PACKAGED HEAT PUMPS

LH

L SERIES® ROOFTOP UNITS
60 HZ

ENGINEERING DATA

Bulletin No. 210311
August 2009
Supersedes September 2007

L Connection NETWORK

ASHRAE 90.1 COMPLIANT

ENERGY STAR

7.5 to 20 Tons
Net Cooling Capacity - 98,000 to 220,000 Btuh
Net Heating Capacity - 90,000 to 220,000 Btuh
Optional Electric Heat - 7.5 to 90 kW

MODEL NUMBER IDENTIFICATION

L H A 240 H 2 B L 3 Y

Brand/Family
L = L Series Product Line

Unit Type
H = Packaged Heat Pump

Major Design Sequence
A = 1st Generation

Nominal Cooling Capacity - Tons
090 = 7.5Tons
102=8.5 Tons
120 = 10 Tons
150=12.5 Tons
180 = 15 Tons
240 = 20 Tons

Cooling Efficiency
H = High Efficiency
S=Standard Efficiency

Refrigerant Type
2 = R-22

Blower Type
B = Belt Drive

Heating Type
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
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

CONTENTS

FEATURES AND BENEFITS

APPROVALS

ETL and CSA listed.

Efficiency rating verified by CSA.

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

Certified in accordance with the ULE certification program, which is based on AHRI Standard 340/360-2004.

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.

Dealer Design Award

Lennox has received the Dealer Design Award from an independent panel of dealer-contractors selected by Air Conditioning, Heating & Refrigeration News (”*The News*”) magazine. Their decision is based on ”best in categories” of installation, maintenance and service as well as quality and performance.

WARRANTY

Limited five years on compressors.

Limited three years on Integrated Modular Control.

Limited one year all other covered components.

COOLING/HEATING SYSTEM

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

Two efficiency levels provide flexibility.

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

1 Compressors

Resiliently mounted on rubber grommets for quiet operation.

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

Compressor Crankcase Heaters

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

Check/Thermal Expansion Valves

Assures optimal performance throughout the application range.

Removable element head.

Filter/Driers

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

High Pressure Switches

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

Low Pressure Switches

Protects the compressor from low pressure conditions such as low refrigerant charge, or low/no air flow.

Freezestats

Protects the indoor coil from damaging ice build-up due to conditions such as low/no air flow, or low/no refrigerant charge.

2 Reversing Valves

4-way interchange reversing valve effects a rapid change in direction of refrigerant flow resulting in quick changeover from cooling to heating and vice versa.

3 Coil Construction

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

Indoor Coil

Cross row circuiting with rifled copper tubing optimizes both sensible and latent cooling capacity. Low fin per inch count minimizes air pressure drop.

Outdoor Coil

Two independent formed coils allows separation for cleaning.

Condensate Drain Pan

Painted, galvanized pan with positive slope.

Drain connection extends outside unit.

4 Outdoor Coil Fan Motors

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 the nominal cooling capacity of the unit.

Cooling Efficiency

Specify either standard or high efficiency.

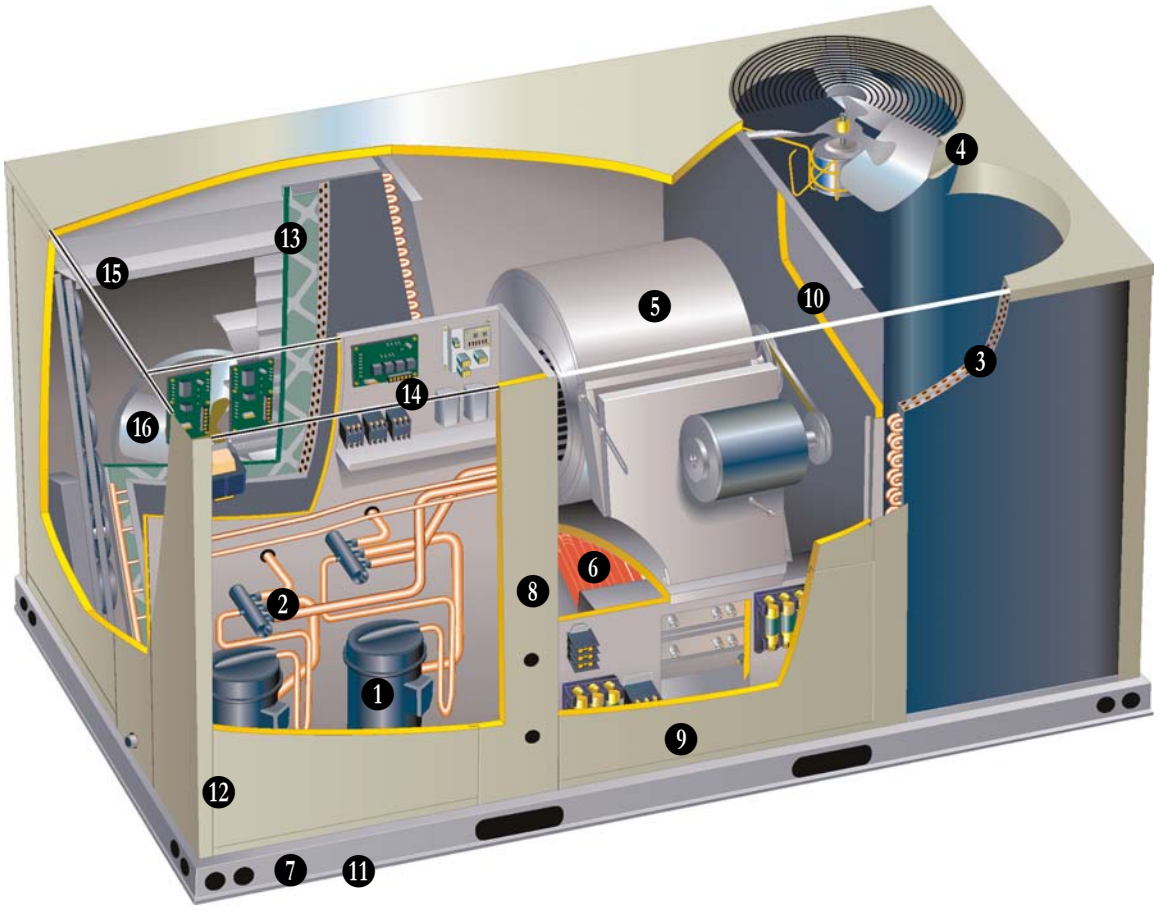
OPTIONS/ACCESSORIES

Factory or Field Installed

Condensate Drain Trap

Field installed only, may be factory enclosed to ship with unit. Available in copper or PVC.

FEATURES AND BENEFITS



5 BLOWER

A wide selection of supply air blower options are available to meet a variety of air flow 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

Specify standard or high efficiency.

Supply Air Blower

Forward curved blades, double inlet, blower wheel is statically and dynamically balanced, ball bearings, adjustable pulley (allows speed change), blower assembly slides out of unit for servicing.

Ordering Information

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

See Blower Data table for specifications.

REQUIRED SELECTIONS

Supply Air Blower

Order Standard or High Efficiency Blower motor (See Blower Data Table for specifications).

Order one drive kit, see Drive Kit Specifications Table.

Air Flow Configuration

Specify horizontal or down-flow.

ELECTRICAL

REQUIRED SELECTIONS

Voltage Choice

Specify 208/230V, 460V or 575V 3-phase-60hz when ordering base unit.

OPTIONS/ACCESSORIES

Factory Installed

Circuit Breakers up to 250 Amp

HACR type circuit breaker with or without power distribution lugs, allows a circuit breaker to be used on units with or without electric heat. Accessible from outside of unit, spring-loaded weatherproof cover furnished. Circuit breaker option is available on LHA090 thru 150 configurations with Maximum Overcurrent Protection of 150A or less and LHA180 or 240 configurations with Maximum Overcurrent Protection of 250A or less.

Phase Monitor

Protects unit against premature equipment failure caused by phase loss, phase reversal, phase unbalance, under voltage and over voltage.

Factory or Field Installed

Disconnect Switch

Accessible from outside of unit, spring loaded weatherproof cover furnished. Factory installed switch is not available for: 208/230V LHA090/102/120/150 models with 45-60 kW electric heat, 208/230V LHA180 models with 60 kW electric heat, and 208/230V LHA240 models with 60-90 kW electric heat. See Optional Disconnect Switch Requirements table, Pages 27-32. for field installed disconnect switches.

6 Electric Heat

Helix wound nichrome elements, time delay for element staging, individual element limit controls, wiring harness, may be two-stage controlled. When electric heat is factory installed, all required components are included. The following must be ordered extra when field installed electric heat is used: Unit Fuse Block, LBT2 Terminal Block, Control Module (180/240 models only) and Electric Heat Fuse Box. See Electric Heat tables for ordering information, Pages 27-32.

GFI Service Outlets (2)

Dual 115v ground fault circuit interrupter (GFI) type, field wired.

FEATURES AND BENEFITS

CABINET

Construction

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

7 Base rails have rigging holes. Three sides of the base rail have fork slots.

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

Air-Flow Choice

Units are available in down-flow (vertical) or horizontal return air flow configuration.

Horizontal supply duct flange is standard on 090/102/120/150 models.

Horizontal Conversion Kit is also required if converting a down-flow configured unit to horizontal air flow (090/102/120/150 models only).

Horizontal air flow requires Horizontal Roof Curb (180/240 models only).

Horizontal Return Air Panel Kit is also required if converting a down-flow configured unit to horizontal air flow (180/240 models only).

8 **Power Entry**

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

9 **Exterior Panels**

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

10 **Insulation**

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

11 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.

12 **Access Panels**

Hinged access panels are provided for the economizer/filter section, blower/heating section and the compressor/controls section.

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

REQUIRED SELECTIONS

Air Flow Configuration

Specify horizontal or down-flow.

OPTIONS/ACCESSORIES

Factory Installed

Corrosion Protection

Polymeric epoxy coating that is deposited by electrical transport (electrophoresis), using a process known as electrocoat (e-coat). Available for enhanced coil corrosion protection. Factory installed on the condenser coil, evaporator coil, or both.

Field Installed

Coil Guards

Painted, galvanized steel wire guards to protect outdoor coil. Not used with Hail Guards.

Hail Guards

Constructed of heavy gauge steel, painted to match cabinet, helps protect outdoor coils from hail damage. Not used with Coil Guards.

Horizontal Return Air Panel Kit - (090/102/120/150)

Two piece duct cover in kit blocks off unit down-flow supply air opening, horizontal return air opening panel (on unit) is moved to block off down-flow return air opening for horizontal applications.

Horizontal Return Air Panel Kit - (180/240)

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.

INDOOR AIR QUALITY

13 **Air Filters**

Disposable 2 inch pleated MERV 7 filters (Minimum Efficiency Reporting Value based on ASHRAE 52.2).

OPTIONS/ACCESSORIES

Factory or Field Installed

Healthy Climate® High Efficiency Air Filters

Disposable MERV 11 (Minimum Efficiency Reporting Value based on ASHRAE 52.2) efficiency 2 inch pleated filters.

Field Installed

Healthy Climate® High Efficiency Air Filters

Disposable MERV 15 (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 furnished on models used with 460V and 575V rooftop units.

Magnetic safety interlock terminates power when access panels are removed.

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 media. Filter media is furnished.

Indoor Air Quality (CO_2) Sensor

Monitors CO_2 levels, reports to IMC board which adjusts economizer dampers as needed.

FEATURES AND BENEFITS

SERVICEABILITY

Designed to streamline general maintenance and decrease troubleshooting time.

Diagnostics
IMC diagnostic codes pinpoint problems, minimizing troubleshooting time.

Marked & Color-Coded Wiring
All electrical wiring is color-coded and marked to identify which components it is connecting.

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

Toolless, Hinged Access Panels
Large access panels are hinged and have quarter-turn, latching handles for quick and easy access to maintenance areas.

Blower Access
Blower assembly slides out of the unit for easy access.

Check/Thermal Expansion Valves
Check/thermal expansion valves are located near the perimeter of the unit for easier access.
Removable element head allows change out of element and bulb without removing the TXV.

Coil Cleaning
Independently formed outdoor coils allow separation for easier cleaning.

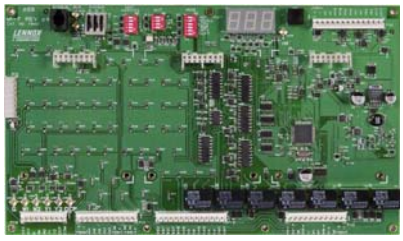
Standard Components
A large number of common maintenance parts are standard throughout the entire range of sizes (7.5-20 tons), reducing the need to carry a lot of different parts to the job or in inventory.

Compressor Compartment
Compressors are located near the perimeter of the unit for easier access.
Compressors are isolated from the condenser air flow allowing system operation checks to be done without changing the air flow across the outdoor coils.

Electric Heaters (optional)
Optional electric heaters are accessed through the heating access panel. Heaters can be removed if necessary.

CONTROLS

⓮ INTELLIGENT UNIT CONTROLLER



The Integrated Modular Control (IMC) is a solid-state microprocessor-based control board that provides flexible control of all unit functions.
All control voltage is provided via a 24V (secondary) transformer with built-in circuit breaker protection.
Built-in functions include:

Blower On/Off Delay - Adjustable time delay between blower on and off.

Built-in Control Parameter Defaults - No programming required.

Compressor Time-Off Delay - Adjustable time delay between compressor shutoff and start up.

DDC Compatible - Various third party DDC controllers can be factory or field installed. Refer to the Unit Controllers section for details.

Defrost Control - Provides a defrost cycle, if needed, every 30 or 60 or 90 minutes (adjustable) of compressor "on" time at outdoor coil temperature below 32°F (0°C). Pressure switch mounted on outdoor coil vapor line terminates defrost cycle.

Dirty Filter Switch Input - When a Dirty Filter Switch is installed, the IMC will signal when the indoor blower static pressure increases, indicating a dirty filter condition. Switch is optional and can be factory or field installed.

Display/Sensor Readout - Displays control parameters, diagnostic codes, and sensor readings. The IMC unit controller displays temperature readings from return air, supply air, and outdoor air sensors that are furnished as standard on all L Series units. IMC will also display readings from optional sensors such as zone sensors, CO_2 sensors or relative humidity sensors.

Economizer Control Choice - The economizer is controlled by an add-on board to the IMC. The economizer control board has several choices for controlling the economizer. See Economizer / Outdoor Air / Exhaust Options.

Extensive Unit Diagnostics - The IMC monitors all sensors and functions related to unit operation to provide critical information. The IMC will display detailed diagnostic information with over 90 diagnostic codes to pinpoint any problems and reduce troubleshooting time. All diagnostic codes are listed inside control access panel for easy reference.

Exhaust Fan Control Modes - Fans controlled by fresh air damper position or building static differential pressure transducer.

Permanent Diagnostic Code Storage - Maintains diagnostic codes through a power failure.

Field Changeable Control Parameters - Over 200 different control parameters allow customization of the unit operation by changing delays, cooling stages, deadbands, and setpoints.

Indoor Air Quality Input - The IMC is Demand Control Ventilation ready from the factory (optional field installed CO_2 sensor required). Two modes of operation are available: setpoint and proportional.

1 - Setpoint - Opens the economizer dampers to full position when CO_2 setpoint level is reached.
2 - Proportional - Opens the dampers at the first set point and gradually increases it as the CO_2 level increases until the second setpoint is reached.

Low Ambient Controls - Allows unit cooling operation down to 0°F.

Minimum Compressor Run Time - Ensures proper oil return to the compressor.

Network Capable - The IMC can be daisy chained to other L Series units or L Connection® Network controllers using twisted pair wire.

Night Setback Mode - Adjusts setpoints, closes outdoor air dampers and operates the blower on demand, may be customized for special requirements.

Return Air Temperature Limit Control - Allows the user to override the demands based upon the return air temperature during either heating or cooling operation. Helps protect against abnormal operating conditions in the event of a room sensor or thermostat failure.

Safety Switch Input - Normally-closed digital input allows the IMC to respond to a external safety switch trip (phase protector, low voltage, etc.) shutting down unit operation.

CONTROLS - CONTINUED

Service Relay Output - Digital output can indicate a critical error has occurred to an external control device. Can also be configured to energize based on relative humidity, indoor air quality, outdoor air temperature or unit operation.

Smoke Alarm Mode - Control board has four choices for responding to a smoke alarm.

1 - Unit Off - unit will turn off.

2 - Positive Pressure - blower is energized, exhaust fan is de-energized, and the outdoor air dampers are opened.

3 - Negative Pressure - blower is energized, exhaust fan is energized, and the outdoor air dampers are closed.

4 - Purge - blower is energized, exhaust fan is energized, and the outdoor air dampers are opened.

Staging - 2 heat/2 cool. Capable of up to 4 heat/4 cool with zone sensor third party DDC control system.

"Strike Three" Protection - Ends cooling or heating operation when any of the following occurs three times (adjustable) within a thermostat cycle: low pressure trip, high pressure trip, heat limit trip, or freeze-stat trip.

Thermostat Bounce Delay - Protects compressor from short cycling when mechanical thermostat is used.

Warm-up Mode Delay - Adjustable time that the economizer dampers are kept in the closed position during morning warm-up.

On-Board User Interface - Push-button, DIP switches used with three-digit display readout for field adjustment of control parameters. LED indicators for L Connection Network (transmit and receive) and for each thermostat input.

PC Interface - PC with optional Unit Controller software may be used to field or remotely adjust parameters, read alarms, or display unit status.

OPTIONS / ACCESSORIES

Factory or Field Installed

Blower Proving Switch

Monitors blower operation, shuts down unit if blower fails. Factory installed.

Dirty Filter Switch

Senses static pressure increase indicating dirty filter condition.

Smoke Detector

Photoelectric type, installed in supply air section or return air section or both sections

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. See Page 35.

Commercial Control Systems

L Connection® Network

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 Engineering Handbook Bulletin for details.

Aftermarket DDC

Novar® Unit Controller and options. See Page 34.

Thermostats

Control system and thermostat options. Aftermarket unit controller options. See See Page 39.

Field Installed

Humidity Sensor Kit, Remote Mounted

Humidity sensor required with factory installed Humiditrol™ Option or Supermarket reheat field selectable option.

OPTIONS / ACCESSORIES

ECONOMIZER/OUTDOOR AIR/EXHAUST OPTIONS

Factory or Field Installed

⓯ Economizer

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, adjustable minimum damper position, damper assembly slides in unit, outdoor air hood must be ordered separately, optional down-flow barometric relief dampers available, choice of economizer controls. The IMC add-on board for economizer control is included with the economizer. Control board has four choices for controlling the economizer (DIP switch selections).

1 - Differential Sensible Control - Factory setting. Uses the outdoor air and return air sensors that are furnished with the unit. The IMC compares the 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.

2 - Global Control - The IMC 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.

3 - Single Enthalpy Control - Outdoor air enthalpy sensor enables economizer if the outdoor enthalpy is less than the setpoint of the board. Factory installed.

4 - Differential Enthalpy Control - Two solid-state enthalpy sensors allow the economizer control board to select between outdoor air or return air, whichever has lower enthalpy. Factory installed.

Down-Flow Barometric Relief Dampers

Allows relief of excess air, aluminum blade dampers prevent blow back and outdoor air infiltration during off cycle, bird screen furnished, see Field Installed section (below) for damper hood

Outdoor Air Damper Section

Linked mechanical dampers, 0 to 25% (fixed) outdoor air adjustable, installs in unit, outdoor air hood must be ordered separately. Motorized model features fully modulating spring return damper motor with plug-in connection. Manual model features a slide damper. Minimum mixed air temperature in heat pump mode: 50°F, electric heat mode: 30°F Maximum mixed air temperature in cooling mode: 90°F.

Outdoor Air Hood

Required with LAREMD Economizer, LAOAD and LAOADM Outdoor Air Damper Sections, two cleanable aluminum mesh fresh air filter furnished.

⓰ Power Exhaust Fan

Installs in unit for down-flow applications only with economizer option, provides exhaust air pressure relief, interlocked to run when supply air blower is operating, fan runs when outdoor air dampers are 50% open (adjustable), motor is overload protected, requires optional down-flow barometric relief dampers. Fan is 20 in. in diameter with 5 fan blades. Total air volume is 4200 cfm (LAPEF08/10 and LAPEF10/15) or 8630 cfm (LAPEF18/24) at 0 in. wg. LAPEF08/10 and LAPEF10/15 models have 1/3 hp motors with a total input of 300 Watts. LAPEF18/24 models have 2, 1/3 hp motors with a total input of 750 Watts.

Field Installed

Down-Flow Barometric Relief Damper Hood

Field installed only.

Horizontal Barometric Relief Dampers

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, two dampers per order number.

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.

ROOF CURBS

Standard Down-Flow

Nailer strip furnished, mates to unit, US National Roofing Contractors Approved, shipped knocked down. Available in 14 inch and 24 inch heights.

ClipLock 1000 Full Perimeter Down-Flow

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

Horizontal (180/240 only)

Converts unit from down-flow 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. Available in 26 and 37 inch heights. Optional Insulation Kit is available to help prevent sweating.

Standard roof curb corners fasten together with furnished hardware.

Cliplock curbs use interlocking tabs to fasten together. No tools required.

OPTIONS / ACCESSORIES

Item		Catalog No.	090	102	120	150	180	240
COOLING / HEATING SYSTEM								
Condensate Drain Trap	Copper - LTACDKC09/36	**76M19**	⊗	⊗	⊗	⊗	⊗	⊗
	PVC - LTACDKP09/36	**76M18**	⊗	⊗	⊗	⊗	⊗	⊗
Corrosion Protection		Factory	○	○	○	○	○	○
Efficiency	Standard	Factory	○	○	○	○	○	○
	High	Factory	○	○	○		○	○
Refrigerant Type	R-22	Factory	○	○	○	○	○	○
	R-410A	Factory	○	○	○	○	○	○
Stainless Steel Condensate Drain Pan		Factory	○	○	○	○	○	○
BLOWER - SUPPLY AIR								
Constant Air Volume	2 hp Standard or High Efficiency	Factory	○	○	○	○		
	3 hp Standard or High Efficiency	Factory	○	○	○	○		
	5 hp Standard or High Efficiency	Factory	○	○	○	○		
	7.5 hp Standard or High Efficiency	Factory					○	○
	10 hp Standard or High Efficiency	Factory						○
CABINET								
Coil Guards		**88K54**	**x**	**x**	**x**	**x**		
		88K52					**x**	**x**
Hail Guards		**88K27**	**x**	**x**	**x**	**x**		
		88K25					**x**	**x**
CONTROLS								
Blower Proving Switch	C0SWCH01AE1-	**30K49**	⊗	⊗	⊗	⊗	⊗	⊗
Commercial Controls	L Connection® Building Automation System	**- - -**	⊗	⊗	⊗	⊗	⊗	⊗
	Novar® ETM-2051 Unit Controller	**69K67**	⊗	⊗	⊗	⊗	⊗	⊗
Dirty Filter Switch	C0SWCH00AE1-	**30K48**	⊗	⊗	⊗	⊗	⊗	⊗
Smoke Detector - Supply	L1SNSR41BD1	**53W26**	⊗	⊗	⊗	⊗	⊗	⊗
Smoke Detector - Return	L1SNSR42BD1	**53W25**	⊗	⊗	⊗	⊗	⊗	⊗
Supply Static Limit Switch	C0SNSR11AE1	**79M80**					**x**	**x**
	Mounting Kit - C0SNSR12AE1	**79M81**					**x**	**x**
ELECTRICAL								
Voltage 60 hz	208/230V - 3 phase	Factory	○	○	○	○	○	○
	460V - 3 phase	Factory	○	○	○	○	○	○
	575V - 3 phase	Factory	○	○	○	○	○	○
HACR Circuit Breakers		Factory	○	○	○	○	○	○
GFI Service Outlets	LTAGFIK10/15	**74M70**	⊗	⊗	⊗	⊗	⊗	⊗
Phase Monitor		Factory	○	○	○	○	○	○
Disconnect Switch - See Electrical / Electric Heat Tables (Pages 27-32) for selection	80 Amp	**84M13**					⊗	⊗
	150 Amp	**84M14**	⊗	⊗	⊗	⊗	⊗	⊗
	250 Amp	**84M15**					⊗	⊗
GFI Service Outlets	LTAGFIK10/15	**74M70**					⊗	⊗

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

⊗ - Field Installed or Configure to Order (factory installed).

○ - Configure to Order (Factory Installed).

X - Field Installed.

OPTIONS / ACCESSORIES

	Item	Catalog No.	090	102	120	150	180	240
ELECTRIC HEAT								
7.5 kW	208/240V-3ph - EHA102-7.5	**99J01**	⊗	⊗				
	460V-3ph - EHA102-7.5	**99J02**	⊗	⊗				
	575V-3ph - EHA102-7.5	**99J03**	⊗	⊗				
15 kW	208/240V-3ph - EHA150-15	**99J04**	⊗	⊗	⊗	⊗		
	460V-3ph - EHA150-15	**99J05**	⊗	⊗	⊗	⊗		
	575V-3ph - EHA150-15	**99J06**	⊗	⊗	⊗	⊗		
	208/230V-3ph - Order One each - EHA240-7.5 EHA240S-7.5	**99J16** **99J17**					⊗	⊗
	460V-3 ph - Order One each - EHA240-7.5 EHA240S-7.5	**99J18** **99J19**					⊗	⊗
	575V-3ph - Order One each - EHA240-7.5 EHA240S-7.5	**99J20** **99J21**					⊗	⊗
22.5 kW	208/240V-3ph - EHA360-22.5	**99J28**	⊗	⊗	⊗	⊗		
	460V-3ph - EHA360-22.5	**99J29**	⊗	⊗	⊗	⊗		
	575V-3ph - EHA360-22.5	**99J30**	⊗	⊗	⊗	⊗		
30 kW	208/240V-3ph - EHA150-30	**99J07**	⊗	⊗	⊗	⊗		
	460V-3ph - EHA150-30	**99J08**	⊗	⊗	⊗	⊗		
	575V-3ph - EHA150-30	**99J09**	⊗	⊗	⊗	⊗		
	208/230V-3ph - Order One each - EHA360-15 EHA360S-15	**99J22** **99J23**					⊗	⊗
	460V-3 ph - Order One each - EHA360-15 EHA360S-15	**99J24** **99J25**					⊗	⊗
	575V-3ph - Order One each - EHA360-15 EHA360S-15	**99J26** **99J27**					⊗	⊗
45 kW	208/240V-3ph - EHA150-45	**99J10**	⊗	⊗	⊗	⊗		
	460V-3ph - EHA150-45	**99J11**	⊗	⊗	⊗	⊗		
	575V-3ph - EHA150-45	**99J12**	⊗	⊗	⊗	⊗		
	208/230V-3ph - Order Two Each - EHA360-22.5	**99J28**					⊗	⊗
	460V-3 ph - Order Two Each - EHA360-22.5	**99J29**					⊗	⊗
	575V-3ph - Order Two Each - EHA360-22.5	**99J30**					⊗	⊗
60 kW	208/240V-3ph - EHA150-60	**99J13**			⊗	⊗		
	460V-3ph - EHA150-60	**99J14**			⊗	⊗		
	575V-3ph - EHA150-60	**99J15**			⊗	⊗		
	208/230V-3ph - Order Two Each - EHA150-30	**99J07**					⊗	⊗
	460V-3 ph - Order Two Each - EHA150-30	**99J08**					⊗	⊗
	575V-3ph - Order Two Each - EHA150-30	**99J09**					⊗	⊗
90 kW	208/230V-3ph - Order Two Each - EHA360-45	**99J31**						⊗
	460V-3 ph - Order Two Each - EHA360-45	**99J32**						⊗
	575V-3ph - Order Two Each - EHA360-45	**99J33**						⊗
ELECTRIC HEAT ACCESSORIES/OPTIONS - See Electrical / Electric Heat Tables (Pages 27-32) for selection								
LTB2 Terminal Block	175 Amp - LTB2-175	**30K75**	⊗	⊗	⊗	⊗	⊗	⊗
	335 Amp - LTB2-335	**30K76**	⊗	⊗	⊗	⊗	⊗	⊗
Electric Heat Control Module	208/230V-3ph	**15K13**				⊗	⊗	⊗
	460V-3ph	**15K92**				⊗	⊗	⊗
	575V-3ph	**15K93**				⊗	⊗	⊗
Unit Fuse Block - See Electrical / Electric Heat Tables (Pages 27-32) for selection			⊗	⊗	⊗	⊗	⊗	⊗

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

⊗ - Field Installed or Configure to Order (factory installed).

