

# LMHS-LC

Single Duct Terminal Unit | Large Casing



## INTRODUCTION

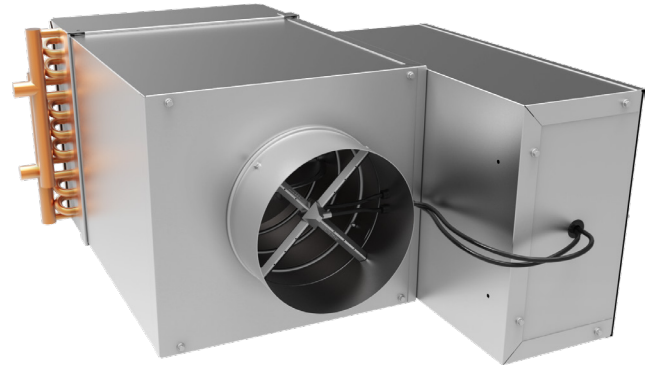
The LMHS-LC terminal units are a fantastic energy efficient alternative to the traditional LMHS single duct terminal unit. The LMHS-LC utilizes a large casing, which accompanied with a hot water re-heat coil greatly reduces air pressure loss through the coil, increases heating performance, and in some cases reduces number of coil rows. This is especially true when low entering water temperature is used for the hot water reheat coil. The LMHS-LC comes with several different configurations and control packages that makes it easy to integrate into any HVAC system. The efficient and reliable LMHS-LC unit is available with pneumatic, analog or direct digital control options. When your design is maximizing on every opportunity to be energy efficient with a hot water reheat system, the Krueger LMHS-LC is the terminal unit of choice.

## MODEL

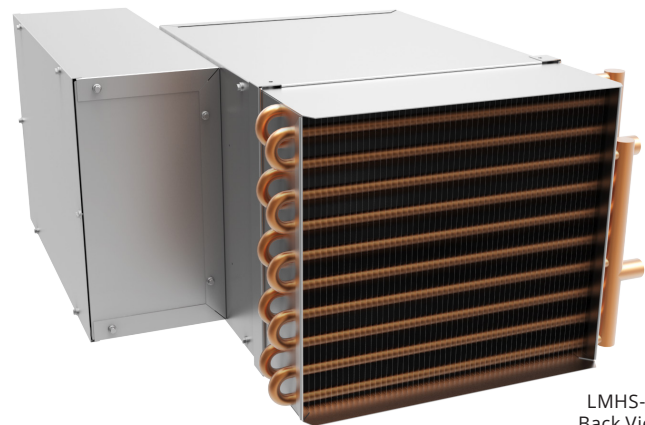
LMHS-LC: Large Casing Single Duct Terminal Unit

## FEATURES

- 22 gauge galvanized steel casing construction with a 20 gauge casing option that provides strength and product durability.
- AHRI listings for certified performance in accordance with AHRI Standard 880 testing standard.
- Available 6"x9" access opening for easy accessibility during routine inspections and maintenance.
- Several casing liner options provide quiet and clean operation.
- Airflow capacities from 40 to 2800 CFM providing airflow control for most commercial applications.
- Round inlet sizes from 4" through 14" diameter which are slightly undersized to fit standard spiral and flex duct.
- Rectangular discharge with slip and drive connections providing quick and easy connection to hot water heat coils and down stream duct work.
- Pneumatic, analog, and digital controls may be customized for many building systems. BACnet/BMS compatible digital controls can be provided by Krueger.
- K4 Lineacross four quadrant, multi-point center averaging sensor or optional linear, multiple-point, averaging velocity sensor, offers low resistance to airflow while providing amplified velocity pressure signal to the controller.
- Gasketed round volume control damper operates over a full 90° range and provides a low leakage shutoff position.
- An oversized hot water coil outperforms the a traditionally sized hot water coil, making this unit the perfect terminal unit for low entering water temperature applications.



LMHS-LC  
Front View



LMHS-LC  
Back View

## AHRI CERTIFIED PERFORMANCE DATA

INLET SIZE	RATED CFM	MIN $\Delta$ Ps	DISCHARGE DATA					
			SOUND POWER @ 1.5" $\Delta$ Ps					
			2	3	4	5	6	7
4	150	0.100	69	64	55	51	49	44
5	250	0.100	71	69	62	54	50	47
6	400	0.100	71	70	62	54	50	47
7	550	0.100	73	72	61	56	53	52
8	700	0.100	74	71	62	58	54	51
9	900	0.100	71	68	61	57	54	52
10	1100	0.100	71	68	63	59	57	54
12	1600	0.100	74	68	64	61	59	57
14	2100	0.100	74	68	63	61	59	57

INLET SIZE	RATED CFM	MIN $\Delta$ Ps	RADIATED DATA					
			SOUND POWER @ 1.5" $\Delta$ Ps					
			2	3	4	5	6	7
4	150	0.100	56	49	42	40	37	33
5	250	0.100	59	52	44	39	35	31
6	400	0.100	60	58	50	40	36	33
7	550	0.100	60	57	51	43	39	35
8	700	0.100	62	59	49	43	38	38
9	900	0.100	60	56	50	42	39	35
10	1100	0.100	58	54	50	43	38	32
12	1600	0.100	64	58	51	46	42	36
14	2100	0.100	60	56	47	44	41	36

NOTES: All sound data is based on tests conducted in accordance with AHRI 880-11.  $\Delta$ Ps is the difference in static pressure from inlet to discharge. Sound power levels are in dB, re  $10^{-12}$  Watts. Discharge sound power is the sound emitted from the unit discharge. Radiated sound power is the sound transmitted through the casing walls. Discharge sound power has been corrected for end reflection. NC application data is from AHRI Standard 885-08 Appendix E, as a function of flow rate shown. See Krueger's selection program for specific sound data for optional liners; 1/2", dual density liner shown. See Engineering section for reductions and definitions. AHRI certification points are shown in bold, white font in the sound performance data found on page A2-35 and A2-36.



## UNIT CAPACITIES

### SELECTION EXAMPLE - BASED ON CFM CRITERIA

A zone exists requiring VAV control. The maximum flow is to be 500 CFM; the minimum is to be 175 CFM, based on heat requirements. Use the table to the right to select a size 6. Note that size 7 will also be capable of controlling the required amount.

### AIRFLOW CAPACITY DETAILS

- CFM ranges are factory set on all pressure independent pneumatic control sequences.
- Factory set minimum CFMs are based on the controller's ability to accurately maintain flow setting. Factory will not set controls outside the ranges indicated.
- Minimum CFM settings can be set at 0 CFM; however, ventilation requirements can be met by setting a minimum greater than zero. Krueger recommends a minimum setpoint equal to 25% of the nominal flow rating of the terminal.
- Pressure dependent pneumatic or electric controls do not have the ability to control CFM settings. Therefore, the minimum setting is always zero. A set maximum flow rate is not possible.
- The ASHRAE handbook of fundamentals states that discharge temperatures in excess of 90°F are likely to result in objectionable air temperature stratification in the space. Also, ventilation short circuiting may occur. ASHRAE Standard 62.1 limits discharge temperatures to 90°F or increasing the ventilation rate when heating from the ceiling.

