INTRODUCTION: LMHS

The LMHS terminal units are among the most versatile single duct air control products on the market, providing easy HVAC system integration with diverse control packages. The compact design simplifies the building layout process for virtually any application. The efficient and reliable LMHS unit is available with pneumatic, analog electronic or digital electronic control options. Design CFM requirements can be met and maintained regardless of varying system pressure by using control packages designed to be compatible with control systems installed by major temperature control manufacturers.

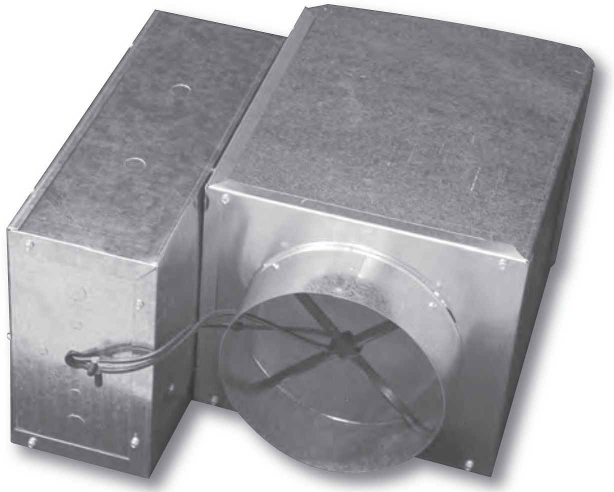
When your design requires an easily integrated terminal unit, the Krueger LMHS is the terminal unit of choice.

MODEL

MODEL LMHS - Single Duct Terminal Unit

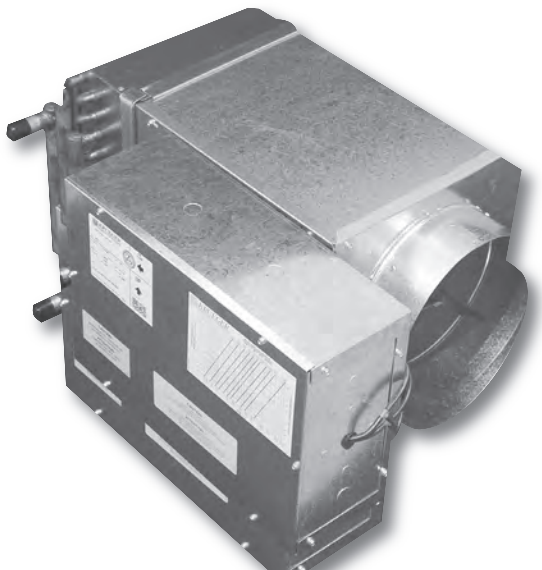
FEATURES

- 22 Gage Galvanized Steel Casing Construction with a 20 Gage Casing Option that Provides Strength and Product Durability
- ARI Listings for Certified Performance in Accordance with ARI Standard 880 Testing Standard
- Suitable for Low, Medium, or High Pressure Applications; Able to Operate Throughout a Wide Range of HVAC Systems
- 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 7000 CFM Providing Airflow Control for Most Commercial Applications
- Round Inlet Sizes from 4” through 16” Diameter which are Slightly Undersized to Fit Standard Spiral and Flex Duct; Size 20 Inlet is Rectangular, 13 1/2”x7 7/8”; Size 22 Inlet is Rectangular, 15 7/8”x23 7/8”
- Rectangular Discharge with Slip and Drive Connections Providing Quick and Easy Connection to Hot Water Heat Coils and Down Stream Duct Work
- Digital, Analog, or Pneumatic Controls with Pressure Independent or Dependent Control Packages Allows Tailoring to Many Building Systems
- Linear, Multiple-point, Averaging Velocity Sensor, or Optional K4 Lineacross Four Quadrant, Multi-point Center Averaging 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
- Compact Unit Casing Sizes Accommodates Installation in Reduced Ceiling Plenum Space
- A Wide Range of Auxiliary Heat Options, Including Electric and Hot Water Heat
- LineaHeat Solid State Electronic Controlled Heaters are Available with or without Leaving Air Temperature Control



▲ LMHS Base Unit

▲ LMHS with Electric Heat



▲ LMHS with Hot Water Heat

LMHS TYPICAL APPLICATION

Krueger LMHS single duct terminal units are designed to be easily incorporated in the overall building HVAC design. Control packages allow the LMHS to be used in constant volume and variable volume applications. Although designed for compatibility with low pressure (<0.10"Ps), the LMHS 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 unit compensates for system pressure, while adjusting the airflow in response to room thermostat demand. When used in a constant volume application, the LMHS 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 with electric or hot water reheat coils and a reheat control package.

Depending on the layout of the ductwork, it is sometimes more practical to specify the LMHS with a single, factory-installed round discharge or with multiple round outlets.

Note: Reference 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.