OPTIONS / ACCESSORIES

Item		Catalog No.	090	102	120	150	180	240
INDOOR AIR QUALITY								
Air Filters								
Healthy Climate® High Efficiency Air Filters 18 x 24 x 2 - order 4 per unit	MERV 11 - C1FLTR20B-1	**97L86**	⊗	⊗	⊗	⊗		
	MERV 15 - C1FLTR50B-1	**28W04**	x	x	x	x		
Healthy Climate® High Efficiency Air Filters 24 x 24 x 2 - order 6 per unit	MERV 11 - C1FLTR20C-1	**97L87**					⊗	⊗
	MERV 15 - C1FLTR50C-1	**28W05**					x	x
Replaceable Media Filter With Metal Mesh Frame (includes non-pleated filter media)	24 x 24 x 2 - C1FLTR30C order 2 per unit	**44N61**					x	x
Germicidal Lamps								
Healthy Climate® UVC Germicidal Lamps	208/230V - C1UVCL10B-1Y	**X7521**	x	x	x	x		
	460V - C1UVCL10B-1G	**X7526**	x	x	x	x		
	575V - C1UVCL10B-1J	**X7531**	x	x	x	x		
	208/230V - C1UVCL10C-1Y	**X7521**					x	x
	460V - C1UVCL10C-1G-1G	**X7526**					x	x
	575V - C1UVCL10C-1J	**X7531**					x	x
Indoor Air Quality Sensors								
Wall-Mount - Off-White Plastic Cover With LCD Display	C0SNSR50AE1L	**77N39**	x	x	x	x	x	x
Wall-Mount - Off-White Plastic Cover, No Display	C0SNSR52AE1L	**87N53**	x	x	x	x	x	x
Black Plastic Case With LCD Display, rated for plenum mounting	C0SNSR51AE1L	**87N52**	x	x	x	x	x	x
Wall-Mount - Black Plastic Case, No Display, rated for plenum mounting	C0SNSR53AE1L	**87N54**	x	x	x	x	x	x
CO_2 Sensor Duct Mounting Kit	C0MISC19AE1-	**85L43**	x	x	x	x	x	x
Aspiration Box For Duct Mounting Non-Plenum Rated CO2 Sensors (87N53 or 77N39)	C0MISC16AE1-	**90N43**	x	x	x	x	x	x
ECONOMIZER								
Economizer								
Economizer - Order Hood Separately	LAREMD10/15	**53K51**	⊗	⊗	⊗	⊗		
	LAREMD18/24	**16K95**					⊗	⊗
Outdoor Air Hood (down-flow) (Number of Filters) 16 x 25 x 1 in.	LAOAH10/15 (2)	**53K05**	⊗	⊗	⊗	⊗		
	C1HOOD10C-1 (3)	**85M25**					⊗	⊗
Economizer Controls								
Differential Enthalpy	C1SNSR07AE	**86M33**	⊗	⊗	⊗	⊗	⊗	⊗
Single Enthalpy	C1SNSR06AE	**86M32**	⊗	⊗	⊗	⊗	⊗	⊗
Global, Enthalpy	Sensor field provided	Factory	○	○	○	○	○	○
Differential Sensible	Furnished	Factory	○	○	○	○	○	○
Barometric Relief								
Down-Flow Barometric Relief Dampers - Order Hood Separately	LAGED10/15	**53K03**	⊗	⊗	⊗	⊗		
	LAGED18/24	**16K98**					⊗	⊗
Hood for Down-Flow LAGED	LAGEH09/15	**88K79**	x	x	x	x		
	C1HOOD20C-1	**85M26**					⊗	⊗
Horizontal Barometric Relief Dampers Hood Furnished	LAGEDH03/15	**53K04**	x	x	x	x		
	LAGEDH18/24	**16K99**					⊗	⊗

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

⊗ - Field Installed or Configure to Order (factory installed).

○ - Configure to Order (Factory Installed).

X - Field Installed.

OPTIONS / ACCESSORIES

Item			Catalog No.	090	102	120	150	180	240
OUTDOOR AIR									
Outdoor Air Dampers									
Damper Section down-flow Order Hood Separately	Motorized	LAOADM10/15	**53K53**	⊗	⊗	⊗	⊗		
		LAOADM18/24	**16K94**					⊗	⊗
	Manual	LAOAD10/15	**66K69**	⊗	⊗	⊗	⊗		
		LAOAD18/24	**16K93**					⊗	⊗
Outdoor Air Hood (down-flow) (Number of Filters) - 16 x 25 x 1 in.		LAOAH10/15 (2)	**53K05**	⊗	⊗	⊗	⊗		
		C1HOOD10C-1 (3)	**85M25**					⊗	⊗
Power Exhaust									
Standard Static		208/230V - LAPEF10/15	**73M32**	⊗	⊗	⊗	⊗		
		460V - LAPEF10/15	**73M33**	⊗	⊗	⊗	⊗		
		575V - LAPEF10/15	**73M34**	⊗	⊗	⊗	⊗		
		208/230V - C1PWRE20C-1Y	**85M37**					⊗	⊗
		460V - C1PWRE20C-1G	**85M38**					⊗	⊗
		575V - C1PWRE20C-1J	**85M39**					⊗	⊗
ROOF CURBS - CLIPLOCK 1000									
Down Flow									
8 in. height		C1CURB40BN1	**26W31**	x	x	x	x		
		C1CURB40CN1	**26W32**					x	x
14 in. height		LARMF10/15S-14	**65K34**	x	x	x	x		
		LARMF18/30S-14	**33K44**					x	x
18 in. height		LARMF10/15S-18	**65K35**	x	x	x	x		
		LARMF18/30S-18	**33K45**					x	x
24 in. height		LARMF10/15S-24	**35K36**	x	x	x	x		
		LARMF18/30S-24	**33K46**					x	x
Horizontal									
26 in. height - Slab Applications		LARMFH18/24-26	**97J33**					x	x
30 in. height - Slab Applications		(Canada Only) LARMFH30/36S-30	**45K71**					x	x
37 in. height - Rooftop Applications		LARMFH18/24S-37	**45K70**					x	x
41 in. height - Rooftop Applications		(Canada Only) LARMFH30/36S-30	**45K72**					x	x
Horizontal Supply Discharge Air Kit		LTHSDKGC10/15	**56K53**	x	x	x	x		
		C1HAP10C-1	**87M00**					x	x
ROOF CURBS - STANDARD									
Down Flow									
14 in. height		LARMF10/15-14	**53K50**	x	x	x	x		
		LARMF18/36-14	**16K87**					x	x
24 in. height		LARMF10/15-24	**49K54**	x	x	x	x		
		LARMF18/36-24	**16K88**					x	x
Horizontal									
26 in. height - Slab Applications		(Canada Only) LARMFH18/24S-26	**33K47**					x	x
37 in. height - Rooftop Applications		LARMFH18/24-37	**38K53**					x	x
Insulation Kits									
for LARMFH18/24-26		C1INSU11C	**73K32**					x	x
for LARMFH18/24-37		C1INSU13C	**73K34**					x	x

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

⊗ - Field Installed or Configure to Order (factory installed)
X - Field Installed.

OPTIONS / ACCESSORIES

Item		Catalog No.	090	102	120	150	180	240
CEILING DIFFUSERS								
Step-Down Order one	RTD11-95	**29G04**	x					
	(Canada Only) RTD11-95S	**13K61**	x					
	RTD11-135	**29G05**		x	x			
	(Canada Only) RTD11-135S	**13K62**		x	x			
	RTD11-185	**29G06**				x		
	(Canada Only) RTD11-150/180S	**13K63**				x		
	RTD11-185	**29G06**					x	
	(Canada Only) RTD11-150/180S	**13K63**					x	
	RTD11-275-R	**29G07**						x
	(Canada Only) RTD11-275S	**13K64**						x
Flush Order one	FD11-95	**29G08**	x					
	(Canada Only) FD11-95S	**13K56**	x					
	FD11-135	**29G09**		x	x			
	(Canada Only) FD11-135S	**13K57**		x	x			
	FD11-185	**29G10**				x		
	(Canada Only) FD11-150/180S	**13K58**				x		
	FD11-185	**29G10**					x	
	(Canada Only) FD11-150/180S	**13K58**					x	
	FD11-275-R	**29G11**						x
	(Canada Only) FD11-275S	**13K59**						x
Transitions (Supply and Return) Order one	LASRT08/10	**24L14**	x					
	LASRT10/12	**49K55**		x	x			
	(Canada Only) LASRT10/12S	**65K37**		x	x			
	LASRT15	**49K56**				x		
	LASRT15S	**65K38**				x		
	LASRT18	**19K01**					x	
	(Canada Only) LASRT18S	**33K48**					x	
	LASRT21/24	**19K02**						x
	(Canada Only) LASRT21/24S	**33K49**						x

NOTE - The catalog and model numbers that appear here are for ordering field installed accessories only.

X - Field Installed.

SPECIFICATIONS — 7.5 TO 12.5 TON

General Data		7.5 Ton	8.5 Ton	10 Ton	12.5 Ton
	Nominal Tonnage	7.5 Ton	8.5 Ton	10 Ton	12.5 Ton
	Model No.	LHA090H2B	LHA102H2B	LHA120H2B	LHA150S2B
	Efficiency Type	High (H)	High (H)	High (H)	Standard (S)
Cooling Performance	Gross Cooling Capacity - Btuh	94,000	104,000	124,000	145,200
	[1] Net Cooling Capacity - Btuh	89,000	100,000	118,000	137,000
	AHRI Rated Air Flow - cfm	3000	3500	4200	4400
	Total Unit Power (kW)	7.7	9.1	11.5	14.8
	[1] EER (Btuh/Watt)	11.5	11.0	10.3	9.3
	[2] Integrated Part Load Value (Btuh/Watt)	12.5	12.4	11.3	10.5
	Refrigerant Charge Furnished (R-22) Circuit 1	12 lbs. 0 oz.	11 lbs. 0 oz.	12 lbs. 8 oz.	11 lbs. 8 oz.
	Refrigerant Charge Furnished (R-22) Circuit 2	12 lbs. 0 oz.	11 lbs. 0 oz.	12 lbs. 8 oz.	11 lbs. 8 oz.
[3]Sound Rating Number (dB)		88	88	88	88
Heating Performance	[1] Total High Heat Capacity - Btuh	90,000	102,000	120,000	136,000
	Total Unit Power (kW)	8.0	8.8	10.7	13.2
	[1] C.O.P.	3.3	3.4	3.3	3.1
	[1] Total Low Heat Capacity - Btuh	52,000	56,000	72,000	80,000
	Total Unit Power (kW)	7.3	7.5	10.1	11.7
	[1] C.O.P.	2.2	2.2	2.2	2.0
Compressor - Number & Type		(2) Scroll	(2) Scroll	(2) Scroll	(2) Scroll
Outdoor Coil	Net face area - sq. ft.	28.6 total	29.3 total	28.6 total	29.3 total
	Tube diameter - in.	3/8	3/8	3/8	3/8
	Number of rows	2	2	2	2
	Fins per inch	20	20	20	20
Outdoor Fans	Motor horsepower	(2) 1/3	(2) 1/3	(2) 1/3	(2) 1/2
	Motor rpm	1075	1075	1075	1075
	Total Motor watts	700	700	700	1050
	Diameter - in.	(2) 24	(2) 24	(2) 24	(2) 24
	Number of blades	3	3	3	3
	Total Air volume - cfm	8000	8000	8000	10,000
Indoor Coil	Net face area - sq. ft.	10.5 total	10.5 total	10.5 (0.98) total	10.5 total
	Tube diameter - in.	3/8	3/8	3/8	3/8
	Number of rows	3	4	4	4
	Fins per inch	14	14	14	14
	Condensate Drain - number & size	(1) 1 in. NPT cplg.	(1) 1 in. NPT cplg.	(1) 1 in. NPT cplg.	(1) 1 in. NPT cplg.
	Expansion device type	Balanced Port Thermostatic Expansion Valve, removeable power head			
[4] Indoor Blower and Drive Selection	Nominal motor output	2 hp, 3 hp, or 5 hp			
	Maximum usable motor output (US Only)	2.3 hp, 3.45 hp, or 5.75			
	Motor - Drive kit	2 hp kit #1 - 680 - 925 rpm kit #3 - 895 - 1120 rpm	3 hp kit #1 - 680 - 925 rpm kit #2 -680 - 925 rpm kit #3 - 895 - 1120 rpm kit #4 - 895 - 1120 rpm kit #5 - 1110 - 1395 rpm kit #6 - 1110 - 1395 rpm	5 hp kit #4 - 895 - 1120 rpm kit #6 - 1110 - 1395 rpm	
	Wheel nominal diameter x width	15 x 15 in.			
Filters	Type of filter	Disposable			
	Number and size - in. (mm)	(4) 18 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 Certified in accordance with the ULE certification program, which is based on AHRI Standard 340/360.
Cooling Ratings - 95°F outdoor air temperature and 80°F db/67°F wb entering indoor coil air.
High Temperature Heating Ratings - 47°F db/43°F wb outdoor air temperature and 70°F entering indoor coil air.
Low Temperature Heating Ratings - 17°F db/15°F wb outdoor air temperature and 70°F entering indoor coil air.

2 Integrated Part Load Value rated at 80°F outdoor air temperature.

3 Sound Rating Number rated in accordance with test conditions included in AHRI Standard 270.

4 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.

SPECIFICATIONS — 15 AND 20 TON

			15 Ton	20 Ton
General Data	Nominal Tonnage		**15 Ton**	**20 Ton**
	Model No.		**LHA180H2B**	**LHA240H2B**
	Efficiency Type		High (H)	High (H)
Cooling Performance	Gross Cooling Capacity - Btuh		187,000	227,000
	[1] Net Cooling Capacity - Btuh		182,000	220,000
	AHRI Rated Air Flow - cfm		5700	7000
	Total Unit Power		16.5	21.6
	[1] EER (Btuh/Watt)		11.0	10.2
	[2] Integrated Part Load Value (Btuh/Watt)		12.0	11.0
	Refrigerant Charge Furnished (R-22)	Circuit 1	24 lbs. 8 oz.	26 lbs. 0 oz.
		Circuit 2	24 lbs. 8 oz.	26 lbs. 0 oz.
Heating Performance	[1] Total High Heat Capacity - Btuh		192,000	220,000
	Total Unit Power (kW)		17.1	19.5
	[1] C.O.P.		3.3	3.3
	[1] Total Low Heat Capacity - Btuh		106,000	118,000
	Total Unit Power (kW)		15.5	16.5
	[1] C.O.P.		2.0	2.1
Compressor Type (No.)			Scroll (2)	Scroll (2)
Outdoor Coil	Net face area - sq. ft.		57.0	57.0
	Tube diameter - in.		3/8	3/8
	Number of rows		2	2
	Fins per inch		20	20
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head	
Outdoor Fans	Motor horsepower		(4) 1/3	(4) 1/3
	Motor rpm		1075	1075
	Total Motor watts		1395	1395
	Diameter - in.		(4) 24	(4) 24
	Number of blades		3	3
	Total Air volume - cfm		15,450	15,450
Indoor Coil	Net face area - sq. ft.		22.3	22.3
	Tube diameter - in.		3/8	3/8
	Number of rows		3	4
	Fins per inch		14	14
	Condensate Drain - number & size		(1) 1 in. NPT coupling	(1) 1 in. NPT coupling
	Expansion device type		Balanced Port Thermostatic Expansion Valve, removeable power head	
[3] Indoor Blower and Drive Selection	Nominal motor output		3 hp, 5 hp, or 7.5 hp	5 hp, 7.5 hp, or 10 hp
	Maximum usable motor output (US Only)		3.45 hp, 5.75, or 8.63 hp	5.75 hp, 8.63 hp, or 11.5 hp
	Motor - Drive kit		3 hp kit #A - 535 - 725 rpm kit #1 - 685 - 865 rpm kit #2 - 685 - 865 rpm 5 hp kit #2 - 685 - 865 rpm kit #3 - 850 - 1045 rpm kit #4 - 945 - 1185 rpm 7.5 hp kit# 5 - 945 - 1185 rpm kit# 6 -1045 - 1285 rpm kit# 7 - 850 - 1045 rpm	5 hp kit #2 - 685 - 865 rpm kit #3 - 850 - 1045 rpm kit #4 - 945 - 1185 rpm 7.5 hp kit #5 - 945 - 1185 rpm kit #6 -1045 - 1285 rpm kit #7 - 850 - 1045 rpm 10 hp kit #6 -1045 - 1285 rpm kit #8 -1135 - 1365 rpm
	Wheel nominal diameter x width		(2) 15 x 15 in.	(2) 15 x 15 in.
Filters	Type of filter		Disposable	
	Number and size - in. (mm)		(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] Certified in accordance with the ULE certification program, which is based on AHRI Standard 340/360.
Cooling Ratings - 95°F outdoor air temperature and 80°F db/67°F wb entering indoor coil air.
High Temperature Heating Ratings - 47°F db/43°F wb outdoor air temperature and 70°F entering indoor coil air.
Low Temperature Heating Ratings - 17°F db/15°F wb outdoor air temperature and 70°F entering indoor coil air.

[2] Integrated Part Load Value rated at 80°F outdoor air temperature.

[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.

COOLING AND HEATING 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 HIGH EFFICIENCY - COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA090H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	2400	1130	52.2	15.3	2090	.70	.83	.96	49.1	14.4	2370	.70	.84	.97	45.9	13.5	2670	.70	.85	.98	42.6	12.5	3020	.70	.86	.99
	3000	1415	54.1	15.9	2100	.75	.90	1.00	51.0	14.9	2370	.75	.91	1.00	47.7	14.0	2680	.75	.93	1.00	44.4	13.0	3030	.76	.94	1.00
	3600	1700	55.7	16.3	2110	.80	.96	1.00	52.5	15.4	2380	.80	.97	1.00	49.3	14.4	2690	.81	.98	1.00	46.0	13.5	3040	.82	1.00	1.00
67°F (19°C)	2400	1130	55.4	16.2	2110	.56	.67	.80	52.2	15.3	2380	.55	.67	.80	48.9	14.3	2690	.54	.67	.81	45.5	13.3	3030	.53	.67	.82
	3000	1415	57.2	16.8	2120	.58	.72	.87	53.8	15.8	2390	.58	.72	.88	50.4	14.8	2700	.57	.73	.89	47.0	13.8	3040	.57	.73	.91
	3600	1700	58.4	17.1	2120	.61	.77	.93	55.0	16.1	2400	.61	.78	.95	51.6	15.1	2700	.60	.79	.96	48.0	14.1	3050	.60	.80	.97
71°F (22°C)	2400	1130	59.0	17.3	2130	.43	.54	.65	55.7	16.3	2400	.42	.53	.65	52.3	15.3	2700	.40	.52	.65	48.8	14.3	3050	.38	.52	.65
	3000	1415	60.7	17.8	2140	.44	.57	.70	57.3	16.8	2410	.43	.56	.70	53.8	15.8	2710	.41	.56	.70	50.2	14.7	3060	.40	.55	.71
	3600	1700	61.9	18.1	2140	.45	.60	.75	58.4	17.1	2410	.44	.60	.76	54.8	16.1	2720	.43	.59	.76	51.2	15.0	3060	.41	.59	.77

7.5 TON HIGH EFFICIENCY - COOLING CAPACITY - BOTH COMPRESSORS OPERATING — LHA090H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	2400	1130	88.7	26.0	5260	.70	.85	.99	83.9	24.6	5950	.71	.86	1.00	79.0	23.2	6720	.72	.88	1.00	73.8	21.6	7590	.72	.90	1.00
	3000	1415	92.2	27.0	5280	.76	.93	1.00	87.4	25.6	5970	.77	.95	1.00	82.2	24.1	6740	.78	.96	1.00	77.0	22.6	7620	.80	.99	1.00
	3600	1700	95.2	27.9	5300	.81	.99	1.00	90.3	26.5	5990	.83	1.00	1.00	85.3	25.0	6760	.84	1.00	1.00	80.3	23.5	7650	.86	1.00	1.00
67°F (19°C)	2400	1130	94.5	27.7	5300	.55	.68	.81	89.5	26.2	5970	.55	.68	.83	84.3	24.7	6750	.55	.69	.84	78.8	23.1	7630	.54	.70	.86
	3000	1415	97.5	28.6	5320	.58	.73	.89	92.4	27.1	5990	.58	.74	.91	87.1	25.5	6780	.58	.75	.93	81.4	23.9	7660	.58	.77	.95
	3600	1700	99.8	29.2	5320	.61	.79	.96	94.5	27.7	6010	.61	.80	.98	89.0	26.1	6790	.62	.82	1.00	83.3	24.4	7670	.62	.84	1.00
71°F (22°C)	2400	1130	101.0	29.6	5330	.41	.53	.65	95.8	28.1	6010	.40	.53	.66	90.3	26.5	6790	.39	.53	.66	84.7	24.8	7670	.38	.53	.67
	3000	1415	104.0	30.5	5350	.42	.57	.71	98.6	28.9	6030	.41	.57	.72	93.0	27.3	6800	.41	.57	.73	87.2	25.6	7690	.40	.57	.74
	3600	1700	106.0	31.1	5360	.43	.60	.76	100.6	29.5	6040	.43	.60	.78	94.8	27.8	6810	.42	.61	.79	88.9	26.1	7690	.42	.62	.81

7.5 TON HIGH EFFICIENCY - HEATING CAPACITY — LHA090H

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
2400	1135	111.2	32.6	7680	84.4	24.7	6910	56.6	16.6	6105	36.9	10.8	5385	18.6	5.5	4125
3000	1415	112.8	33.1	7080	86.0	25.2	6310	58.2	17.1	5505	38.5	11.3	4785	20.2	5.9	3525
3600	1700	114.4	33.5	6780	87.6	25.7	6010	59.8	17.5	5205	40.1	11.8	4485	21.8	6.4	3225

7.5 TON HIGH EFFICIENCY - HEATING PERFORMANCE at 3000 cfm (1415 L/s) Indoor Coil Air Volume — LHA090H

*Outdoor Temperature		Compressor Motor Watts Input	Total Output	
°F	°C		kBtuh	kW
65	18	7080	112.8	33.1
60	16	6900	106.5	31.2
55	13	6720	100.1	29.3
50	10	6540	93.8	27.5
47	8	6430	90.0	26.4
45	7	6310	86.0	25.2
40	4	6005	76.0	22.3
35	2	5700	66.0	19.3
30	-1	5605	62.1	18.2
25	-4	5505	58.2	17.1
20	-7	5410	54.3	15.9
17	-8	5350	52.0	15.2
15	-9	5280	49.5	14.5
10	-12	5100	43.1	12.6
5	-15	4785	38.5	11.3
0	-18	4470	34.0	10.0
-5	-21	4155	29.4	8.6
-10	-23	3840	24.8	7.3
-15	-26	3525	20.2	5.9
-20	-29	3210	15.6	4.6

COOLING AND HEATING RATINGS

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

8.5 TON HIGH EFFICIENCY - COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA102H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	2720	1285	51.6	15.1	2.40	.65	.80	.95	50.0	14.7	2.70	.65	.81	.97	48.4	14.2	3.05	.66	.83	.98	46.6	13.7	3.45	.67	.85	1.00
	3400	1605	53.5	15.7	2.42	.70	.88	1.00	51.9	15.2	2.73	.71	.90	1.00	50.2	14.7	3.07	.72	.92	1.00	48.4	14.2	3.46	.74	.94	1.00
	4080	1925	55.1	16.1	2.44	.76	.96	1.00	53.4	15.6	2.74	.77	.97	1.00	51.7	15.2	3.09	.79	.99	1.00	50.0	14.7	3.48	.81	1.00	1.00
67°F (19°C)	2720	1285	54.8	16.1	2.43	.51	.62	.76	53.1	15.6	2.74	.51	.63	.77	51.3	15.0	3.09	.52	.64	.79	49.4	14.5	3.48	.52	.65	.81
	3400	1605	56.5	16.6	2.45	.53	.67	.84	54.7	16.0	2.76	.54	.68	.86	52.8	15.5	3.11	.55	.70	.88	50.8	14.9	3.50	.55	.72	.91
	4080	1925	57.7	16.9	2.47	.56	.73	.92	55.8	16.4	2.77	.57	.75	.94	53.9	15.8	3.12	.58	.77	.96	51.9	15.2	3.51	.59	.78	.98
71°F (22°C)	2720	1285	58.3	17.1	2.47	.38	.49	.60	56.5	16.6	2.78	.38	.50	.61	54.6	16.0	3.13	.39	.50	.62	52.6	15.4	3.53	.39	.51	.63
	3400	1605	60.0	17.6	2.49	.39	.52	.65	58.1	17.0	2.80	.39	.53	.66	56.1	16.4	3.15	.40	.53	.67	54.0	15.8	3.54	.40	.54	.69
	4080	1925	61.2	17.9	2.51	.40	.55	.70	59.2	17.3	2.82	.41	.56	.72	57.1	16.7	3.16	.41	.57	.74	54.9	16.1	3.56	.41	.58	.76

8.5 TON HIGH EFFICIENCY - COOLING CAPACITY - ALL COMPRESSORS OPERATING — LHA102H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	2720	1285	98.6	28.9	6.25	.69	.84	.98	95.0	27.8	7.06	.70	.86	.99	91.3	26.8	7.98	.71	.88	1.00	87.2	25.6	9.05	.73	.90	1.00
	3400	1605	102.2	30.0	6.29	.74	.92	1.00	98.6	28.9	7.10	.76	.94	1.00	94.7	27.8	8.03	.78	.96	1.00	90.6	26.6	9.09	.80	.98	1.00
	4080	1925	105.2	30.8	6.33	.80	.98	1.00	101.7	29.8	7.14	.82	.99	1.00	97.9	28.7	8.08	.84	1.00	1.00	93.9	27.5	9.15	.87	1.00	1.00
67°F (19°C)	2720	1285	104.5	30.6	6.33	.54	.67	.80	100.7	29.5	7.13	.55	.68	.82	96.6	28.3	8.06	.55	.69	.84	92.3	27.1	9.14	.56	.71	.87
	3400	1605	107.6	31.5	6.37	.57	.72	.89	103.6	30.4	7.18	.58	.74	.91	99.4	29.1	8.10	.59	.75	.93	94.9	27.8	9.17	.60	.77	.95
	4080	1925	109.9	32.2	6.40	.60	.78	.96	105.8	31.0	7.20	.61	.80	.97	101.4	29.7	8.14	.62	.82	.99	96.7	28.3	9.20	.64	.84	1.00
71°F (22°C)	2720	1285	111.3	32.6	6.41	.41	.53	.65	107.2	31.4	7.23	.41	.53	.66	102.9	30.2	8.16	.41	.54	.67	98.3	28.8	9.22	.41	.55	.68
	3400	1605	114.3	33.5	6.46	.42	.56	.70	110.0	32.2	7.27	.42	.57	.71	105.5	30.9	8.19	.42	.58	.73	100.7	29.5	9.26	.43	.59	.75
	4080	1925	116.4	34.1	6.49	.43	.59	.76	112.0	32.8	7.30	.43	.60	.77	107.3	31.4	8.23	.44	.62	.80	102.3	30.0	9.29	.44	.63	.82

8.5 TON HIGH EFFICIENCY - HEATING CAPACITY — LHA102H

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
2720	1285	128.5	37.7	6.17	95.3	27.9	5.21	61.0	17.9	4.18	37.1	10.9	3.48	19.1	5.6	2.23
3400	1605	130.2	38.2	7.51	97.0	28.4	6.55	62.7	18.4	5.52	38.8	11.4	4.82	20.8	6.1	3.57
4080	1925	133.0	39.0	8.86	99.8	29.2	7.90	65.5	19.2	6.87	41.6	12.2	6.17	23.6	6.9	4.92

8.5 TON HIGH EFFICIENCY - HEATING PERFORMANCE at 3400 cfm (1605 L/s) Indoor Coil Air Volume — LHA102H

*Outdoor Temperature		Compressor Motor kW Input	Total Output	
°F	°C		kBtuh	kW
65	18	7.51	130.2	38.2
60	16	7.30	122.3	35.8
55	13	7.08	114.4	33.5
50	10	6.86	106.5	31.2
47	8	6.73	101.8	29.8
45	7	6.55	97.0	28.4
40	4	6.09	85.0	24.9
35	2	5.63	73.0	21.4
30	-1	5.58	67.8	19.9
25	-4	5.52	62.7	18.4
20	-7	5.47	57.5	16.9
17	-8	5.43	54.4	15.9
15	-9	5.35	51.2	15.0
10	-12	5.13	43.3	12.7
5	-15	4.82	38.8	11.4
0	-18	4.51	34.3	10.1
-5	-21	4.20	29.8	8.7
-10	-23	3.88	25.3	7.4
-15	-26	3.57	20.8	6.1
-20	-29	3.26	16.3	4.8

*Outdoor temperature 70% relative humidity. Indoor temperature 70°F (21°C).