INLET SIZE	MAX PRIMARY AIRFLOW - CFM	MIN AIRFLOW - CFM
		STANDARD*
4	230	40
5	360	62
6	515	89
7	700	121
8	920	159
9	1160	201
10	1430	248
12	2060	357
14	2800	486

\* The Standard Minimum CFM value is based on a signal of 0.03" WG differential pressure of the inlet sensor. Minimum CFM may be 0. The inlet sensor is capable of reading a signal down to .01" WG. To operate unit below the Standard Minimum CFM values listed, DDC Controller must be capable to accurately read below 0.03" WG.

### PRODUCT DESCRIPTION

#### CASING

- All LMHS-LC unit casing panels are constructed of 22 gauge galvanized steel with a 20 gauge option.

#### INLET COLLARS

- All round 20 gauge inlet collars accommodate standard spiral and flex duct sizes.
- Left or right hand is determined by looking in the direction of airflow with the unit in the installed position.

#### OUTLET CONNECTION

- All standard outlet connections are rectangular and require a slip and drive duct connection.

#### DAMPER ASSEMBLY

- Unit sizes 4 - 14 utilize a round control damper. All damper assemblies utilize a solid 1/2" shaft that rotates in self lubricating Delrin® bearings.
- Damper blade incorporates a flexible gasket for tight airflow shutoff and operates over a full 90° rotation.
- The damper position is marked by an arrow embossment on the end of the damper shaft.

#### CASING LINERS

All liners are attached to the unit casing with both adhesive and weld pins to ensure long term durability (excludes Sterilwall and Perforated Doublewall). The standard liner option is 1/2" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.

- **(Optional)** 1" Thick Insulation: 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.
- **(Optional)** Cellular Insulation: 1/2" or 1" thick, 1 1/2 lb. density, smooth surface, polyolefin, closed-cell foam insulation for fiber free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth.
- **(Optional)** Steriliner Insulation: 13/16" thick, 4 lb. density, rigid board insulation with nylon reinforced foil covering insulation fibers that meets UL 181 and NFPA 90A. Liner shall be attached to unit

casing by adhesive and weld pins with full-seam-length Z-strips to enclose and seal the insulation cut edges.

- **(Optional)** Sterilwall Insulation: 1/2" or 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional)** Perforated Doublewall Insulation: 1/2" or 1", 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheet metal cover extending over the fiberglass insulation and covering the liner cut edges.
- **(Optional)** No Liner: No internal insulation liner.
- See Krueger's selection program for acoustical impact of different liners.

#### AIRFLOW SENSOR

- All units are equipped with a factory installed airflow measuring sensor.
- The standard sensor is a K4 LineaCross four quadrant, multipoint center averaging sensor.
- **(Optional)** Linear, multi-point, velocity averaging sensor with an amplified signal is also available.
- Balancing taps are provided to allow for easy airflow verification.
- Both the linear and K4 LineaCross sensors use the same flow constant.

#### CONTROLS

- Pneumatic, analog or direct digital control types are available. Digital controls can be provided by others or Krueger for factory mounting. A "no control" unit is also available for field mounting of direct digital controls where a sheet metal enclosure will be provided by Krueger.

#### ACCESS PANEL

- **(Optional)** Gasketed access panel in the terminal unit casing is available for viewing damper components and for upstream cleaning of the hot water coil fins.

#### OVERSIZED HOT WATER REHEAT COIL

- Hot water coils are constructed of ten aluminum fins per inch with sweat type, left or right hand, tubing connections. The 1/2" diameter coil tubing is water leakage tested to 400 PSIG and has a wall thickness of 0.016".
- **(Optional)** Twelve fins per inch for higher capacity.
- **(Optional)** Vent and drain on coil headers.

#### CONTROL TRANSFORMERS

- Optional factory supplied and wired control transformer mounted inside the control enclosure.

#### LABELS

- Label information is adhered to each unit and includes model name, unit size, configuration code, airflow (CFM), balancing chart and tagging data.

#### PACKAGING

- LMHS-LC base units with and without hot water coils are individually packaged in a carton and stacked on a pallet. Attenuated units are stacked directly on the pallet. All pallets are banded and stretch wrapped with cellophane.

## TYPICAL APPLICATION

Krueger LMHS-LC large casing single duct terminal units are designed to be easily incorporated in the overall building HVAC design. Control packages allow the LMHS-LC to be used in constant volume and variable volume applications. Although designed for compatibility with low pressure (<0.10"Ps), the LMHS-LC unit performs reliably in high pressure systems as well (up to 6.0" Ps). See the Engineering section for more information.

In variable volume pressure independent applications, the LMHS-LC unit compensates for system pressure, while adjusting the airflow in response to room thermostat demand. When used in a constant volume application, the LMHS-LC can maintain a set flow requirement, compensating for fluctuations in system pressure.

Interior zones are typically controlled by an LMHS with a cooling-only control package; exterior zones are often controlled by an LMHS-LC with hot water reheat coils and a reheat control package.

NOTE: Reference the Design Guidelines in the Engineering section of this catalog for more details on Oversizing Terminal Units, Capacity Concentrated in Too Few Terminal Units, Insufficient Space, and Improper Discharge Conditions.

## DAMPER AND CASING LEAKAGE

INLET SIZE	DAMPER LEAKAGE			CASING LEAKAGE			
	1.5" WG	3.0" WG	6.0" WG	0.5" WG	1.0" WG	1.5" WG	3.0" WG
	CFM	CFM	CFM	CFM	CFM	CFM	CFM
4	4	5	7	4	5	6	9
5	4	5	7	4	5	6	9
6	4	5	7	4	5	6	9
7	4	5	7	4	6	7	10
8	4	5	7	4	6	7	10
9	4	5	7	5	7	9	12
10	4	5	7	5	7	9	12
12	4	5	7	6	9	11	16
14	4	6	8	7	10	13	17