LMHS DAMPER & CASING LEAKAGE

▼ LMHS, DAMPER & CASING LEAKAGE DETAIL

	Damper Leakage						Casing Leakage					
Unit Size	1.5" WG		3.0" WG		6.0" WG		0.25" WG		0.5" WG		1.0" WG	
	CFM	%	CFM	%	CFM	%	CFM	%	CFM	%	CFM	%
4	4	1.7	5	2.2	7	3.0	2	0.9	3	1.3	5	2.2
5	4	1.1	5	1.4	7	1.9	2	0.6	3	0.8	5	1.4
6	4	0.8	5	1.0	7	1.3	2	0.4	3	0.6	5	1
7	4	0.6	5	0.7	7	1.0	3	0.4	4	0.6	6	0.8
8	4	0.4	5	0.5	7	0.8	3	0.3	4	0.4	6	0.6
9	4	0.3	5	0.4	7	0.6	4	0.3	5	0.4	7	0.6
10	4	0.3	5	0.3	7	0.5	4	0.3	5	0.3	7	0.5
12	4	0.2	5	0.2	7	0.3	5	0.2	7	0.3	9	0.5
14	4	0.1	6	0.2	8	0.3	6	0.2	9	0.3	12	0.4
16	5	0.1	7	0.2	9	0.2	7	0.2	10	0.3	14	0.4

► *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.*

KRUEGER
Excellence in Air Distribution

LMHS UNIT CAPACIES

▼ LMHS, UNIT CAPACITIES

Inlet Size	Max. Primary Airflow - CFM	Min. Airflow, CFM	
		Standard*	Electric Heat **
4	230	40	55
5	360	62	85
6	515	89	110
7	700	121	140
8	920	159	190
9	1160	201	240
10	1430	248	300
12	2060	357	425
14	2800	486	580
16	3660	634	750
20	2100	420	425
22	7000	1212	1800

► *(*) Standard CFM value is based on a signal of 0.03" WG differential pressure of the inlet sensor. Minimum CFM may be 0.*
(**) Electric heat based on CFM necessary to trip airflow proving safety switch.

▼ 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 above table to select a size 6. Note that size 7 will also be capable of controlling the required amount.

▼ AIRFLOW CAPACITY DETAILS

1. CFM ranges are factory set on all pressure independent pneumatic control sequences.
2. 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.
3. 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. Less than 25% may result in greater than +/- 5% control of unit flow.
4. 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.
5. Check the selected kW value to be sure it does not exceed the recommended 55°F temperature rise.

   Formula: $\Delta T = \dfrac{kW \times 3160}{CFM}$

   Discharge temperature must not exceed 120°.
6. 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.

LMHS PRODUCT DESCRIPTION

▼ CASING

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

▼ INLET COLLARS

- All round 22 gage 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.
- Round and multi-outlet discharge options are available.

▼ DAMPER ASSEMBLY

- Unit sizes 4-16 utilize a round control damper. Unit sizes 20 and 22 have rectangular inlets. Size 20 utilizes a single blade damper design and size 22 has an opposed blade 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

Unit casing will be lined with 1/2" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.

- **(Optional) 1" Thick Insulation:** Unit casing will be lined with 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.
- **(Optional) Cellular Insulation:** Unit casing will be lined with glued and riveted 3/8" 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:** Unit casing will 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 insulation adhesive and full-seam-length Z-strips to enclose and seal the insulation cut edges.
- **(Optional) Sterilwall Insulation:** Unit casing will be lined with 1/2" or 1" thick, 1 1/2 lb. dual density fiberglass insulation, meeting UL 181 and NFPA 90A, enclosed between the unit casing and a non-perforated internal sheetmetal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional) Perforated Doublewall Insulation:** Unit casing will be lined with 1/2", 1 1/2 lb. dual density fiberglass insulation meeting UL 181 and NFPA 90A, enclosed between the unit casing and a perforated internal sheetmetal cover extending over the fiberglass insulation, as well as covering the liner cut edges.
- **(Optional) No Liner:** Unit casing will be equipped with no internal insulation liner.
- See K-Select for acoustical impact of different liners.

LMHS TYPICAL APPLICATION

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

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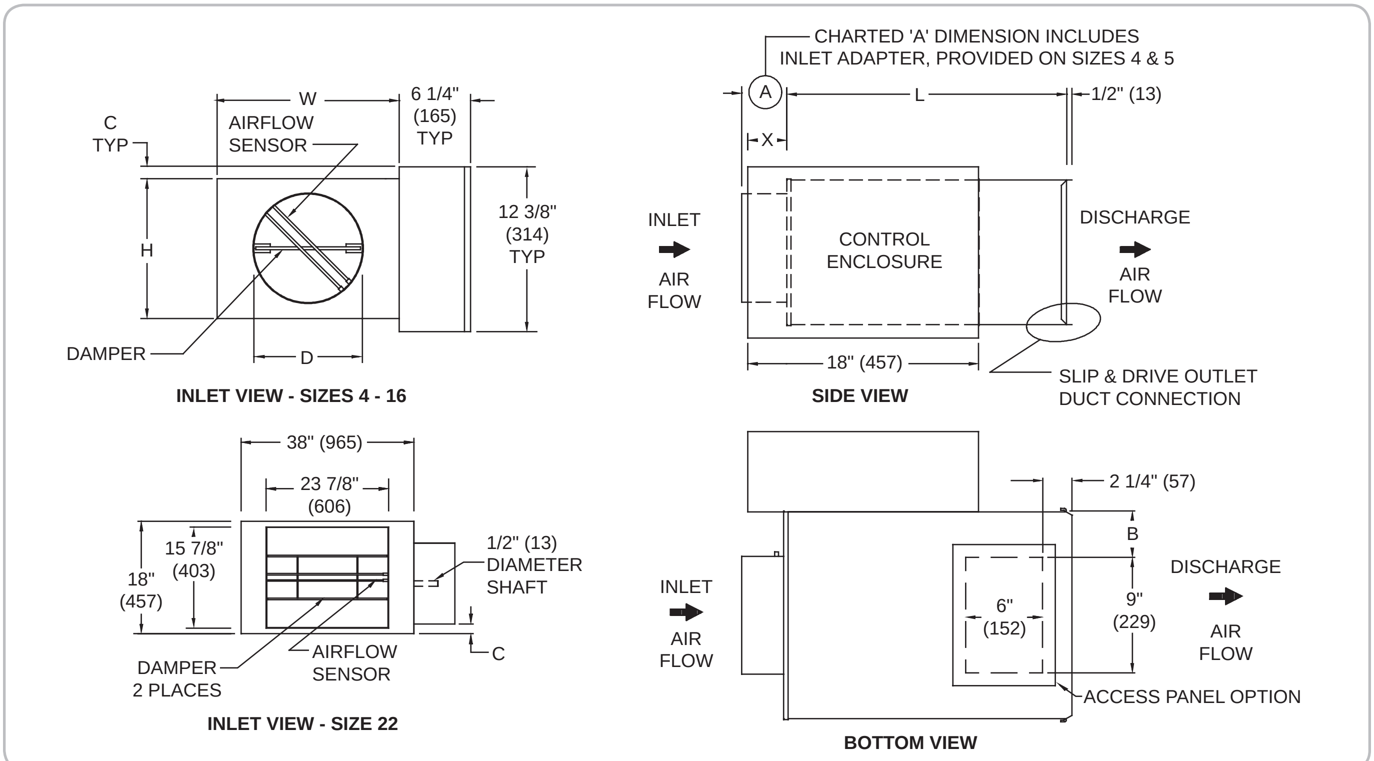
4	4	1.7	5	2.2	7	3.0	2	0.9	3	1.3	5	2.2
5	4	1.1	5	1.4	7	1.9	2	0.6	3	0.8	5	1.4
6	4	0.8	5	1.0	7	1.3	2	0.4	3	0.6	5	1
7	4	0.6	5	0.7	7	1.0	3	0.4	4	0.6	6	0.8
8	4	0.4	5	0.5	7	0.8	3	0.3	4	0.4	6	0.6
9	4	0.3	5	0.4	7	0.6	4	0.3	5	0.4	7	0.6
10	4	0.3	5	0.3	7	0.5	4	0.3	5	0.3	7	0.5
12	4	0.2	5	0.2	7	0.3	5	0.2	7	0.3	9	0.5
14	4	0.1	6	0.2	8	0.3	6	0.2	9	0.3	12	0.4
16	5	0.1	7	0.2	9	0.2	7	0.2	10	0.3	14	0.4

