.65	0.45	0.6	0.75
	7200	244.7	7.83	0.46	0.61	0.75	233	9	0.46	0.62	0.77	221.2	10.28	0.46	0.63	0.79	208.4	11.67	0.46	0.64	0.81

20 TON ULTRA -HIGH EFFICIENCY LCH240U4M (ALL COMPRESSORS OPERATING) - MSAV (Multi-Stage Air Volume)

Entering Wet Bulb Temperature	Total Air Volume	Outdoor Air Temperature Entering Outdoor Coil																			
		85°F					95°F					105°F					115°F				
		Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cool Cap.	Comp. Motor Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F	kBtuh	kW	75°F	80°F	85°F
63°F	6400	237.1	13.72	0.69	0.84	0.99	224.5	15.55	0.69	0.86	1	211.1	17.57	0.71	0.89	1	196.8	19.78	0.73	0.92	1
	8000	250.4	13.83	0.74	0.93	1	237	15.67	0.75	0.96	1	222.5	17.69	0.78	0.99	1	208.6	19.91	0.81	1	1
	9600	261.1	13.92	0.8	1	1	248	15.76	0.82	1	1	234.6	17.8	0.85	1	1	220.6	20.03	0.88	1	1
67°F	6400	254.9	13.86	0.54	0.66	0.8	241	15.71	0.54	0.67	0.82	227.2	17.73	0.55	0.69	0.84	211.6	19.94	0.55	0.7	0.88
	8000	268.1	13.97	0.56	0.71	0.88	253	15.81	0.57	0.73	0.91	237.7	17.81	0.58	0.75	0.94	221.8	20.04	0.6	0.78	0.98
	9600	277.3	14.03	0.6	0.77	0.96	262.5	15.87	0.61	0.79	0.99	246.2	17.89	0.62	0.82	1	228.4	20.1	0.63	0.86	1
71°F	6400	272.3	14	0.41	0.52	0.64	257.9	15.84	0.41	0.52	0.65	243.8	17.88	0.4	0.53	0.66	227.1	20.08	0.4	0.54	0.68
	8000	286.3	14.08	0.42	0.56	0.69	270.8	15.92	0.42	0.56	0.7	254.9	17.95	0.42	0.57	0.72	238.4	20.18	0.42	0.58	0.75
	9600	296	14.12	0.43	0.58	0.74	280.9	15.99	0.43	0.6	0.76	264.2	18.02	0.43	0.61	0.79	245.7	20.23	0.43	0.63	0.82

BLOWER DATA

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

FOR ALL UNITS ADD:

1 - Wet indoor coil air resistance of selected unit.
2 - Any factory installed options air resistance (electric heat, economizer, etc.)
3 - Any field installed accessories air resistance (electric heat, duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.
See page 27 for wet coil and option/accessory air resistance data.
See page 27 for factory installed drive kit specifications.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

All units require 6000 cfm minimum air with electric heat.

Air Volume cfm	TOTAL STATIC PRESSURE - Inches Water Gauge (Pa)																									
	0.20		0.40		0.60		0.80		1.00		1.20		1.40		1.60		1.80		2.00		2.20		2.40		2.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2750	385	0.30	505	0.50	600	0.70	680	0.90	755	1.10	820	1.30	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3000	395	0.35	515	0.55	610	0.75	685	1.00	760	1.20	825	1.45	885	1.70	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3250	405	0.40	520	0.60	615	0.85	695	1.10	765	1.30	830	1.60	890	1.85	950	2.10	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3500	415	0.45	530	0.70	620	0.95	700	1.20	775	1.45	840	1.70	900	2.00	955	2.25	1005	2.55	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
3750	425	0.50	540	0.75	630	1.05	710	1.30	780	1.60	845	1.85	905	2.15	960	2.45	1010	2.70	1060	3.00	1110	3.30	- - -	- - -	- - -	- - -
4000	435	0.55	545	0.85	635	1.10	715	1.40	785	1.70	850	2.00	910	2.30	965	2.60	1020	2.90	1070	3.25	1115	3.55	1160	3.85	1205	4.15
4250	445	0.60	555	0.90	645	1.25	725	1.55	795	1.85	855	2.15	915	2.45	970	2.80	1025	3.10	1075	3.45	1120	3.75	1165	4.10	1210	4.45
4500	455	0.70	565	1.00	655	1.35	730	1.65	800	2.00	865	2.35	925	2.65	980	3.00	1030	3.30	1080	3.65	1130	4.05	1175	4.35	1215	4.70
4750	470	0.75	575	1.10	660	1.45	740	1.80	810	2.15	870	2.50	930	2.85	985	3.20	1040	3.55	1085	3.90	1135	4.25	1180	4.65	1225	5.00
5000	480	0.85	585	1.25	670	1.60	750	1.95	815	2.30	880	2.70	940	3.05	995	3.40	1045	3.80	1095	4.15	1140	4.50	1185	4.90	1230	5.30
5250	495	0.95	595	1.35	680	1.70	755	2.10	825	2.50	890	2.90	945	3.25	1000	3.65	1050	4.00	1100	4.40	1150	4.80	1195	5.20	1235	5.60
5500	505	1.05	605	1.45	690	1.85	765	2.25	835	2.65	895	3.05	955	3.45	1010	3.85	1060	4.25	1110	4.70	1155	5.10	1200	5.50	1240	5.90
5750	520	1.15	615	1.60	700	2.00	775	2.45	840	2.85	905	3.25	960	3.65	1015	4.10	1065	4.50	1115	4.95	1160	5.35	1205	5.80	1250	6.25
6000	530	1.30	630	1.75	710	2.15	785	2.60	850	3.05	910	3.45	970	3.90	1025	4.35	1075	4.80	1120	5.20	1170	5.65	1215	6.10	1255	6.55
6250	545	1.40	640	1.90	720	2.35	795	2.80	860	3.25	920	3.70	975	4.15	1030	4.60	1080	5.05	1130	5.50	1175	5.95	1220	6.45	1265	6.90
6500	560	1.55	650	2.05	730	2.50	805	3.00	870	3.45	930	3.95	985	4.40	1040	4.85	1090	5.35	1140	5.85	1185	6.30	1225	6.75	1270	7.25
6750	570	1.70	665	2.20	745	2.70	815	3.20	880	3.70	940	4.20	995	4.65	1045	5.10	1095	5.60	1145	6.10	1190	6.60	1235	7.10	1275	7.60
7000	585	1.85	675	2.35	755	2.90	825	3.40	890	3.95	950	4.45	1005	4.95	1055	5.40	1105	5.95	1155	6.45	1200	6.95	1240	7.45	1285	8.00
7250	600	2.00	690	2.60	765	3.10	835	3.65	900	4.15	955	4.65	1015	5.25	1065	5.75	1115	6.25	1160	6.75	1205	7.30	1250	7.85	1290	8.35
7500	615	2.20	700	2.75	775	3.30	845	3.85	910	4.45	965	4.95	1020	5.50	1075	6.05	1125	6.60	1170	7.15	1215	7.65	1260	8.25	1300	8.75
7750	630	2.40	715	3.00	790	3.55	855	4.10	920	4.70	975	5.25	1030	5.80	1080	6.35	1130	6.90	1180	7.50	1225	8.05	1265	8.60	1305	9.15
8000	640	2.55	725	3.20	800	3.80	865	4.35	930	4.95	985	5.50	1040	6.10	1090	6.70	1140	7.25	1185	7.85	1230	8.40	1275	9.00	1315	9.60
8250	655	2.80	740	3.40	810	4.00	880	4.65	940	5.25	995	5.85	1050	6.45	1100	7.05	1150	7.65	1195	8.25	1240	8.85	1280	9.40	1325	10.05
8500	670	3.00	750	3.65	825	4.30	890	4.90	950	5.55	1005	6.15	1060	6.80	1110	7.40	1160	8.05	1205	8.65	1250	9.25	1290	9.85	1330	10.45
8750	685	3.25	765	3.90	835	4.55	900	5.20	960	5.85	1015	6.45	1070	7.15	1120	7.75	1165	8.35	1215	9.05	1255	9.65	1300	10.30	1340	10.90
9000	700	3.50	780	4.20	850	4.85	910	5.50	970	6.15	1025	6.80	1080	7.50	1130	8.15	1175	8.75	1220	9.40	1265	10.10	1310	10.80	1350	11.40
9250	715	3.75	790	4.45	860	5.15	925	5.85	985	6.55	1040	7.20	1090	7.85	1140	8.55	1185	9.20	1230	9.85	1275	10.55	1315	11.20	- - -	- - -
9500	730	4.00	805	4.75	875	5.45	935	6.15	995	6.90	1050	7.60	1100	8.25	1150	8.95	1195	9.60	1240	10.30	1285	11.05	- - -	- - -	- - -	- - -
9750	745	4.30	820	5.05	885	5.75	950	6.55	1005	7.20	1060	7.95	1110	8.65	1160	9.40	1205	10.05	1250	10.80	1295	11.50	- - -	- - -	- - -	- - -
10,000	760	4.60	835	5.40	900	6.15	960	6.85	1015	7.60	1070	8.35	1120	9.05	1170	9.80	1215	10.50	1260	11.25	- - -	- - -	- - -	- - -	- - -	- - -
10,250	775	4.90	845	5.65	910	6.45	970	7.20	1030	8.00	1080	8.75	1135	9.55	1180	10.25	1225	11.00	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
10,500	790	5.20	860	6.00	925	6.85	985	7.65	1040	8.40	1095	9.20	1145	10.00	1190	10.70	1235	11.45	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
10,750	805	5.55	875	6.40	940	7.25	1000	8.05	1055	8.85	1105	9.65	1155	10.45	1200	11.20	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
11,000	820	5.90	890	6.80	950	7.60	1010	8.45	1065	9.30	1115	10.05	1165	10.90	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