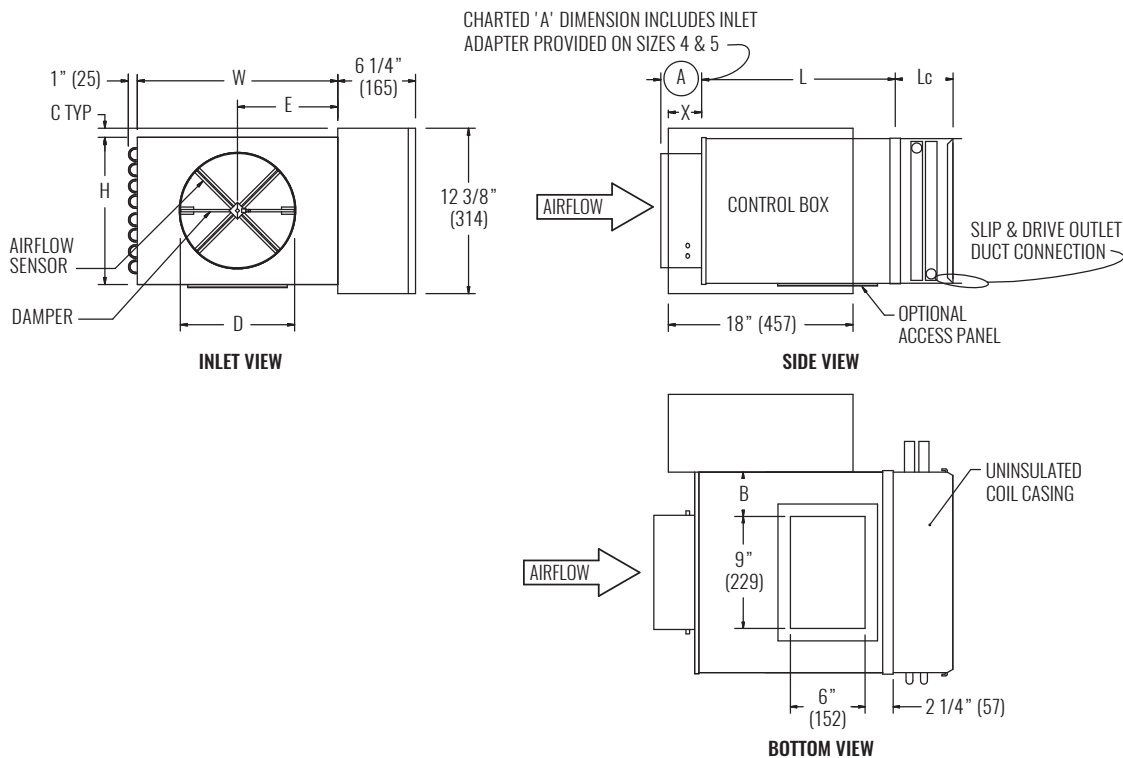
NOTES: Damper leakage is measured with the damper fully closed using an actuator. A precision low flow orifice is used upstream of the unit to measure the leakage rate as a function of the measured upstream static pressure. Casing leakage is determined with the damper fully open and the discharge of the unit sealed. A precision low flow orifice is used upstream of the unit to measure the leakage rate as a function of the supplied static pressure. Leakage testing conducted in accordance with ASHRAE 130-2008.

# LMHS-LC

Single Duct Terminal Unit | Large Casing



## DIMENSIONAL DATA | BASE UNIT WITH HOT WATER HEAT



INLET SIZE	MAX CFM [L/s]	L	W	H	A	B	C	D	E	X	Lc
4	230 [109]	15 1/2" (394)	12" (305)	10" (254)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	3 7/8" (98)	6" (152)	7 1/4" (184)	SEE PAGE A2-38
5	360 [170]	15 1/2" (394)	12" (305)	10" (254)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	4 7/8" (124)	6" (152)	7 1/4" (184)	
6	515 [243]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	5 7/8" (149)	6" (152)	7 1/4" (184)	
7	700 [330]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	6 7/8" (175)	7" (178)	5 1/4" (133)	
8	920 [434]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	7 7/8" (200)	7" (178)	5 1/4" (133)	
9	1160 [547]	15 1/2" (394)	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	8 7/8" (225)	8" (203)	5 1/4" (133)	
10	1430 [674]	15 1/2" (394)	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	9 7/8" (251)	8" (203)	5 1/4" (133)	
12	2060 [972]	15 1/2" (394)	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	-	11 7/8" (302)	10" (254)	3 1/4" (83)	
14	2800 [1321]	15 1/2" (394)	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	-	13 7/8" (352)	12" (305)	3 1/4" (83)	

NOTES: \*Dimensions in parentheses are millimeters. Right-hand base unit with electronic control enclosure shown; left-hand is available.

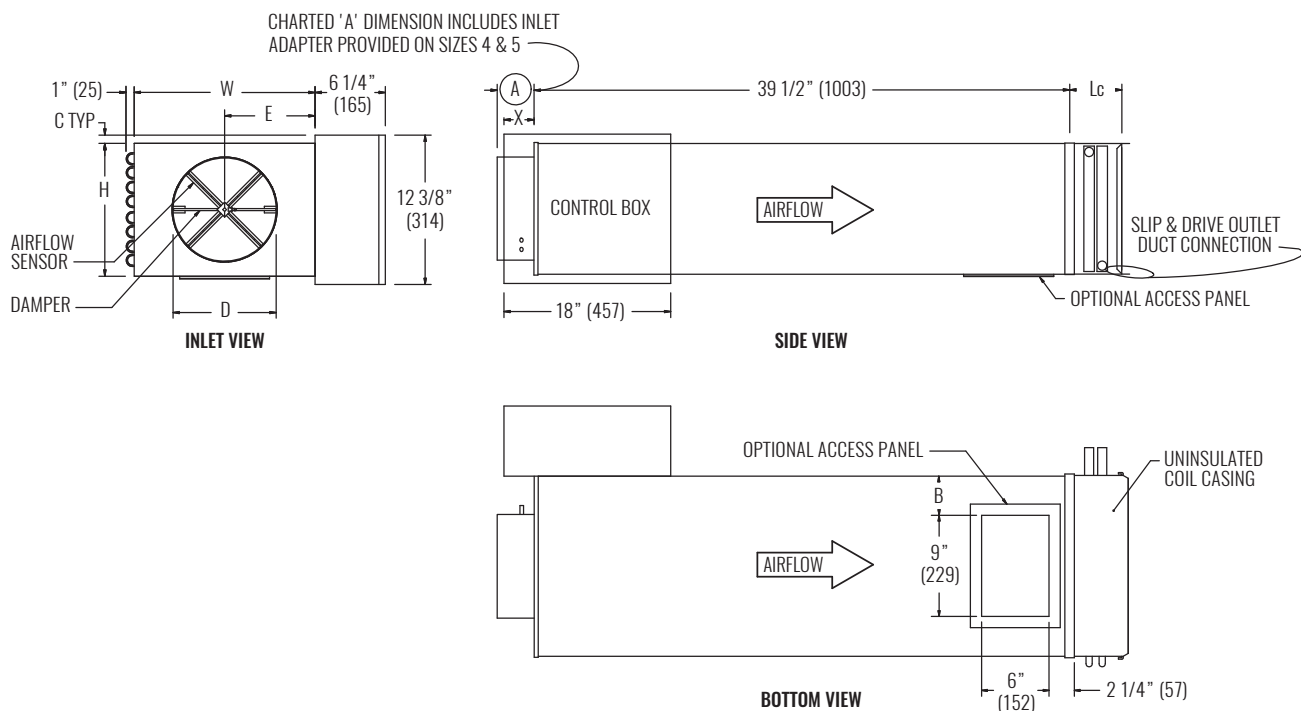
### STANDARD FEATURES

- 22 gauge galvanized steel construction
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" dia shaft extending from the unit casing
- 1/2" thick dual density fiberglass insulation meeting NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging cross flow sensor
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- Hot water coils
- ETL Listed - Adherence to UL 429 for electrically operated valves
- AHRI 880 certified sound ratings

### OPTIONAL FEATURES\*

- 20 gauge galvanized steel construction
- Liners: 1/2" or 1" cellular, 1" dual density fiberglass, sterilwall, sterliner, perforated doublewall, or no liner
- Linear averaging airflow sensor
- 24-volt transformer
- Disconnect switch for electronic controls
- Dust tight control enclosure
- Left or right-hand control enclosure
- Left or right-hand water coil connection
- Bottom access panel
- Cam locks (bottom access panel)
- Hanger brackets

## DIMENSIONAL DATA | BASE UNIT WITH HOT WATER HEAT AND ATTENUATOR



INLET SIZE	MAX CFM [L/s]	W	H	A	B	C	D	E	X	Lc
4	230 [109]	12" (305)	10" (254)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	3 7/8" (98)	6" (152)	7 1/4" (184)	SEE NEXT PAGE
5	360 [170]	12" (305)	10" (254)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	4 7/8" (124)	6" (152)	7 1/4" (184)	
6	515 [243]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	5 7/8" (149)	6" (152)	7 1/4" (184)	
7	700 [330]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	6 7/8" (175)	7" (178)	5 1/4" (133)	
8	920 [434]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	7 7/8" (200)	7" (178)	5 1/4" (133)	
9	1160 [547]	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	8 7/8" (225)	8" (203)	5 1/4" (133)	
10	1430 [674]	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	9 7/8" (251)	8" (203)	5 1/4" (133)	
12	2060 [972]	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	-	11 7/8" (302)	10" (254)	3 1/4" (83)	
14	2800 [1321]	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	-	13 7/8" (352)	12" (305)	3 1/4" (83)	

NOTES: \*Dimensions in parentheses are millimeters. Right-hand configuration with electronic control enclosure shown; left-hand is available.