COOLING AND HEATING RATINGS

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

10 TON HIGH EFFICIENCY - COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA120H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	3200	1510	63.4	18.6	3.10	.66	.81	.96	61.6	18.1	3.48	.67	.83	.97	59.6	17.5	3.93	.68	.84	.99	57.5	16.9	4.44	.69	.86	1.00
	4000	1890	66.0	19.3	3.12	.72	.90	1.00	64.0	18.8	3.50	.73	.91	1.00	61.9	18.1	3.95	.74	.93	1.00	59.8	17.5	4.47	.76	.95	1.00
	4800	2265	68.0	19.9	3.14	.78	.97	1.00	66.1	19.4	3.52	.79	.98	1.00	64.1	18.8	3.97	.81	.99	1.00	62.0	18.2	4.49	.83	1.00	1.00
67°F (19°C)	3200	1510	67.4	19.8	3.13	.52	.64	.77	65.4	19.2	3.52	.53	.65	.79	63.2	18.5	3.97	.53	.66	.80	61.0	17.9	4.48	.54	.67	.82
	4000	1890	69.6	20.4	3.16	.55	.69	.86	67.5	19.8	3.54	.56	.70	.88	65.2	19.1	3.99	.56	.72	.90	62.9	18.4	4.50	.57	.73	.92
	4800	2265	71.2	20.9	3.17	.58	.75	.94	69.0	20.2	3.55	.59	.77	.95	66.7	19.5	4.00	.60	.79	.97	64.2	18.8	4.52	.61	.81	.99
71°F (22°C)	3200	1510	71.9	21.1	3.18	.39	.51	.62	69.7	20.4	3.56	.40	.51	.63	67.4	19.8	4.01	.40	.52	.64	65.0	19.0	4.53	.40	.52	.65
	4000	1890	74.1	21.7	3.20	.40	.54	.67	71.7	21.0	3.58	.41	.54	.68	69.3	20.3	4.03	.41	.55	.69	66.8	19.6	4.55	.41	.56	.71
	4800	2265	75.5	22.1	3.21	.41	.57	.73	73.1	21.4	3.60	.42	.58	.74	70.6	20.7	4.04	.42	.59	.76	68.0	19.9	4.57	.43	.60	.78

10 TON HIGH EFFICIENCY - COOLING CAPACITY - BOTH COMPRESSORS OPERATING — LHA120H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	3200	1510	117.4	34.4	7.76	.70	.85	.98	113.2	33.2	8.78	.71	.86	.99	108.9	31.9	9.94	.72	.88	1.00	104.1	30.5	11.26	.74	.91	1.00
	4000	1890	122.0	35.8	7.80	.75	.93	1.00	117.8	34.5	8.83	.77	.95	1.00	113.2	33.2	10.00	.79	.97	1.00	108.4	31.8	11.32	.81	.99	1.00
	4800	2265	126.1	37.0	7.85	.81	.99	1.00	121.9	35.7	8.87	.83	1.00	1.00	117.5	34.4	10.05	.85	1.00	1.00	112.9	33.1	11.38	.88	1.00	1.00
67°F (19°C)	3200	1510	124.6	36.5	7.84	.55	.68	.81	120.2	35.2	8.85	.55	.69	.83	115.4	33.8	10.03	.56	.70	.85	110.3	32.3	11.35	.57	.71	.87
	4000	1890	128.6	37.7	7.88	.58	.73	.89	124.0	36.3	8.90	.59	.74	.91	118.9	34.8	10.08	.60	.76	.94	113.6	33.3	11.41	.61	.78	.96
	4800	2265	131.5	38.5	7.91	.61	.79	.96	126.6	37.1	8.94	.62	.81	.98	121.5	35.6	10.12	.63	.83	.99	116.1	34.0	11.44	.65	.85	1.00
71°F (22°C)	3200	1510	132.9	38.9	7.92	.41	.53	.65	128.1	37.5	8.95	.41	.54	.66	123.1	36.1	10.13	.41	.54	.67	117.8	34.5	11.45	.42	.55	.69
	4000	1890	136.7	40.1	7.97	.42	.57	.71	131.7	38.6	9.00	.42	.57	.72	126.4	37.0	10.18	.43	.58	.74	120.8	35.4	11.51	.43	.59	.76
	4800	2265	139.3	40.8	7.99	.43	.60	.77	134.1	39.3	9.04	.44	.61	.79	128.6	37.7	10.22	.44	.62	.81	122.8	36.0	11.54	.45	.64	.83

10 TON HIGH EFFICIENCY - HEATING CAPACITY — LHA120H

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input	Total Heating Capacity		Comp. Motor Watts Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
3200	1510	145.7	42.7	9430	112.2	32.9	8840	77.2	22.6	8225	53.0	15.5	7450	26.7	7.8	5630
4000	1890	147.2	43.1	8650	113.7	33.3	8060	78.7	23.1	7445	54.5	16.0	6670	28.2	8.3	4850
4800	2265	150.7	44.2	8230	117.2	34.3	7640	82.2	24.1	7025	58.0	17.0	6250	31.7	9.3	4430

10 TON HIGH EFFICIENCY - HEATING PERFORMANCE at 4000 cfm (1890 L/s) Indoor Coil Air Volume — LHA120H

*Outdoor Temperature		Compressor Motor Watts Input	Total Output	
°F	°C		kBtuh	kW
65	18	8650	147.2	43.1
60	16	8510	139.4	40.9
55	13	8370	131.5	38.5
50	10	8235	123.7	36.3
47	8	8150	119.0	34.9
45	7	8060	113.7	33.3
40	4	7830	100.3	29.4
35	2	7600	87.0	25.5
30	-1	7520	82.8	24.3
25	-4	7445	78.7	23.1
20	-7	7365	74.5	21.8
17	-8	7320	72.0	21.1
15	-9	7265	68.9	20.2
10	-12	7125	61.0	17.9
5	-15	6670	54.5	16.0
0	-18	6215	47.9	14.0
-5	-21	5760	41.3	12.1
-10	-23	5305	34.7	10.2
-15	-26	4850	28.2	8.3
-20	-29	4390	21.6	6.3

COOLING AND HEATING 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 STANDARD EFFICIENCY - COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA150S

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	3800	1795	69.4	20.3	4.97	.61	.77	.93	67.2	19.7	5.59	.61	.79	.95	65.0	19.0	6.26	.62	.80	.97	62.7	18.4	6.99	.63	.82	.99
	4400	2075	71.1	20.8	5.01	.64	.83	.99	68.9	20.2	5.63	.65	.85	1.00	66.6	19.5	6.30	.67	.87	1.00	64.3	18.8	7.03	.68	.89	1.00
	5000	2360	72.6	21.3	5.04	.68	.89	1.00	70.4	20.6	5.67	.69	.90	1.00	68.1	20.0	6.33	.71	.93	1.00	65.7	19.3	7.07	.73	.95	1.00
67°F (19°C)	3800	1795	73.6	21.6	5.05	.48	.58	.72	71.3	20.9	5.68	.48	.59	.74	68.9	20.2	6.36	.48	.60	.76	66.4	19.5	7.10	.49	.61	.78
	4400	2075	75.2	22.0	5.08	.49	.61	.78	72.7	21.3	5.71	.50	.62	.80	70.3	20.6	6.39	.50	.64	.83	67.7	19.8	7.14	.51	.65	.85
	5000	2360	76.4	22.4	5.10	.51	.65	.84	73.9	21.7	5.74	.51	.67	.86	71.4	20.9	6.43	.52	.68	.89	68.7	20.1	7.17	.53	.70	.91
71°F (22°C)	3800	1795	78.3	22.9	5.14	.36	.46	.56	75.8	22.2	5.78	.36	.47	.57	73.3	21.5	6.47	.36	.47	.58	70.6	20.7	7.22	.36	.48	.59
	4400	2075	79.9	23.4	5.17	.36	.48	.59	77.2	22.6	5.81	.37	.48	.60	74.6	21.9	6.51	.37	.49	.61	71.8	21.0	7.27	.37	.50	.62
	5000	2360	81.0	23.7	5.19	.37	.50	.62	78.4	23.0	5.84	.37	.50	.64	75.6	22.2	6.54	.38	.51	.65	72.8	21.3	7.30	.38	.52	.67

12.5 TON STANDARD EFFICIENCY - COOLING CAPACITY - ALL COMPRESSORS OPERATING — LHA150S

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	3800	1795	139.1	40.8	10.24	.66	.81	.96	134.4	39.4	11.44	.67	.83	.98	129.3	37.9	12.79	.68	.85	.99	123.7	36.3	14.34	.69	.87	1.00
	4400	2075	142.7	41.8	10.30	.69	.87	1.00	137.8	40.4	11.51	.70	.89	1.00	132.5	38.8	12.87	.72	.91	1.00	126.7	37.1	14.42	.74	.94	1.00
	5000	2360	145.6	42.7	10.37	.73	.92	1.00	140.7	41.2	11.57	.75	.94	1.00	135.3	39.7	12.94	.76	.96	1.00	129.7	38.0	14.49	.79	.98	1.00
67°F (19°C)	3800	1795	147.5	43.2	10.40	.52	.63	.77	142.3	41.7	11.61	.52	.64	.79	136.7	40.1	12.98	.53	.65	.81	130.8	38.3	14.53	.53	.67	.83
	4400	2075	150.5	44.1	10.46	.53	.67	.83	145.2	42.6	11.68	.54	.68	.85	139.4	40.9	13.05	.55	.69	.87	133.3	39.1	14.61	.56	.71	.90
	5000	2360	152.9	44.8	10.51	.55	.70	.88	147.5	43.2	11.73	.56	.72	.91	141.6	41.5	13.11	.57	.74	.93	135.4	39.7	14.66	.58	.76	.95
71°F (22°C)	3800	1795	157.0	46.0	10.58	.39	.50	.61	151.4	44.4	11.81	.39	.51	.62	145.4	42.6	13.20	.39	.51	.63	139.1	40.8	14.77	.39	.52	.65
	4400	2075	159.9	46.9	10.64	.39	.52	.64	154.1	45.2	11.89	.40	.53	.66	148.1	43.4	13.28	.40	.53	.67	141.4	41.4	14.84	.40	.54	.69
	5000	2360	162.2	47.5	10.69	.40	.54	.68	156.4	45.8	11.93	.40	.55	.69	150.1	44.0	13.32	.41	.56	.71	143.2	42.0	14.90	.41	.57	.74

12.5 TON STANDARD EFFICIENCY - HEATING CAPACITY — LHA150S

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
3800	1795	169.6	49.7	10.66	129.3	37.9	9.87	87.1	25.5	9.06	59.8	17.5	8.04	31.2	9.1	5.93
4400	2075	169.6	49.7	10.39	129.3	37.9	9.60	87.1	25.5	8.79	59.8	17.5	7.77	31.2	9.1	5.66
5000	2360	173.7	50.9	9.84	133.4	39.1	9.05	91.2	26.7	8.24	63.9	18.7	7.23	35.3	10.3	5.12

12.5 TON STANDARD EFFICIENCY - HEATING PERFORMANCE at 4400 cfm (2075 L/s) Indoor Coil Air Volume — LHA150S

*Outdoor Temperature		Compressor Motor kW Input	Total Output	
°F	°C		kBtuh	kW
65	18	10.39	169.6	49.7
60	16	10.20	160.3	47.0
55	13	10.01	150.9	44.2
50	10	9.82	141.6	41.5
47	8	9.70	136.0	39.9
45	7	9.60	129.3	37.9
40	4	9.34	112.7	33.0
35	2	9.07	96.0	28.1
30	-1	8.93	91.6	26.8
25	-4	8.79	87.1	25.5
20	-7	8.65	82.7	24.2
17	-8	8.56	80.0	23.4
15	-9	8.49	76.3	22.4
10	-12	8.30	66.9	19.6
5	-15	7.77	59.8	17.5
0	-18	7.24	52.6	15.4
-5	-21	6.72	45.5	13.3
-10	-23	6.19	38.3	11.2
-15	-26	5.66	31.2	9.1
-20	-29	5.14	24.0	7.0

*Outdoor temperature 70% relative humidity. Indoor temperature 70°F (21°C).

COOLING AND HEATING RATINGS

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

15 TON HIGH EFFICIENCY- COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA180H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	4800	2265	91.3	26.8	4.91	.63	.77	.91	88.8	26.0	5.39	.64	.78	.93	86.1	25.2	5.98	.65	.80	.95	83.1	24.4	6.65	.65	.81	.97
	6000	2830	95.1	27.9	4.96	.67	.85	.99	92.4	27.1	5.45	.69	.86	1.00	89.5	26.2	6.04	.70	.88	1.00	86.4	25.3	6.71	.71	.90	1.00
	7200	3400	98.1	28.8	5.01	.73	.92	1.00	95.3	27.9	5.50	.74	.93	1.00	92.4	27.1	6.07	.76	.95	1.00	89.2	26.1	6.75	.77	.97	1.00
67°F (19°C)	4800	2265	97.6	28.6	5.00	.50	.61	.73	94.9	27.8	5.49	.50	.61	.74	91.9	26.9	6.07	.51	.62	.76	88.7	26.0	6.74	.51	.63	.77
	6000	2830	101.0	29.6	5.05	.52	.65	.81	98.2	28.8	5.54	.53	.66	.82	95.0	27.8	6.11	.53	.67	.84	91.6	26.8	6.79	.54	.68	.86
	7200	3400	103.5	30.3	5.09	.55	.70	.88	100.5	29.5	5.57	.55	.71	.90	97.3	28.5	6.15	.56	.73	.92	93.7	27.5	6.83	.57	.75	.94
71°F (22°C)	4800	2265	104.3	30.6	5.09	.38	.48	.58	101.4	29.7	5.58	.38	.49	.59	98.3	28.8	6.17	.38	.49	.60	94.9	27.8	6.84	.38	.50	.61
	6000	2830	107.9	31.6	5.15	.39	.51	.63	104.8	30.7	5.63	.39	.51	.63	101.5	29.7	6.22	.39	.52	.64	97.8	28.7	6.88	.39	.52	.66
	7200	3400	110.3	32.3	5.18	.40	.53	.67	107.1	31.4	5.67	.40	.54	.69	103.6	30.4	6.25	.40	.55	.70	99.8	29.2	6.92	.41	.56	.72

15 TON HIGH EFFICIENCY - COOLING CAPACITY - ALL COMPRESSORS OPERATING — LHA180H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																							
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	4800	2265	176.9	51.8	12.08	.68	.82	.95	170.7	50.0	13.44	.69	.83	.97	164.0	48.1	15.01	.70	.85	.99	156.5	45.9	16.78	.71	.88	1.00
	6000	2830	184.0	53.9	12.20	.73	.89	1.00	177.6	52.0	13.56	.74	.91	1.00	170.5	50.0	15.12	.76	.93	1.00	163.0	47.8	16.87	.78	.96	1.00
	7200	3400	189.9	55.7	12.27	.78	.96	1.00	183.3	53.7	13.64	.80	.97	1.00	176.4	51.7	15.19	.82	.99	1.00	169.1	49.6	16.96	.84	1.00	1.00
67°F (19°C)	4800	2265	188.9	55.4	12.26	.53	.65	.78	182.3	53.4	13.62	.54	.66	.80	174.9	51.3	15.17	.55	.67	.81	166.9	48.9	16.95	.55	.69	.84
	6000	2830	195.3	57.2	12.35	.56	.70	.86	188.2	55.2	13.72	.57	.71	.87	180.6	52.9	15.28	.58	.73	.90	172.2	50.5	17.03	.59	.75	.92
	7200	3400	199.9	58.6	12.43	.59	.76	.93	192.6	56.4	13.80	.60	.77	.94	184.8	54.2	15.34	.61	.79	.96	176.1	51.6	17.09	.62	.82	.98
71°F (22°C)	4800	2265	202.0	59.2	12.46	.40	.52	.63	195.0	57.1	13.82	.41	.52	.64	187.2	54.9	15.37	.41	.53	.65	178.6	52.3	17.13	.41	.54	.66
	6000	2830	208.5	61.1	12.56	.41	.55	.68	201.0	58.9	13.91	.42	.55	.69	192.8	56.5	15.48	.42	.56	.71	183.9	53.9	17.22	.42	.57	.72
	7200	3400	212.9	62.4	12.62	.42	.58	.73	205.1	60.1	13.99	.43	.59	.75	196.7	57.6	15.52	.43	.60	.77	187.5	55.0	17.28	.44	.61	.79

15 TON HIGH EFFICIENCY - HEATING CAPACITY — LHA180H

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
4800	2265	241.4	70.7	15.96	181.7	53.3	14.77	120.5	35.3	13.34	74.0	21.7	12.83	38.0	11.1	9.61
6000	2830	244.2	71.6	14.86	184.5	54.1	13.67	123.3	36.1	12.24	76.8	22.5	11.73	40.8	12.0	8.51
7200	3400	246.8	72.3	14.21	187.1	54.8	13.02	125.9	36.9	11.59	79.4	23.3	11.08	43.4	12.7	7.86

15 TON HIGH EFFICIENCY - HEATING PERFORMANCE at 6000 cfm (2830 L/s) Indoor Coil Air Volume — LHA180H

*Outdoor Temperature		Compressor Motor kW Input	Total Output	
°F	°C		kBtuh	kW
65	18	14.86	244.2	71.6
60	16	14.65	229.8	67.3
55	13	14.44	215.4	63.1
50	10	14.23	201.0	58.9
47	8	14.10	192.4	56.4
45	7	13.67	184.5	54.1
40	4	12.59	164.8	48.3
35	2	11.50	145.0	42.5
30	-1	11.87	134.2	39.3
25	-4	12.24	123.3	36.1
20	-7	12.61	112.5	33.0
17	-8	12.83	106.0	31.1
15	-9	12.75	100.2	29.4
10	-12	12.54	85.8	25.1
5	-15	11.73	76.8	22.5
0	-18	10.92	67.8	19.9
-5	-21	10.12	58.8	17.2
-10	-23	9.31	49.8	14.6
-15	-26	8.51	40.8	12.0
-20	-29	7.70	31.8	9.3

COOLING AND HEATING RATINGS

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

20 TON HIGH EFFICIENCY - COOLING CAPACITY - ONE COMPRESSOR OPERATING — LHA240H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			65°F (18°C)						75°F (24°C)						85°F (29°C)						95°F (35°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	6000	2830	111.0	32.5	6.52	.63	.78	.95	108.1	31.7	7.15	.64	.80	.96	104.9	30.7	7.87	.64	.81	.98	101.4	29.7	8.70	.65	.83	.99
	7500	3540	115.4	33.8	6.62	.68	.88	1.00	112.5	33.0	7.25	.69	.89	1.00	109.1	32.0	7.96	.71	.91	1.00	105.4	30.9	8.78	.72	.94	1.00
	9000	4250	119.0	34.9	6.70	.75	.96	1.00	116.0	34.0	7.33	.76	.97	1.00	112.7	33.0	8.04	.78	.99	1.00	109.2	32.0	8.86	.80	1.00	1.00
67°F (19°C)	6000	2830	117.9	34.6	6.68	.50	.61	.74	114.9	33.7	7.30	.50	.61	.75	111.5	32.7	8.01	.50	.62	.77	107.7	31.6	8.84	.51	.63	.79
	7500	3540	121.8	35.7	6.77	.52	.66	.84	118.6	34.8	7.39	.53	.66	.85	115.0	33.7	8.10	.53	.68	.87	111.1	32.6	8.91	.54	.69	.89
	9000	4250	124.5	36.5	6.83	.55	.72	.92	121.3	35.5	7.45	.56	.73	.94	117.6	34.5	8.15	.56	.75	.96	113.5	33.3	8.97	.57	.77	.98
71°F (22°C)	6000	2830	125.6	36.8	6.86	.37	.48	.58	122.4	35.9	7.47	.38	.48	.59	118.8	34.8	8.18	.38	.49	.60	114.8	33.6	9.00	.38	.49	.61
	7500	3540	129.4	37.9	6.95	.38	.51	.63	126.0	36.9	7.57	.38	.51	.64	122.2	35.8	8.27	.39	.52	.65	118.0	34.6	9.07	.39	.53	.67
	9000	4250	131.9	38.7	7.02	.39	.54	.69	128.4	37.6	7.62	.40	.55	.71	124.5	36.5	8.32	.40	.55	.72	120.1	35.2	9.13	.40	.56	.74

20 TON HIGH EFFICIENCY - COOLING CAPACITY - ALL COMPRESSORS OPERATING — LHA240H

Entering Wet Bulb Temperature	Total Air Volume		Outdoor Air Temperature Entering Outdoor Coil																					
			85°F (29°C)						95°F (35°C)						105°F (41°C)						115°F (46°C)					
			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb			Total Cooling Capacity		Comp Motor kW Input	Sensible To Total Ratio (S/T) Dry Bulb		
	cfm	L/s	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C	kBtuh	kW		75°F 24°C	80°F 27°C	85°F 29°C
63°F (17°C)	6000	2830	216.5	63.4	15.84	.71	.86	1.00	209.2	61.3	17.50	.72	.88	1.00	201.2	59.0	19.35	.73	.90	1.00	192.5	56.4	21.49	.75	.93	1.00
	7500	3540	225.2	66.0	16.02	.77	.95	1.00	217.5	63.7	17.67	.78	.97	1.00	209.3	61.3	19.56	.80	.99	1.00	200.4	58.7	21.69	.82	1.00	1.00
	9000	4250	232.6	68.2	16.18	.83	1.00	1.00	225.4	66.1	17.83	.85	1.00	1.00	217.3	63.7	19.72	.87	1.00	1.00	208.8	61.2	21.87	.90	1.00	1.00
67°F (19°C)	6000	2830	230.1	67.4	16.12	.56	.69	.82	222.2	65.1	17.78	.56	.70	.84	213.4	62.5	19.66	.57	.71	.86	204.1	59.8	21.77	.58	.72	.89
	7500	3540	237.4	69.6	16.30	.59	.74	.92	229.2	67.2	17.93	.60	.76	.94	220.2	64.5	19.79	.61	.77	.96	210.1	61.6	21.94	.62	.80	.99
	9000	4250	242.7	71.1	16.41	.62	.81	1.00	234.2	68.6	18.05	.63	.83	1.00	224.8	65.9	19.93	.64	.85	1.00	214.6	62.9	22.03	.66	.88	1.00
71°F (22°C)	6000	2830	245.2	71.9	16.46	.42	.54	.66	236.9	69.4	18.11	.42	.54	.67	227.7	66.7	19.98	.42	.55	.68	217.7	63.8	22.09	.42	.56	.70
	7500	3540	252.1	73.9	16.64	.43	.58	.72	243.5	71.4	18.25	.43	.58	.73	233.8	68.5	20.12	.43	.59	.75	223.1	65.4	22.26	.44	.61	.77
	9000	4250	256.9	75.3	16.74	.44	.61	.78	247.9	72.7	18.38	.45	.62	.80	237.9	69.7	20.22	.45	.64	.82	227.0	66.5	22.34	.46	.65	.85

20 TON HIGH EFFICIENCY - HEATING CAPACITY — LHA240H

Indoor Coil Air Volume 70°F db (21°C db)		Air Temperature Entering Outdoor Coil															
		65°F (18°C)			45°F (7°C)			25°F (-4°C)			5°F (-15°C)			-15°F (-26°C)		
		Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input	Total Heating Capacity		Comp. Motor kW Input
cfm	L/s	kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW		kBtuh	kW	
6000	2830	285.9	83.8	17.24	207.4	60.8	16.80	127.8	37.5	16.47	66.8	19.6	14.59	35.3	10.3	10.79
7500	3540	290.3	85.1	16.27	211.8	62.1	15.83	132.2	38.7	15.50	71.2	20.9	13.62	39.7	11.6	9.82
9000	4250	294.8	86.4	15.67	216.3	63.4	15.23	136.7	40.1	14.90	75.7	22.2	13.02	44.2	13.0	9.22

20 TON HIGH EFFICIENCY - HEATING PERFORMANCE at 7500 cfm (3540 L/s) Indoor Coil Air Volume — LHA240H

*Outdoor Temperature		Compressor Motor kW Input	Total Output	
°F	°C		kBtuh	kW
65	18	16.27	290.3	85.1
60	16	16.12	271.1	79.5
55	13	15.96	251.9	73.8
50	10	15.81	232.7	68.2
47	8	15.71	221.2	64.8
45	7	15.83	211.8	62.1
40	4	16.12	188.4	55.2
35	2	16.40	165.0	48.4
30	-1	15.95	148.6	43.6
25	-4	15.50	132.2	38.7
20	-7	15.05	115.8	33.9
17	-8	14.78	106.0	31.1
15	-9	14.72	98.3	28.8
10	-12	14.57	79.1	23.2
5	-15	13.62	71.2	20.9
0	-18	12.67	63.3	18.6
-5	-21	11.72	55.5	16.3
-10	-23	10.77	47.6	14.0
-15	-26	9.82	39.7	11.6
-20	-29	8.87	31.8	9.3

7.5, 8.5, 10 and 12.5 TON (090, 102, 120, 150)

BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY 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 (economizer, etc.)
3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.
See Page 24 - 25 for wet coil and option/accessory air resistance data.
See Page 23 for factory installed drive kit specifications.

BOLD INDICATES FIELD FURNISHED DRIVE

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

3000 cfm minimum air with electric heat for LHA090/102 models.
4000 cfm minimum air with electric heat for LHA120/150 models.

0.20 to 1.40 in. w.g.

Air Volume cfm	Total Static Pressure - in. w.g.													
	.20		.40		.60		.80		1.00		1.20		1.40	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	**455**	**0.30**	**555**	**0.45**	**640**	**0.60**	720	0.80	790	1.00	855	1.20	915	1.40
2500	**475**	**0.40**	**575**	**0.55**	**660**	**0.70**	735	0.90	805	1.10	870	1.30	930	1.55
2750	**495**	**0.45**	**595**	**0.65**	**675**	**0.85**	750	1.05	820	1.25	885	1.45	940	1.70
3000	**525**	**0.55**	**615**	**0.75**	695	0.95	770	1.20	835	1.40	895	1.60	955	1.85
3250	**550**	**0.65**	**640**	**0.90**	715	1.10	790	1.35	855	1.60	915	1.80	970	2.05
3500	**580**	**0.80**	**665**	**1.05**	740	1.25	810	1.50	870	1.75	930	2.00	985	2.25
3750	**605**	**0.95**	690	1.20	760	1.45	830	1.70	890	1.95	950	2.25	1005	2.50
4000	**635**	**1.10**	715	1.40	785	1.65	850	1.90	910	2.20	965	2.45	1020	2.75
4250	**665**	**1.30**	740	1.60	810	1.85	870	2.15	930	2.45	985	2.75	1040	3.05
4500	695	1.50	770	1.80	835	2.10	895	2.40	955	2.70	1005	3.00	1060	3.35
4750	725	1.75	795	2.05	860	2.40	920	2.70	975	3.00	1030	3.35	1080	3.65
5000	760	2.05	825	2.35	885	2.65	945	3.00	1000	3.35	1050	3.65	1100	4.00
5250	790	2.30	855	2.65	910	2.95	970	3.35	1020	3.65	1070	4.00	1120	4.35
5500	820	2.60	880	2.95	940	3.30	995	3.70	1045	4.05	1095	4.40	1145	4.80
5750	850	2.95	910	3.30	965	3.70	1020	4.05	1070	4.45	1120	4.80	1165	5.20
6000	885	3.35	940	3.70	995	4.10	1045	4.45	1095	4.85	1145	5.25	1190	5.65

1.60 to 2.60 in. w.g.