BLOWER DATA

FACTORY INSTALLED BELT DRIVE KIT SPECIFICATIONS

Motor Efficiency	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
Standard	3	3.45	1	535 - 725
Standard	3	3.45	2	710 - 965
High	3	3.45	3	685 - 856
High	3	3.45	4	850 - 1045
Standard	5	5.75	3	685 - 856
Standard	5	5.75	4	850 - 1045
Standard	5	5.75	5	945 - 1185
Standard	7.5	8.63	6	850 - 1045
Standard	7.5	8.63	7	945 - 1185
Standard	7.5	8.63	8	1045 - 1285
Standard	10	11.50	7	945 - 1185
Standard	10	11.50	10	1045 - 1285
Standard	10	11.50	11	1135 - 1365

NOTE - 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.

NOTE – MSAV® (Multi-Stage Air Volume) drive is limited to a motor service factor of 1.0.

FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm	Wet Indoor Coil	Electric Heat	Economizer	Filters		Horizontal Roof Curb
	in. w.g.	in. w.g.	in. w.g.	MERV 8	MERV 13	in. w.g.
2750	.02	- - -	- - -	.01	.03	.03
3000	.02	- - -	- - -	.01	.03	.04
3250	.03	- - -	- - -	.01	.04	.04
3500	.03	- - -	- - -	.01	.04	.05
3750	.03	- - -	- - -	.01	.04	.05
4000	.04	- - -	- - -	.01	.04	.06
4250	.04	- - -	- - -	.01	.05	.07
4500	.05	- - -	- - -	.01	.05	.07
4750	.05	- - -	- - -	.02	.05	.08
5000	.05	- - -	- - -	.02	.06	.08
5250	.06	- - -	- - -	.02	.06	.09
5500	.07	- - -	- - -	.02	.06	.10
5750	.07	- - -	- - -	.02	.07	.11
6000	.08	.01	- - -	.03	.07	.11
6250	.08	.01	.01	.03	.07	.12
6500	.09	.01	.02	.03	.08	.13
6750	.10	.01	.03	.03	.08	.14
7000	.10	.01	.04	.04	.08	.15
7250	.11	.01	.05	.04	.09	.16
7500	.12	.01	.06	.04	.09	.17
8000	.13	.02	.09	.05	.10	.19
8500	.15	.02	.11	.05	.10	.21
9000	.16	.04	.14	.06	.11	.24
9500	.18	.05	.16	.07	.12	.26
10,000	.20	.06	.19	.07	.12	.29
10,500	.22	.09	.22	.08	.13	.31
11,000	.24	.11	.25	.09	.14	.34

BLOWER DATA

POWER EXHAUST FAN PERFORMANCE

Return Air System Static Pressure	Air Volume Exhausted
in. w.g.	cfm
0.00	8630
0.05	8210
0.10	7725
0.15	7110
0.20	6470
0.25	5790
0.30	5060
0.35	4300
0.40	3510
0.45	2690
0.50	1840

CEILING DIFFUSER AIR RESISTANCE - in. w.g.

Air Volume cfm	Step-Down Diffuser						Flush Diffuser	
	RTD11-185			RTD11-275			FD11-185	FD11-275
	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open	2 Ends Open	1 Side/2 Ends Open	All Ends & Sides Open		
5000	.51	.44	.39	- - -	- - -	- - -	.27	- - -
5200	.56	.48	.42	- - -	- - -	- - -	.30	- - -
5400	.61	.52	.45	- - -	- - -	- - -	.33	- - -
5600	.66	.56	.48	- - -	- - -	- - -	.36	- - -
5800	.71	.59	.51	- - -	- - -	- - -	.39	- - -
6000	.76	.63	.55	.36	.31	.27	.42	.29
6200	.80	.68	.59	- - -	- - -	- - -	.46	- - -
6400	.86	.72	.63	- - -	- - -	- - -	.50	- - -
6500	- - -	- - -	- - -	.42	.36	.31	- - -	.34
6600	.92	.77	.67	- - -	- - -	- - -	.54	- - -
6800	.99	.83	.72	- - -	- - -	- - -	.58	- - -
7000	1.03	.87	.76	.49	.41	.36	.62	.40
7200	1.09	.92	.80	- - -	- - -	- - -	.66	- - -
7400	1.15	.97	.84	- - -	- - -	- - -	.70	- - -
7500	- - -	- - -	- - -	.51	.46	.41	- - -	.45
7600	1.20	1.02	.88	- - -	- - -	- - -	.74	- - -
8000	- - -	- - -	- - -	.59	.49	.43	- - -	.50
8500	- - -	- - -	- - -	.69	.58	.50	- - -	.57
9000	- - -	- - -	- - -	.79	.67	.58	- - -	.66
9500	- - -	- - -	- - -	.89	.75	.65	- - -	.74
10,000	- - -	- - -	- - -	1.00	.84	.73	- - -	.81
10,500	- - -	- - -	- - -	1.10	.92	.80	- - -	.89
11,000	- - -	- - -	- - -	1.21	1.01	.88	- - -	.96

CEILING DIFFUSER AIR THROW DATA - ft.

Model No.	Air Volume cfm	[1] Effective Throw Range - ft.		Model No.	Air Volume cfm	[1] Effective Throw Range - ft.	
		RTD11-185 Step-Down	FD11-185 Flush			RTD11-275 Step-Down	FD11-275 Flush
180	5600	39 - 49	28 - 37	240	7200	33 - 38	26 - 35
	5800	42 - 51	29 - 38		7400	35 - 40	28 - 37
	6000	44 - 54	40 - 50		7600	36 - 41	29 - 38
	6200	45 - 55	42 - 51		7800	38 - 43	40 - 50
	6400	46 - 55	43 - 52		8000	39 - 44	42 - 51
	6600	47 - 56	45 - 56		8200	41 - 46	43 - 52
					8400	43 - 49	44 - 54
					8600	44 - 50	46 - 57
					8800	47 - 55	48 - 59

[1] Throw is the horizontal or vertical distance an airstream travels on leaving the outletor diffuser before the maximum velocity is reduced to 50 ft. per minute. Four sides open.