### STANDARD FEATURES

- 22 gauge galvanized steel construction
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" dia shaft extending from the unit casing
- 1/2" thick dual density fiberglass insulation meeting NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging cross flow sensor
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- Hot water coils
- ETL Listed - Adherence to UL 429 for electrically operated valves
- AHRI 880 certified sound ratings

### OPTIONAL FEATURES\*

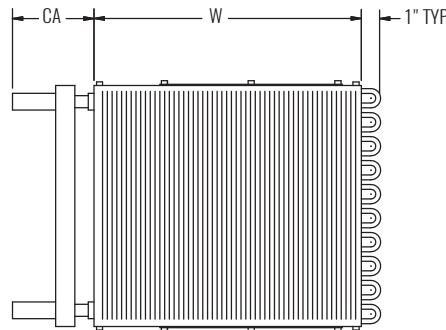
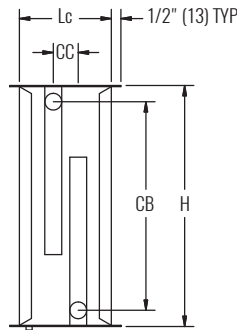
- 20 gauge galvanized steel construction
- Liners: 1/2" or 1" cellular, 1" dual density fiberglass, sterlwall, sterliner, perforated doublewall, or no liner
- Linear averaging airflow sensor
- 24-volt transformer
- Disconnect switch for electronic controls
- Dust tight control enclosure
- Left or right-hand control enclosure
- Left or right-hand water coil connection
- Bottom access panel
- Cam locks (bottom access panel)
- Hanger brackets

# LMHS-LC

Single Duct Terminal Unit | Large Casing



## DIMENSIONAL DATA | HOT WATER COIL



UNIT SIZE	NUMBER OF ROWS	H	W	Lc	CA	CB	CC	WATER CONNECTION*
4, 5, 6	1	10 1/4" (260)	12" (305)	5" (127)	3" (76)	8 3/4" (222)	-	1/2" (13)
	2	10 1/4" (260)	12" (305)	5" (127)	2 1/2" (64)	8 3/4" (222)	-	5/8" (16)
	3	10 1/4" (260)	12" (305)	7 1/4" (184)	4 1/4" (108)	8 3/8" (213)	2 3/16" (56)	7/8" (22)
	4	10 1/4" (260)	12" (305)	7 1/4" (184)	4 1/4" (108)	9" (229)	3 1/4" (83)	7/8" (22)
7, 8	1	12 3/4" (324)	14" (356)	5" (127)	4 1/4" (108)	10 7/8" (276)	1 1/8" (29)	7/8" (22)
	2	12 3/4" (324)	14" (356)	5" (127)	4 1/4" (108)	11 1/2" (292)	1 1/16" (27)	7/8" (22)
	3	12 3/4" (324)	14" (356)	7 1/4" (184)	4 1/4" (108)	10 7/8" (276)	2 3/16" (56)	7/8" (22)
	4	12 3/4" (324)	14" (356)	7 1/4" (184)	4 1/4" (108)	11 1/2" (292)	3 1/4" (83)	7/8" (22)
9, 10	1	15 1/4" (387)	16" (406)	5" (127)	4 1/4" (108)	13 3/8" (340)	1 1/8" (29)	7/8" (22)
	2	15 1/4" (387)	16" (406)	5" (127)	4 1/4" (108)	14" (356)	1 1/16" (27)	7/8" (22)
	3	15 1/4" (387)	16" (406)	7 1/4" (184)	4 1/4" (108)	13 3/8" (340)	2 3/16" (56)	7/8" (22)
	4	15 1/4" (387)	16" (406)	7 1/4" (184)	4 1/4" (108)	14" (356)	3 1/4" (83)	7/8" (22)
12	1	17 3/4" (451)	20" (508)	7 1/2" (191)	4 1/4" (108)	15 7/8" (403)	1 1/8" (29)	7/8" (22)
	2	17 3/4" (451)	20" (508)	7 1/2" (191)	4 1/4" (108)	16 1/2" (419)	1 1/16" (27)	7/8" (22)
	3	17 3/4" (451)	20" (508)	9 3/4" (248)	4 1/4" (108)	15 7/8" (403)	2 3/16" (56)	7/8" (22)
	4	17 3/4" (451)	20" (508)	9 3/4" (248)	4 1/4" (108)	16 1/2" (419)	3 1/4" (83)	7/8" (22)
14	1	17 3/4" (451)	24" (610)	7 1/2" (191)	4 1/4" (108)	15 7/8" (403)	1 1/8" (29)	7/8" (22)
	2	17 3/4" (451)	24" (610)	7 1/2" (191)	4 1/4" (108)	16 1/2" (419)	1 1/16" (27)	7/8" (22)
	3	17 3/4" (451)	24" (610)	9 3/4" (248)	4 1/4" (108)	15 7/8" (403)	2 3/16" (56)	7/8" (22)
	4	17 3/4" (451)	24" (610)	9 3/4" (248)	4 1/4" (108)	16 1/2" (419)	3 1/4" (83)	7/8" (22)

\*NOTES: Dimensions in parentheses are millimeters. Water connection dimension is O.D.

### STANDARD FEATURES

- Shipped from factory attached to the unit discharge
- Slip and drive field duct work installation
- Coil section is uninsulated
- Coil Casing - 20 gauge galvanized steel
- Connection Tubing - 0.032" thick copper (see O.D. connection diameter in table)
- Coil Tubing - 1/2" diameter x 0.016" thick copper
- Coil Fins - 0.0045" thick aluminum, 10 FPI, mechanically bonded to tubing

### OPTIONAL FEATURES

- 12 FPI, 0.0045" thick aluminum fins, 0.016" thick copper tube
- 10 FPI, 0.0045" thick aluminum fins, 0.035" thick copper tube
- Coil Accessories - Air vent and drain ports



**NOTE:**

For hot water performance data tables, visit the Krueger website at [www.krueger-hvac.com](http://www.krueger-hvac.com) or download the Krueger selection software to run customized selections. The selection program can provide performance data with different entering air and water conditions as well as show effects of altitude and glycol on the heating performance of the water coil. The selection software also allows selections to be saved in a schedule format that can be imported onto a set of project drawings.