► *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.*

LMHS BASE UNIT DIMENSIONAL INFORMATION

▼ LMHS BASE UNIT, INLET, SIDE, & BOTTOM VIEWS



▼ LMHS BASE UNIT, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	L	W	H	A	B	C	D	X
4	230 [109]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	3 7/8" (98)	7 1/4" (184)
5	360 [170]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	4 7/8" (124)	7 1/4" (184)
6	515 [243]	15 1/2" (394)	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	2 1/8" (54)	5 7/8" (149)	7 1/4" (184)
7	700 [330]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	6 7/8" (175)	7 1/4" (184)
8	920 [434]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	7 7/8" (200)	7 1/4" (184)
9	1160 [547]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	8 7/8" (225)	5 1/4" (133)
10	1430 [675]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	9 7/8" (251)	5 1/4" (133)
12	2060 [972]	15 1/2" (394)	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	11 7/8" (302)	5 1/4" (133)
14	2800 [1321]	15 1/2" (394)	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	-	13 7/8" (352)	3 1/4" (83)
16	3660 [1727]	15 1/2" (394)	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	-	15 7/8" (403)	3 1/4" (83)
22	7000 [3304]	15" (381)	38" (965)	18" (457)	4 1/4" (108)	14 1/2" (368)	1 1/8" (29)	See Above	5 1/4" (133)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS BASE UNIT FEATURES & OPTIONS

▼ STANDARD FEATURES

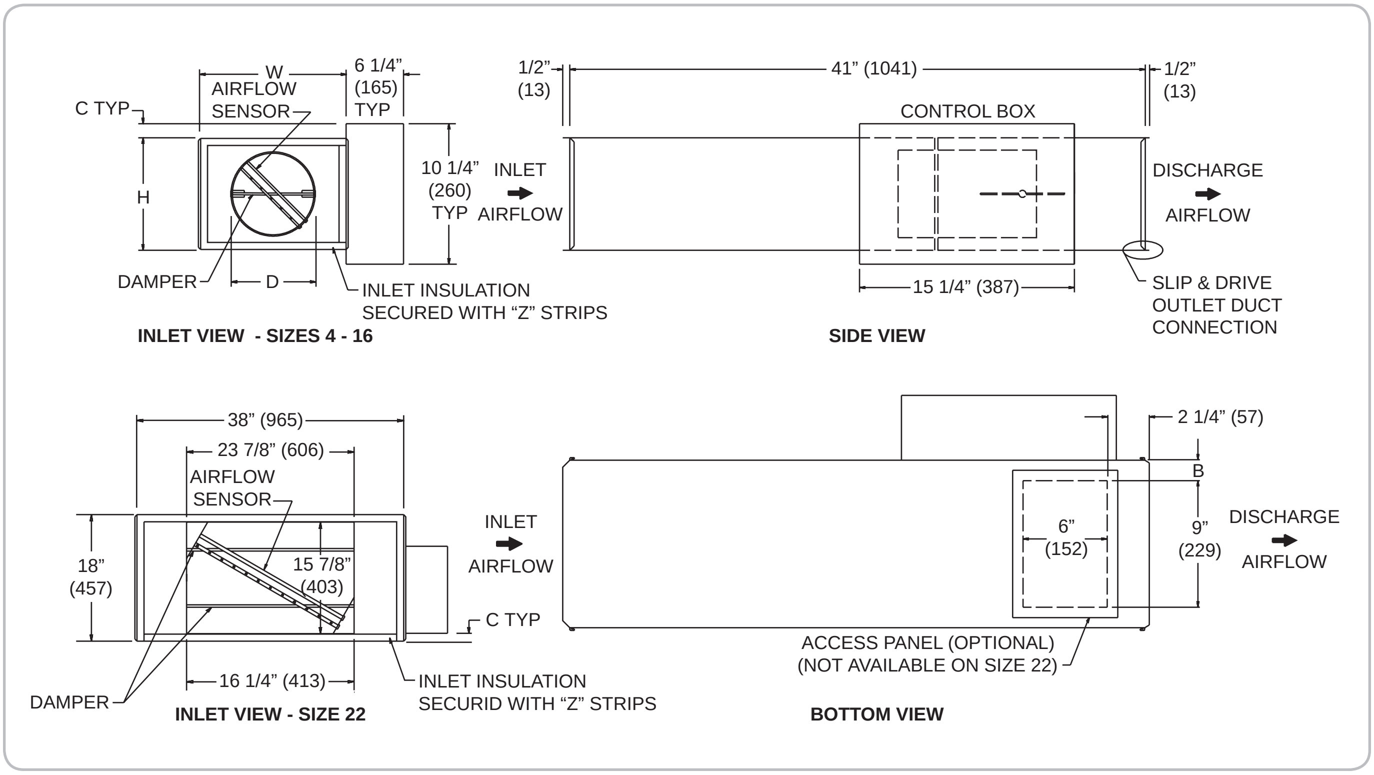
- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2” Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves
- ARI Certified Sound Ratings

▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1” Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

LMHS EXHAUST UNIT DIMENSIONAL INFORMATION

▼ LMHS EXHAUST UNIT, INLET, SIDE, & BOTTOM VIEWS



▼ LMHS EXHAUST UNIT, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	W	H	B	C	D
4	230 [109]	12" (305)	8" (203)	1 1/2" (38)	2 1/8" (54)	3 7/8" (98)
5	360 [170]	12" (305)	8" (203)	1 1/2" (38)	2 1/8" (54)	4 7/8" (124)
6	520 [245]	12" (305)	8" (203)	1 1/2" (38)	2 1/8" (54)	5 7/8" (149)
7	710 [335]	12" (305)	10" (254)	1 1/2" (38)	1 1/8" (29)	6 7/8" (175)
8	925 [437]	12" (305)	10" (254)	1 1/2" (38)	1 1/8" (29)	7 7/8" (200)
9	1200 [566]	14" (356)	12 1/2" (318)	2 1/2" (64)	-	8 7/8" (225)
10	1450 [685]	14" (356)	12 1/2" (318)	2 1/2" (64)	-	9 7/8" (251)
12	2100 [991]	16" (406)	15" (381)	3 1/2" (89)	-	11 7/8" (302)
14	2900 [1369]	20" (508)	17 1/2" (445)	5 1/2" (140)	-	13 7/8" (352)
16	3700 [1746]	24" (610)	18" (457)	7 1/2" (191)	-	15 7/8" (403)
22	7100 [3351]	38" (965)	18" (457)	14 1/2" (368)	1 1/8" (29)	See Above

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS EXHAUST UNIT FEATURES & OPTIONS

▼ STANDARD FEATURES

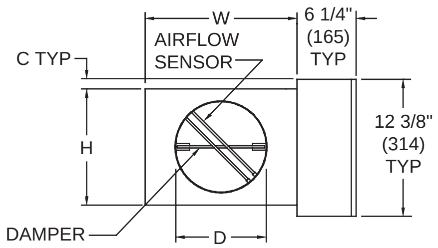
- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A And UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

▼ OPTIONAL FEATURES

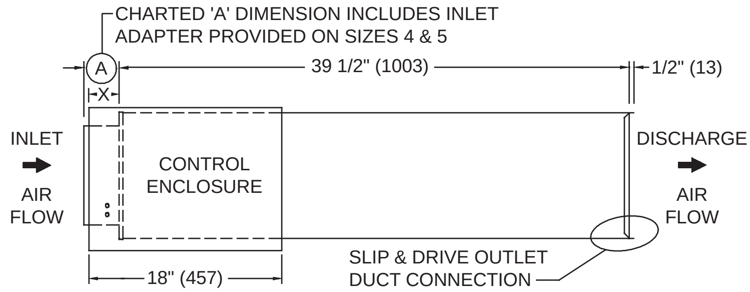
- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

LMHS UNIT WITH ATTENUATOR DIMENSIONAL INFORMATION

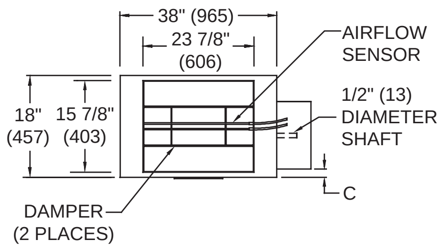
▼ LMHS UNIT WITH ATTENUATOR, INLET, SIDE, & BOTTOM VIEWS