ELECTRICAL/ELECTRIC HEAT DATA — 15 TON

15 TON ULTRA HIGH EFFICIENCY (R-410A) — LCH180U4M

[1] Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Compressor 2	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Compressor 3	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Compressor 4	Rated Load Amps	13.1			6.1			4.4		
	Locked Rotor Amps	83.1			41			33		
Outdoor Fan Motors (6)	Full Load Amps (total)	2.8 (16.8)			1.4 (8.4)			1.1 (6.6)		
Power Exhaust (2) 0.33 HP	Full Load Amps (total)	2.4 (4.8)			1.3 (2.6)			1 (2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	3	5	7.5	3	5	7.5	3	5	7.5
	Full Load Amps	10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
[2] Maximum Overcurrent Protection	Unit Only	90	100	110	45	45	50	30	35	40
	With (2) 0.33 HP Power Exhaust	100	110	125	45	50	60	35	35	45
[3] Minimum Circuit Ampacity	Unit Only	84	91	100	40	43	47	30	32	36
	With (2) 0.33 HP Power Exhaust	88	95	105	42	45	50	32	34	38

ELECTRIC HEAT DATA

	Electric Heat Voltage	208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection — Unit+ Electric Heat	**15 kW**	90	90	100	100	110	110	45	45	50	30	35	40
	30 kW	[4] 100	110	[4] 100	125	[4] 110	125	60	60	60	45	45	50
	45 kW	150	150	[4] 150	175	[4] 150	175	80	80	90	60	70	70
	60 kW	[4] 150	175	[4] 150	175	175	175	80	90	90	70	70	70
[3] Minimum Circuit Ampacity — Unit+ Electric Heat	**15 kW**	84	84	91	91	100	100	40	43	47	30	32	36
	30 kW	92	104	100	112	109	121	52	55	59	41	44	48
	45 kW	131	149	139	157	148	166	74	78	82	60	62	66
	60 kW	139	158	146	166	156	175	79	82	86	63	66	69
[2] Maximum Overcurrent Protection — Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	100	100	110	110	125	125	45	50	60	35	35	45
	30 kW	[4] 100	110	[4] 110	125	[4] 125	150	60	60	70	45	50	50
	45 kW	[4] 150	175	[4] 150	175	175	175	80	90	90	70	70	70
	60 kW	[4] 150	175	175	175	[4] 175	200	90	90	90	70	70	80
[3] Minimum Circuit Ampacity — Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	88	88	95	95	105	105	42	45	50	32	34	38
	30 kW	98	110	106	118	115	127	55	58	63	44	47	50
	45 kW	137	155	145	163	154	172	77	81	85	62	65	68
	60 kW	145	164	152	172	162	181	82	85	90	66	68	72

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	**54W85**	**54W85**	**54W85**	**54W85**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Power Exhaust	**54W85**	**54W85**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **15 kW**	**54W85**	**54W85**	**54W85**	**54W85**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **30 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **45 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W87**	**54W87**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **60 kW**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**
Unit + Power Exhaust + Elec. Heat **15 kW**		**54W85**	**54W85**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
Unit + Power Exhaust + Elec. Heat **30 kW**		**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
Unit + Power Exhaust + Elec. Heat **45 kW**		**54W86**	**54W86**	**54W86**	**54W86**	**54W87**	**54W87**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
Unit + Power Exhaust + Elec. Heat **60 kW**		**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**

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.

20 TON ULTRA HIGH EFFICIENCY (R-410A) LCH240U4M

[1] Voltage - 60hz		208/230V - 3 Ph			460V - 3 Ph			575V - 3 Ph		
Compressor 1	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 2	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 3	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Compressor 4	Rated Load Amps	13.5			8			5		
	Locked Rotor Amps	109			59			40		
Outdoor Fan Motors (6)	Full Load Amps (total)	2.8 (16.8)			1.4 (8.4)			1.1 (6.6)		
Power Exhaust (2) 0.33 HP	Full Load Amps (total)	2.4 (4.8)			1.3 (2.6)			1 (2)		
Service Outlet 115V GFI (amps)		15			15			20		
Indoor Blower Motor	Horsepower	5	7.5	10	5	7.5	10	5	7.5	10
	Full Load Amps	16.7	24.2	30.8	7.6	11	14	6.1	9	11
[2] Maximum Overcurrent Protection	Unit Only	100	125	125	50	60	70	40	45	50
	With (2) 0.33 HP Power Exhaust	110	125	125	60	60	70	40	45	50
[3] Minimum Circuit Ampacity	Unit Only	92	102	110	50	55	58	35	38	41
	With (2) 0.33 HP Power Exhaust	97	106	115	53	57	61	37	40	43

ELECTRIC HEAT DATA

	Electric Heat Voltage		208V	240V	208V	240V	208V	240V	480V	480V	480V	600V	600V	600V
[2] Maximum Overcurrent Protection	Unit+ Electric Heat	**15 kW**	100	100	125	125	125	125	50	60	70	40	45	50
		30 kW	[4] 100	125	125	125	[4] 125	150	60	60	70	45	50	50
		45 kW	[4] 150	175	[4] 150	175	175	175	80	90	90	70	70	70
		60 kW	[4] 150	175	175	175	[4] 175	200	90	90	90	70	70	80
		90 kW	[4] 225	250	[4] 225	250	[4] 250	[4] 300	125	125	150	100	100	110
[3] Minimum Circuit Ampacity	Unit+ Electric Heat	**15 kW**	92	92	102	102	110	110	50	55	58	35	38	41
		30 kW	100	112	109	121	117	129	55	59	63	44	48	50
		45 kW	139	157	148	166	156	174	78	82	86	62	66	68
		60 kW	146	166	156	175	164	183	82	86	90	66	69	72
		90 kW	209	238	218	247	227	256	118	123	126	95	98	101
[2] Maximum Overcurrent Protection	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	110	110	125	125	125	125	60	60	70	40	45	50
		30 kW	[4] 110	125	[4] 125	150	[4] 125	150	60	70	70	50	50	60
		45 kW	[4] 150	175	175	175	[4] 175	200	90	90	90	70	70	80
		60 kW	175	175	[4] 175	200	[4] 175	200	90	90	100	70	80	80
		90 kW	[4] 225	250	[4] 225	[4] 300	[4] 250	[4] 300	125	150	150	100	110	110
[3] Minimum Circuit Ampacity	Unit+ Electric Heat and (2) 0.33 HP Power Exhaust	**15 kW**	97	97	106	106	115	115	53	57	61	37	40	43
		30 kW	106	118	115	127	123	135	58	63	66	47	50	53
		45 kW	145	163	154	172	162	180	81	85	89	65	68	71
		60 kW	152	172	162	181	170	189	85	90	93	68	72	74
		90 kW	215	244	224	253	233	262	122	126	130	97	101	103

ELECTRICAL ACCESSORIES

Disconnect	Unit Only	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Power Exhaust	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **15 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **30 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **45 kW**	**54W86**	**54W86**	**54W87**	**54W87**	**54W87**	**54W87**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **60 kW**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**
	Unit + Electric Heat **90 kW**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**
	Unit + Power Exhaust + Elec. Heat **15 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Power Exhaust + Elec. Heat **30 kW**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**	**54W85**
	Unit + Power Exhaust + Elec. Heat **45 kW**	**54W86**	**54W86**	**54W87**	**54W87**	**54W87**	**54W87**	**54W85**	**54W85**	**54W86**	**54W85**	**54W85**	**54W85**
	Unit + Power Exhaust + Elec. Heat **60 kW**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W87**	**54W86**	**54W86**	**54W86**	**54W85**	**54W85**	**54W86**
	Unit + Power Exhaust + Elec. Heat **90 kW**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**[5] N/A**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**	**54W86**

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.