**GLOSSARY OF ABBREVIATIONS**

- EAT - Entering Air Temperature (°F)
- EWT - Entering Water Temperature (°F)
- CFM - Cubic Feet/Minute (Air Volume)
- Btuh - Heating Capacity (British Thermal Units/hr)
- MBH - 1,000 Btuh
- WTD - Water Temperature Drop (°F)
- ATR - Air Temperature Rise (°F)
- LAT - Leaving Air Temperature (°F)
- kW - Heating Capacity (kilowatts)
- Ps - Static Pressure Drop ("WG)
- GPM - Gallon Per Minute
- WPD - Water Pressure Drop or Head Loss (ft WG)



## PERFORMANCE DATA | DISCHARGE SOUND

INLET SIZE	FLOW RATE		MIN Δ Ps		0.75" Δ Ps							1.5" Δ Ps							2.5" Δ Ps						
					OCTAVE BAND SOUND POWER, L <sub>w</sub>						L <sub>p</sub>	OCTAVE BAND SOUND POWER, L <sub>w</sub>						L <sub>p</sub>	OCTAVE BAND SOUND POWER, L <sub>w</sub>						L <sub>p</sub>
	CFM	(L/s)	"WG	(Pa)	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC	2	3	4	5	6	7	NC
4	50	(24)	0.011	(2.76)	53	41	35	34	29	25	-	54	42	39	38	33	31	-	55	43	42	41	36	35	-
	110	(52)	0.054	(13.37)	63	56	47	43	40	34	-	64	58	51	47	44	40	<b>20</b>	65	59	53	50	47	44	<b>21</b>
	150	(71)	0.100	(24.88)	68	62	52	47	45	38	<b>24</b>	69	64	55	51	49	44	<b>26</b>	69	65	58	54	51	48	<b>27</b>
	230	(109)	0.235	(58.51)	73	71	58	52	51	43	<b>32</b>	74	72	62	56	55	49	<b>33</b>	75	73	64	59	57	53	<b>34</b>
5	60	(28)	0.006	(1.43)	49	41	39	31	30	25	-	52	44	44	35	35	31	-	55	47	47	38	38	35	-
	140	(66)	0.031	(7.80)	60	55	50	43	39	34	-	63	59	55	47	44	40	-	66	61	58	50	48	45	<b>22</b>
	250	(118)	0.100	(24.88)	67	66	58	50	46	41	<b>25</b>	71	69	62	54	50	47	<b>29</b>	73	72	66	57	54	51	<b>32</b>
	360	(170)	0.207	(51.60)	72	72	63	55	50	45	<b>31</b>	76	75	67	59	55	51	<b>35</b>	78	78	70	62	58	55	<b>38</b>
6	100	(47)	0.006	(1.56)	51	47	35	31	33	29	-	55	52	40	35	38	36	-	57	56	44	39	42	41	-
	250	(118)	0.039	(9.72)	62	59	49	44	41	36	-	66	64	54	48	46	43	<b>23</b>	68	68	58	51	50	48	<b>28</b>
	400	(189)	0.100	(24.88)	68	65	56	50	45	40	<b>23</b>	71	70	62	54	50	47	<b>29</b>	74	74	66	57	54	52	<b>33</b>
	520	(245)	0.169	(42.05)	71	68	60	54	47	43	<b>27</b>	74	73	66	58	53	50	<b>33</b>	77	77	70	61	57	55	<b>37</b>
7	120	(57)	0.005	(1.18)	56	54	33	28	32	32	-	60	60	39	32	38	40	-	63	65	43	34	43	45	<b>25</b>
	330	(156)	0.036	(8.96)	65	61	48	44	42	41	-	69	68	54	48	48	48	<b>27</b>	72	73	58	50	52	54	<b>32</b>
	550	(260)	0.100	(24.88)	69	65	56	53	47	45	<b>23</b>	73	72	61	56	53	52	<b>31</b>	76	76	66	59	57	58	<b>37</b>
	700	(330)	0.162	(40.31)	71	67	59	57	49	47	<b>24</b>	75	73	65	60	55	54	<b>32</b>	78	78	69	62	59	60	<b>38</b>
8	160	(76)	0.005	(1.30)	57	51	42	34	37	33	-	60	57	48	39	42	40	-	62	61	53	42	47	45	-
	440	(208)	0.040	(9.83)	66	61	52	47	45	41	-	69	67	58	52	51	48	<b>25</b>	72	71	62	55	55	53	<b>30</b>
	700	(330)	0.100	(24.88)	70	66	56	53	49	44	<b>24</b>	74	71	62	58	54	51	<b>31</b>	76	76	67	61	58	56	<b>36</b>
	920	(434)	0.173	(42.98)	73	68	59	56	51	46	<b>26</b>	76	74	65	61	57	53	<b>33</b>	78	78	69	64	61	58	<b>38</b>
9	200	(94)	0.005	(1.23)	50	46	35	32	35	35	-	53	51	39	36	40	42	-	55	54	43	39	44	46	-
	550	(260)	0.037	(9.29)	62	57	49	46	44	42	-	65	62	54	50	50	48	-	67	66	57	53	53	53	<b>24</b>
	900	(425)	0.100	(24.88)	68	63	56	53	49	46	-	71	68	61	57	54	52	<b>25</b>	73	71	64	59	58	56	<b>30</b>
	1160	(547)	0.166	(41.34)	72	66	60	56	52	47	<b>23</b>	74	71	65	60	57	53	<b>29</b>	76	74	68	63	60	58	<b>33</b>
10	250	(118)	0.005	(1.29)	50	48	40	38	39	37	-	53	53	45	42	45	43	-	55	57	48	45	49	48	-
	700	(330)	0.040	(10.08)	62	58	52	49	48	45	-	65	63	57	54	53	51	<b>21</b>	68	67	61	57	57	55	<b>26</b>
	1100	(519)	0.100	(24.88)	68	63	58	54	51	48	-	71	68	63	59	57	54	<b>26</b>	73	72	67	62	61	58	<b>30</b>
	1450	(684)	0.174	(43.24)	71	66	61	58	53	50	<b>23</b>	74	71	66	62	59	56	<b>29</b>	77	74	70	65	63	61	<b>33</b>
12	400	(189)	0.006	(1.56)	52	47	39	42	42	42	-	56	52	43	46	47	48	-	58	56	46	50	50	52	-
	1000	(472)	0.039	(9.72)	64	58	53	52	50	48	-	68	63	57	56	55	54	-	70	67	60	60	58	58	<b>24</b>
	1600	(755)	0.100	(24.88)	71	63	60	57	54	51	<b>22</b>	74	68	64	61	59	57	<b>26</b>	77	72	67	65	62	61	<b>30</b>
	2060	(972)	0.166	(41.25)	74	66	63	59	56	52	<b>26</b>	78	71	68	64	61	58	<b>30</b>	80	75	71	67	64	63	<b>34</b>
14	480	(227)	0.005	(1.30)	47	44	33	39	38	40	-	50	48	37	43	42	46	-	52	52	39	46	45	50	-
	1375	(649)	0.043	(10.67)	64	58	53	52	50	48	-	67	62	56	56	54	54	-	69	65	58	59	57	58	<b>22</b>
	2100	(991)	0.100	(24.88)	71	63	60	58	55	52	<b>22</b>	74	68	63	61	59	57	<b>26</b>	76	71	66	64	62	62	<b>29</b>
	2800	(1321)	0.178	(44.24)	75	67	66	61	58	54	<b>28</b>	78	71	69	65	62	60	<b>32</b>	81	75	71	68	65	64	<b>35</b>

NOTES: Discharge sound power is the sound emitted from the unit discharge. All sound data is based on tests conducted in accordance with AHRI 880-11 and corrected for end reflection. Sound power levels are in dB, re 10<sup>-12</sup> Watts. ΔPs is the difference in static pressure from inlet to discharge. NC application data is from AHRI Standard 885-08 Appendix E, as a function of flow rate shown. AHRI certification points are shown in bold, white font. For a complete list of AHRI certified data, see page A2-4. All other data points listed are application ratings outside the scope of the Certification Program. See Krueger's selection program for specific sound data for optional liners; 1/2", dual density liner shown. Dash indicates a NC is less than 20. See Engineering section for reductions and definitions.