Air Volume cfm	Total Static Pressure - in. w.g.											
	1.60		1.80		2.00		2.20		2.40		2.60	
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
2250	975	1.60	1030	1.85	1080	2.05	1130	2.30	1175	2.55	1220	2.80
2500	985	1.75	1040	2.00	1090	2.25	1140	2.50	1185	2.75	1230	3.00
2750	995	1.90	1050	2.20	1100	2.45	1145	2.65	1195	2.95	1240	3.25
3000	1010	2.10	1060	2.35	1110	2.65	1160	2.90	1205	3.20	1250	3.45
3250	1025	2.35	1075	2.60	1125	2.85	1170	3.15	1215	3.40	1260	3.70
3500	1040	2.55	1090	2.85	1135	3.10	1185	3.40	1230	3.70	1270	4.00
3750	1055	2.80	1105	3.10	1150	3.35	1195	3.65	1240	3.95	1285	4.30
4000	1070	3.05	1120	3.35	1165	3.65	1210	3.95	1255	4.30	1295	4.60
4250	1090	3.35	1135	3.65	1185	4.00	1225	4.30	1270	4.65	1310	4.95
4500	1105	3.65	1155	4.00	1200	4.30	1245	4.65	1285	5.00	1325	5.30
4750	1125	3.95	1175	4.35	1215	4.65	1260	5.00	1300	5.35	1340	5.70
5000	1145	4.35	1190	4.70	1235	5.05	1280	5.45	- - -	- - -	- - -	- - -
5250	1165	4.70	1210	5.10	1255	5.45	- - -	- - -	- - -	- - -	- - -	- - -
5500	1190	5.15	1230	5.50	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
5750	1210	5.60	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

15 and 20 TON (180 and 240)

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 (heat section, economizer, etc.)
3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.
See Page 24 - 25 for wet coil and option/accessory air resistance data.
See Page 23 for factory installed drive kit specifications.

MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT

●-Units with 15, 22.5, 30 or 45 kW electric heat require 6400 cfm (3020 L/s) minimum air.
●-Units with 60 or 90 kW electric heat require 7000 cfm (3305 L/s) minimum air.

Air Volume cfm	TOTAL STATIC PRESSURE - Inches Water Gauge																							
	.40		.60		.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
4000	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	---	---	---	---
10000	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	---	---	---	---	---	---
10250	845	5.65	910	6.45	970	7.20	1030	8.00	1080	8.75	1135	9.55	1180	10.25	1225	11.00	---	---	---	---	---	---	---	---
10500	860	6.00	925	6.85	985	7.65	1040	8.40	1095	9.20	1145	10.00	1190	10.70	1235	11.45	---	---	---	---	---	---	---	---
10750	875	6.40	940	7.25	1000	8.05	1055	8.85	1105	9.65	1155	10.45	1200	11.20	---	---	---	---	---	---	---	---	---	---
11000	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

Model No.	Motor Efficiency	Nominal hp	Maximum hp	Drive Kit Number	RPM Range
090	Standard or High	2	2.3	1	680 - 925
102				3	895 - 1120
120	Standard	3	3.45	1	680 - 925
150				3	895 - 1120
				5	1110 - 1395
	High	3	3.45	2	680 - 895
				4	895 - 1120
				6	1110 - 1395
	Standard or High	5	5.75	4	895 - 1120
				6	1110 - 1395
180	Standard	3	3.45	A	535 - 725
				1	685 - 865
	High	3	3.45	2	685 - 865
	Standard or High	5	5.75	2	685 - 865
				3	850 - 1045
				4	945 - 1185
	Standard or High	7.5	8.63	5	945 - 1185
				6	1045 - 1285
				7	850 - 1045
240	Standard or High	5	5.75	2	685 - 865
				3	850 - 1045
				4	945 - 1185
	Standard or High	7.5	8.63	5	945 - 1185
				6	1045 - 1285
				7	850 - 1045
	Standard or High	10	11.5	6	1045 - 1285
				8	1135 - 1365

BLOWER DATA

AIR RESISTANCE - OPTIONS

Air Volume cfm	Total Resistance - in. w.g.												
	Wet Indoor Coil				Electric Heat		Economizer		Filters				LARMFH18/24 Horizontal Roof Curb
									MERV 11		MERV 15		
	090, 102	120, 150	180	240	090, 102, 120, 150	180, 240	090, 102, 120, 150	180, 240	090, 102, 120, 150	180, 240	090, 102, 120, 150	180, 240	180, 240
2250	.06	.10	- - -	- - -	.01	- - -	.03	- - -	.01	- - -	0.04	- - -	- - -
2500	.08	.12	- - -	- - -	.01	- - -	.04	- - -	.01	- - -	0.05	- - -	- - -
2750	.09	.14	- - -	- - -	.01	- - -	.04	- - -	.02	- - -	0.05	- - -	- - -
3000	.10	.16	- - -	- - -	.02	- - -	.05	- - -	.02	- - -	0.06	- - -	- - -
3250	.11	.19	- - -	- - -	.02	- - -	.06	- - -	.02	- - -	0.06	- - -	- - -
3500	.13	.21	- - -	- - -	.03	- - -	.07	- - -	.03	- - -	0.07	- - -	- - -
3750	.14	.23	- - -	- - -	.03	- - -	.07	- - -	.03	- - -	0.08	- - -	- - -
4000	.16	.26	.04	.07	.04	.01	.08	.05	.04	.01	0.08	- - -	.06
4250	.17	.28	.04	.07	.04	.01	.09	.05	.04	.01	0.09	- - -	.07
4500	.18	.31	.04	.08	.05	.01	.10	.05	.04	.01	0.09	- - -	.07
4750	.20	.33	.05	.09	.05	.01	.11	.05	.05	.01	0.10	0.02	.08
5000	.22	.36	.05	.10	.06	.01	.12	.06	.06	.01	0.10	0.02	.08
5250	.24	.39	.06	.10	.06	.02	.13	.06	.06	.02	0.11	0.02	.09
5500	.26	.42	.06	.11	.07	.02	.14	.06	.07	.02	0.12	0.02	.10
5750	.28	.45	.06	.12	.07	.02	.15	.07	.07	.02	0.12	0.03	.11
6000	.30	.48	.07	.13	.08	.02	.16	.07	.08	.02	0.13	0.03	.11
6250	- - -	- - -	.07	.14	- - -	.02	- - -	.08	- - -	.02	- - -	0.03	.12
6500	- - -	- - -	.08	.14	- - -	.03	- - -	.08	- - -	.02	- - -	0.03	.13
6750	- - -	- - -	.08	.15	- - -	.03	- - -	.08	- - -	.02	- - -	0.03	.14
7000	- - -	- - -	.09	.16	- - -	.03	- - -	.09	- - -	.03	- - -	0.03	.15
7250	- - -	- - -	.09	.17	- - -	.03	- - -	.09	- - -	.03	- - -	0.03	.16
7500	- - -	- - -	.10	.18	- - -	.03	- - -	.10	- - -	.03	- - -	0.03	.17
7750	- - -	- - -	.10	.19	- - -	.04	- - -	.10	- - -	.03	- - -	0.03	.18
8000	- - -	- - -	.11	.20	- - -	.04	- - -	.11	- - -	.04	- - -	0.03	.19
8250	- - -	- - -	.11	.21	- - -	.04	- - -	.11	- - -	.04	- - -	0.03	.20
8500	- - -	- - -	.12	.22	- - -	.04	- - -	.12	- - -	.04	- - -	0.03	.21
8750	- - -	- - -	.12	.23	- - -	.05	- - -	.12	- - -	.04	- - -	0.03	.22
9000	- - -	- - -	.13	.24	- - -	.05	- - -	.13	- - -	.04	- - -	0.03	.24
9250	- - -	- - -	.14	.25	- - -	.05	- - -	.14	- - -	.04	- - -	0.03	.25
9500	- - -	- - -	.14	.26	- - -	.05	- - -	.14	- - -	.05	- - -	0.04	.26
9750	- - -	- - -	.15	.27	- - -	.06	- - -	.15	- - -	.05	- - -	0.04	.27
10,000	- - -	- - -	.15	.28	- - -	.06	- - -	.16	- - -	.06	- - -	0.04	.29
10,250	- - -	- - -	.15	.29	- - -	.06	- - -	.16	- - -	.06	- - -	0.04	.30
10,500	- - -	- - -	.16	.30	- - -	.07	- - -	.17	- - -	.06	- - -	0.04	.31
10,750	- - -	- - -	.16	.31	- - -	.07	- - -	.18	- - -	.06	- - -	0.04	.33
11,000	- - -	- - -	.16	.32	- - -	.07	- - -	.18	- - -	.07	- - -	0.04	.34

BLOWER DATA

AIR RESISTANCE - CEILING DIFFUSERS

Models	Air Volume	RTD11 Step-Down Diffuser			FD11 Flush Diffuser
		2 Ends Open	1 Side, 2 Ends Open	All Ends & Sides Open	
	cfm	in. w.g.	in. w.g.	in. w.g.	in. w.g.
090	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
102 & 120	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
150	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
180	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	.42
	6200	.80	.68	.59	.46
	6400	.86	.72	.63	.50
	6600	.92	.77	.67	.54
	6800	.99	.83	.72	.58
	7000	1.03	.87	.76	.62
	7200	1.09	.92	.80	.66
	7400	1.15	.97	.84	.70
	7600	1.20	1.02	.88	.74
240	6000	.36	.31	.27	.29
	6500	.42	.36	.31	.34
	7000	.49	.41	.36	.40
	7500	.51	.46	.41	.45
	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

BLOWER DATA

POWER EXHAUST FANS PERFORMANCE

Model No.	Return Air System Static Pressure in. w.g.	Air Volume Exhausted cfm
090	0	4200
102	0.05	3970
120	0.10	3750
150	0.15	3520
	0.20	3300
	0.25	3080
	0.30	2860
	0.35	2640
180	0	8630
240	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 THROW DATA

Model No.	Air Volume cfm	[1] Effective Throw Range - ft. RTD11 Step-Down	FD11 Flush
090	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
102	3600	25 - 33	22 - 29
120	3800	27 - 35	22 - 30
	4000	29 - 37	24 - 33
	4200	32 - 40	26 - 35
	4400	34 - 42	28 - 37
150	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
180	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
240	7200	33 - 38	26- 35
	7400	35 - 40	28 - 37
	7600	36 - 41	29 - 38
	7800	38 - 43	40 - 50
	8000	39 - 44	42 - 51
	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 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

7.5 TON HIGH EFFICIENCY (R-22) — **LHA090H2**

Voltage - 60hz - 3 phase			208/230V-3ph			460V-3ph			575V-3ph		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		12.4 (24.8)			6.4 (12.8)			4.8 (9.6)		
	Locked rotor amps - each (total)		88 (176)			44 (88)			34 (68)		
Outdoor Fan Motors	Number of Motors		2			2			2		
	Full load amps - each (total)		2.4 (4.8)			1.3 (2.6)			1.0 (2.0)		
	Locked rotor amps - each (total)		4.7 (9.4)			2.4 (4.8)			1.9 (3.8)		
Indoor Blower Motor	Horsepower		**2**	**3**	**5**	**2**	**3**	**5**	**2**	**3**	**5**
	Rated Load Amps		7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
	Locked rotor amps		46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6
[1] Maximum Overcurrent Protection	Unit Only		50	50	60	25	25	30	20	20	25
	with power exhaust	**0 kW**	50	50	60	25	25	30	20	20	25
		7.5 kW	70	70	80	35	35	40	30	30	30
		15 kW	90	100	100	45	50	50	35	40	40
		22.5 kW	125	125	125	60	60	60	45	45	50
		30 kW	150	150	150	70	70	80	60	60	60
		45 kW	200	200	200	100	100	100	80	80	80
[2] Minimum Circuit Ampacity	Unit Only		41	44	50	21	22	25	16	17	19
	with power exhaust	**0 kW**	43	46	52	22	24	26	17	18	20
		7.5 kW	66	69	75	33	35	38	26	27	29
		15 kW	88	91	97	45	46	49	35	36	38
		22.5 kW	111	114	120	56	57	60	44	45	47
		30 kW	133	136	143	67	69	72	53	54	56
		45 kW	178	182	188	90	71	94	71	72	75
Unit Fuse Block	Unit Only		**56K93**	**56K93**	**56K94**	**56K52**	**56K52**	**25K08**	**56K51**	**56K51**	**56K52**
	with power exhaust		**56K93**	**56K93**	**56K94**	**56K52**	**56K52**	**25K08**	**56K51**	**56K51**	**56K52**
Disconnect		**0-15 kW**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		22.5 kW	**84M13**	**84M13**	Factory	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		30-45 kW	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
Terminal Block			**30K75**			**30K75**			**30K75**		
Optional Power Exhaust Fan	(Number) Horsepower (W)		(1) 1/3 (249)			(1) 1/3 (249)			(1) 1/3 (249)		
	Full load amps		2.4			1.3			1.0		
	Locked rotor amps		4.7			2.4			1.9		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

[1] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 8.5 TON

8.5 TON HIGH EFFICIENCY (R-22) — LHA102H2

Voltage - 60hz - 3 phase			208/230V-3ph			460V-3ph			575V-3ph		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		14.7 (29.4)			7.1 (14.2)			5.1 (10.2)		
	Locked rotor amps - each (total)		91 (182)			50 (100)			37 (74)		
Outdoor Fan Motors	Number of Motors		2			2			2		
	Full load amps - each (total)		2.4 (4.8)			1.3 (2.6)			1.0 (2.0)		
	Locked rotor amps - each (total)		4.7 (9.4)			2.4 (4.8)			1.9 (3.8)		
Indoor Blower Motor	Horsepower		**2**	**3**	**5**	**2**	**3**	**5**	**2**	**3**	**5**
	Rated Load Amps		7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
	Locked rotor amps		46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6
[1] Maximum Overcurrent Protection	Unit Only		60	60	70	25	30	30	20	20	25
	with power exhaust	**0 kW**	60	60	70	30	30	35	20	20	25
		7.5 kW	80	80	90	35	40	40	30	30	30
		15 kW	100	100	110	50	50	60	40	40	40
		22.5 kW	125	125	125	60	60	70	45	50	50
		30 kW	150	150	150	70	70	80	60	60	60
		45 kW	200	200	200	100	100	100	80	80	80
[2] Minimum Circuit Ampacity	Unit Only		46	49	55	22	24	27	17	18	20
	with power exhaust	**0 kW**	48	51	57	24	25	28	18	19	21
		7.5 kW	71	74	80	35	36	39	27	28	30
		15 kW	93	96	103	46	48	51	36	37	39
		22.5 kW	116	119	125	58	59	62	45	46	48
		30 kW	138	142	148	69	70	73	54	55	57
		45 kW	184	187	193	91	93	96	72	73	75
Unit Fuse Block	Unit Only		**56K94**	**56K94**	**56K95**	**56K52**	**25K08**	**25K08**	**56K51**	**56K51**	**56K52**
	with power exhaust		**56K94**	**56K94**	**56K95**	**25K08**	**25K08**	**25K09**	**56K51**	**56K51**	**56K52**
Disconnect		**0-15 kW**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		22.5 kW	**84M13**	**84M13**	**Factory**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		30-45 kW	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
Terminal Block			**30K75**			**30K75**			**30K75**		
Optional Power Exhaust Fan	(Number) Horsepower (W)		(1) 1/3 (249)			(1) 1/3 (249)			(1) 1/3 (249)		
	Full load amps		2.4			1.3			1.0		
	Locked rotor amps		4.7			2.4			1.9		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

1 HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 10 TON

10 TON HIGH EFFICIENCY (R-22) — **LHA120H2**

Voltage - 60hz - 3 phase			208/230V-3ph			460V-3ph			575V-3ph		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		17.3 (34.6)			9.0 (18.0)			7.1 (14.2)		
	Locked rotor amps - each (total)		123 (246)			62 (124)			50 (100)		
Outdoor Fan Motors	Number of Motors		2			2			2		
	Full load amps - each (total)		2.4 (4.8)			1.3 (2.6)			1.0 (2.0)		
	Locked rotor amps - each (total)		4.7 (9.4)			2.4 (4.8)			1.9 (3.8)		
Indoor Blower Motor	Horsepower		**2**	**3**	**5**	**2**	**3**	**5**	**2**	**3**	**5**
	Rated Load Amps		7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
	Locked rotor amps		46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6
[1] Maximum Overcurrent Protection	Unit Only		60	70	70	35	35	35	25	25	30
	with power exhaust	**0 kW**	70	70	80	35	35	40	25	25	30
		15 kW	100	110	110	60	60	60	40	45	45
		22.5 kW	125	125	150	70	70	70	50	50	60
		30 kW	150	150	175	80	80	80	60	60	70
		45 kW	200	200	200	100	100	100	80	80	80
		60 kW	200	225	225	100	110	110	80	90	90
[2] Minimum Circuit Ampacity	Unit Only		52	55	61	27	28	31	21	22	25
	with power exhaust	**0 kW**	54	57	63	28	29	32	22	23	26
		15 kW	99	102	108	51	52	55	40	41	44
		22.5 kW	122	125	131	62	63	66	49	50	53
		30 kW	144	147	154	73	75	77	58	59	62
		45 kW	189	193	199	96	97	100	76	78	80
		60 kW	198	202	208	100	102	104	80	81	83
Unit Fuse Block	Unit Only		**56K94**	**56K95**	**56K95**	**25K09**	**25K09**	**25K09**	**56K52**	**56K52**	**25K08**
	with power exhaust		**56K95**	**56K95**	**56K96**	**25K09**	**25K09**	**25K10**	**56K52**	**56K52**	**25K08**
Disconnect		**0 kW**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		15-22.5 kW	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		30 kW	Factory	Factory	N/A	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		45 kW	N/A	N/A	N/A	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**
		60 kW	N/A	N/A	N/A	Factory	Factory	Factory	Factory	Factory	Factory
Terminal Block		**15-45 kW**		**30K75**			**30K75**			**30K75**	
		60 kW		**30K76**			**30K75**			**30K75**	
Optional Power Exhaust Fan	(Number) Horsepower (W)		(1) 1/3 (249)			(1) 1/3 (249)			(1) 1/3 (249)		
	Full load amps		2.4			1.3			1.0		
	Locked rotor amps		4.7			2.4			1.9		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

[1] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 12.5 TON

12.5 TON STANDARD EFFICIENCY (R-22) — LHA150S2

Voltage - 60hz - 3 phase			208/230V-3ph			460V-3ph			575V-3ph		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		19.6 (39.2)			9.5 (19.0)			7.8 (15.6)		
	Locked rotor amps - each (total)		156 (312)			75 (150)			54 (108)		
Outdoor Fan Motors	Number of Motors		2			2			2		
	Full load amps - each (total)		3.0 (6.0)			1.5 (3.0)			1.2 (2.4)		
	Locked rotor amps - each (total)		6.0 (12.0)			3.0 (6.0)			2.9 (5.8)		
Indoor Blower Motor	Horsepower		**2**	**3**	**5**	**2**	**3**	**5**	**2**	**3**	**5**
	Rated Load Amps		7.5	10.6	16.7	3.4	4.8	7.6	2.7	3.9	6.1
	Locked rotor amps		46.9	66	105	20.4	26.8	45.6	16.2	23.4	36.6
[1] Maximum Overcurrent Protection	Unit Only		70	80	90	35	35	40	25	30	30
	with power exhaust	**0 kW**	70	80	80	35	35	40	30	30	30
		15 kW	110	110	125	60	60	60	45	45	45
		22.5 kW	150	150	150	70	70	70	60	60	60
		30 kW	175	175	175	80	80	80	60	70	70
		45 kW	200	200	225	100	100	110	80	80	90
		60 kW	225	225	225	110	110	110	90	90	90
[2] Minimum Circuit Ampacity	Unit Only		58	61	67	28	30	32	28	29	31
	with power exhaust	**0 kW**	60	64	70	30	31	34	29	30	32
		15 kW	106	109	115	52	54	56	42	43	45
		22.5 kW	128	131	137	63	65	68	51	52	54
		30 kW	151	154	160	75	76	79	60	61	63
		45 kW	196	199	205	97	99	101	78	79	81
		60 kW	205	208	214	102	103	106	81	83	85
Unit Fuse Block	Unit Only		**56K95**	**56K96**	**56K96**	**25K09**	**25K09**	**25K10**	**25K08**	**25K08**	**25K08**
	with power exhaust		**56K95**	**56K96**	**56K96**	**25K09**	**25K09**	**25K10**	**25K08**	**25K08**	**25K08**
Disconnect		**0 kW**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		15-22.5 kW	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		30 kW	Factory	Factory	N/A	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
		45 kW	N/A	N/A	N/A	Factory	Factory	Factory	**84M13**	**84M13**	**84M13**
		60 kW	N/A	N/A	N/A	Factory	Factory	Factory	Factory	Factory	Factory
Terminal Block		**15-30 kW**	**30K75**			**30K75**			**30K75**		
		45-60 kW	**30K76**			**30K75**			**30K75**		
Optional Power Exhaust Fan	(Number) Horsepower (W)		(1) 1/3 (249)			(1) 1/3 (249)			(1) 1/3 (249)		
	Full load amps		2.4			1.3			1.0		
	Locked rotor amps		4.7			2.4			1.9		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

[1] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 15 TON

15 TON HIGH EFFICIENCY (R-22) — **LHA180H2**

Voltage - 60hz - 3 phase			**208/230V**			**460V**			**575V**		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		28.8 (57.6)			14.7 (29.4)			10.8 (21.6)		
	Locked rotor amps - each (total)		195 (390)			95 (190)			80 (160)		
Outdoor Fan Motors	Number of Motors		4			4			4		
	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)		
	Locked rotor amps - each (total)		4.7 (18.8)			2.4 (9.6)			1.9 (7.6)		
Indoor Blower Motor	Horsepower		**3**	**5**	**7.5**	**3**	**5**	**7.5**	**3**	**5**	**7.5**
	Rated Load Amps		10.6	16.7	24.2	4.8	7.6	11	3.9	6.1	9
	Locked rotor amps		66	105	152	26.8	45.6	66	23.4	26.6	54
[1] Maximum Overcurrent Protection	Unit Only		110	110	125	50	60	60	40	45	45
	with power exhaust	**0 kW**	110	110	125	60	60	60	45	45	50
		15 kW	150	150	150	70	80	80	60	60	60
		30 kW	200	200	200	100	100	100	80	80	80
		45 kW	250	250	250	125	125	125	90	100	100
		60 kW	250	250	250	125	125	125	100	100	100
[2] Minimum Circuit Ampacity	Unit Only		85	92	99	44	46	50	33	35	38
	with power exhaust	**0 kW**	90	96	104	46	49	52	35	37	40
		15 kW	135	142	149	69	71	75	53	55	58
		30 kW	181	187	194	91	94	97	71	73	76
		45 kW	226	232	239	114	117	120	89	91	94
		60 kW	235	241	248	118	121	125	92	95	97
Unit Fuse Block	Unit Only		**25K18**	**25K18**	**25K19**	**56K93**	**56K94**	**56K94**	**25K10**	**25K11**	**25K11**
	with power exhaust		**25K18**	**25K18**	**25K19**	**56K94**	**56K94**	**56K94**	**25K10**	**25K11**	**56K93**
Disconnect	**0-15 kW**		**84M14**	**84M14**	**84M14**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
	30 kW		**84M15**	**84M15**	**84M15**	**84M14**	**84M14**	**84M14**	**84M13**	**84M13**	**84M13**
	45 kW		**84M15**	**84M15**	**84M15**	**84M14**	**84M14**	**84M14**	**84M14**	**84M14**	**84M14**
	60 kW		N/A	N/A	N/A	**84M14**	**84M14**	**84M14**	**84M14**	**84M14**	**84M14**
Terminal Block	**15-45 kW**		**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
	60 kW		**30K75**	**30K75**	**30K76**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
Electric Heat Control Module - 45-90 kW Only			**15K13**			**15K92**			**15K93**		
Optional Power Exhaust Fan	(Number) Horsepower (W)		(2) 1/3 (249)			(2) 1/3 (249)			(2) 1/3 (249)		
	Full load amps		4.8			2.6			2.0		
	Locked rotor amps		9.4			4.8			3.8		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

NOTE - Extremes of operating range are plus and minus 10% of line voltage.

[1] HACR type breaker or fuse.

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

ELECTRICAL/ELECTRIC HEAT DATA — 20 TON

20 TON HIGH EFFICIENCY (R-22) — **LHA240H2**

Voltage - 60hz - 3 phase			**208/230V**			**460V**			**575V**		
Compressors	Number of Compressors		2			2			2		
	Rated load amps - each (total)		30.1 (60.2)			15.5 (31.0)			12.1 (24.2)		
	Locked rotor amps - each (total)		225 (450)			114 (228)			80 (160)		
Outdoor Fan Motors	Number of Motors		4			4			4		
	Full load amps - each (total)		2.4 (9.6)			1.3 (5.2)			1.0 (4.0)		
	Locked rotor amps - each (total)		4.7 (18.8)			2.4 (9.6)			1.9 (7.6)		
Indoor Blower Motor	Horsepower		**5**	**7.5**	**10**	**5**	**7.5**	**10**	**5**	**7.5**	**10**
	Rated Load Amps		16.7	24.2	30.8	7.6	11	14	6.1	9	11
	Locked rotor amps		105	152	193	45.6	66	84	36.6	54	66
[1] **Maximum Overcurrent Protection**	Unit Only		110	125	125	60	60	60	45	50	50
	with power exhaust	**0 kW**	125	125	125	60	60	70	50	50	50
		15 kW	144	152	159	73	77	80	58	61	63
		30 kW	190	197	204	96	99	102	76	79	81
		45 kW	235	242	249	118	122	125	94	97	99
		60 kW	244	251	258	123	126	129	98	100	102
		90 kW	316	323	330	159	162	165	126	129	131
[2] **Minimum Circuit Ampacity**	Unit Only		95	102	109	48	52	55	38	41	43
	with power exhaust	**0 kW**	99	107	113	51	54	57	40	43	45
		15 kW	144	152	159	73	77	80	58	61	63
		30 kW	190	197	204	96	99	102	76	79	81
		45 kW	235	242	249	118	122	125	94	97	99
		60 kW	244	251	258	123	126	129	98	100	102
		90 kW	316	323	330	159	162	165	126	129	131
Unit Fuse Block	Unit Only		**25K18**	**25K19**	**25K19**	**25K14**	**25K14**	**25K14**	**25K11**	**25K13**	**25K13**
	with power exhaust		**25K19**	**25K19**	**25K19**	**25K14**	**25K14**	**56K95**	**25K13**	**25K13**	**25K13**
Disconnect	Unit Only		**84M14**	**84M14**	**84M14**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**	**84M13**
Terminal Block		**0-45 kW**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
		60 kW	**30K75**	**30K75**	**30K76**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
		90 kW	**30K76**	**30K76**	**30K76**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**	**30K75**
[4] **Electric Heat Control Module**			**15K13**			**15K92**			**15K93**		
Optional Power Exhaust Fan	(Number) Horsepower (W)		(2) 1/3 (249)			(2) 1/3 (249)			(2) 1/3 (249)		
	Full load amps		4.8			2.6			2.0		
	Locked rotor amps		9.4			4.8			3.8		
Service Outlet 115 volt GFI (amp rating)			15			15			15		

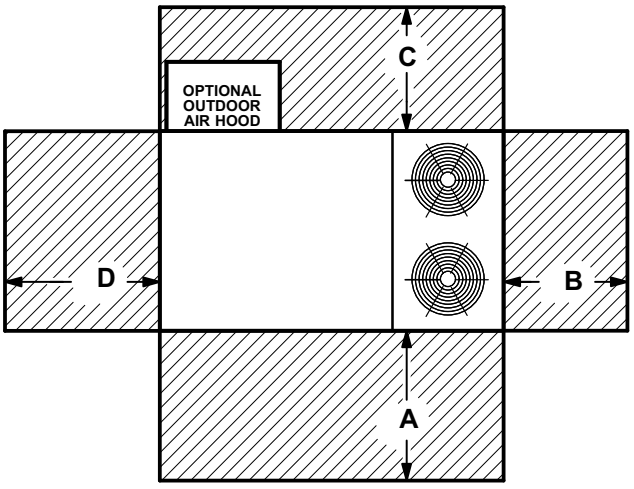
NOTE - Extremes of operating range are plus and minus 10% of line voltage.