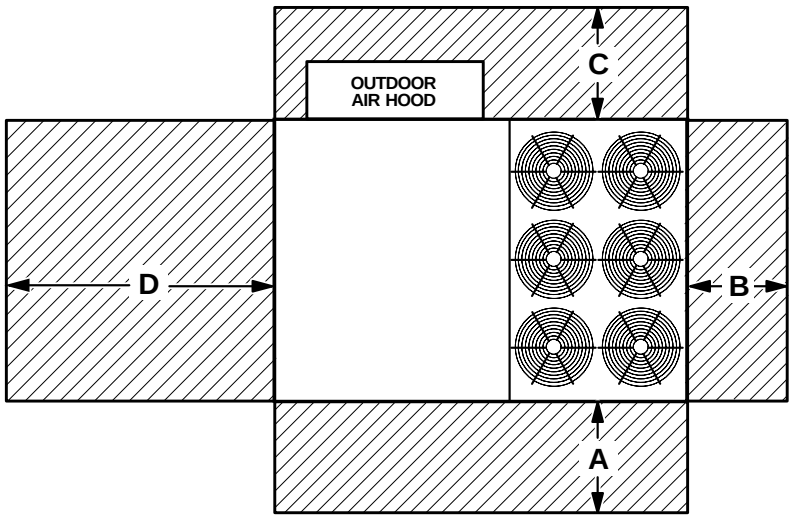
[5] Disconnect must be field furnished.

ELECTRIC HEAT CAPACITIES

Volts Input	15 kW			30 kW			45 kW			60 kW			90 kW		
	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages	kW Input	Btuh Output	No. of Stages
208	11.3	38,600	1	22.5	76,800	1	33.8	115,300	2	45.0	153,600	2	67.6	230,700	2
220	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
230	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
240	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2
440	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
460	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
480	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2
550	12.6	43,000	1	25.2	86,000	1	37.8	129,000	2	50.4	172,000	2	75.6	258,000	2
575	13.8	47,100	1	27.5	93,900	1	41.3	141,000	2	55.1	188,000	2	82.7	282,200	2
600	15.0	51,200	1	30.0	102,400	1	45.0	153,600	2	60.0	204,800	2	90.0	307,100	2

UNIT CLEARANCES - INCHES (MM)

Unit With Economizer



[1] Unit Clearance	A		B		C		D		Top Clearance
	in.	mm	in.	mm	in.	mm	in.	mm	
Service Clearance	60	1524	36	914	36	934	66	1676	Unobstructed
Minimum Operation Clearance	45	1143	36	914	36	914	41	1041	

NOTE - Entire perimeter of unit base requires support when elevated above the mounting surface.

[1] **Service Clearance** - Required for removal of serviceable parts.
Minimum Operation Clearance - Required clearance for proper unit operation.

OUTDOOR SOUND DATA

Unit Model Number	Octave Band Linear Sound Power Levels dB, re 10^{-12} Watts - Center Frequency - Hz							[1] Sound Rating Number (SRN) (dBA)
	125	250	500	1000	2000	4000	8000	
180	71	76	80	78	74	70	63	86
240	73	81	86	84	78	73	67	90

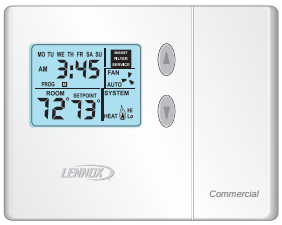
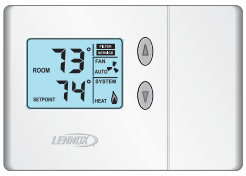
Note - The octave sound power data does not include tonal corrections.

[1] Sound Rating Number according to ARI Standard 370-2001 (includes pure tone penalty). “SRN” is the overall A-Weighted Sound Power Level, (LWA), dB (100 Hz to 10,000 Hz).

OPTIONAL CONVENTIONAL TEMPERATURE CONTROL SYSTEMS

Item	Model No.	Catalog No.
COMFORTSENSE® 7500 COMMERCIAL 7-DAY PROGRAMMABLE THERMOSTAT		
• Four-Stage Heating / Two-Stage Cooling Universal Multi-Stage • Intuitive Touchscreen Interface • Remote Indoor Temperature Sensing with Averaging • Outside or Discharge Air Temperature Display • Full Seven-Day Programming • Four Time Periods Per Day • Occupancy Scheduling with Economizer Relay Control • Away Mode • Holiday Scheduling • Smooth Setback Recovery (SSR) • Performance Reports • Notifications/Reminders • Dehumidification/Humiditrol® Control for Split Systems and Rooftop Units • Economizer Relay Control • Backlit Display • Wallplate Furnished	C0STAT06FF1L	**13H15**
Optional Accessories		
[1] Remote non-adjustable wall mount 20k temperature sensor	C0SNZN01AE2-	**47W36**
[1] Remote non-adjustable wall mount 10k temperature sensor	C0SNZN73AE1-	**47W37**
Remote non-adjustable discharge air (duct mount) temperature sensor	C0SNDC00AE1-	**19L22**
Outdoor temperature sensor	C0SNSR03AE1-	**X2658**
Locking cover (clear)	C0MISC15AE1-	**39P21**

[1] Remote sensors can be applied in any of the following combinations:
One Sensor - (1) 47W36
Two Sensors - (2) 47W37
Three Sensors - (2) 47W36 and (1) 47W37
Four Sensors - (4) 47W36
Five Sensors - (3) 47W36 and (2) 47W37

COMFORTSENSE® 3000 COMMERCIAL 5-2 DAY PROGRAMMABLE THERMOSTAT		
 • Two-Stage Heating / Two-Stage Cooling Conventional Systems • Intuitive Interface • 5-2 Day Programming • Program Hold • Remote Indoor Temperature Sensing • Smooth Setback Recovery (SSR) • Economizer Relay Control • Maintenance/Filter/Service Reminders • Backlit Display • Wallplate Furnished • Simple Up and Down Temperature Control.	C0STAT05FF1L	**11Y05**
Optional Accessories		
Remote non-adjustable wall mount 10k averaging temperature sensor	C0SNZN73AE1-	**47W37**
Optional wall mounting plate	C0MISC17AE1-	**X2659**
DIGITAL NON-PROGRAMMABLE THERMOSTAT		
 • One-Stage Heating / Cooling Conventional Systems • Intuitive Interface • Automatic Changeover • Backlit Display • Simple Up and Down Temperature Control.	C0STAT12AE1L	**51M32**
Optional Accessories		
Outdoor temperature sensor	C0SNSR04AE1-	**X2658**
Optional wall mounting plate	C0MISC17AE1-	**X2659**

WEIGHT DATA

Model Number	Net		Shipping	
	lbs.	kg	lbs.	kg
180 Base Unit	2240	1016	2440	1107
180 Max. Unit	2570	1166	2770	1256
240 Base Unit	2280	1034	2480	1125
240 Max. Unit	2620	1188	2820	1279

NOTE - Max. Unit is the unit with ALL INTERNAL OPTIONS Installed. (Economizer, Standard Static Power Exhaust Fans, Controls, etc.). Does not include accessories EXTERNAL to unit.