**PERFORMANCE DATA | RADIATED SOUND**

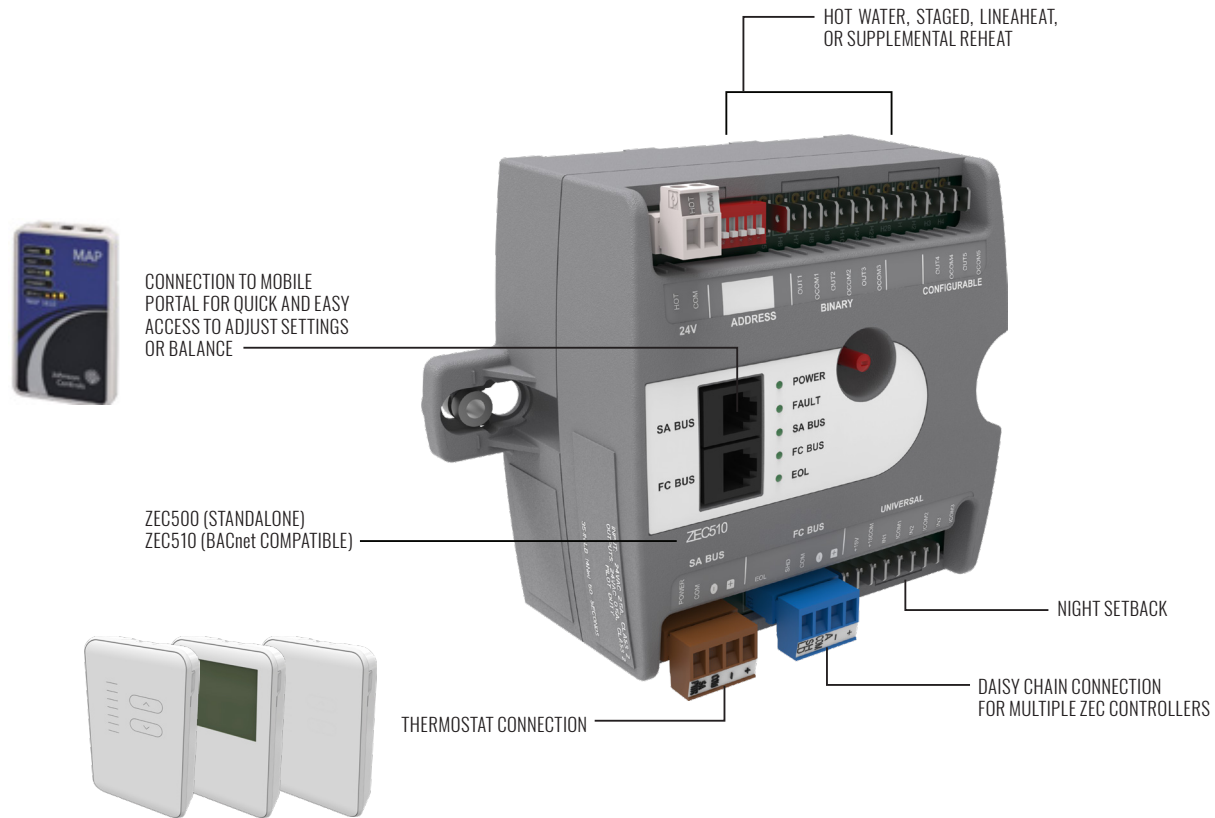
INLET SIZE	FLOW RATE		MIN Δ Ps		0.75" Δ Ps								1.5" Δ Ps								2.5" Δ Ps							
					OCTAVE BAND SOUND POWER, Lw								Lp	OCTAVE BAND SOUND POWER, Lw								Lp	OCTAVE BAND SOUND POWER, Lw					
	CFM	(L/s)	"WG	(Pa)	2	3	4	5	6	7	NC	2		3	4	5	6	7	NC	2	3		4	5	6	7	NC	
4	50	(24)	0.011	(2.76)	37	28	24	23	17	10	-	38	29	27	25	19	15	-	38	30	30	27	21	18	-			
	110	(52)	0.054	(13.37)	50	42	34	33	30	23	-	51	43	38	35	32	28	-	51	45	40	37	34	31	-			
	150	(71)	0.100	(24.88)	55	47	39	37	35	29	-	56	49	42	40	37	33	-	56	50	45	41	39	37	-			
	230	(109)	0.235	(58.51)	62	55	45	43	42	36	24	62	57	48	45	44	40	26	63	58	51	47	46	44	27			
5	60	(28)	0.006	(1.43)	38	21	17	12	8	6	-	43	26	22	15	11	12	-	47	30	26	18	14	17	-			
	140	(66)	0.031	(7.80)	47	36	30	26	22	17	-	52	41	35	29	25	23	-	56	45	39	32	28	28	-			
	250	(118)	0.100	(24.88)	53	47	39	36	31	25	-	59	52	44	39	35	31	20	62	55	47	41	38	36	25			
	360	(170)	0.207	(51.60)	57	53	44	42	37	30	21	62	58	49	45	41	36	27	66	62	53	47	44	41	31			
6	100	(47)	0.006	(1.56)	43	35	24	15	10	6	-	46	40	28	20	16	13	-	49	44	31	24	20	19	-			
	250	(118)	0.039	(9.72)	52	47	38	28	23	19	-	56	52	43	33	29	26	-	58	55	46	37	33	32	24			
	400	(189)	0.100	(24.88)	57	53	46	35	30	26	21	60	58	50	40	36	33	27	63	61	53	43	40	38	31			
	520	(245)	0.169	(42.05)	60	56	50	39	34	29	25	63	61	54	43	39	37	30	65	64	57	47	43	42	35			
7	120	(57)	0.005	(1.18)	38	42	25	17	12	7	-	42	47	31	21	16	14	-	44	51	35	24	19	19	-			
	330	(156)	0.036	(8.96)	50	48	38	31	27	22	-	54	54	44	36	31	28	22	57	58	49	39	34	33	27			
	550	(260)	0.100	(24.88)	56	52	45	39	34	29	-	60	57	51	43	39	35	26	63	61	55	46	42	40	31			
	700	(330)	0.162	(40.31)	59	53	48	42	38	32	23	63	59	54	46	42	38	29	66	63	59	50	45	43	34			
8	160	(76)	0.005	(1.30)	45	39	27	22	18	16	-	48	45	34	27	23	23	-	50	49	39	30	27	28	-			
	440	(208)	0.040	(9.83)	55	49	38	33	28	26	-	58	54	45	38	33	33	23	60	59	50	41	37	38	28			
	700	(330)	0.100	(24.88)	59	53	43	38	32	31	21	62	59	49	43	38	38	28	64	63	55	46	41	43	33			
	920	(434)	0.173	(42.98)	62	56	45	41	35	34	24	65	62	52	46	40	41	31	67	66	57	49	44	46	37			
9	200	(94)	0.005	(1.23)	38	36	21	22	21	19	-	42	42	26	26	26	27	-	44	47	29	29	30	33	-			
	550	(260)	0.037	(9.29)	50	45	38	33	30	24	-	54	51	42	37	35	32	-	56	56	45	40	39	38	25			
	900	(425)	0.100	(24.88)	56	49	46	38	34	27	-	60	56	50	42	39	35	24	62	60	53	45	43	41	30			
	1160	(547)	0.166	(41.34)	59	52	50	41	37	28	24	63	58	54	45	42	36	28	65	63	57	48	46	42	32			
10	250	(118)	0.005	(1.29)	33	33	17	16	11	3	-	39	39	21	20	19	14	-	43	44	23	24	25	23	-			
	700	(330)	0.040	(10.08)	46	43	37	31	24	15	-	52	50	41	36	32	27	-	56	54	44	40	38	35	23			
	1100	(519)	0.100	(24.88)	52	48	46	38	30	21	20	58	54	50	43	38	32	24	62	59	52	46	44	41	28			
	1450	(684)	0.174	(43.24)	55	51	52	42	33	24	26	61	57	55	47	42	36	30	66	62	58	51	48	44	33			
12	400	(189)	0.006	(1.56)	42	44	29	24	20	15	-	46	49	33	28	24	20	-	50	53	37	31	28	25	21			
	1000	(472)	0.039	(9.72)	54	50	41	36	32	25	-	58	55	45	40	36	31	23	61	58	48	43	40	35	27			
	1600	(755)	0.100	(24.88)	60	53	47	42	38	31	22	64	58	51	46	42	36	28	67	61	54	49	46	41	32			
	2060	(972)	0.166	(41.25)	63	55	50	45	41	33	26	67	59	54	49	46	39	32	71	63	58	52	49	43	36			
14	480	(227)	0.005	(1.30)	35	35	19	24	21	18	-	39	40	22	27	24	22	-	43	44	25	30	27	26	-			
	1375	(649)	0.043	(10.67)	50	46	37	36	33	28	-	54	51	40	39	37	32	-	58	55	43	42	39	36	24			
	2100	(991)	0.100	(24.88)	56	51	44	41	38	32	-	60	56	47	44	41	36	25	64	60	50	47	44	40	29			
	2800	(1321)	0.178	(44.24)	60	54	49	44	41	34	23	65	59	52	48	45	39	28	68	63	55	50	47	42	33			