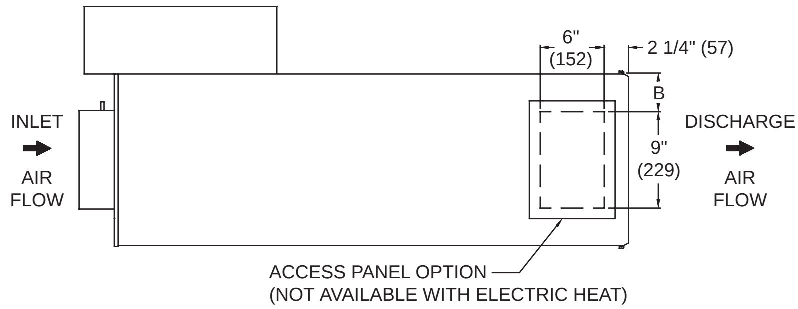
INLET VIEW - SIZES 4 - 16



SIDE VIEW



INLET VIEW - SIZE 22



BOTTOM VIEW

▼ LMHS UNIT WITH ATTENUATOR, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	W	H	A	B	C	D	X
4	230 [109]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	3 7/8" (98)	7 1/4" (184)
5	360 [170]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	4 7/8" (124)	7 1/4" (184)
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8	920 [434]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	7 7/8" (200)	7 1/4" (184)
9	1160 [547]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	8 7/8" (225)	5 1/4" (133)
10	1430 [675]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	9 7/8" (251)	5 1/4" (133)
12	2060 [972]	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	11 7/8" (302)	5 1/4" (133)
14	2800 [1321]	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	-	13 7/8" (352)	3 1/4" (83)
16	3660 [1727]	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	-	15 7/8" (403)	3 1/4" (83)
22	7000 [3304]	38" (965)	18" (457)	4 1/4" (108)	14 1/2" (368)	1 1/8" (29)	See Above	5 1/4" (133)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS UNIT WITH ATTENUATOR FEATURES & OPTIONS

▼ STANDARD FEATURES

- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A And UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

LMHS UNIT WITH MULTIPLE OUTLET ATTENUATOR DIMENSIONAL INFORMATION

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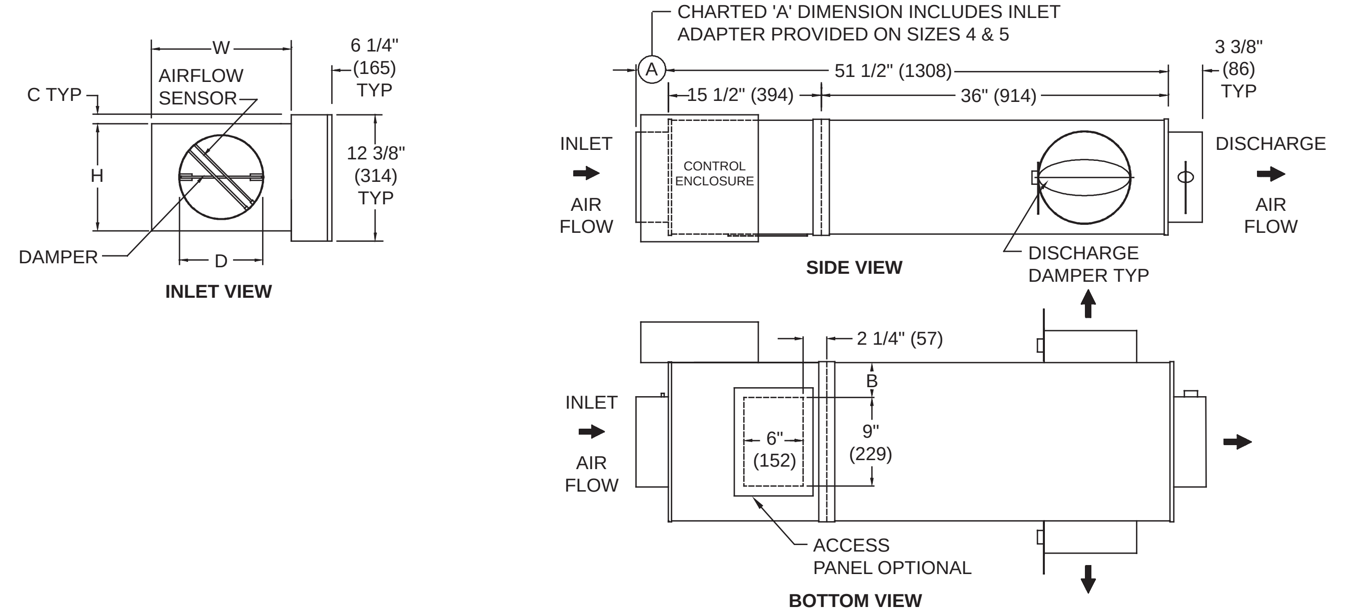
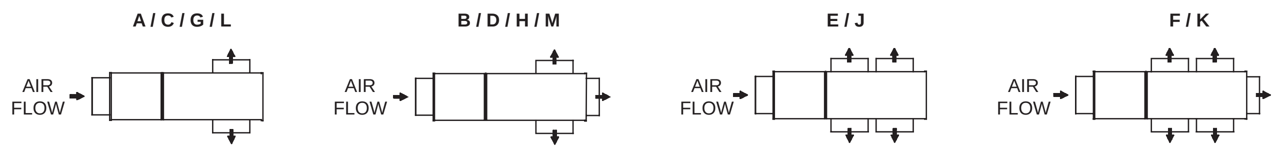


▼ LMHS UNIT WITH MULTIPLE OUTLET ATTENUATOR, OPTIONAL OUTLET TYPES



▼ LMHS UNIT WITH MULTIPLE OUTLET ATTENUATOR, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	W	H	A	B	D	Outlet Types
4	230 [109]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	3 7/8" (98)	A / B
5	360 [170]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	4 7/8" (124)	A / B
6	515 [243]	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	5 7/8" (149)	A / B
7	700 [330]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	6 7/8" (175)	C / D / E
8	920 [434]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	7 7/8" (200)	C / D / E / F
9	1160 [547]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	8 7/8" (225)	D / E / G / H / J
10	1430 [675]	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	9 7/8" (251)	D / E / G / H / J
12	2060 [972]	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	11 7/8" (302)	H / J / K / L / M
14	2800 [1321]	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	13 7/8" (352)	H / J / K / L / M
16	3660 [1727]	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	15 7/8" (403)	H / J / K / L / M