OPTIONS / ACCESSORIES

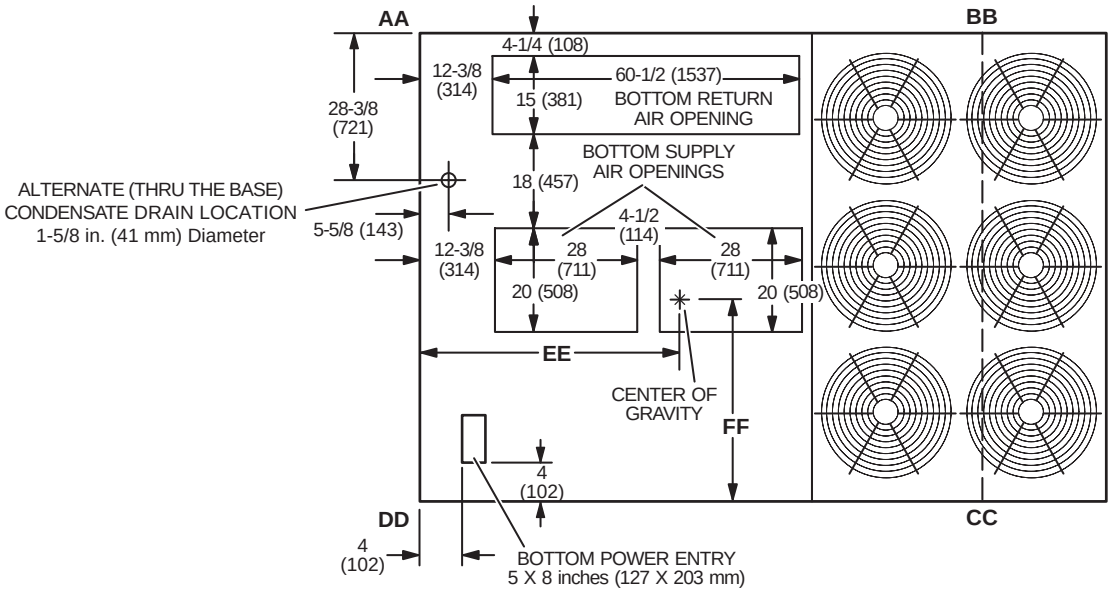
Description	Shipping Weight	
	lbs.	kg
CEILING DIFFUSERS		
Step-Down		
RTD11-185	392	178
RTD11-275	403	183
Flush		
FD11-185	289	131
FD11-275	363	165
Transitions		
C1DIFF33C-1	80	36
C1DIFF34C-1	75	34
ECONOMIZER / OUTDOOR AIR / EXHAUST		
Economizer		
Economizer Dampers	102	46
Barometric Relief Dampers (downflow)	30	14
Barometric Relief Dampers (horizontal)	20	9
Outdoor Air Dampers		
Outdoor Air Damper Section (downflow) - Automatic	52	24
Outdoor Air Damper Section (downflow) - Manual	49	22
Outdoor Air Damper Hood (downflow)	65	29
Power Exhaust	62	28
ELECTRIC HEAT		
15 kW	59	27
30 kW	59	27
45 kW	76	34
60 kW	76	34
90 kW	84	38
MSAV (MULTI-STAGE AIR VOLUME) SUPPLY AIR BLOWER OPTION		
Variable Frequency Drive (VFD) and associated components	10	5
ROOF CURBS		
Hybrid Roof Curbs, Downflow		
8 in. height	75	34
14 in. height	105	48
18 in. height	125	57
24 in. height	155	70
Adjustable Pitch Curb, Downflow		
14 in. height	262	119
Horizontal, Standard		
26 in. height	470	213
37 in. height	505	229
PACKAGING		
LTL Packaging (less than truck load)	310	141

DIMENSIONS - UNIT - INCHES (MM)

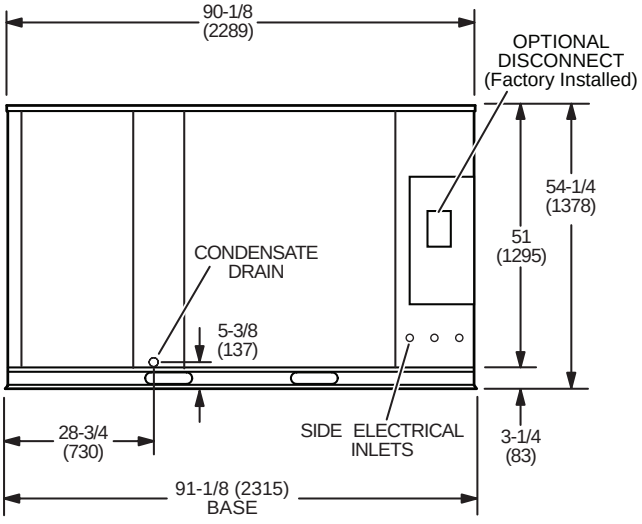
CORNER WEIGHTS									CENTER OF GRAVITY			
Model No.	AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	in.	mm	in.	mm
LCH180 Base Unit	438	199	480	218	692	314	630	286	56-1/2	1334	37-1/2	953
LCH180 Max. Unit	546	248	577	262	743	337	703	319	55-1/2	1410	40	1016
LCH240 Base Unit	473	215	473	215	667	303	667	303	53-3/4	1365	38	965
LCH240 Max. Unit	591	268	569	258	717	325	744	337	52-3/4	1340	40-1/2	1029

Base Unit - The unit with NO INTERNAL OPTIONS.

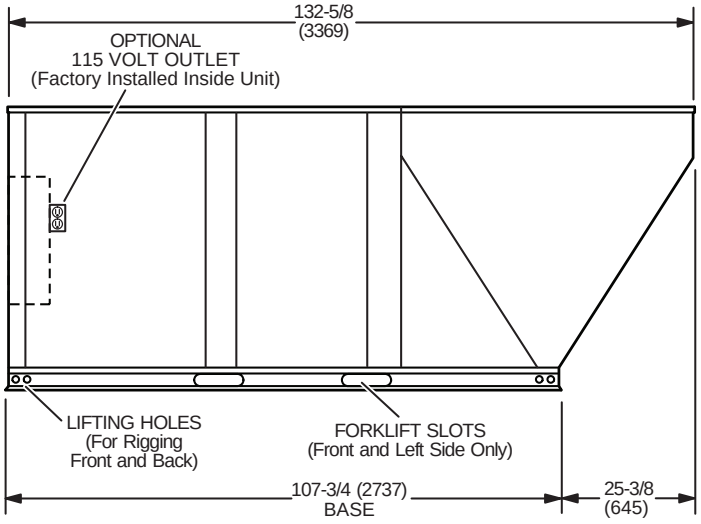
Max. Unit - The unit with ALL INTERNAL OPTIONS Installed. (Economizer, Standard Static Power Exhaust Fans, Controls, etc.). Does not include accessories external to unit.



TOP VIEW

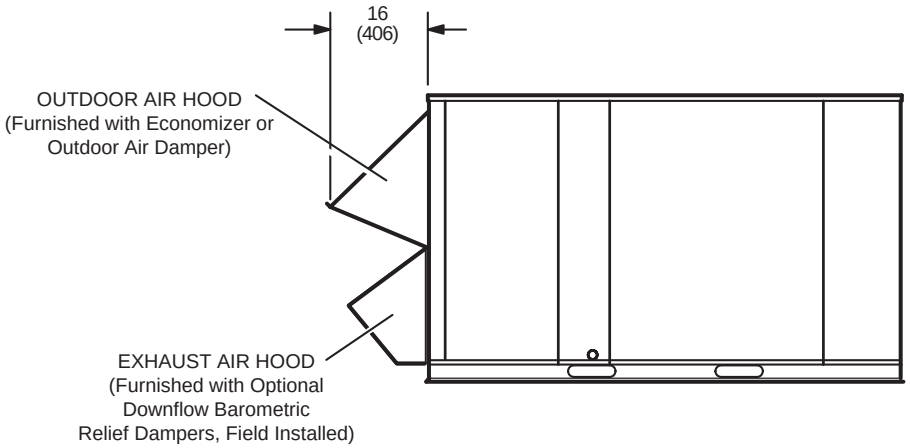


END VIEW



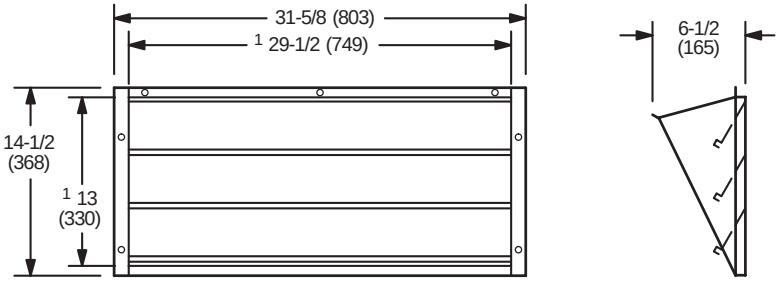
SIDE VIEW

OUTDOOR AIR HOOD DETAIL



OPTIONAL HORIZONTAL BAROMETRIC RELIEF DAMPERS WITH HOOD

(Field installed in horizontal return air duct adjacent to unit)