NOTES: Radiated sound power is the sound transmitted through the casing walls. All sound data is based on tests conducted in accordance with AHRI 880-11. Sound power levels are in dB, re  $10^{-12}$  Watts.  $\Delta$ Ps is the difference in static pressure from inlet to discharge. NC application data is from AHRI Standard 885-08 Appendix E, as a function of flow rate shown. AHRI certification points are shown in bold, white font. For a complete list of AHRI certified data, see page A2-28. All other data points listed are application ratings outside the scope of the Certification Program. See Krueger's selection program for specific sound data for optional liners; 1/2", dual density liner shown. Dash indicates a NC is less than 20. See Engineering section for reductions and definitions.

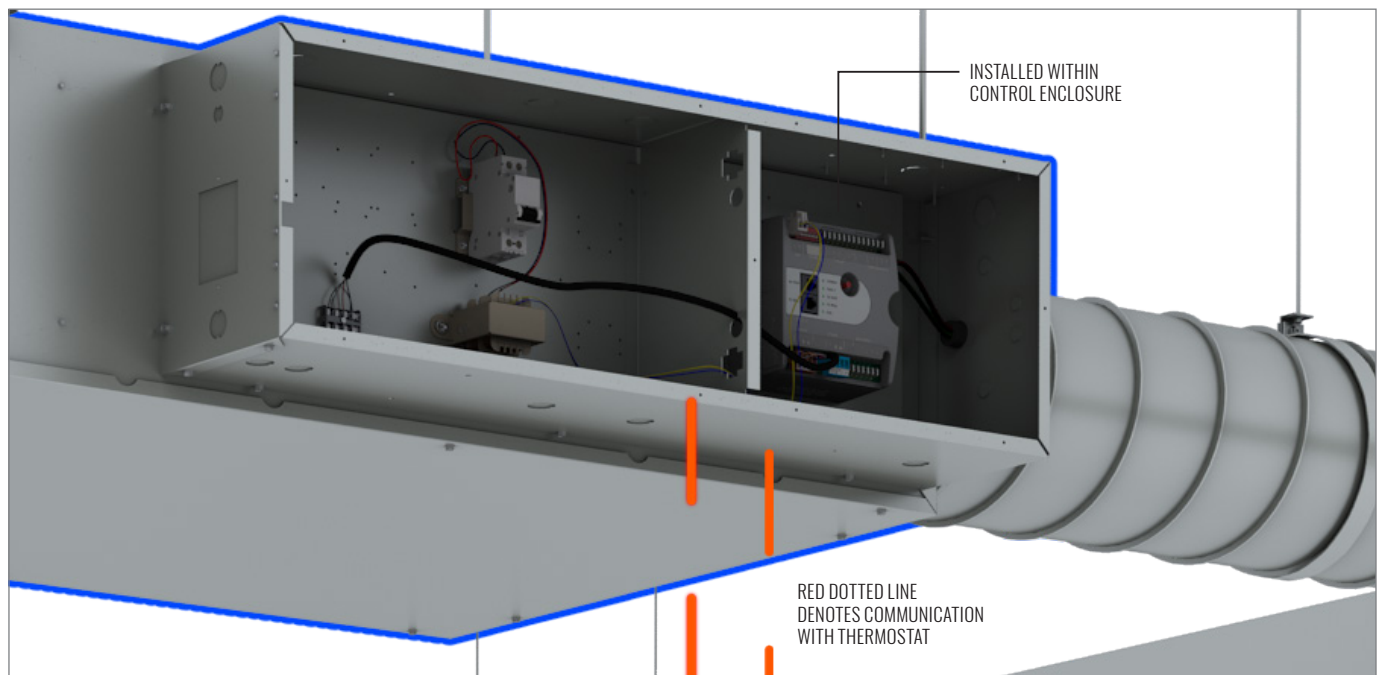
© Copyright Krueger 2021

## CONTROL INFORMATION

### SMART EQUIPMENT CONTROLLER DETAIL



### SMART EQUIPMENT CONTROLLER INSTALLED VIEW



### SUGGESTED SPECIFICATION & CONFIGURATION

Furnish and install Krueger model LMHS-LC single duct (variable or constant) terminal units of the sizes shown in the plans.

Terminals shall be certified by use of the AHRI Standard 880 Certification Program and carry the AHRI seal.

Unit casing shall be constructed of not less than 22 gauge galvanized steel.

- **(Optional)** Unit casing shall be constructed of not less than 20 gauge galvanized steel.