1 HACR type breaker or fuse.

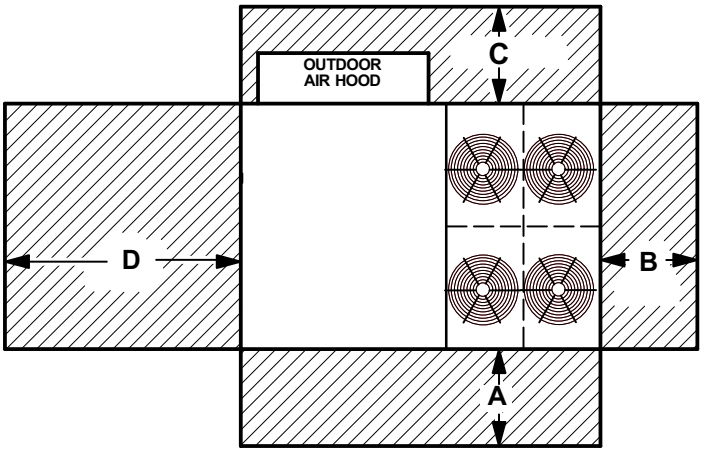
2 Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

UNIT CLEARANCES - INCHES (MM)

7.5, 8.5, 10 AND 12.5 TON (090, 102, 120, 150)



15 AND 20 TON (180, 240)



Model No.	[1] Unit Clearance	A		B		C		D		Top Clearance
		in.	mm	in.	mm	in.	mm	in.	mm	
090 102 120 150	Service Clearance	60	1524	36	914	36	914	36	914	Unobstructed
	Minimum Operation Clearance	36	914	36	914	36	914	36	914	
180 240	Service Clearance	60	1524	36	914	36	914	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 No.	Operating Mode	Octave Band Sound Power Levels dB, re 10^{-12} Watts Center Frequency - HZ							[1] Sound Rating Number (dB)
		125	250	500	1000	2000	4000	8000	
090, 102, 120, 150	Cooling	86	84	83	80	75	70	65	88
	Heating	85	86	84	82	77	71	66	88
180	Cooling	92	90	90	88	85	80	70	93
	Heating	92	90	91	89	85	80	72	93
240	Cooling	94	90	91	88	85	79	68	93
	Heating	94	90	91	89	85	80	69	93

NOTE - The octave sound power data shown does not include tonal correction.

1 Tested according to AHRI Standard 270-95 test conditions and ANSI Standard S1.32-1981.

OPTIONAL UNIT CONTROLLERS AND SYSTEMS INTEGRATION

FACTORY OR FIELD INSTALLED

NOVAR ETM-2051

Electronic Thermostat Module (ETM)/Blower Proving Switch/Return Air Sensor/Discharge Air Sensor/Wiring Harness - Module monitors unit operation from different sensors installed in unit and monitors unit diagnostic codes of the IMC. The ETM has outputs for 2 stage heat/2 stage cool, 7 relay outputs: fan Cool 1, Cool 2. Heat 1, Heat 2, Economizer, Night Mode, automatic or continuous blower operation, economizer damper operation and night setback, features: day/occupied mode with low enthalpy (outdoor air damper open), high enthalpy (outdoor air damper closed) or night/unoccupied mode (outdoor air damper closed), network communication (RS-485, shielded pair twisted wire), local override (1 to 255 minutes), watchdog function, fail-safe operation, ETM allows units to be “daisy chained” together (up to 31 units) to be operated from one central location with an “executive” type control processor (on-site or off-site), built-in time delays, built-in unit operating defaults, diagnostic LED’s indicate various operating functions, surge suppression protects ETM against lightning or voltage spikes, Blower Proving Switch monitors blower operation and locks out unit in case of blower failure, Return Air Sensor provides input to ETM module to determine heating or cooling operation and number of stages required, Discharge Air Sensor monitors leaving air temperature during unit operation. — C0CTRL35EA1L

FIELD INSTALLED

Room Temperature Sensor with Adjustable Temperature Setpoint and Built-in Night Setback Override Button - Provides input to ETM module to determine heating or cooling operation and number of stages required. Temperature setpoint adjustment. Override button allows momentary override of night setback during unoccupied mode. Status LED. — C0SNZN75AE1-

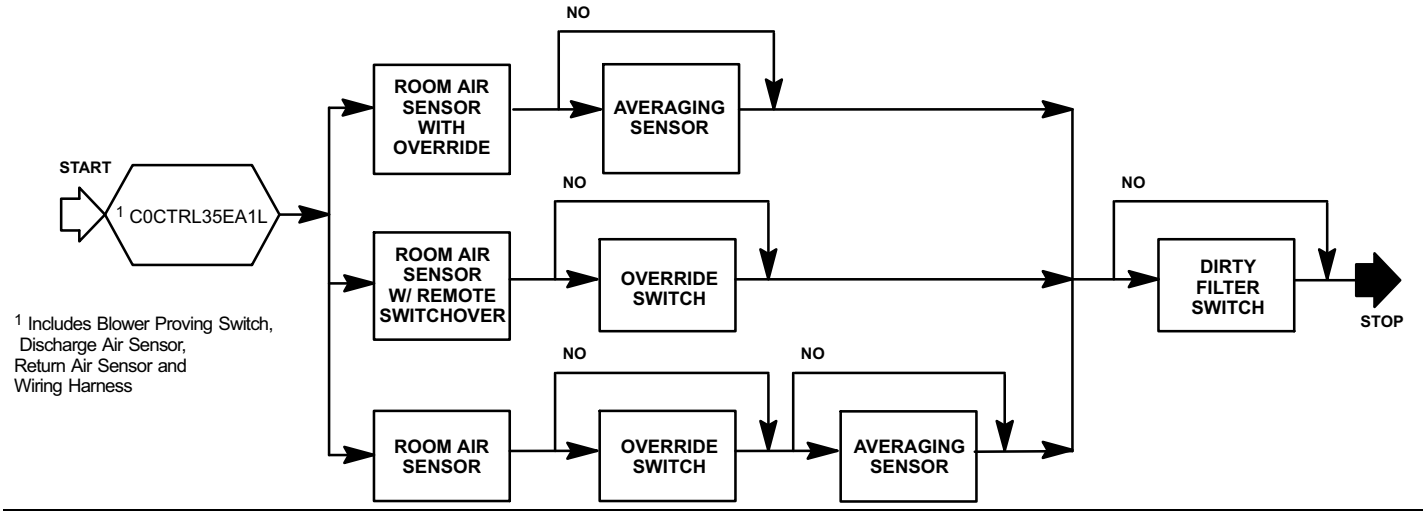
Room Temperature Sensor - Provides input to ETM module to determine heating or cooling operation and number of stages required. — C0SNZN74AE1-

Room Temperature Sensor with Switchover - Used to sense indoor space temperatures in commercial and industrial environments. In programmable ”fall-back” configuration, provides capability to switch over control to a secondary sensor if the signal is lost from this sensor. — C0SNZN76AE1-

Averaging Sensor - Used for temperature averaging in a large room. C0SNZN74AE1-

Override Switch - After Hours Remote Override Button - Wall Plate furnished. C0SWCH20AE1-

Dirty Filter Switch - Senses static pressure increase indicating a dirty filter condition. C0SWCH00AE1-



1 Includes Blower Proving Switch, Discharge Air Sensor, Return Air Sensor and Wiring Harness

OPTIONAL UNIT CONTROLLERS AND SYSTEMS INTEGRATION

FACTORY OR FIELD INSTALLED

IMC LONTALK® MODULE

The IMC LonTalk module allows communication between the Lennox IMC (M1-7, v5.10+) controller and a LonWorks® network. The module translates input and output variables between the Lennox protocol and the LonTalk protocol. The IMC LonTalk Module has been developed to communicate with building automation systems that support the LonMark® Space Comfort Controller (SCC) or Discharge Air Controller (DAC) functional profiles. A Lennox zone sensor, a LonTalk network zone sensor, or a LonTalk thermostat or DDC controller may be used to send the zone temperature or thermostat demands to the IMC.

The IMC LonTalk Module utilizes an FTT-10A free topology transceiver communicating at 78.8 kbps. It is compatible with Echelon® qualified twisted pair cable such as Lennox model no. C0MISC03AE1-, Belden 8471 or NEMA Level 4 cables. The Module can communicate up to 1640 ft. (500m) with no repeater and up to 3200 ft. (1000m) with one repeater. The LonWorks limit of 64 nodes per segment applies to this device. One termination module, Lennox model no. C0MISC90AE1- is required for free topology segments and two are required for doubly terminated bus topology segments. Termination modules must be field provided. C0CTRL51AE1L

NOTE: A qualified systems integrator with adequate training and experience is required to integrate and commission the IMC LonTalk Module into a third-party LonTalk building automation system. A LonWorks network configuration software tool such as LonMaker® (or equivalent) is required to commission the LonWorks network. An external interface file (XIF) will be made available upon request.

LONWORKS NETWORK VARIABLES - INPUTS

LonMark Name	Variable Type	Description
nviApplicMode	SNVT_hvac_mode	Unit application mode
0-Auto		Auto (unit-defined operation)
1-Heat		Demand for full heating
3-Cool		Demand for full cooling
6-Off		Unit off (IMC standby)
9-Fan only		Main fan (blower) on
254-Reset		Force controller reset
255-Null		Same as auto.
nviOAMinPos	SNVT_lev_percent	Min economizer damper position
nviOccManCmd	SNVT_occupancy	Zone occupied status
nviOccSchedule	SNVT_tod_event	Occupancy scheduler input used to put controller unit into different occupancy modes
nviOccSensor	SNVT_occupancy	Occupancy sensor input. Used to indicate the presence of occupants
nviSpaceDehumSP	SNVT_lev_percent	Zone relative humidity set point
nviSetpoint	SNVT_temp_p	Zone temperature setpoint
nviSetptOffset	SNVT_temp_p	Zone temp setpoint offset
nviSpaceTemp	SNVT_temp_p	Remote zone temp.
nviEmergOverride	SNVT_hvac_emerg	Emergency smoke override
nviComprEnable	SNVT_switch	Compressor enable
nviPriHeatEnable	SNVT_switch	Primary heat enable
nviAuxHeatEnable	SNVT_switch	Auxiliary heat enable

OPTIONAL UNIT CONTROLLERS AND SYSTEMS INTEGRATION

IMC LONTALK® MODULE (Continued)

LONWORKS NETWORK VARIABLES - OUTPUTS

LonMark Name	Variable Type	Description
snvoIMCVersion	Manufacturer defined	IMC firmware version. D0-D3 (ASCII)
snvoUnitID	Manufacturer defined	Unit ID. $3x-Gas/Elect $4x-Elect/Elect $5x-Heat Pump
nvoUnitStatus:	SNVT_hvac_status	Unit operation mode (i.e. cool, heat, etc)
1 - HVAC heat		
2 - HVAC morning warmup		
3 - HVAC cool		
5 - HVAC pre-cool		
6 - HVAC off		
7 - HVAC test		
8 - HVAC emergency heat		
9 - HVAC fan only		
12 - HVAC max heat		
14 - HVAC dehumidification		
129 - HVAC fresh air heating		
131 - HVAC fresh air cooling		
145 - HVAC defrost 1		
161 - HVAC defrost 2		
177 - HVAC defrost 1 2		
nvoSpaceTemp	SNVT_temp_p	Zone Temperature, effective
nvoDischAirTemp	SNVT_temp_p	Supply air temperature
nvoEffectOccup	SNVT_occupancy	Zone occupied status
nvoLocalOATemp	SNVT_temp_p	Outdoor air temperature
nvoLocalSpaceTemp	SNVT_temp_p	Zone Temperature, local
nvoOADamper	SNVT_lev_percent	Economizer damper position
nvoHeatPrimary	SNVT_lev_percent	Primary heating status
nvoHeatSecondary	SNVT_lev_percent	Heat pump electric strip heating status
nvoCoolPrimary	SNVT_lev_percent	Cooling compressor 1-4 status (on/off)
nvoEconEnabled	SNVT_switch	Economizer outdoor air suitable
nvoSupFanStatus	SNVT_switch	Supply fan status
nvoEffectSetpt	SNVT_temp_p	Zone temperature set points
snvoCurrentError	Manufacturer defined	Currently displayed error code
snvoCommStatus	Manufacturer defined	IMC Communicating
snvoErrorPointer	Manufacturer defined	Error pointer. This value points to the next available alarm code location. It runs from 0 to 83 and then returns to 0. Tracking this value and using the ten most recent IMC error codes (next variable) allows an application to 1) determine when new errors are logged by the IMC, 2) what those errors are, and 3) if any errors have been missed due to network delays or other reasons.
snvoMostRecErr1-10	Manufacturer defined	Alarm codes listed in the IMC manual
nvoSpaceCO2	SNVT_ppm	Zone CO_2 level (PPM), local
nvoSpaceRHEff	SNVT_lev_percent	Zone relative humidity, effective
nvoSpaceRH	SNVT_lev_percent	Zone relative humidity, local
nvoEffSpaceDHSP	SNVT_lev_percent	Zone relative humidity set point
nvoDehumidifier	SNVT_switch	Dehumidification status
nvoRATemp	SNVT_temp_p	Return air temperature
nvoBldgStatPress	SNVT_press_p	Analog Input 2 (GP1 - VAV Bldg Static)
nvoDuctStatPress	SNVT_press_p	Analog Input 1 (GP1 - VAV Supply Static)
nvoExhFanStatus	SNVT_switch	Exhaust fan status

OPTIONAL UNIT CONTROLLERS AND SYSTEMS INTEGRATION

FACTORY OR FIELD INSTALLED

IMC BACNET® MODULE

The IMC BACnet module allows communication between the Lennox IMC (M1-7, v5.10+) controller and a BACnet MSTP network. The module translates input and output variables between the Lennox protocol and the BACnet protocol. The IMC BACnet Module has been developed to communicate with building automation systems that support the BACnet Application Specific Controller (B-ASC) device profile. A Lennox zone sensor, a BACnet network zone sensor, or a BACnet thermostat or DDC controller may be used to send the zone temperature or thermostat demands to the IMC.

The IMC BACnet Module is compatible with MSTP EIA-485 daisy-chain networks communicating at 38.4 kbps. It is compatible with twisted pair, shielded cable such as Lennox model nos. C0MISC00AE1-, C0MISC04AE1- or C0MISC01AE1- or Belden 8761, 88761. A maximum of 31 IMC BACnet Modules can be included per network. The BACnet MSTP maximum total bus length (without repeater) of 850 ft. (260m) applies to this device. A 120 ohm resistor must be added to the last module in the daisy chain (included in field kit). C0CTRL50AE1L

NOTE: A qualified systems integrator with adequate training and experience is required to integrate and commission the IMC BACnet Module into a third-party BACnet building automation system. A BACnet network configuration software tool is required to commission the BACnet network.

INPUTS TO IMC

BACnet Object Name	Object Type: ID: Units	Description
Application Mode Control	AO: 101:95 (No_ Units)	Unit application
0 - Auto		Auto (unit-defined operation)
1 - Heat		Demand for full Heating
3 - Cool		Demand for full Cooling
6 - Off		Unit Off (IMC stand by)
9 - Fan only		Main fan (blower) on
228 - Cool 1		Thermostat input Y1
232 - Cool 2		Thermostat input Y2
236 - Cool 3		Thermostat input Y1 & Y2
225 - Heat 1		Thermostat input W1
226 - Heat 2 (heat pump only)		Thermostat input W2 (heat pump emergency heat)
227 - Heat 3		Thermostat input W1 & W2
229 - Supermarket Reheat Lo		Thermostat input Y1 & W1
230 - Supermarket Reheat Hi		Thermostat input Y1 & W2
254 - Reset		Force controller reset
255 - Null		Same as auto.
Outdoor Air Min Pos Control	AO: 102 : 98 (Percent)	Min economizer damper position
Occupancy Override Control	AO: 103: 95 (No_Units)	Zone occupied status
Occupancy Scheduler Control	AO: 104: 95 (No_Units)	Occupancy scheduler input used to put controller unit into different occupancy modes.
Occupancy Sensor Input	AO: 107: 95 (No_Units)	Occupancy sensor input. Used to indicate the presence of occupants
Space Dehumidification Setpt	AO: 108: 98 (Percent)	Zone relative humidity set point
Temperature Setpoint (abs)	AO: 109: 64 (Degrees - Fahrenheit)	Zone temperature setpoint
Temperature Setpoint Offset	AO: 110: 64 (Degrees - Fahrenheit)	Zone temp setpoint offset
Space Temperature Input	AO: 113: 64 (Degrees - Fahrenheit)	Remote zone temp.
Emergency Override Control	AO: 114: 95 (No_Units)	Emergency smoke override
Compressor Enable Control	AO: 115: 98 (Percent)	Compressor enable
Primary Heat Enable Control	AO: 117: 98 (Percent)	Primary heat enable
Auxiliary Heat Enable Control	AO: 119: 98 (Percent)	Auxiliary heat enable

OPTIONAL UNIT CONTROLLERS AND SYSTEMS INTEGRATION

IMC BACNET® MODULE (Continued)

OUTPUTS FROM IMC

OUTPUTS FROM IMC		
IMC Version [00].....[07]	AI: 200-207 : 95 (No_Units)	IMC firmware version. (null terminated ASCII)
Unit ID	AI: 231 : 95 (No_Units)	Unit ID $3x-Gas/Elect. $4x-Elect/Elect. $5x-Heat Pump
Unit Status	AI :232 : 95 (No_Units)	Unit operation mode (i.e. cool, heat, etc.)
1 - HVAC heat		
2 - HVAC morning warm-up		
3 - HVAC cool		
5 - HVAC pre-cool		
6 - HVAC off		
7 - HVAC test		
8 - HVAC emergency heat		
9 - HVAC fan only		
12 - HVAC max heat		
14 - HVAC dehumidification		
129 - HVAC fresh air heating		
131 - HVAC fresh air cooling		
145 - HVAC defrost 1		
161 - HVAC defrost 2		
177 - HVAC defrost 1, 2		
Space Temperature	AI: 239 : 64 : 95 (Degrees - Fahrenheit))	
Discharge Air Temperature	AI: 240 : 64 (Degrees - Fahrenheit)	Supply air temperature
Effective Occupancy	AI : 241 : 95 (No_ Unit)	Zone occupied status
Local Outside Air Temperature	AI 242 : 64 (Degrees - Fahrenheit)	Outdoor air temperature
Local Space Temperature	AI: 243 :64 (Degrees Fahrenheit)	Zone Temperature, local
Outside Air Damper	AI: 244 : 98 (Percent)	Economizer damper position
Heat Primary	AI: 245 :98 (Percent)	Primary heating status
Heat Secondary	AI: 246 : 98 (Percent)	Heat pump electric strip heating status
Cool Primary	AI: 247 : 98 (Percent)	Cooling compressor 1-4 status (on/off)
Economizer Enabled	AI: 248 : 95 (Percent)	Economizer outdoor air suitable
Supply Fan Status	AI: 250 : 98 (Percent)	Supply fan status
Space Temperature Set Point (Eff)	AI: 252 :64 (Degrees Fahrenheit)	Zone temperature set points
Current Error	AI: 253 : 95 (No_Units)	Currently displayed error code
Error Pointer	AI: 254 : 95 (No_Units)	Error pointer. This value points to the next available alarm code location. It runs from 0 to 83 and then rolls-over to 0. Tracking this value and using the ten most recent error codes (below) allows an application to determine when new errors are logged by the IMC, what those errors are, and if any errors have been missed due to network delays or for any other reason.
Most recent Error 1..10	AI: 255-264 : 95 (No _Units)	IMC alarm codes as listed in the IMC manual.
Space CO2 Sensor (Local)	AI : 274 :96 (Parts per million)	Zone CO_2 level (PPM), local
Space Humidity (Local)	AI: 276 : 98 (Percent)	Zone relative humidity, local
Dehumidification Set Point (Eff)	AI: 278 : 98 (Percent)	Zone relative humidity set point
Dehumidification Status	AI: 279 : 95 (No_Units)	Dehumidification status
Return Air Temperature	AI: 281 :64 (Degrees Fahrenheit))	Return air temperature
Building Static Pressure	AI: 282 : 64 (Inches of water)	Analog Input 2 (GP1 - VAV Bldg Static)
Duct Static Pressure	AI: 282 : 64 (Inches of water)	Analog Input 1 (GP1 - VAV Supply Static)
Exhaust Fan Status	AI: 285 :98 (Percent)	Exhaust fan status
Controller Online	B1:100 :95 (No_Units)	IMC Communicating

OPTIONAL CONVENTIONAL TEMPERATURE CONTROL SYSTEMS - FIELD INSTALLED

COMMERCIAL TOUCHSCREEN THERMOSTAT

Intuitive Touchscreen Interface - **Two Stage Heating / Two Stage Cooling Conventional or Heat Pump** - Seven Day Programmable - Four Time Periods/Day - Economizer Output - Title 24 Compliant - ENERGY STAR® Qualified - Backlit Display - Automatic Changeover — C0STAT02AE1L

Sensors For Touchscreen Thermostat

[1] Remote non-adjustable wall mount 20k temperature sensor C0SNZN01AE1-

[1] Remote non-adjustable wall mount 10k averaging temperature sensor C0SNZN73AE1-

[1] Remote non-adjustable duct mount temperature sensor C0SNDC00AE1-

Outdoor temperature sensor C0SNSR03AE1-

Accessories For Touchscreen Thermostat

Locking cover (clear) C0MISC15AE1-

[1] Remote sensors for C0STAT02AE1L can be applied in the following combinations: (1) C0SNZN01AE1-, (2) C0SNZN73AE1-, (2) C0SNZN01AE1- and (1) C0SNZN73AE1-, (4) C0SNZN01AE1-, (3) C0SNZN01AE1- and (2) C0SNZN73AE1.

DIGITAL NON-PROGRAMMABLE THERMOSTATS

Intuitive Interface - Automatic Changeover - Simple Up and Down Temperature Control

Two-stage heating / cooling conventional systems C0STAT10AE1L

Sensor For Digital Non-Programmable Thermostats Above

Remote wall mounted temperature sensor C0SNZN00AE1-

Intuitive Interface - Automatic Changeover - Backlit Display - Simple Up and Down Temperature Control

One-stage heating / cooling conventional systems C0STAT12AE1L

Sensor For Digital Non-Programmable Thermostats Above

Outdoor temperature sensor C0SNSR04AE1-

Accessories For Digital Non-Programmable Thermostats Above

Optional wall mounting plate C0MISC17AE1-

WEIGHT DATA

Model Number	Net		Shipping	
	lbs.	kg	lbs.	kg
090/102 Base Unit	1250	567	1335	606
090/102 Max. Unit	1480	671	1565	710
120 Base Unit	1305	593	1390	630
120 Max. Unit	1525	692	1610	730
150 Base Unit	1340	608	1395	633
150 Max. Unit	1560	708	1615	733
180 Base Unit	2290	1039	2570	1166
180 Max. Unit	2560	1161	2840	1288
240 Base Unit	2340	1060	2615	1186
240 Max. Unit	2600	1179	2875	1304

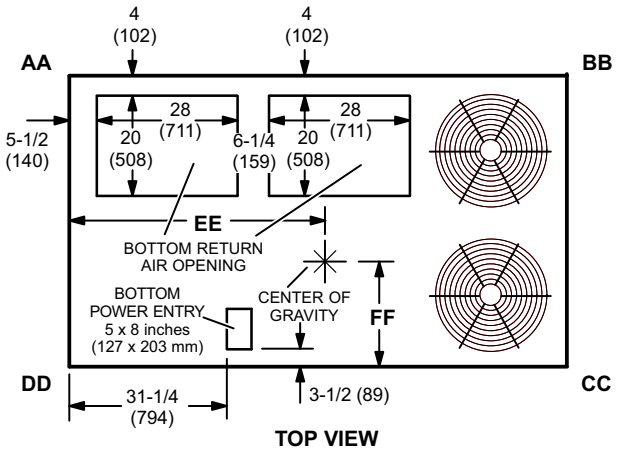
OPTIONS / ACCESSORIES

		Weight	
		lbs.	kg.
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	LASRT08/10	30	14
	LASRT10/12	32	15
	LASRT15	36	16
ECONOMIZER / OUTDOOR AIR / EXHAUST			
Economizer	LAREMD10/15	47	21
Barometric Relief			
Down-Flow Barometric Relief Dampers	LAGED10/15	8	4
Horizontal Barometric Relief Dampers	LAGEDH18/24	20	9
Outdoor Air Dampers			
Damper Section (down-flow) - Automatic	LAOADM10/15	31	14
Damper Section (down-flow) - Manual	LAOAD10/15	26	12
Outdoor Air Hood (down-flow)	LAOAH10/15	11	5
Power Exhaust	LAPEF10/15	28	13
PACKAGING			
LTL Packaging (less than truck load)		105	48
ROOF CURBS - STANDARD			
Down-Flow			
14 in. (356 mm) height	LARMF10/15-14	126	57
24 in. (610 m) height	LARMF10/15-24	174	79
ROOF CURBS - CLIPLOCK 1000			
Down-Flow			
14 in. (356 mm) height	LARMF10/15S-14	115	52
18 in. (457 mm) height	LARMF10/15S-28	156	71
24 in. (610 mm) height	LARMF10/15S-24	189	86
ELECTRIC HEAT			
7.5 to 15 kW		31	14
22.5 to 30 kW		38	17
45 kW		42	19
60 kW		49	22

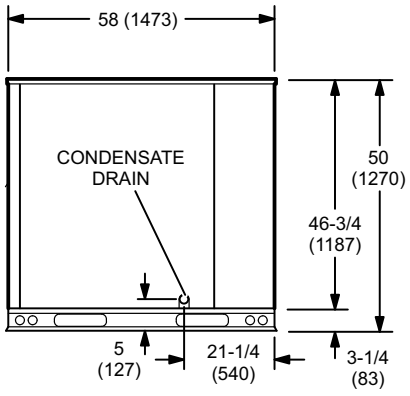
Base Unit - The unit with low fire heat exchanger NO OPTIONS.
Max. Unit - The unit with ALL OPTIONS Installed. (High Input Heat Exchanger, Economizer, Power Exhaust Fans, Controls)

7.5, 8.5, 10 AND 12.5 TON (090, 102, 120, 150)

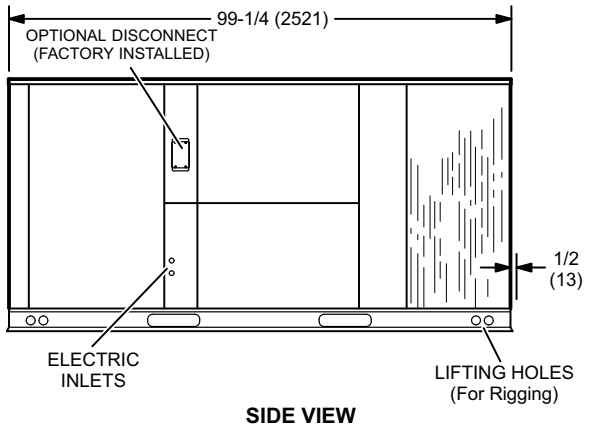
Model Number	CORNER WEIGHTS								CENTER OF GRAVITY			
	AA		BB		CC		DD		EE		FF	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	inch	mm	inch	mm
090/102 Base Unit	302	137	278	126	316	143	354	161	47	1194	21-1/2	546
090/102 Max. Unit	358	162	329	149	374	170	419	190	47	1194	21-1/2	546
120 Base Unit	319	145	286	130	324	147	376	171	46	1168	21-1/2	546
120 Max. Unit	373	169	334	152	379	172	439	199	46	1168	21-1/2	546
150 Base Unit	314	142	299	136	337	153	359	163	48-1/2	1232	22-1/2	572
150 Max. Unit	382	173	344	156	377	171	427	194	46-1/2	1181	24	610



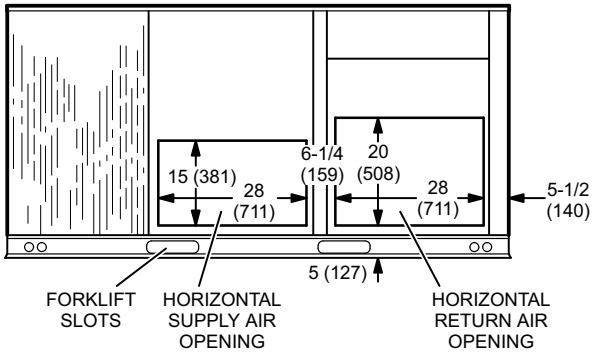
TOP VIEW



END VIEW

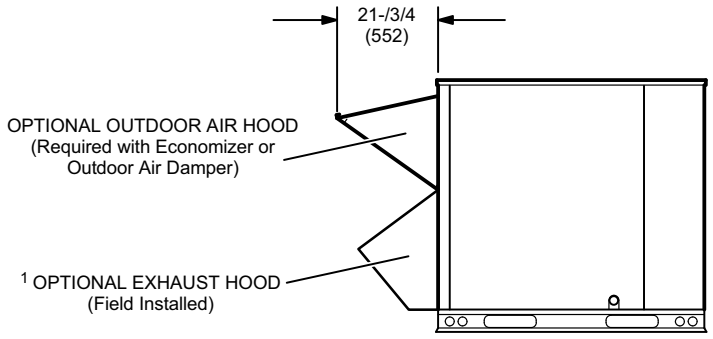


SIDE VIEW
(Compressor Section)



SIDE VIEW
(Horizontal Openings)

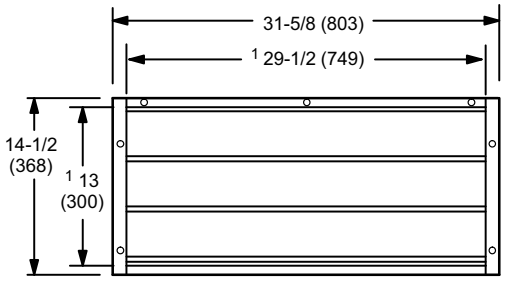
OPTIONAL OUTDOOR AIR HOOD DETAIL



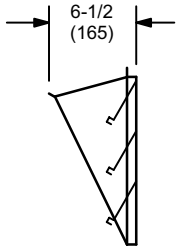
[1] NOTE — Field Installed in Return Air Duct for Horizontal Applications.