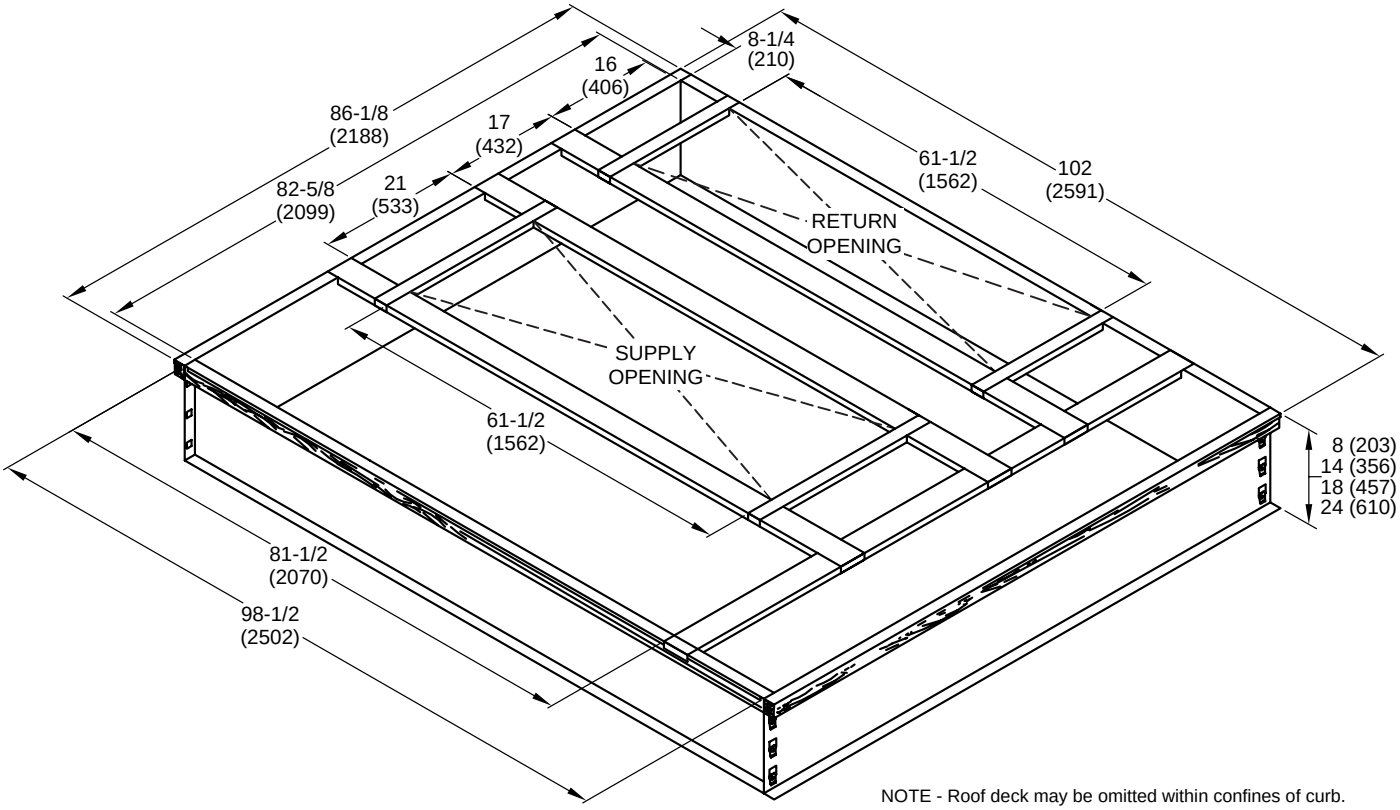


FRONT VIEW **SIDE VIEW**

NOTE - Two furnished per order no.

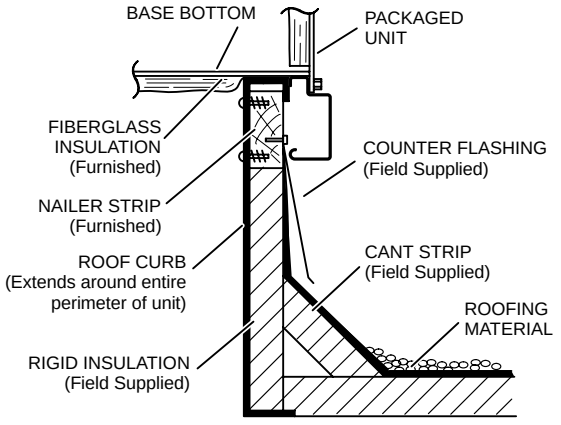
[1] NOTE - Opening size required in return air duct.

HYBRID ROOF CURBS - DOUBLE DUCT OPENING

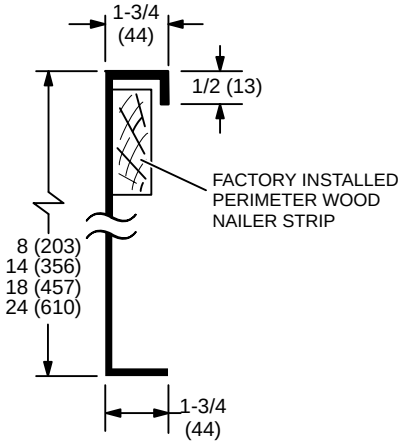


NOTE - Roof deck may be omitted within confines of curb.