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available. Multiple outlets are not available in size 22. See page B-11 for additional outlet information.*

LMHS UNIT WITH MULTIPLE OUTLET ATTENUATOR FEATURES & OPTIONS

▼ STANDARD FEATURES

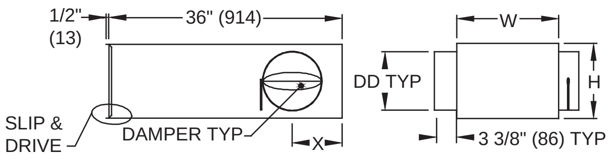
- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Electric, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Steriliner, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Left-hand or Right-hand Control Enclosure
- Dust Tight Control Enclosure
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

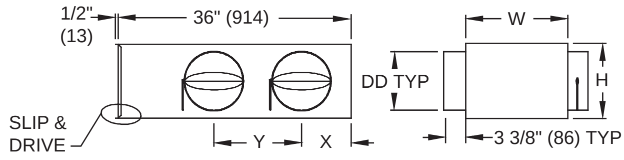
LMHS MULTIPLE OUTLET ATTENUATOR & SINGLE ROUND OUTLET DIMENSIONAL INFORMATION

▼ LMHS MULTIPLE OUTLET ATTENUATOR & SINGLE ROUND OUTLET, SIDE & END VIEWS



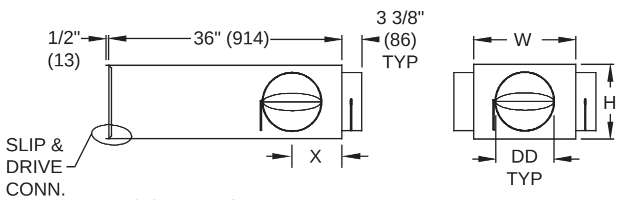
2 OUTLET SIDE VIEW

END VIEW



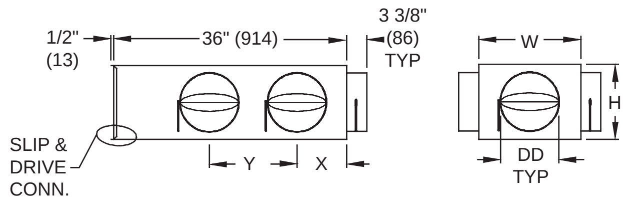
4 OUTLET SIDE VIEW

END VIEW



3 OUTLET SIDE VIEW

END VIEW



5 OUTLET SIDE VIEW

END VIEW

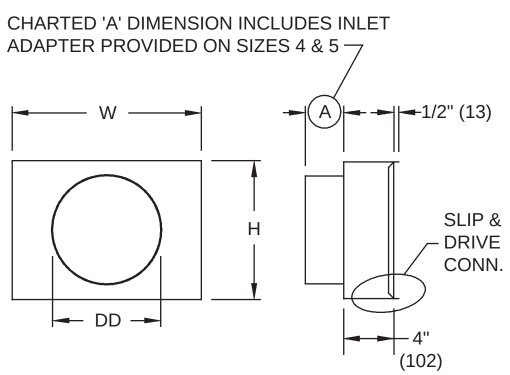
▼ LMHS UNIT WITH MULTIPLE OUTLET ATTENUATOR, DIMENSIONAL DETAILS

Outlet Type	Outlet Quantity				DD Outlet Size	Unit Sizes	X	Y
A	2	-	-	-	5 7/8" (149)	4 / 5 / 6	4 3/8" (111)	-
B	-	3	-	-		4 / 5 / 6		-
C	2	-	-	-	7 7/8" (200)	7 / 8	5 3/8" (137)	-
D	-	3	-	-		7 / 8 / 9 / 10		-
E	-	-	4	-		7 / 8 / 9 / 10		12" (305)
F	-	-	-	5		8		12" (305)
G	2	-	-	-	9 7/8" (251)	9 / 10	6 3/8" (162)	-
H	-	3	-	-		9 / 10 / 12 / 14 / 16		-
J	-	-	4	-		9 / 10 / 12 / 14 / 16		14" (356)
K	-	-	-	5		12 / 14 / 16		14" (356)
L	2	-	-	-	11 7/8" (302)	12 / 14 / 16	6 3/8" (162)	14" (356)
M	-	3	-	-		12 / 14 / 16		14" (356)

► *Dimensions in ( ) are mm. Dash (-) indicates not applicable.*

LMHS ROUND OUTLET ADAPTER DIMENSIONAL INFORMATION

▼ LMHS ROUND OUTLET ADAPTER, FACE & SIDE VIEWS



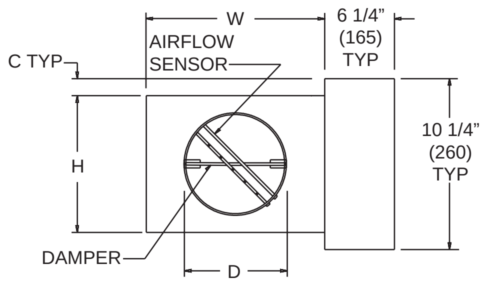
▼ LMHS ROUND OUTLET ADAPTER, DETAILS

Unit Size	W	H	A	DD
4	12" (305)	8" (203)	5 3/8" (136)	3 7/8" (98)
5	12" (305)	8" (203)	5 3/8" (136)	4 7/8" (124)
6	12" (305)	8" (203)	3 3/8" (86)	5 7/8" (149)
7	12" (305)	10" (254)	3 3/8" (86)	6 7/8" (175)
8	12" (305)	10" (254)	3 3/8" (86)	7 7/8" (200)
9	14" (356)	12 1/2" (318)	3 3/8" (86)	8 7/8" (225)
10	14" (356)	12 1/2" (318)	3 3/8" (86)	9 7/8" (251)
12	16" (406)	15" (381)	3 3/8" (86)	11 7/8" (302)
14	20" (508)	17 1/2" (445)	3 3/8" (86)	13 7/8" (352)
16	24" (610)	18" (457)	3 3/8" (86)	15 3/8" (403)