HORIZONTAL BAROMETRIC RELIEF DAMPERS

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



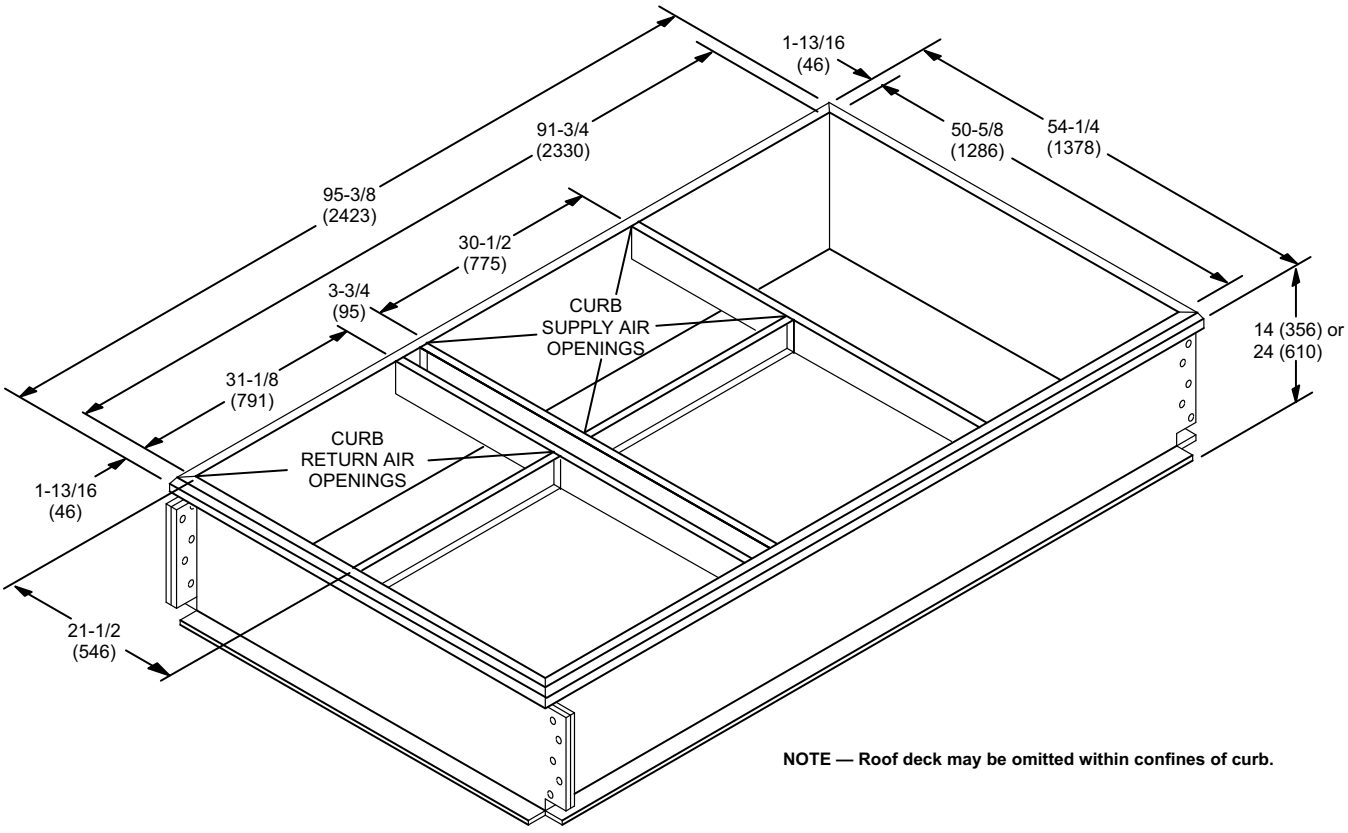
FRONT VIEW



SIDE VIEW

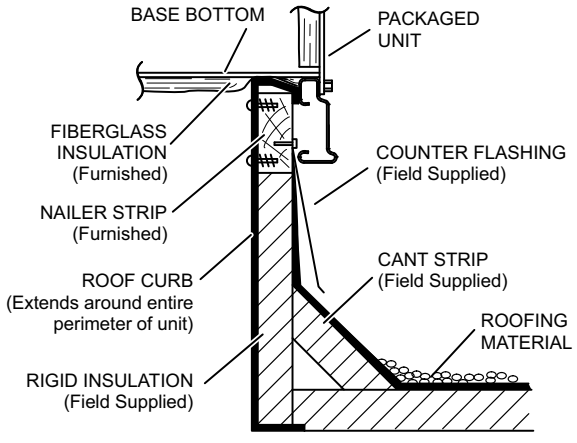
[1] NOTE - Opening size required in return air duct.

STANDARD ROOF CURBS - DOUBLE DUCT OPENING

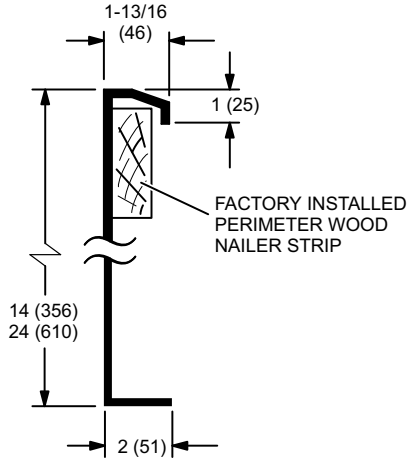


NOTE — Roof deck may be omitted within confines of curb.

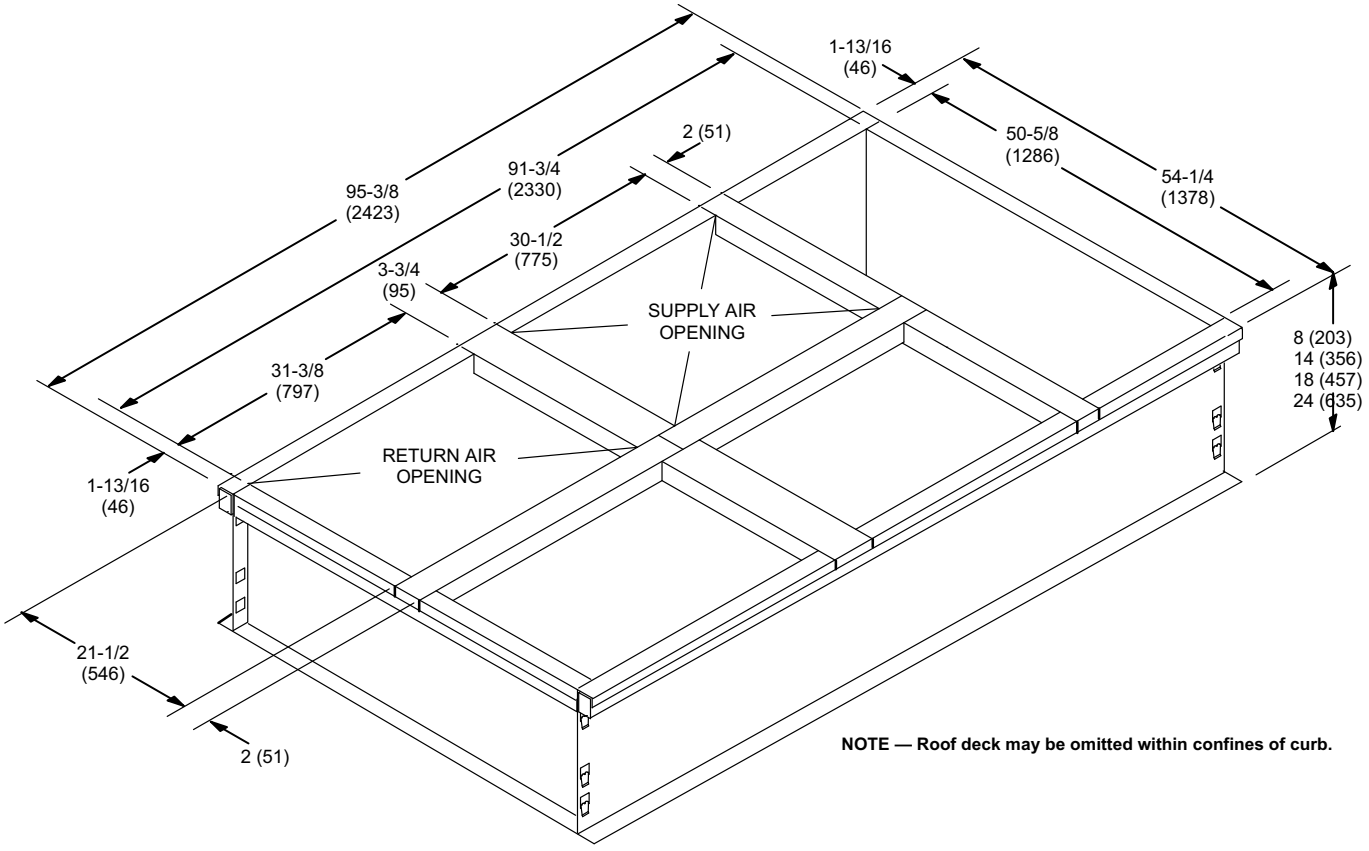
TYPICAL FLASHING DETAIL FOR ROOF CURB



DETAIL ROOF CURB

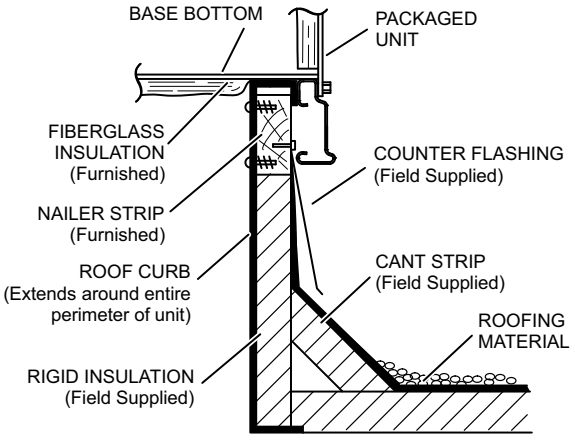


CLIPLOCK 1000 ROOF CURBS - DOUBLE DUCT OPENING

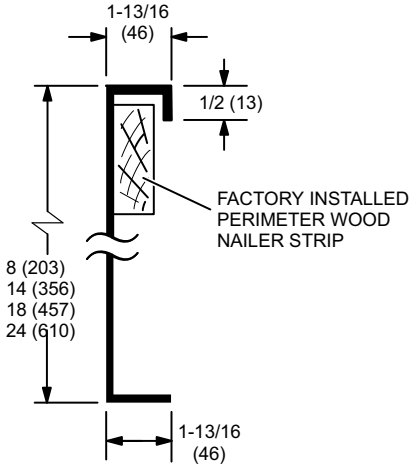


NOTE — Roof deck may be omitted within confines of curb.

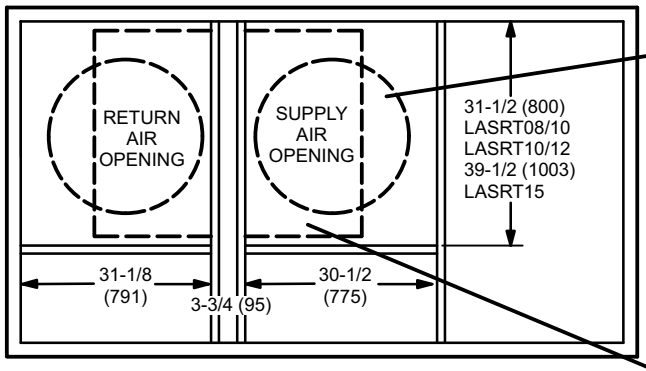
TYPICAL FLASHING DETAIL FOR ROOF CURB



DETAIL ROOF CURB

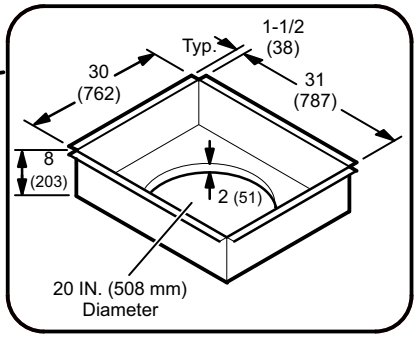


STANDARD ROOF CURBS WITH SUPPLY & RETURN AIR TRANSITIONS FOR CEILING DIFFUSERS

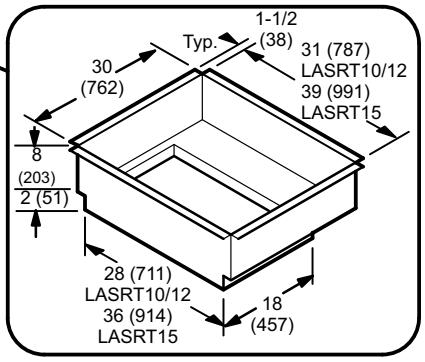


TOP VIEW

LASRT08/10 ROUND TRANSITIONS
(for 090 models with FD11-95, RTD11-95 Diffusers)

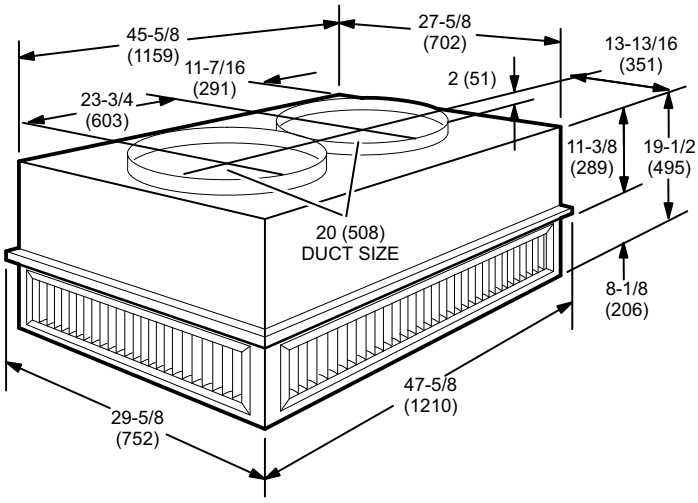


LASRT10/12 & LASRT15 RECTANGULAR TRANSITIONS
(for 102 thru 150 models with FD11-135-185, RTD11-135-185 Diffusers)

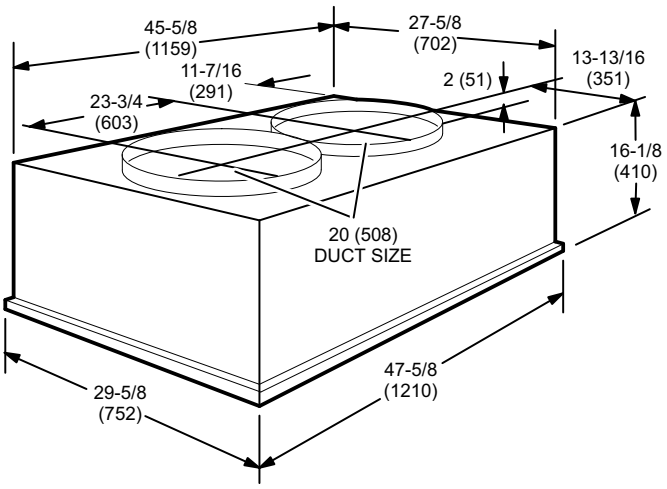


COMBINATION CEILING SUPPLY AND RETURN DIFFUSERS

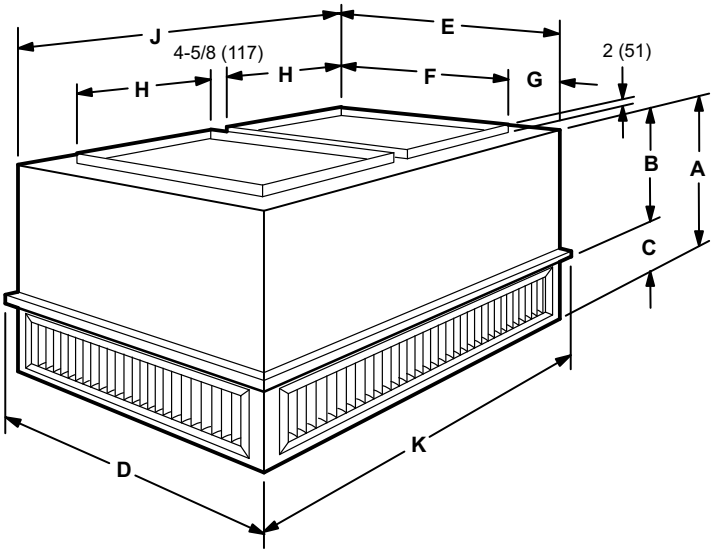
RTD11-95 STEP-DOWN



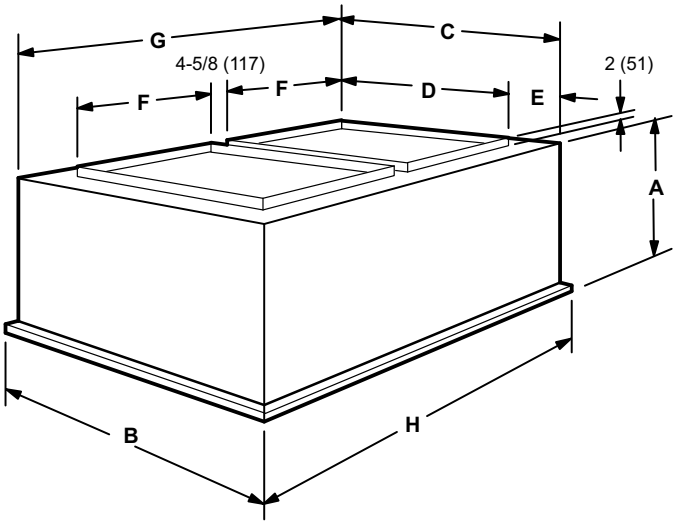
FD11-95 FLUSH



RTD11-135-185 STEP-DOWN



FD11-135-185 FLUSH



Model Number	A		B		C		D		E	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
RTD11-135	28	711	18-7/8	479	9-1/8	232	35-5/8	905	33-5/8	854
RTD11-185	34	864	23-7/8	606	10-1/8	257	47-5/8	1210	45-5/8	1159

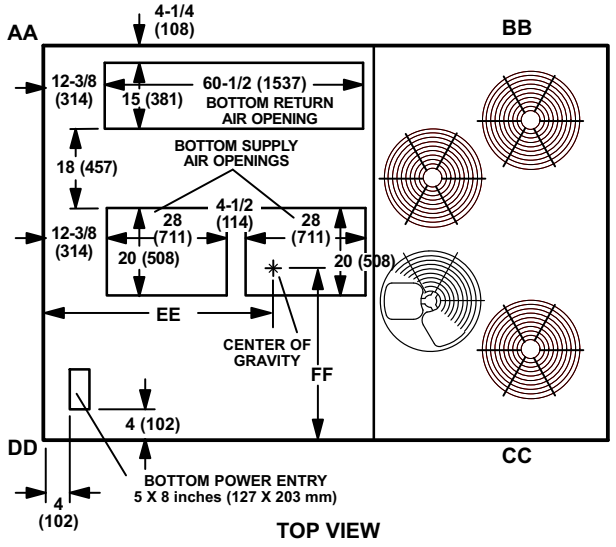
Model Number	F		G		H		J		K	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
RTD11-135	28	711	2-13/16	71	18	457	45-5/8	1159	47-5/8	1210
RTD11-185	36	914	4-13/16	122	18	457	45-5/8	1159	47-5/8	1210

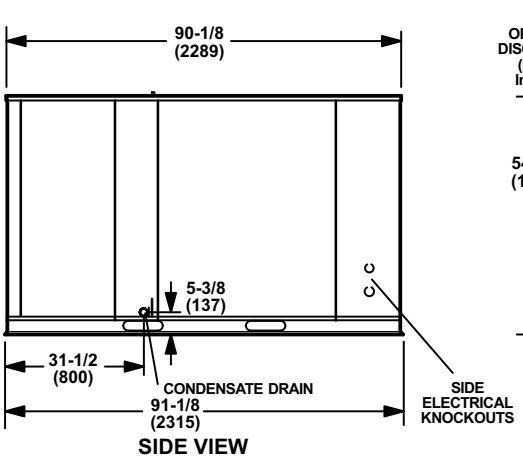
Model Number	A		B		C		D	
	inch	mm	inch	mm	inch	mm	inch	mm
FD11-135	24-1/8	613	35-5/8	905	33-5/8	854	28	711
FD11-185	30-1/8	613	47-5/8	1210	45-5/8	1159	36	914

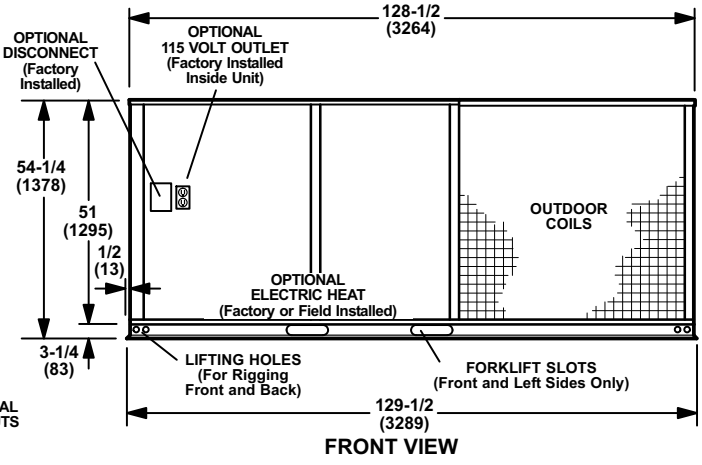
Model Number	E		F		G		H	
	inch	mm	inch	mm	inch	mm	inch	mm
FD11-135	2-13/16	71	18	457	45-5/8	1159	47-5/8	1210
FD11-185	4-13/16	122	18	457	45-5/8	1159	47-5/8	1210

15 AND 20 TON (180, 240)

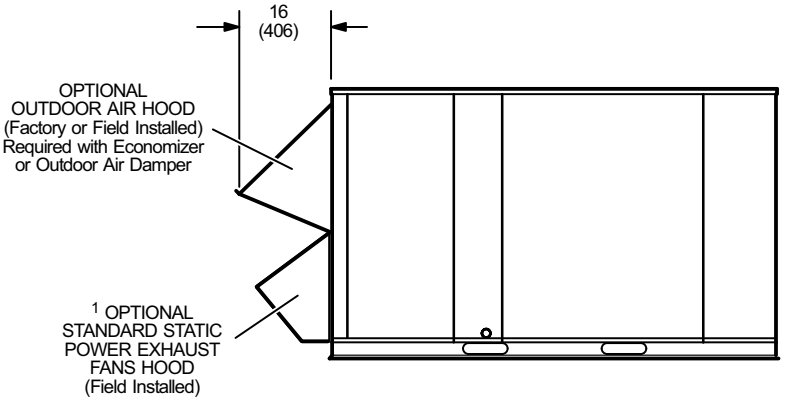
Model Number	CORNER WEIGHTS AA lbs.	AA kg	BB lbs.	BB kg	CC lbs.	CC kg	DD lbs.	DD kg	CENTER OF GRAVITY EE inch	EE mm	FF inch	FF mm
180 Base Unit	550	249	440	200	580	263	720	327	58	1473	39-1/2	1003
180 Max. Unit	670	304	510	231	590	268	790	358	56	1422	42	1067
240 Base Unit	570	259	460	209	580	263	730	331	57-1/2	1461	40	1016
240 Max. Unit	690	313	520	236	600	272	790	358	55-1/2	1410	42-1/2	1080







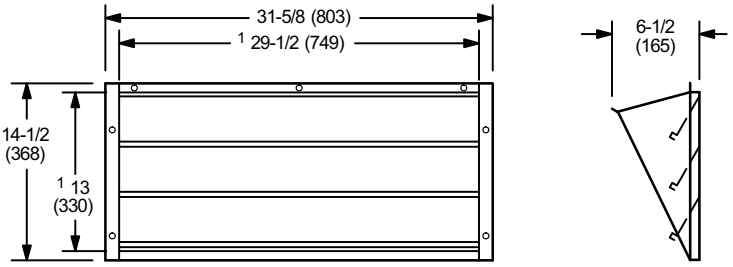
OPTIONAL OUTDOOR AIR HOOD DETAIL WITH STANDARD STATIC POWER EXHAUST FANS



[1] Field Installed in Return Air Duct for Horizontal Applications.