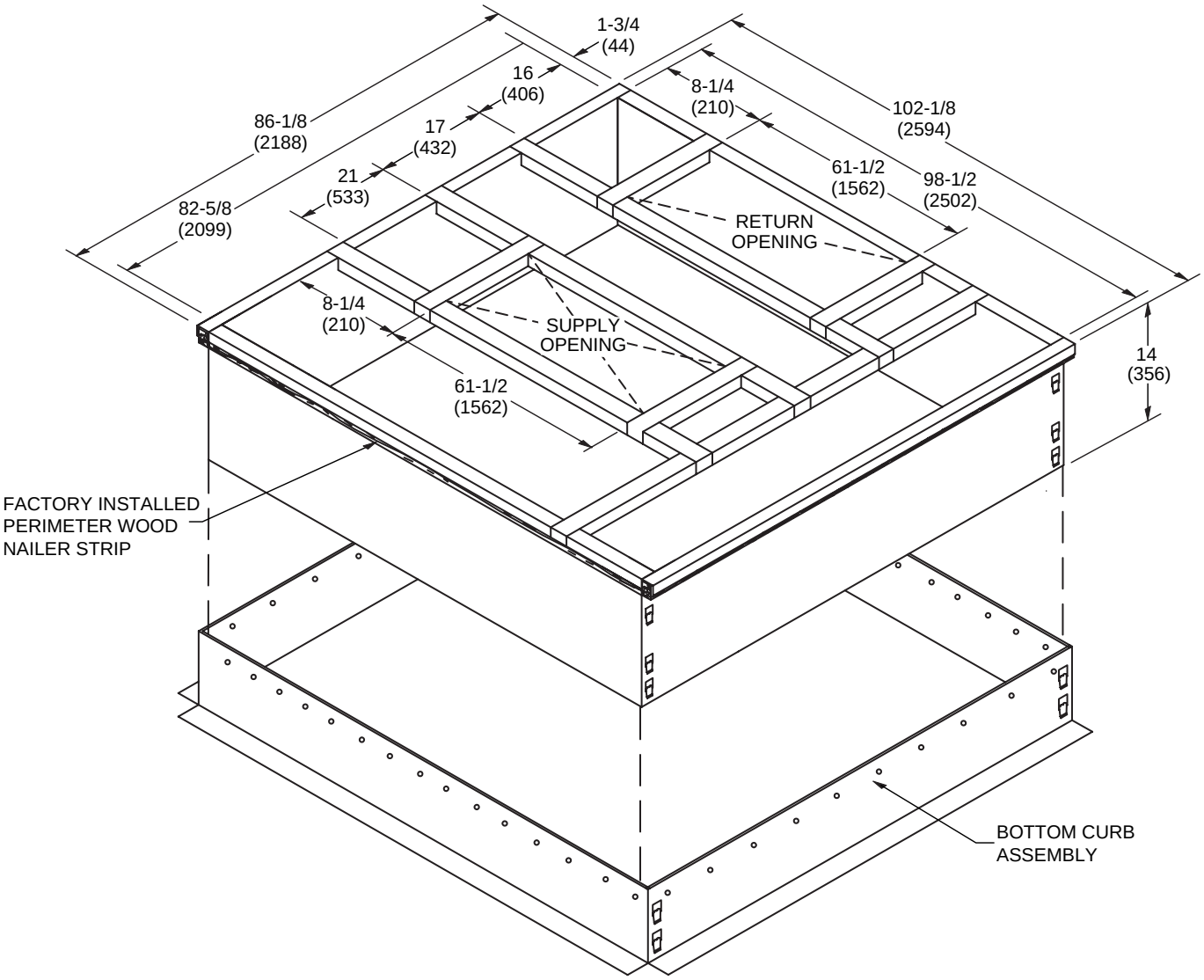
TYPICAL FLASHING DETAIL FOR ROOF CURB



DETAIL ROOF CURB

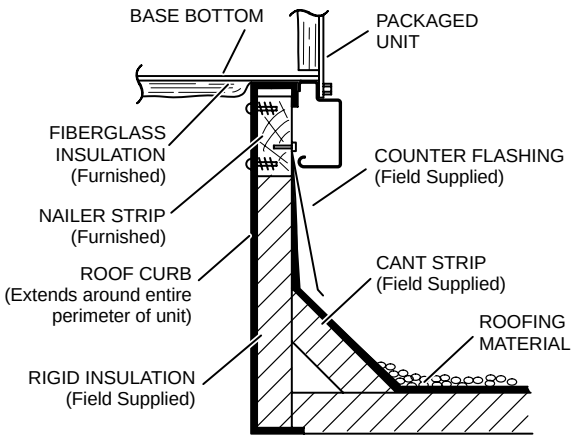


ADJUSTABLE PITCH CURB - DOUBLE DUCT OPENING

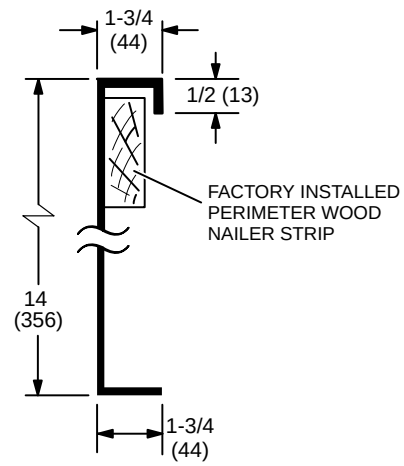


NOTE - Maximum slope pitch is 3/4 in. per 1 foot (19 mm per 305 mm) in any one direction.