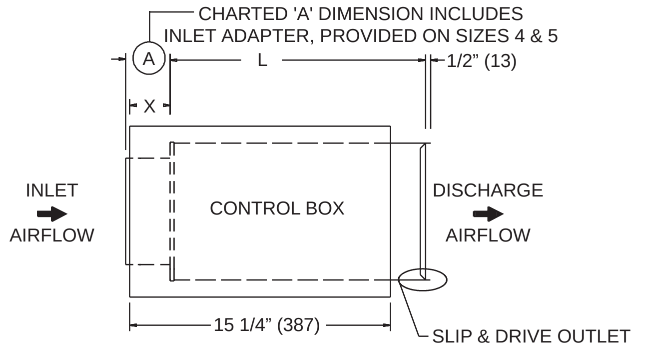
► *Dimensions in ( ) are mm. Dash (-) indicates not applicable. Multiple outlet plenums are for use with basic LMHS unit and hot water heat, factory assembled into one unit.*

LMHS LOW PROFILE BASE UNIT DIMENSIONAL INFORMATION

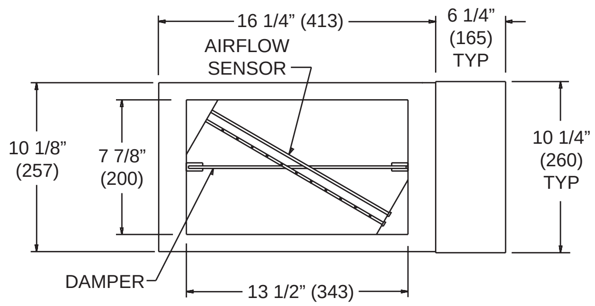
▼ LMHS LOW PROFILE BASE UNIT, INLET, SIDE, & BOTTOM VIEWS



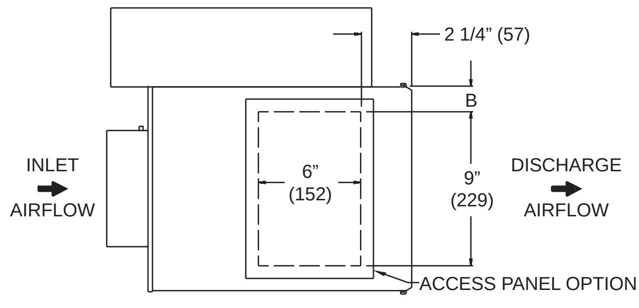
INLET VIEW - SIZES 4 - 16



SIDE VIEW



INLET VIEW - SIZE 20



BOTTOM VIEW

▼ LMHS LOW PROFILE BASE UNIT, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	L	W	H	A	B	C	D	X
4	230 [109]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (54)	3 7/8" (98)	2 5/8" (67)
5	360 [170]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (54)	4 7/8" (124)	2 5/8" (67)
6	515 [243]	15 1/2" (394)	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	1 1/8" (54)	5 7/8" (149)	2 5/8" (67)
7	710 [335]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	6 7/8" (175)	2 5/8" (67)
8	920 [434]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	7 7/8" (200)	2 5/8" (67)
20	2100 [991]	15 1/2" (394)	16 1/4" (406)	10" (254)	2 7/8" (73)	3 5/8" (92)	1/8" (3)	N/A	2 5/8" (67)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS LOW PROFILE BASE UNIT FEATURES & OPTIONS

▼ STANDARD FEATURES

- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

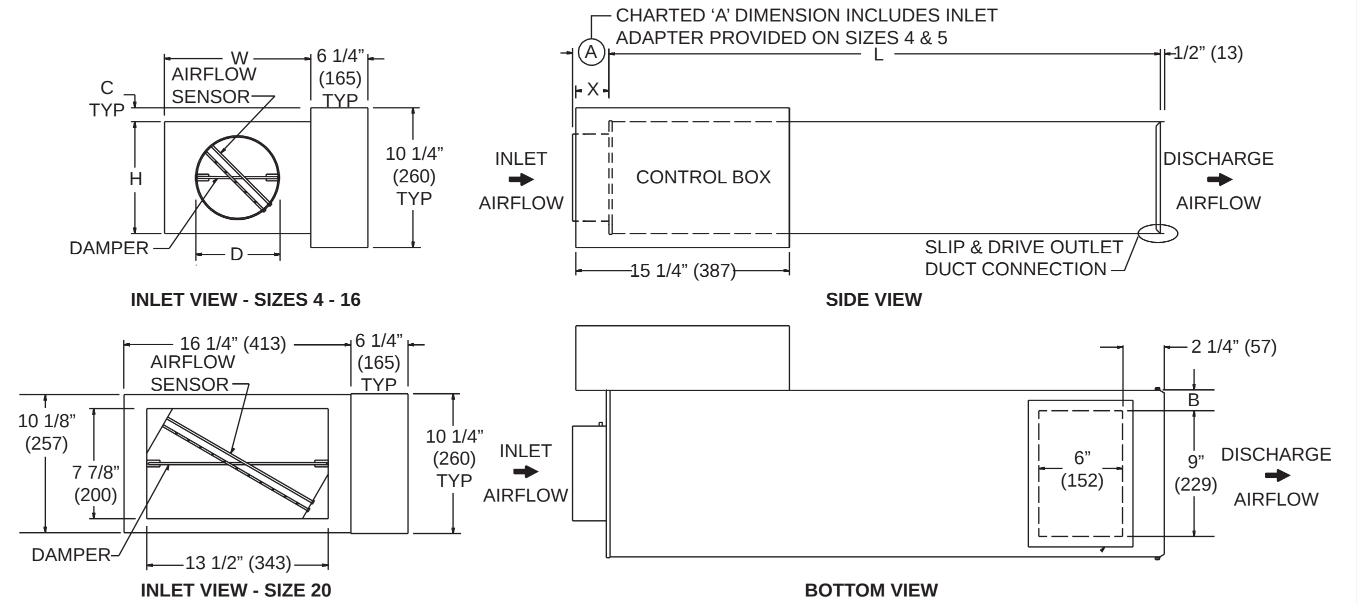
▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Bottom Access Panel*
- Cam Locks (Bottom Access Panel)*
- Hanger Brackets