HORIZONTAL BAROMETRIC RELIEF DAMPERS

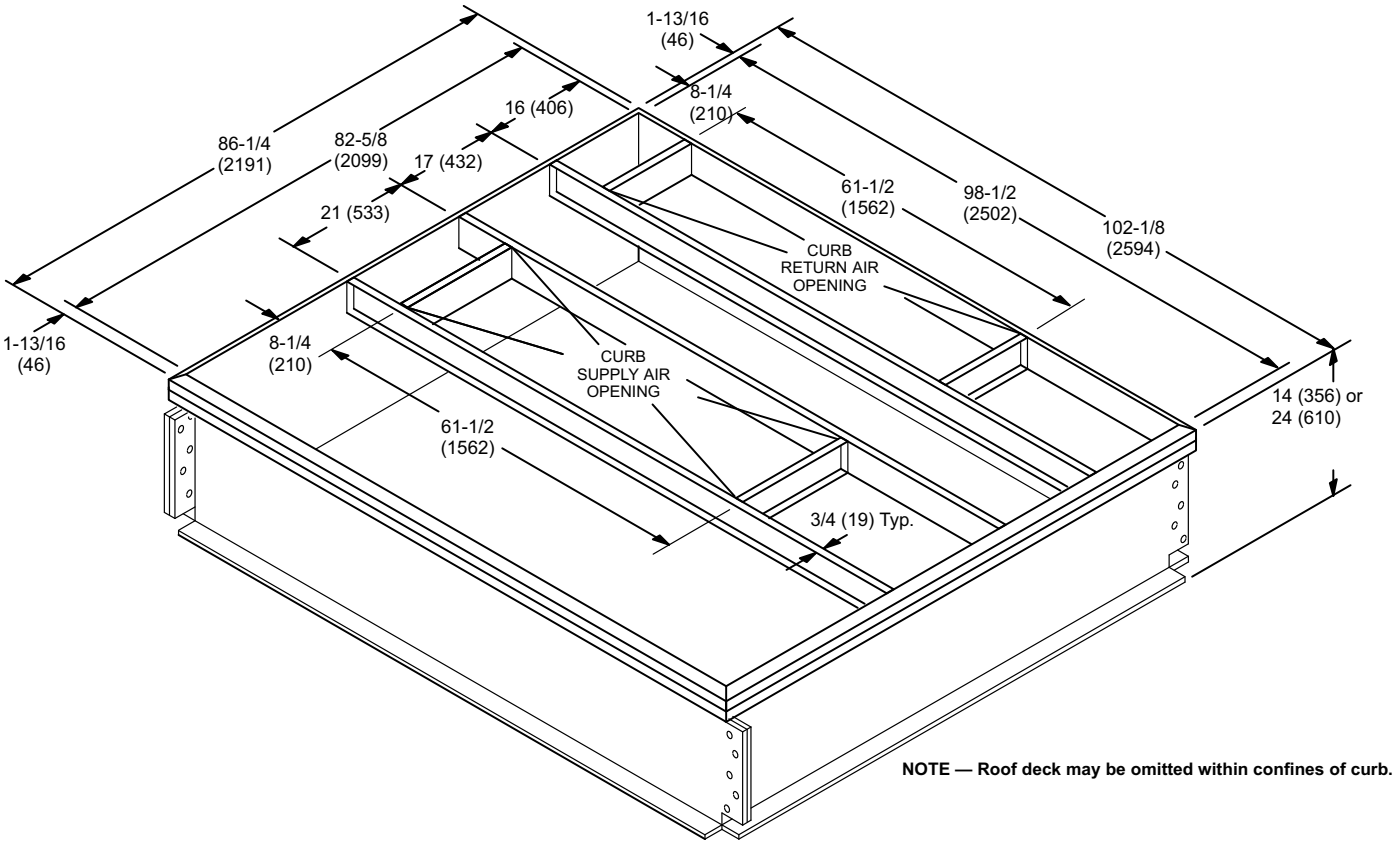
(Field installed in horizontal return air duct adjacent to unit)



FRONT VIEW **SIDE VIEW**

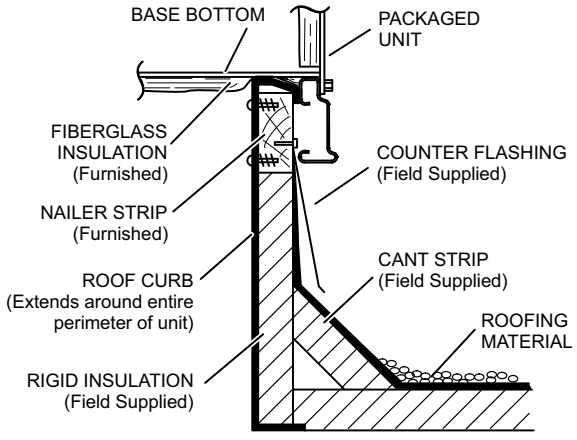
NOTE - Two furnished per order no.
[1] NOTE - Opening size required in return air duct.

STANDARD ROOF CURBS - DOUBLE DUCT OPENING

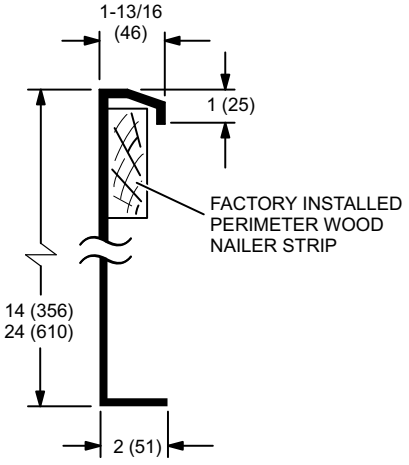


NOTE — Roof deck may be omitted within confines of curb.

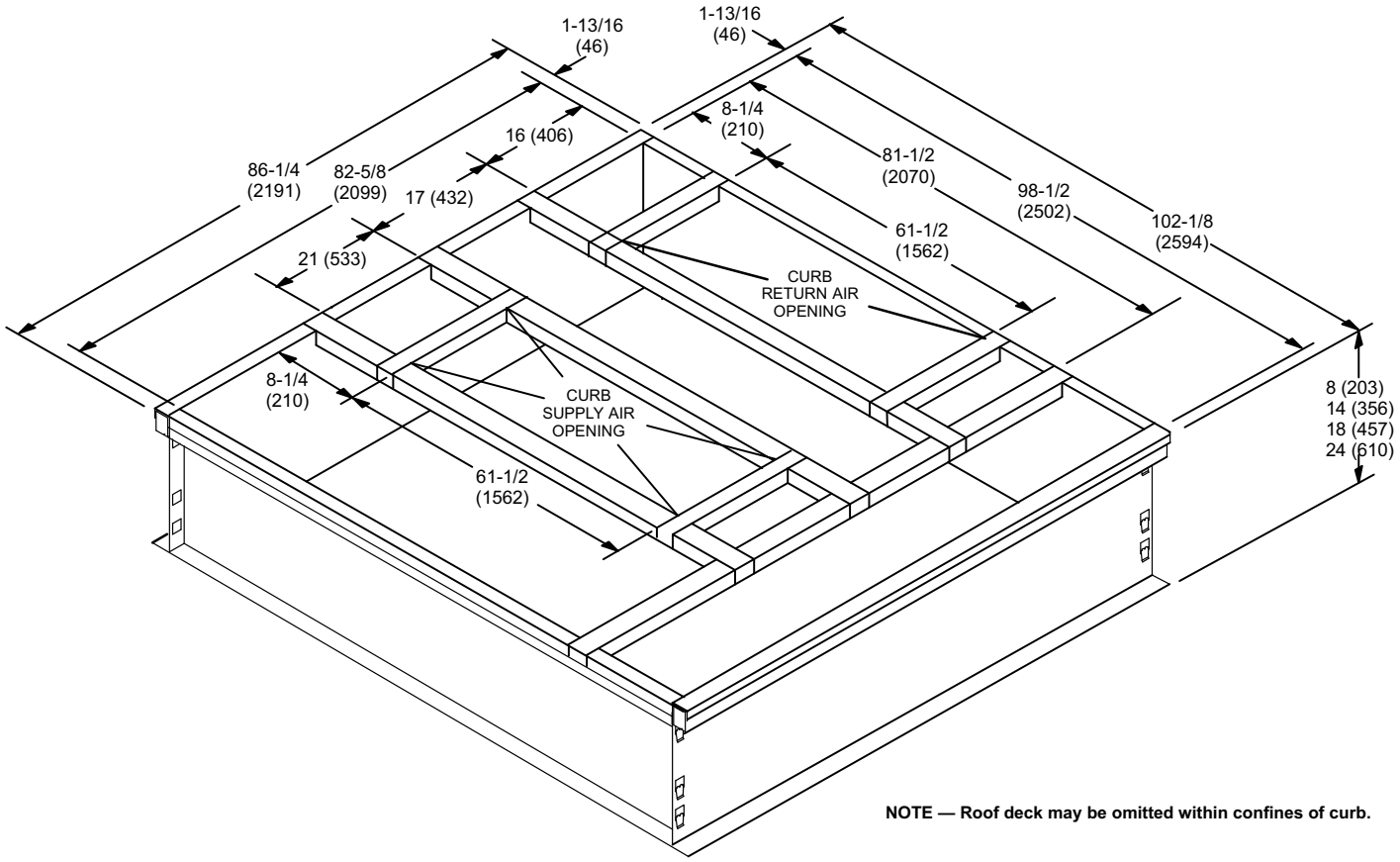
TYPICAL FLASHING DETAIL FOR ROOF CURB



DETAIL ROOF CURB

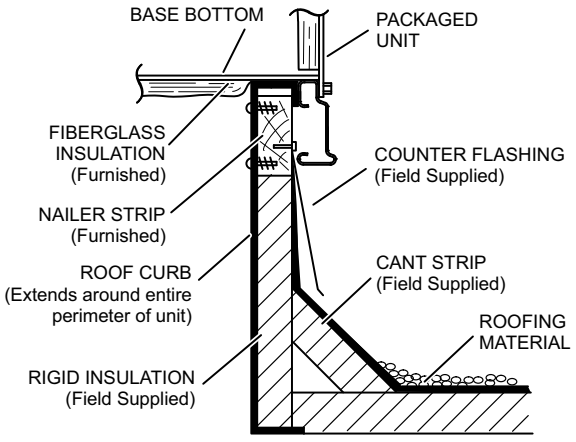


CLIPLOCK 1000 ROOF CURBS - DOUBLE DUCT OPENING

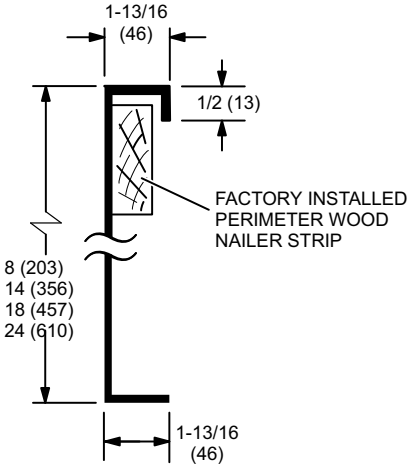


NOTE — Roof deck may be omitted within confines of curb.

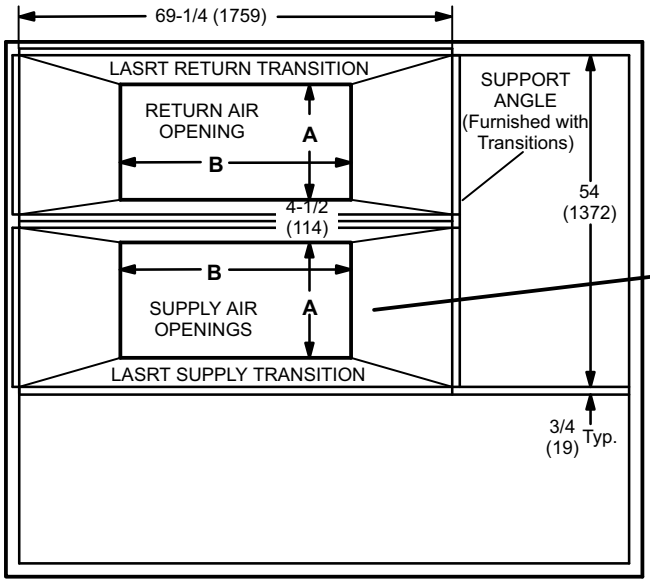
TYPICAL FLASHING DETAIL FOR ROOF CURB



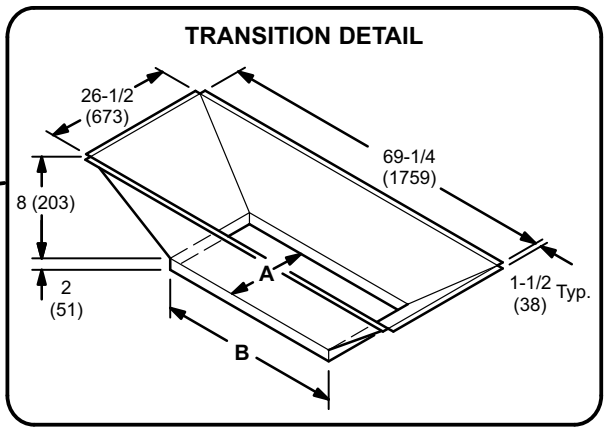
DETAIL ROOF CURB



STANDARD ROOF CURBS WITH SUPPLY & RETURN AIR TRANSITIONS FOR CEILING DIFFUSERS

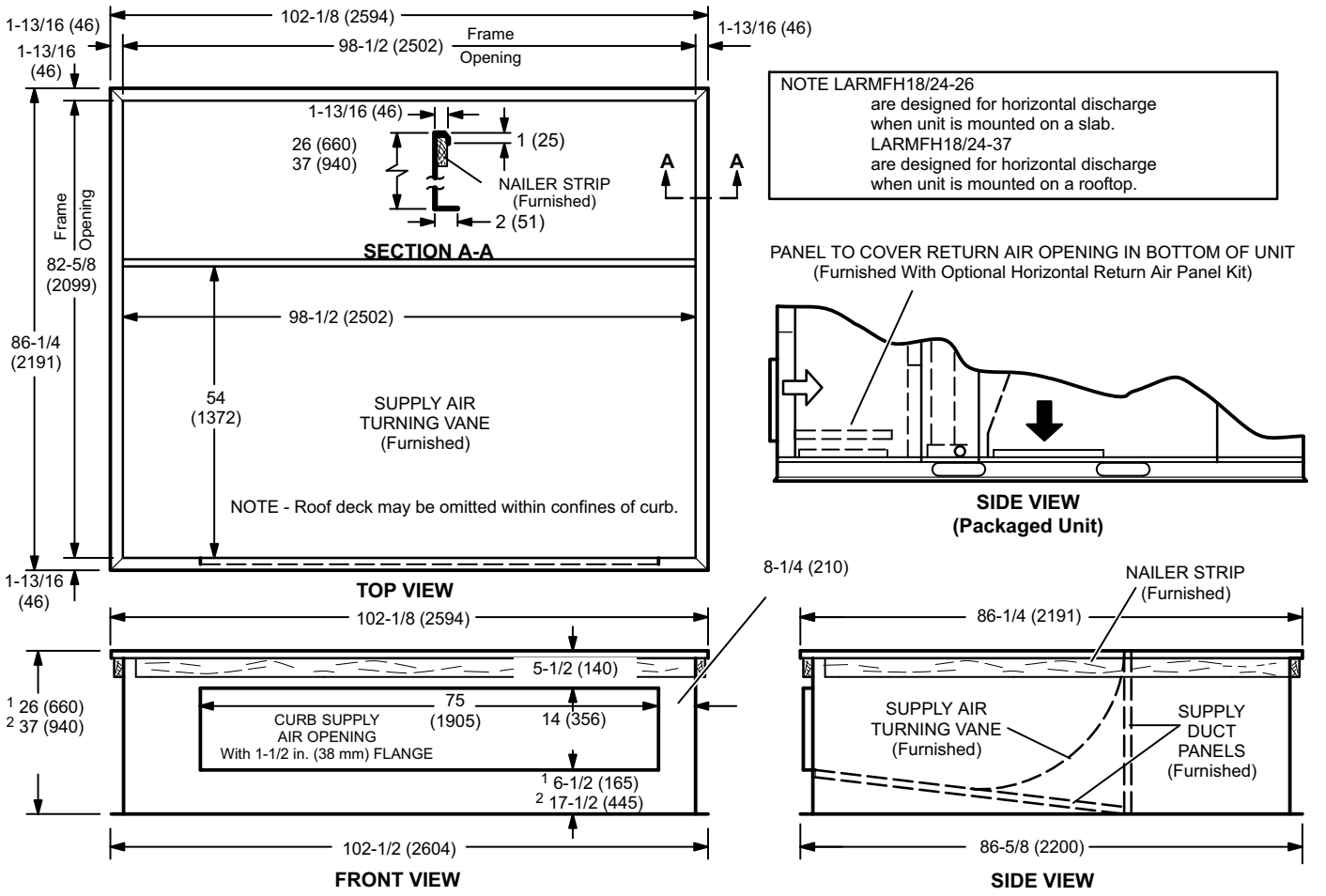


TOP VIEW



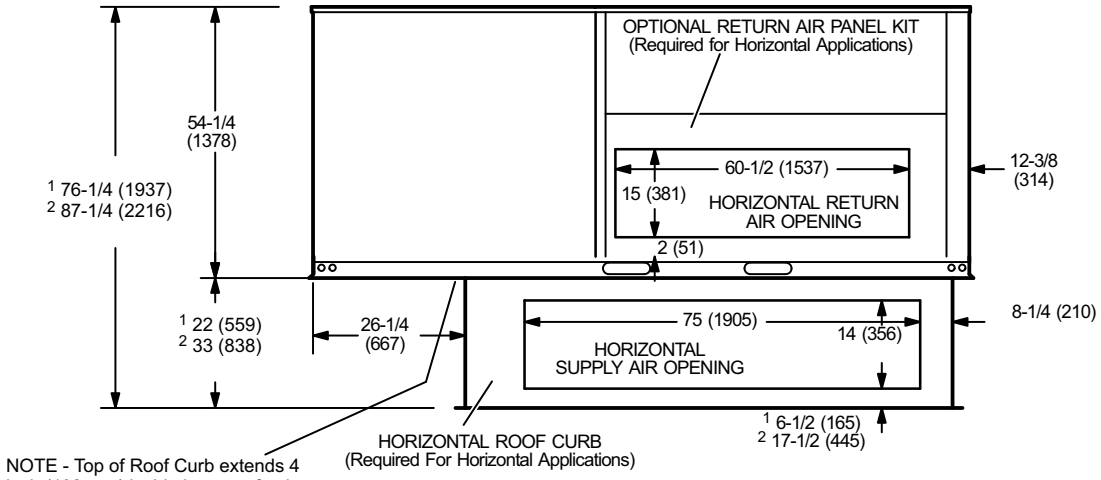
TRANSITION OPENING SIZES				
Model Number	A		B	
	inch	mm	inch	mm
LASRT18	18	457	36	914
LASRT21/24	24	610	48	1219

HORIZONTAL ROOF CURBS - Requires Optional Horizontal Return Air Panel Kit



1 LARMFH18/24-26 2 LARMFH18/24-37

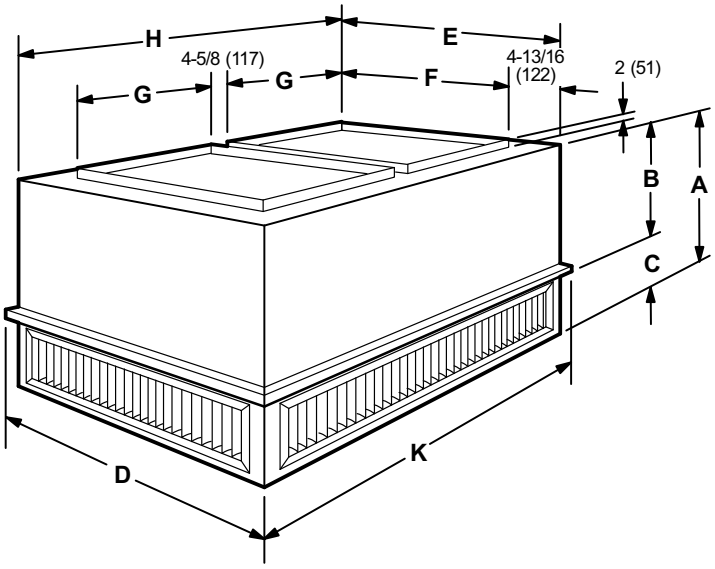
HORIZONTAL SUPPLY AND RETURN AIR OPENINGS WITH HORIZONTAL ROOF CURB



1 LARMFH18/24-26
2 LARMFH18/24-37

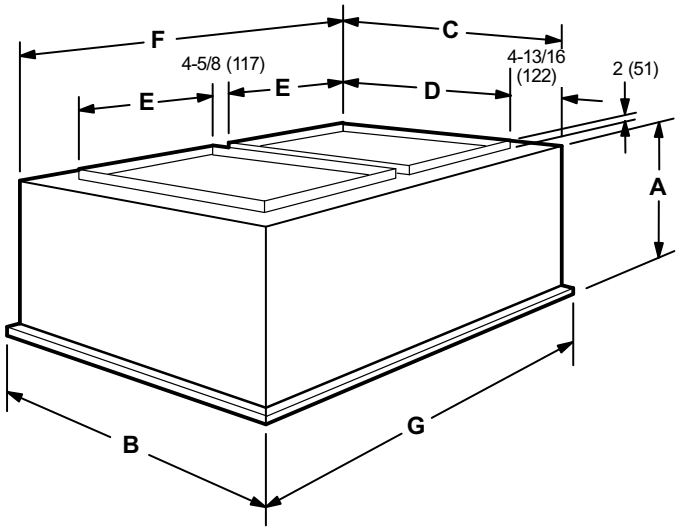
COMBINATION CEILING SUPPLY AND RETURN DIFFUSERS

STEP-DOWN CEILING DIFFUSER



Model Number		RTD11-185	RTD11-275
A	in.	34	40
	mm	864	1016
B	in.	23-7/8	28-7/8
	mm	606	225
C	in.	10-1/8	11-1/8
	mm	257	283
D	in.	47-5/8	59-5/8
	mm	1210	1514
E	in.	45-5/8	57-7/8
	mm	1159	1470
F	in.	36	48
	mm	914	1219
G	in.	18	24
	mm	457	610
H	in.	45-5/8	57-5/8
	mm	1159	1464
K	in.	47-5/8	59-5/8
	mm	1210	1521

FLUSH CEILING DIFFUSER



Model Number		FD11-185	FD11-275
A	in.	30-1/8	36-1/8
	mm	613	918
B	in.	47-5/8	59-5/8
	mm	1210	1514
C	in.	45-5/8	57-5/8
	mm	1159	1464
D	in.	36	48
	mm	914	1219
E	in.	18	24
	mm	457	610
F	in.	45-5/8	57-5/8
	mm	1159	1464
G	in.	47-5/8	59-5/8
	mm	1210	1521

This specification is for ***[Lennox Industries L Series®]*** rooftop units. Revise specification section number and title below to suit project requirements, specification practices and section content. Refer to CSI *MasterFormat ™* for other section numbers and titles.

Optional text and text that requires a decision are indicated by **bold brackets [ ]** and proprietary information is indicated by ***bold italic brackets[ ]***; delete text that is not needed in final copy of specification. Specifier Notes typically precede specification text; delete notes in final copy of specification. Trade/brand names with appropriate symbols typically are used in Specifier Notes; symbols are not used in specification text. Metric conversion, where used, is soft metric conversion.

Specifying Engineer Please Note - These Guide Specifications cover all L Series units (3 thru 30 tons).
Please edit to accurately identify the options selected for the job.

SECTION 23 74 33
UNITARY AIR CONDITIONING EQUIPMENT

PART 1 GENERAL

PART 1.01 SUMMARY

A. Section Includes: Packaged rooftop units and commercial packaged, gas/electric and electric/electric heat pumps.

Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI MasterFormat and specifier's practice.

B. Related Sections:

Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain Reference Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. Conditions of the Contract or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard, but is merely a listing of references used. Article below should list only those industry standards referenced in this section. Retain only those reference standards to be used within the text of this Section. Add and delete as required for specific project.

PART 1.02 REFERENCES

A. American National Standards Institute (ANSI):
   1. ANSI/ASHRAE 15 Safety Standard for Refrigeration Systems.
   2. ANSI/ASHRAE/IESNA 90.1 Energy Efficient Design of New Buildings Except Low-Rise Residential Buildings.
   3. ANSI Z21.47 Gas-Fired Central Furnaces.

B. Air-Conditioning, Heating and Refrigeration Institute (AHRI):
   1. AHRI 210/240 Unitary Air-Conditioning and Air-Source Heat Pump Equipment.
   2. AHRI 270 Sound Rating of Outdoor Unitary Equipment.
   3. AHRI 340/360 Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment.
   4. AHRI 370 Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment.

C. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE):
   1. ASHRAE 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI approved).
   2. ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality.

D. U.S. Energy Policy Act of 1992 (EPACT).

E. U.S. National Appliance Energy Conservation Act (NAECA):
   1. NAECA 1988.

F. National Fire Protection Association (NFPA):
   1. NFPA 90A Installation of Air Conditioning and Ventilation Systems.

G. Underwriters Laboratories, Inc. (UL):
   1. UL 1995 Standard for Safety for Heating and Cooling Equipment.

Specifier Note: Article below should be restricted to statements describing design or performance requirements and functional (not dimensional) tolerances of a complete system. Limit descriptions to composite and operational properties required to link components of a system together and to interface with other systems.

PART 1.03 SYSTEM DESCRIPTION

A. Design Requirements: Provide products and systems that have been manufactured, fabricated and installed to following criteria:

1. ANSI/ASHRAE/IESNA 90.1.
2. ANSI Z21.47.
3. UL 1995.

B. Performance Requirements:

1. Packaged Gas Electric:

a. Natural Gas Supply Pressure: 7 in. w.c. (1.7 kPa).

Specifier Note: For belt drive blowers from models LGC036S, LGA036H, LGC042S, LGA042H, LGC048S, LGA048H, LGC060S, LGA060H, LGC072S, LGA072H, LGC090S, LGA090H, LGC102S, LGA102H, LGC120S, LGA120H, LGC150S, LGC156H, LGC180S, LGC180H, LGC210S, LGC210H, LGC240S, LGA240H, LGA248H, LGC300S, LGC300H and LGC360H single phase is not an option.

b. LPG/Propane Supply Pressure: 11 in. w.c. (2.7 kPa).

Specifier Note: Specify 208/230V or 460V or 575V, 3-phase for L Series units from 6 - 30 ton (21.1 - 105.6 kW). Specify 208/230V, 1-phase, 208/230V, 460V or 575V, 3-phase for L Series units from 3 - 5 ton (10.6 - 17.6 kW).

2. Packaged Cooling:

a. Electrical Requirements for Direct Drive Blowers: 60 hz, **[208/230 V, 1-phase] [208/230 V, 3-phase] [460 V, 3-phase] [575 V, 3-phase]**.

Specifier Note: For belt drive blowers from models LCC036S, LCA036H, LCC042S, LCA042H, LCC048S, LCA048H, LCC060S, LCA060H, LCC072S, LCA072H, LCC090S, LCA090H, LCC102S, LCA102H, LCC120S, LCA120H, LCC150S, LCC156H, LCC180S, LCC180H, LCC210S, LCC210H, LCC240S, LCA240H, LCA248H, LCC300S, LCC300H and LCC360H single phase is not an option.

b. Electrical Requirements for Belt Drive Blowers: 60 hz, [**208/230 V, 3-phase] [460 V, 3-phase] [575 V, 3-phase]**.

Specifier Note: Available Heat Pump units include LHA090, LHA102, LHA120, LHA150, LHA180 and LHA240 only.

3. Packaged Heat Pumps:

a. Electrical Requirements: 60 hz, **[208/230 V, 3-phase] [460 V, 3-phase] [575 V, 3-phase]**.

4. AHRI Rated Net Cooling Efficiency: To meet or exceed ASHRAE Standard 90.1 at rated airflow not less than 350 cfm/ton.

Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in Conditions of the Contract and Division 1 Submittal Procedures Section.

PART 1.04 SUBMITTALS

A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.

B. Product Data: Submit product data for specified products.

C. Shop Drawings:

1. Submit shop drawings in accordance with Section 01 33 23 - Submittal Procedures.
2. Indicate:

a. Equipment, piping and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections.

b. Piping, valves and fittings shipped loose showing final location in assembly.

c. Control equipment shipped loose, showing final location in assembly.

d. Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, mounting curb details, sizes and location of mounting bolt holes; include mass distribution drawings showing point loads.

e. Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices or ancillaries, accessories and controllers.

f. Details of vibration isolation.

g. Estimate of sound levels to be expected across individual octave bands in dB.

h. Type of refrigerant used.

D. Quality Assurance:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

3. Manufacturer's Instructions: Manufacturer's installation instructions.

Specifier Note: Coordinate paragraph below with Part 3 Field Quality Requirements Article herein. Retain or delete as applicable.

E. Manufacturer's Field Reports: Manufacturer's field reports specified.

F. Closeout Submittals: Submit the following:

1. Warranty: Warranty documents specified.

2. Operation and Maintenance Data: Operation and maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance. Include names and addresses of spare part suppliers.

3. Provide brief description of unit, with details of function, operation, control and component service.

4. Commissioning Report: Submit commissioning reports, report forms and schematics in accordance with Section 01 91 00 - Commissioning.

PART 1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in Conditions of the Contract and Division 1 Regulatory Requirements Section. Repetitive statements should be avoided. Current data on building code requirements and product compliance may be obtained from filter manufacturer technical support specialists.

B. Regulatory Requirements: Provide **[Packaged gas electric] [Packaged cooling] [Packaged heat pump]** that complies with the following requirements:

1. AHRI 210/240.

2. AHRI 270.

3. AHRI 340/360.

4. ASHRAE 52.2.

5. NFPA 90A.

C. Preinstallation Meetings: Conduct preinstallation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Comply with Division 1 Project Management and Coordination (Project Meetings).

PART 1.06 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Packing, Shipping, Handling and Delivery:

1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

2. Ship, handle and unload units according to manufacturer's instructions.

D. Storage and Protection:

1. Store materials protected from exposure to harmful weather conditions.

2. Factory shipping covers to remain in place until installation.

PART 1.07 PROJECT CONDITIONS

A. Installation Location: **[Confirm design conditions and temperature.]**.

Specifier Note: Coordinate article below with Conditions of the Contract and with Division 1 Closeout Submittals (Warranty).