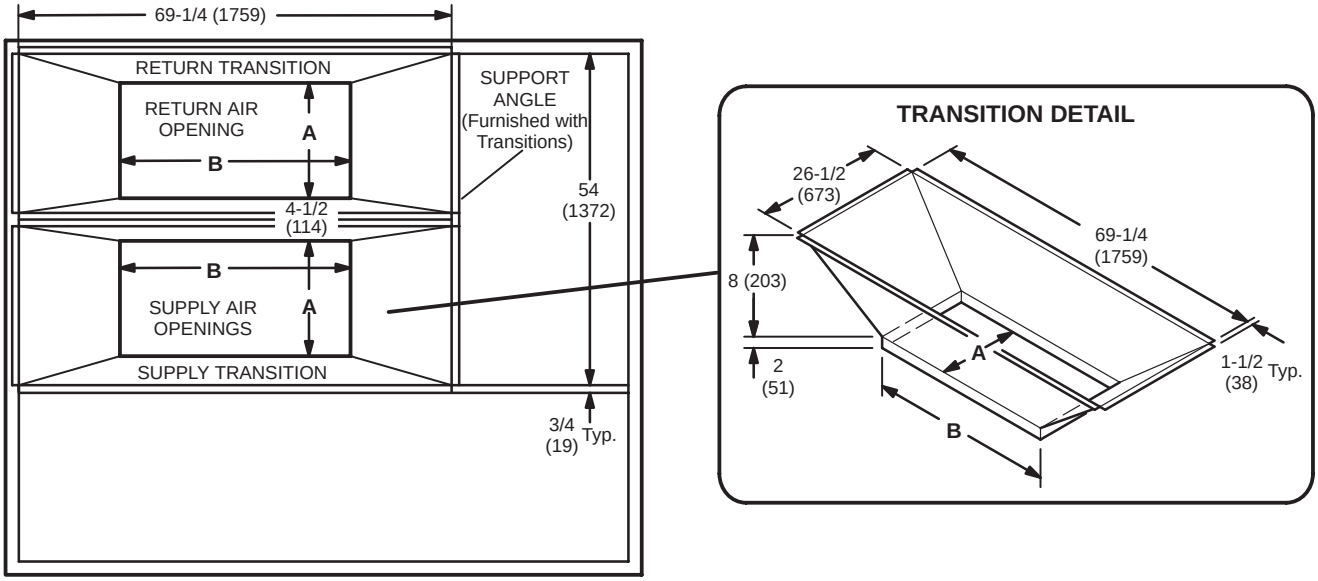
TYPICAL FLASHING DETAIL FOR ROOF CURB



DETAIL ROOF CURB



ROOF CURBS WITH SUPPLY & RETURN AIR TRANSITIONS FOR CEILING DIFFUSERS

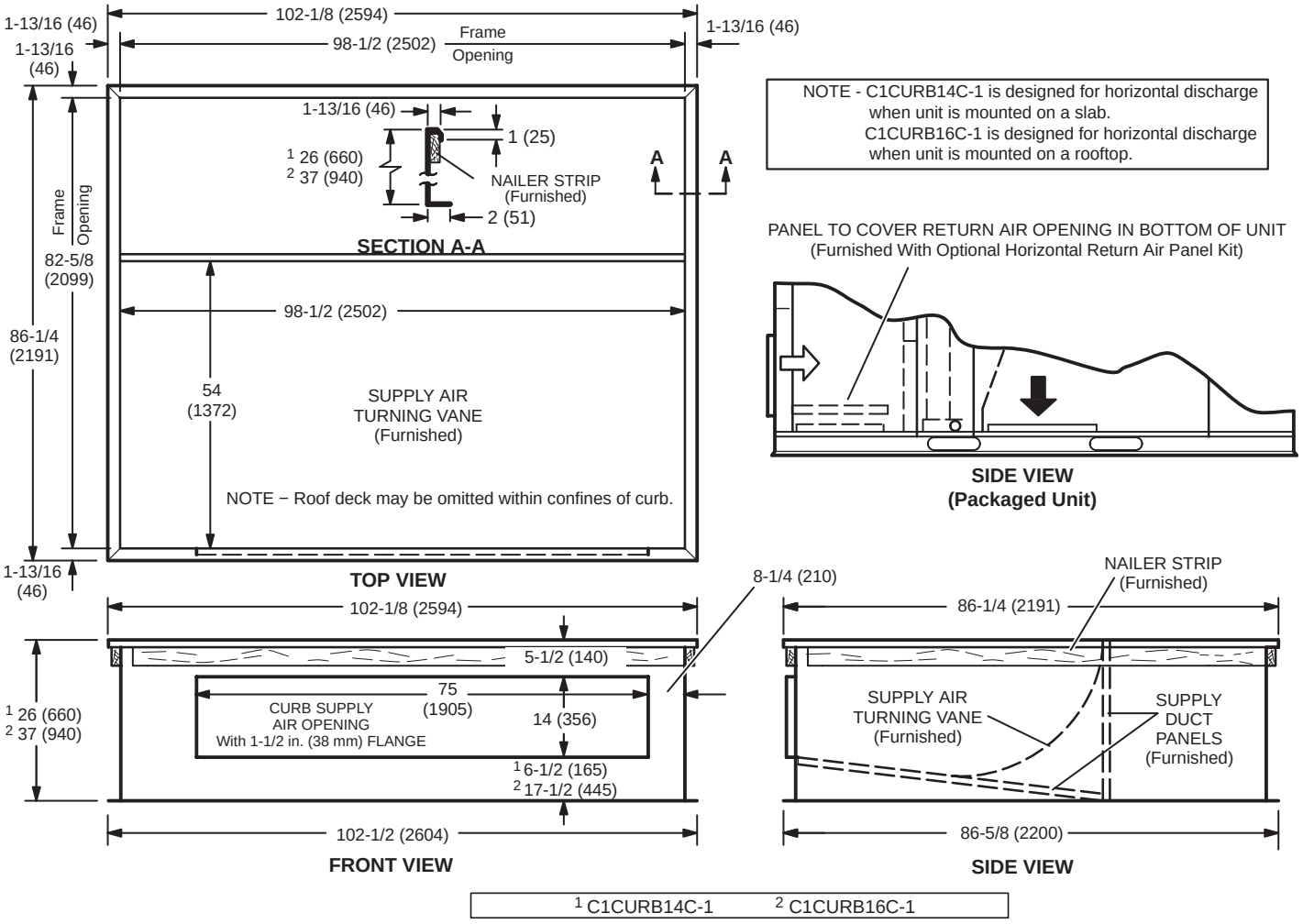


TOP VIEW

TRANSITION OPENING SIZES

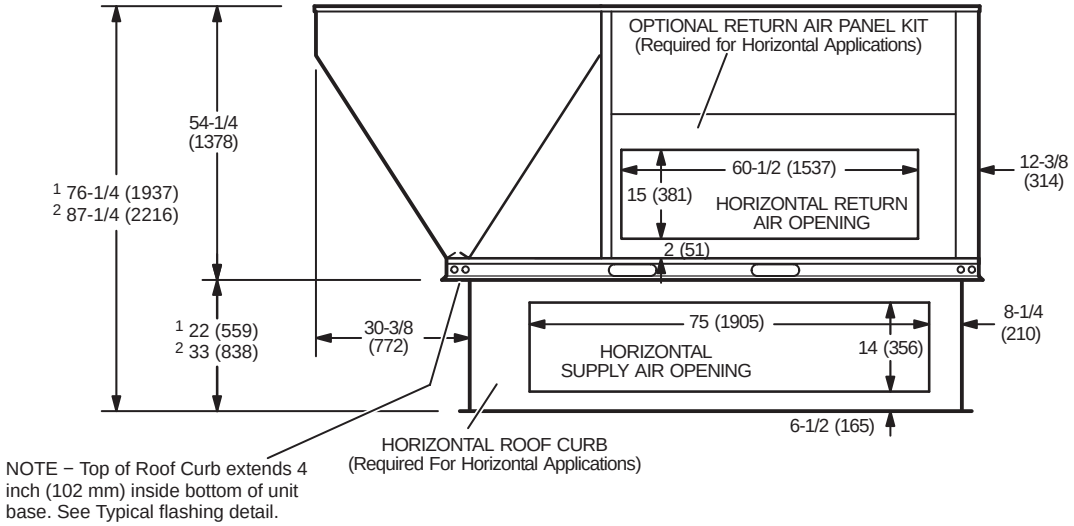
Model Number	A		B	
	inch	mm	inch	mm
C1DIFF33C-1	18	457	36	914
C1DIFF34C-1	24	610	48	1219

HORIZONTAL ROOF CURBS − Requires Optional Horizontal Return Air Panel Kit



1 C1CURB14C-1 2 C1CURB16C-1

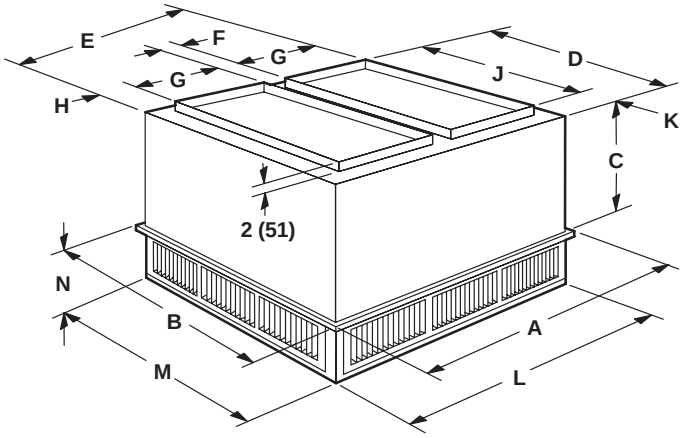
HORIZONTAL SUPPLY AND RETURN AIR OPENINGS WITH HORIZONTAL ROOF CURB



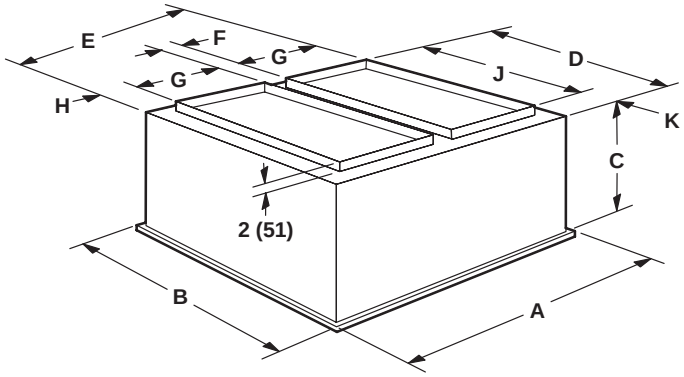
NOTE − Top of Roof Curb extends 4 inch (102 mm) inside bottom of unit base. See Typical flashing detail.

COMBINATION CEILING SUPPLY AND RETURN DIFFUSERS

STEP-DOWN CEILING DIFFUSER



FLUSH CEILING DIFFUSER



Model Number		RTD11-185	RTD11-275
A	in.	47-5/8	59-5/8
	mm	1210	1514
B	in.	47-5/8	59-5/8
	mm	1210	1514
C	in.	24-5/8	30-5/8
	mm	625	778
D	in.	45-1/2	57-1/2
	mm	1156	1461
E	in.	45-1/2	57-1/2
	mm	1156	1461
F	in.	4-1/2	4-1/2
	mm	114	114
G	in.	18	24
	mm	457	610
H	in.	2-1/2	2-1/2
	mm	64	64
J	in.	36	48
	mm	914	1219
K	in.	4-3/4	4-3/4
	mm	121	121
L	in.	45-1/2	57-1/2
	mm	1156	1461
M	in.	45-1/2	57-1/2
	mm	1156	1461
N	in.	10-1/8	11-1/8
	mm	257	283
Duct Size	in.	18 x 36	24 x 48
	mm	457 x 914	610 x 1219

Model Number		FD11-185	FD11-275
A	in.	47-5/8	59-5/8
	mm	1210	1514
B	in.	47-5/8	59-5/8
	mm	1210	1514
C	in.	29-1/4	35-1/4
	mm	743	895
D	in.	45	57
	mm	1143	1148
E	in.	45	57
	mm	1143	1448
F	in.	4-1/2	4-1/2
	mm	114	114
G	in.	18	24
	mm	457	610
H	in.	2-1/4	2-1/4
	mm	57	57
J	in.	36	48
	mm	914	1219
K	in.	4-1/2	4-1/2
	mm	114	114
Duct Size	in.	18 x 36	24 x 48
	mm	457 x 914	610 x 1219

REVISIONS

Section	Description
Options/Accessories	Added new Combination Coil/Hail Guards.
Conventional Control Systems	Added new CS7500 and CS3000 Commercial Thermostats.

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