All round air inlet collars shall accommodate standard flex duct sizes. Unit discharge shall be slip and drive construction for field attachment to downstream duct work.

Unit labels shall be adhered to each unit including model size, airflow (CFM), balancing chart, and tagged data.

The control air damper assembly shall be constructed of heavy gauge galvanized steel with solid 1/2" shaft rotating in Delrin® bearings. Damper shaft shall be marked on the end to indicate damper position. Damper blade shall incorporate a flexible gasket for tight airflow shutoff and operate over a full 90° rotation.

LMHS-LC unit shall be equipped with a factory installed airflow sensing device. Provide a K4 LineaCross, four quadrant, multi-point center averaging sensor with an amplified signal.

- **(Optional)** Provide a linear, multi-point, velocity averaging sensor with an amplified signal.

Provide balancing taps to allow for easy airflow verification.

The radiated and discharge attenuation factors for the specified NC levels shall be based on either room absorption, plus an environmental adjustment factor or the attenuation factors from AHRI Standard 885-08 Appendix E, which includes room absorption, environmental adjustment factor, duct insertion, end reflection and duct branching.

#### CASING LINERS

Unit casing shall be lined with 1/2" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.

- **(Optional)** 1" Thick Insulation: Unit casing shall be lined with 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A. Insulation shall be attached to the unit casing by adhesive and weld pins.
- **(Optional)** Cellular Insulation: Unit casing shall be lined with 1/2" or 1" thick, 1 1/2 lb. density, smooth surface, polyolefin, closed-cell foam insulation for fiber free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth. Insulation shall be attached to the unit casing by adhesive and weld pins. Units with electric reheat 1/2" cellular insulation is enclosed between the unit casing and a non-perforated internal sheet metal cover

extending over the cellular insulation, as well as covering the liner cut edges.

- **(Optional)** Steriliner Insulation: Unit casing shall be lined with 13/16" thick, 4 lb. density, rigid board insulation with nylon reinforced foil covering insulation fibers that meets UL 181 and NFPA 90A. Liner shall be attached to unit casing by adhesive and weld pins with full-seam-length Z-strips to enclose and seal the insulation cut edges.
- **(Optional)** Sterilwall Insulation: Unit casing shall be lined with 1/2" or 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional)** Perforated Doublewall Insulation: Unit casing shall be lined with 1/2", 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheet metal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional)** No Liner: Unit casing shall be equipped with no internal insulation liner.

#### (OPTIONAL) SOUND ATTENUATOR

The single duct terminal units shall be provided with a 1-piece integral sound attenuator section. The sound attenuator section shall consist of a continuous extension of the standard galvanized coated steel casing. Separate slip and drive attached attenuator will not be accepted.

#### HOT WATER COILS

Hot water coil casing shall be constructed with minimum 20 gauge galvanized steel with slip and drive discharge for attachment to downstream duct work. Coils shall be factory attached to the terminal unit. Fins shall be rippled and corrugated heavy gauge aluminum, mechanically bonded to tubes. Tubes shall be copper with minimum wall thickness of 0.016" and with male solder header connections. Coils shall be leak tested to 400 psi. Coils shall be sized to have a maximum 950 foot per minute face velocity. Number of coil rows, circuits, and fins per inch shall be selected to provide performance as required by the plans. Coil performance data shall be based on tests run in accordance with AHRI Standard 410.

- **(Optional)** Vent and drain ports shall be factory installed on coil headers.

#### ACCESS PANEL

Access panel shall be in the unit casing for viewing of damper components and/or for upstream cleaning of the hot water coil fins.

**SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)**
**1. SERIES: (XXXX-XX)**

LMHS-LC: Large Casing Single Duct Terminal Unit

**2. SENSOR TYPE: (X)**

- 1 - Linear Averaging (Standard)
- 3 - K4 LineaCross (Four Quadrant)

**3. UNIT STYLE: (X)**

- 0 - Standard LMHS-LC
- 1 - LMHS-LC with Attenuator

**4. LINER TYPE: (X)**

- 0 - 1/2" Liner
- 1 - 1" Liner
- 2 - Steriliner
- 3 - No Liner
- 4 - Sterilwall with 1/2" Dual Density
- 8 - Sterilwall with 1" Dual Density
- A - Perforated Doublewall with 1/2" Dual Density
- B - Perforated Doublewall with 1" Dual Density
- F - 1/2" Cellular
- H - 1" Cellular <sup>++</sup>

**5. UNIT CASING: (XX)**
**(CONTROLS HANDING, GAUGE, ACCESS)**

- 0L - Left-hand Side, 22 Gauge
- 1L - Left-hand Side, 22 Gauge & Access Panel
- 2L - Left-hand Side, 20 Gauge
- 3L - Left-hand Side, 20 Gauge & Access Panel
- 0R - Right-hand Side, 22 Gauge
- 1R - Right-hand Side, 22 Gauge & Access Panel
- 2R - Right-hand Side, 20 Gauge
- 3R - Right-hand Side, 20 Gauge & Access Panel

**6. INLET CODE: (XX)**

- 04 - 4"
- 05 - 5"
- 06 - 6"
- 07 - 7"
- 08 - 8"
- 09 - 9"
- 10 - 10"
- 12 - 12"
- 14 - 14"

**7. CONTROL TYPE: (XXXX)**

- (2XXX) - Analog
- (7XXX) - Digital, BACnet Compatible
- (6XXX) - Digital, Standalone
- (XXXX) - Factory Mounted, Provided by Others
- (1XXX) - Pneumatic

**8. UNIT ACCESSORIES: (X) (X) (X) (X)**

- 0 - None
- S - Hangers
- D - Disconnect for Controls
- E - Dust Tight Control Enclosure \*
- G - 24-24 VAC Transformer
- H - 120-24 VAC Transformer
- J - 208-24 VAC Transformer
- K - 240-24 VAC Transformer
- L - 277-24 VAC Transformer
- P - Cam Locks (for Liner Codes 1 - 5)
- Y - Cam Locks (for Liner Codes 4 & A)

**9. WATER HEAT: (XXX)**
**(ROWS/CONNECTION HAND)**

- 000 - N/A / None
- W11 - 1-Row/Right, 10 FPI    U11 - 1-Row/Right, 12 FPI
- W12 - 2-Row/Right, 10 FPI    U12 - 2-Row/Right, 12 FPI
- W13 - 3-Row/Right, 10 FPI    U13 - 3-Row/Right, 12 FPI
- W14 - 4-Row/Right, 10 FPI    U14 - 4-Row/Right, 12 FPI
- W21 - 1-Row/Left, 10 FPI    U21 - 1-Row/Left, 12 FPI
- W22 - 2-Row/Left, 10 FPI    U22 - 2-Row/Left, 12 FPI
- W23 - 3-Row/Left, 10 FPI    U23 - 3-Row/Left, 12 FPI
- W24 - 4-Row/Left, 10 FPI    U24 - 4-Row/Left, 12 FPI

**10. HEAT COIL ACCESSORIES: (X)**

- 0 - None
- P - Vent and Drain Ports

\* Dust Tight Control Enclosure not available with Pneumatic Control Types.

**SAMPLE CONFIGURATION:** LMHS-LC - 3 - 0 - A - 0L - 06 - 6106 - SDHP - W11 - P