PART 1.08 WARRANTY

A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

B. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

Specifier Note: Coordinate paragraph below with manufacturer's warranty requirements.

C. Warranty: Commencing on Date of Installation.

1. Compressors: 5 years (limited).
2. Integrated Modular Control: 3 years (limited).
3. Other System Components: 1 year (limited).
4. Aluminized Heat Exchangers: 10 years (limited).
5. Stainless Steel Heat Exchangers: 15 years (limited).

PART 2 PRODUCTS

Specifier Note: Retain article below for proprietary method specification. Add product attributes, performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" or "or approved equal" or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal and regulatory) and assignment of responsibility for determining "or equal" products.

PART 2.01 ROOFTOP UNITS

A. Manufacturer: Lennox Industries Inc.

1. Contact: 2100 Lake Park Blvd., Richardson, TX 75080; Telephone: (800) 453-6669; website: www.lennox.com.

B. Proprietary Products/Systems: Lennox L Series Unitary Air Conditioning Equipment, including the following equipment:

1. Cabinet: Weatherproofing tested and certified to AGA **[Rain test standards]** and soundproofing tested to AHRI 270, **[_____]** dbA at **[_____]** m (_____) ft. free field.
   a. Heavy gauge steel panels and full perimeter heavy gauge galvanized steel base rails.
   b. Raised edges around duct and power entry openings in bottom of unit.
   c. Airflow Configuration: **[Down-flow (vertical) return air] [Horizontal return airflow with Horizontal Roof Mounting Frame] [And Horizontal Return Air Panel Kit (required when converting down-flow configured unit to horizontal airflow)]**.
   d. Power Entry: Electrical **[And gas]** lines brought through unit base or through horizontal access knockouts.
   e. Exterior Panels: Constructed of heavy gauge, galvanized steel with 2-layer enamel paint finish.
   f. Insulation: All panels adjacent to conditioned air fully insulated with non-hygroscopic fiberglass insulation. Unit base fully insulated.
   g. Base Rail: Full perimeter base rail with rigging holes; 3 sides with fork slots.
   h. Access Panels: Hinged for compressor/controls/heating areas, blower access and air filter/economizer access; and, sealed with quarter-turn latching handles and tight air and water seal.
2. Compressor:
   a. Copeland scroll type, hermetically sealed.
3. Fans, General: Centrifugal, forward curved impellers, statically and dynamically balanced. **[Multi]** V-belt drive with adjustable variable pitch motor pulley.
   a. Condenser Fan: Low sound operating, PVC coated fan guard, direct drive propeller type fans to discharge vertically.
   b. Condenser Fan Motor: Permanently lubricated, permanent split capacitor; totally enclosed from weather, dust and corrosion; permanently lubricated ball bearings; resiliently mounted; overload protected.
4. Evaporator Coils: Pressure and leak tested to 500 psi (3445 kPa), nonferrous coils with enhanced aluminum fins mechanically bonded to durable copper tubes.

5. Condenser Coils:
    a. Pressure and leak tested to 500 psi (3445 kPa), nonferrous coils with enhanced aluminum fins mechanically bonded to durable copper tubes.

Specifier Note: Specify slab construction for L Series over 6 tons (21.1 kW), excluding heat pumps.

    b. **[Formed construction] [Slab construction]**.
6. Air Distribution:
    a. Equipment capable of down-flow (vertical) or side (horizontal) handling of conditioned air.
    b. Optional Equipment:

Specifier Note: The following kit is required for horizontal air handling for L Series 3 - 12 ton (10.6 - 42.2 kW) models.

        1) Horizontal conversion kit for horizontal air handling.

Specifier Note: The following kit is required for horizontal air handling for L Series, 13 - 30 ton (45.8 - 105.6 kW) models.

        2) Horizontal return air panel kit and horizontal roof mounting frame for horizontal air handling.
7. Filters: To meet NFPA 90A, air filter requirements **[Type Class 1] [Type Class 2]; [_____]% efficiency, metal framed, [Replaceable media] [Throwaway] [Standard to unit manufacturer]**.
    a. Disposable 2 inch (51 mm).
    b. Disposable 2 inch (51 mm) pleated MERV 11 rated.
    c. Disposable 2 inch (51 mm) pleated MERV 15 rated.
8. Heat Exchanger: Removable for servicing; stainless steel optional for applications where mixed air temperature below 45 degrees F (7 degrees C); E.T.L./C.S.A. design certified for outdoor installation.
9. Gas Heating System:
    a. Tubular heat exchanger and inshot type gas burners constructed of aluminized steel.
    b. Direct spark ignition; electronic flame sensor controls; flame rollout switch; limit controls and automatic redundant dual gas valve with staging control and combustion air proving switch on combustion air inducer.

Specifier Note: When LPG/propane is required, specify optional kit.

    c. Able to use LPG/propane **[With optional kit]**.
    d. Complete service access provided for controls and wiring.
10. Electric Heating System:
    a. Available for factory or field installation.
    b. Heating elements of Nichrome bare wire exposed directly to airstream.
11. Refrigeration System:
    a. Self-sealing, discharge, suction and liquid line service gauge ports, freeze-stats, expansion valves and full refrigerant charge.

Specifier Note: R-22 is available on all models with 3 - 30 ton (10.6 - 105.6 kW) capacities. R-410 is available on all high efficiency units and on the 6, 12.5 and 25 ton (21.1, 44 and 87.9 kW) standard efficiency models. Variable air volume with R-410a is available on 21, 25 and 30 ton (74, 88 and 105.6 kW) units.

    b. **[R22] [R-410a] [Variable air volume] [Variable air volume with R-410a]**.
    c. Copper tubing not to touch sharp metal surfaces.
    d. Compressor Circuits: Automatic reset, high pressure switch; automatic reset, low pressure switch; liquid line filter-drier.
    e. Capable of operating down to 0 degrees F (-17 degrees C) without installation of additional controls.
12. Supply Air Blower:
    a. **[Constant air volume with adjustable pulleys] [Variable air volume with fixed pulleys and variable frequency drive] [Variable air volume with fixed pulleys and variable frequency drive with bypass]** with motor/drive combinations and optional drive kits.
    b. Centrifugal supply air blower with **[Permanently lubricated ball bearings and adjustable belt drive] [Sleeve bearings and multi-speed direct drive motor]**.
    c. Blower assembly **[Slides out of unit] [Is accessible]** for servicing.
    d. Blower wheel statically and dynamically balanced.

13. Integrated Modular Control (IMC):
    a. Solid state control board to operate unit.
    b. Built-in functions include: Blower on/off delay; built-in control parameter defaults; service relay output; dirty filter switch input; dehumidistat input, economizer control; **[Gas valve delay between stages]; [ETM compatible]; [DDC compatible]**; unit diagnosis; diagnostics code storage; indoor air quality input; low ambient controls; minimum run time; night setback mode; smoke alarm mode; low pressure control; thermostat bounce delay; 3-digit display; degrees F or degrees C display, 2-stage heat/4-stage cool thermostat compatible and warm-up mode; **[Electric heat staging with optional 4-stage board]**.
14. Gas Heating Controls:
    a. Remote thermostat**[s]** as indicated.
    b. Built-in **[Un]** fused disconnect switch.
    c. **[Four]** stages of heating control from **[Thermostat with optional four stage board] [DDC with room sensor]**.
    d. Supply fan to turn on **[40]** seconds after heating demand is received with 8 - 60 second adjustable time delay.
    e. Supply fan to turn off **[120]** seconds after heating demand has ended with 80 - 300 second adjustable time delay.
    f. Adjustable delay time of **[30] [Value between 30 - 160]** seconds between low and high fire of 2-stage gas valve system.
    g. Heat off delay of **[100] [Value between 30 - 300]** seconds after thermostat heating demand has ended.
    h. To turn off heat and keep supply air fan running if overheat limit occurs.
    i. Adjustable maximum overheat limit trip count during heating cycle of **[3] [Value between 1 - 15]**, with digital output, limit indicator.
    j. To report error with each occurrence of overheat limit trip and to identify limit that tripped. Error code stored in nonvolatile memory.
    k. To shut off gas heat if flame rollout occurs and to report error identifying rollout switch.
    l. Maximum flame rollout switch trip count of **[3]** during heating cycle, with digital output, limit indicator. Maximum count limit adjustable from 1 - 6 counts.
    m. To turn off heat if induced airflow is too low and to report error identifying pressure switch.
    n. Maximum induced airflow pressure switch trip count of **[3]** during heating cycle, with digital output, limit indicator. Maximum count limit adjustable from 1 - 6 counts.
    o. Error reported if gas valve not energized 2 minutes after heating demand; gas valve identified.
    p. Maximum ignition failure count of **[3]** with digital output, limit indicator. Maximum count limit adjustable from 1 - 6 counts.
    q. To shut off gas valve if flame not sensed. Error reported and stored in nonvolatile memory.
    r. Delay between stages on gas valve.
    s. To shut off unit if gas valve is energized with no demand for heat. Error reported and stored in nonvolatile memory.
15. Electric Heating Controls:
    a. Panel board with **[_____]** stage controller.
    b. Remote thermostat**[s]** as indicated.
    c. Built-in **[Un]** fused disconnect switch.
    d. Supply Fan: Start before electric elements are energized and continue operating until bonnet temperature reaches minimum setting. Include switch for continuous fan operation.
    e. Two stages of heating control from **[Thermostat] [DDC]**.
    f. Supply fan to turn off **[20]** seconds after heating demand has ended. Time delay adjustable from 0 - 300 seconds.
    g. With delay time of **[12]** seconds between low and high heat stages. Time delay adjustable from 12 - 60 seconds.
    h. To turn off heat and keep supply air fan running if overheat limit occurs.
    i. Adjustable maximum overheat limit trip count of **[3]** during heating cycle with digital output, limit indicator. Maximum count limit adjustable from 1 - 15 counts.
    j. Error reported and identified if overheat limit tripped. Error code stored in nonvolatile memory.
16. Cooling Controls:
    a. Provide **[Smoke detectors in return] [Smoke detectors in supply]**.

Specifier Note: Specify b, c or d below.

b. [**Manual] [Automatic]** outside **[And return]** air dampers for fixed outside air quantity.

c. Remote controlled outside **[And return]** air dampers with damper operator and means for adjusting outside air quantity.

d. Motorized outside, return and **[Automatic] [Power exhaust] [Gravity]** relief dampers with spring return damper operator and control package to automatically vary outside air quantity. Outside air and exhaust air dampers, normally closed.

e. Tight-fitting parallel blade dampers with neoprene or suitable gaskets, synthetic bushings and 1% maximum leakage.

f. Damper Operation: 24 V, spring return motor with gear train sealed in oil.

g. Mixed Air Controls: **[Maintain 55 degrees F (13 degrees C)] [Indicated]** mixed air temperature (adjustable).

h. Up to 2 stages of cooling from **[Thermostat] [External DDC controller]** without need for additional controls.

i. Up to 3 stages of cooling when used with relay and **[3-stage thermostat] [DDC controller]**.

j. Up to 4 stages of cooling standard with room sensor.

Specifier Note: Specify article "j" when used with Lennox L Connection Network Building Automation System.

k. Up to 4 stages of cooling.

l. To allow blower on delay of up to 60 seconds after cooling demand is received. Default value of zero.

m. To allow blower off delay of up to 240 seconds after cooling demand has ended. Default value of zero.

n. Minimum compressor on time of [**240]** seconds on 3-phase units, adjustable between 60 - 510 seconds.

o. Minimum compressor off time of **[300]** seconds on single-phase units, adjustable from 60 - 510 seconds.

p. Default maximum high pressure switch trip occurrence during cooling or dehumidification cycle of **[3]**. Trip occurrence limit adjustable from 1 - 8 occurrences. If maximum limit reached, compressor locked out and digital output for service activated.

q. Default maximum low pressure switch trip occurrence during cooling or dehumidification cycle of **[3]**. Trip occurrence limit adjustable from 1 - 8 occurrences. If maximum limit reached, compressor locked out and digital output for service activated.

r. Low pressure trip read delay of **[5]** minutes if compressor off time has been less than 4 hours and outdoor temperature is less than 70 degrees F (21 degrees C). Delay adjustable from 0 - 34 minutes. Temperature set point adjustable from 10 degrees F (-12 degrees C) to 100 degrees F (38 degrees C). Compressor off time adjustable from 1 - 6 hours.

s. Low pressure trip read delay of **[15]** minutes if compressor off time has been 4 hours or greater and outdoor temperature is less than 70 degrees F (21 degrees C). Delay adjustable from 0 - 34 minutes. Temperature set point adjustable from 10 degrees F (-12 degrees C) to 100 degrees F (38 degrees C). Compressor off time adjustable from 1 - 6 hours.

t. Low pressure trip read delay of **[2]** minutes if compressor off time has been less than 4 hours and outdoor temperature is 70 degrees F (21 degrees C) or greater. Delay adjustable from 0 - 34 minutes.

u. Temperature set point adjustable from 10 degrees F (-12 degrees C) to 100 degrees F (38 degrees C). Compressor off time adjustable from 1 - 6 hours.

v. Low pressure trip read delay of **[8]** minutes if compressor off time has been 4 hours or greater and outdoor temperature is 70 degrees F (21 degrees C) or greater. Delay adjustable from 0 - 34 minutes.

w. Temperature set point adjustable from 10 degrees F (-12 degrees C) to 100 degrees F (38 degrees C). Compressor off time adjustable from 1 - 6 hours.

x. Each pressure switch trip occurrence (either high or low) to record error in nonvolatile memory and identify compressor circuit.

y. Low outdoor air temperature compressor lockout set point of 0 degrees F (-18 degrees C) for each compressor circuit. Low outdoor temperature limit set point individually adjustable for each compressor circuit from 80 degrees F (27 degrees C) to -30 degrees F (-34 degrees C).

z. Maximum allowable evaporator freeze-stat trip occurrence of **[3]** during cooling demand with limit adjustable from 1 - 4 occurrences. Control to shut off compressor each time freeze-stat trip occurs and record error code in nonvolatile memory. If maximum limit reached, compressor locked out and digital output for service activated.

aa. Condenser Fan Control:

1) On units with multiple condenser fans, **[6]** second time delay between condenser fan shutoff and restart to prevent reverse rotation of fan. Time delay adjustable between 0 - 16 seconds.

2) On units with 4 condenser fans, first stage low outdoor temperature set point of 55 degrees F (13 degrees C) that reduces airflow through condenser by turning off some fans. Set point adjustable between 60 degrees F (16 degrees C) and 10 degrees F (-12 degrees C).

3) On units with 6 condenser fans, second stage low outdoor temperature set point of 40 degrees F (4 degrees C) to reduce airflow through condenser by turning off all fans. Set point adjustable between 60 degrees F (16 degrees C) and 10 degrees F (-12 degrees C).

4) On units with 6 condenser fans, condenser fan on delay of **[2]** seconds. Adjustable between 0 - 240 seconds.

Specifier Note: Edit article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.

PART 2.02 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

PART 3 EXECUTION

PART 3.01 MANUFACTURER'S INSTRUCTIONS

Specifier Note: Article below is an addition to the CSI SectionFormat and a supplement to MANU-SPEC. Revise article below to suit project requirements and specifier's practice.

A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, and product carton installation instructions.

PART 3.02 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

PART 3.03 INSTALLATION

A. Install **[Packaged rooftop units] [And] [Commercial packaged, gas/electric and electric/electric heat pumps]** in accordance with manufacturer's instructions, on roof curbs **[Provided by manufacturer] [As indicated]**.

B. Run drain line from cooling coil condensation drain pan to discharge **[Over roof drain]**.

PART 3.04 COMPLETION AND CLEANUP

A. Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

AFTERMARKET ZONING SYSTEM INTERFACE

Introduction

Lennox' seventh generation premium rooftop unit (RTU) controller, the Integrated Modular Controller (IMC) version M1-7, along with a variable frequency drive (VFD) option on certain L Series® and S-Class™ RTUs, increases the ability of premium Lennox RTUs to be applied to a variety of zoning systems. The type of zoning system to be used dictates the type of RTU and the requirements for the zoning control system. The following explains each basic system and how the IMC must interface with an aftermarket zoning control system to meet the requirements of each application.

Lennox units in single zone and constant volume bypass applications may utilize an aftermarket unit controller as supervisory controller for the RTU. The IMC runs in thermostat mode and is primarily useful for diagnostic purposes, allowing the aftermarket controller to directly monitor and control heat/cool staging, the bypass damper, zone dampers, etc. When the IMC is used in thermostat mode, a maximum of two stage heating and three stage cooling are available.

Supervisory control must be provided by the Lennox IMC to minimize complication and standardize control on Lennox VFD-controlled variable air volume (VAV) RTUs. In this configuration, the IMC controls the VFD based on static pressure in the supply duct. It controls the economizer, and stages compressors based on discharge air temperature. The aftermarket controller simply sends calls for cooling or heating based on setpoint and schedule conditions. The IMC also has many options for controlling single-stage, 50% power exhaust fans; two-stage, 100% Power exhaust fans; or modulating power exhaust fans.

NOTE - Please refer to the IMC Manual (M1-7 Version 5.0x) for additional details.

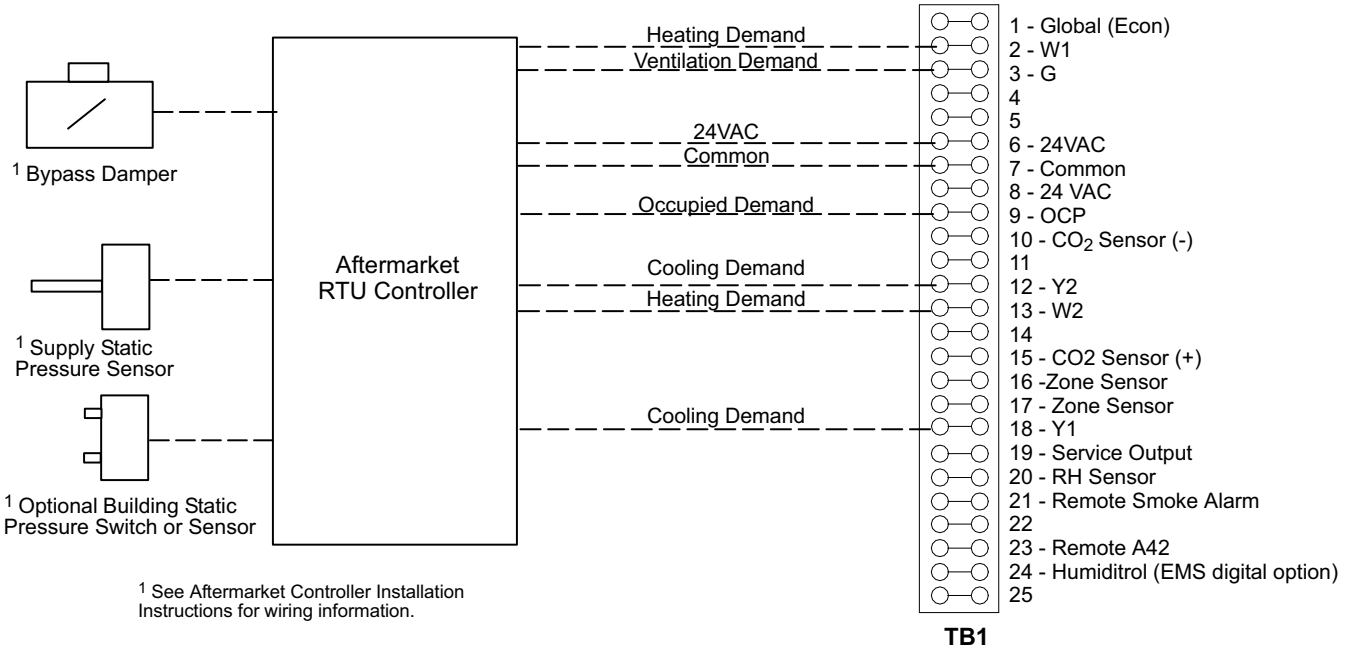
Interface Definition

With an aftermarket control system interface, the IMC requires four digital inputs to control the rooftop unit: G (blower enable), OCP (occupied), Y1 (enables discharge cooling), W1 (enables discharge heating) and Y2 (second stage call for cooling) and W2 (second stage call for heating) should be added in constant volume applications.

These configurations minimize the controls expertise required to create a viable interface. Further, they create a consistent, standardized approach conducive to support and trouble-shooting on a broad basis without the need for substantial knowledge of the IMC, VFD, bypass, or aftermarket controllers or systems.

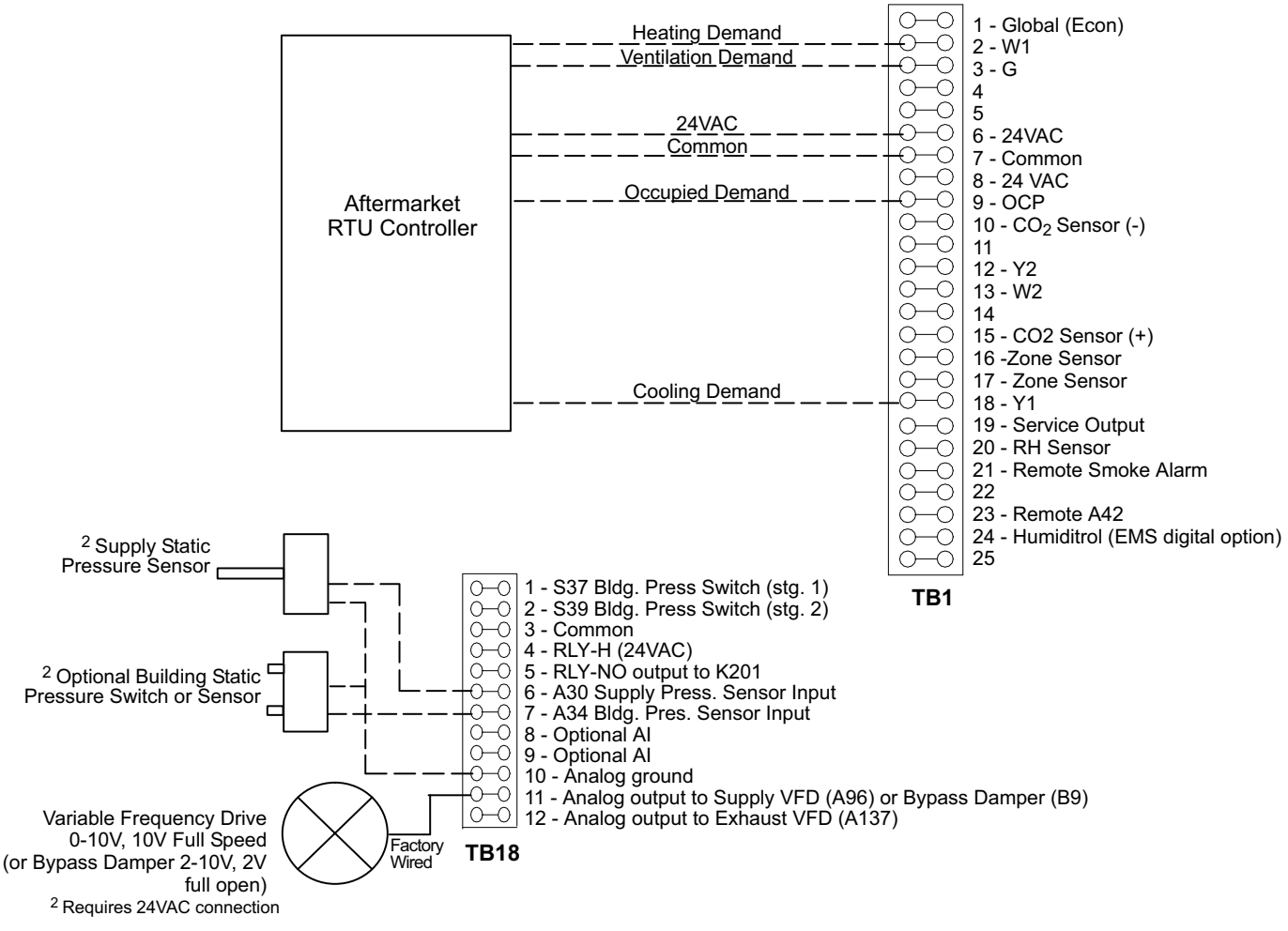
AFTERMARKET ZONING SYSTEM INTERFACE

Constant Volume Bypass RTU Wiring Summary for units equipped with M1-6 or M1-7 (Aftermarket Supervisory Control)



[1] See Aftermarket Controller Installation Instructions for wiring information.

Variable Air Volume RTU Wiring Summary - for units equipped with M1-7 (IMC Supervisory Control)



[2] Requires 24VAC connection

AFTERMARKET ZONING SYSTEM INTERFACE

Sequence of Operation
IMC Supervisory Control

Operation when IMC blower (G) input is energized

When a G signal is present, the IMC controls the VFD or bypass damper to hold a constant supply duct static pressure based on the input from the IMC pressure sensor, using a PID control loop. For increased flexibility, the IMC has separate, adjustable static pressure setpoints for ventilation, cooling, heating and smoke alarms. These set points reside in the memory of the IMC, have factory default settings, and may be adjusted in the field prior to start-up.

Operation when IMC occupied (OCP) input is energized

When an OCP signal is present, the IMC adjusts the fresh air damper to either a fixed minimum position or allows it to modulate based on a CO_2 sensor. The CO_2 sensor can be wired directly to the IMC, to another controller that can monitor the sensor and pass a signal to the IMC for damper control, or to both the IMC and another device for monitoring through the desired man-machine interface while the IMC maintains damper control. During morning warm-up/cool-down the IMC keeps the fresh air damper closed based on the IMC configuration settings selected. The set points for minimum and maximum damper position setting and CO_2 control reside in the memory of the IMC, have factory default settings, and may be adjusted at start up. They cannot be adjusted using the aftermarket controls system.

Operation when IMC first stage cooling (Y1) input is energized

When a Y1 signal is present the IMC controls up to 4 stages of cooling (depending on RTU configuration) to maintain a cooling discharge air temperature setpoint. These stages include mechanical cooling, or outdoor air for cooling with an economizer. The discharge air temperature setpoint resides in the IMC, has a factory default setting, and may be adjusted at start up. It cannot be adjusted using the aftermarket controls system. The IMC has advanced discharge-air cooling reset options selected at start up based on return air temperature and/or outside air temperature. Outside air reset saves energy by gradually increasing the discharge air set point as outside air temperature decreases. Return air reset reduces potential for overcooling if the zoning system is misapplied, has an abnormal condition, or a dominant zone. The reset gradually increases discharge air temperature as return air temperature decreases.
NOTE - Y2 signal is recommended for constant volume applications.

Operation when IMC first stage heating (W1) input is energized

When a W1 signal is present, the IMC controls up to 4 stages of heating (depending on RTU configuration) to maintain a heating discharge air temperature. The heating discharge air temperature set point resides in the IMC, has a factory default setting, and may be adjusted at start up. It cannot be adjusted using the aftermarket controls system. The IMC has advanced discharge air heating reset options based on return air temperature and/or outside air temperature. Outside air reset saves energy by gradually decreasing the discharge air set point as outside air temperature increases. Return air reset reduces the potential for overheating if the zoning system is misapplied, has an abnormal condition, or a dominant zone. The reset gradually decreases discharge air temperature as return air temperature increases.
NOTE - W2 signal is recommended for constant volume applications.

Power Exhaust Fan Operation

The IMC has many power exhaust fan control options that include single-stage, two-stage and modulating control, depending on how the unit is equipped. Stage control options can be triggered based on fresh air damper positions, pressure switches, or a analog pressure sensor. Modulating control for units with VFD powered exhaust fans are typically modulated to maintain return or building static pressure, but can be staged. Set-points and operation settings for controlling power exhaust fans reside in the IMC, have factory default settings, and may be adjusted at start up. They cannot be adjusted using the aftermarket controls system.

REVISIONS

Sections	Description of Change
Dimensions	Revised LHA180/240 drawing. Revised Horizontal Roof Curb drawing.
Options/Accessories	Modified descriptions for CO_2 sensors. Removed Sectra

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Improper installation, adjustment, alteration, service or maintenance can cause property damage or personal injury.
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