► *(*) Not available with Size 20 and Doublewall Liner.*

LMHS LOW PROFILE UNIT WITH ATTENUATOR DIMENSIONAL INFORMATION

▼ LMHS LOW PROFILE UNIT WITH ATTENUATOR, INLET, SIDE, & BOTTOM VIEWS



▼ LMHS LOW PROFILE UNIT WITH ATTENUATOR, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	L	W	H	A	B	C	D	X
4	230 [109]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (54)	3 7/8" (98)	2 5/8" (67)
5	360 [170]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (54)	4 7/8" (124)	2 5/8" (67)
6	515 [243]	15 1/2" (394)	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	1 1/8" (54)	5 7/8" (149)	2 5/8" (67)
7	710 [335]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	6 7/8" (175)	2 5/8" (67)
8	920 [434]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	7 7/8" (200)	2 5/8" (67)
20	2100 [991]	15 1/2" (394)	16 1/4" (406)	10" (254)	2 7/8" (73)	3 5/8" (92)	1/8" (3)	N/A	2 5/8" (67)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS LOW PROFILE UNIT WITH ATTENUATOR FEATURES & OPTIONS

▼ STANDARD FEATURES

- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

LMHS DISCHARGE SOUND PERFORMANCE DATA

▼ LMHS, DISCHARGE SOUND DATA

Inlet Size	Flow Rate		Min Δ Ps		0.5" Δ Ps Octave Band Sound Power, Lw						Lp	1" Δ Ps Octave Band Sound Power, Lw						Lp	2" Δ Ps Octave Band Sound Power, Lw						Lp
	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	40	(19)	0.007	(1.77)	42	32	29	28	24	19	-	43	34	32	32	27	25	-	44	35	36	36	31	31	-
	103	(49)	0.047	(11.79)	54	51	43	40	37	30	-	55	52	47	44	41	36	-	56	53	50	48	45	42	-
	167	(79)	0.124	(30.74)	61	60	50	46	44	36	-	62	62	54	50	48	42	**20**	63	63	57	54	52	47	**22**
	230	(109)	0.235	(58.51)	65	67	55	50	49	40	**26**	66	68	59	54	52	46	**28**	67	69	62	58	56	51	**29**
5	62	(29)	0.006	(1.53)	42	31	30	27	26	21	-	45	35	34	31	31	27	-	49	38	39	35	36	32	-
	161	(76)	0.042	(10.35)	55	49	44	40	37	31	-	58	53	48	44	42	37	-	61	56	53	48	46	43	-
	261	(123)	0.109	(27.07)	61	58	51	46	42	37	-	64	62	55	50	47	43	**21**	68	65	60	54	52	49	**25**
	360	(170)	0.207	(51.60)	65	64	56	50	46	41	**23**	68	68	60	54	51	47	**27**	72	71	65	59	55	52	**31**
6	90	(42)	0.005	(1.26)	41	40	29	27	29	24	-	44	45	34	31	34	31	-	47	50	40	35	39	38	-
	233	(110)	0.034	(8.46)	52	51	44	40	37	32	-	55	57	49	44	42	39	-	59	62	54	48	48	46	**21**
	377	(178)	0.089	(22.08)	57	57	51	46	41	36	-	61	63	57	51	47	43	**20**	64	68	62	55	52	50	**26**
	520	(245)	0.169	(42.05)	61	61	56	51	44	39	-	65	67	62	55	49	45	**25**	68	72	67	59	55	52	**31**
7	120	(57)	0.005	(1.18)	46	47	29	26	28	25	-	51	54	35	29	35	32	-	55	60	40	33	41	40	-
	330	(156)	0.036	(8.96)	55	55	44	42	38	33	-	59	61	50	46	44	41	-	64	68	55	49	50	48	**26**
	525	(248)	0.091	(22.67)	60	58	51	50	42	37	-	64	65	57	53	49	45	**23**	68	71	62	57	55	52	**30**
	700	(330)	0.162	(40.31)	62	60	55	54	45	40	-	66	67	61	58	51	47	**24**	70	73	66	61	57	55	**32**
8	160	(76)	0.005	(1.30)	47	44	39	32	34	29	-	50	50	45	36	39	36	-	53	55	51	41	45	43	-
	440	(208)	0.040	(9.83)	56	54	49	45	42	37	-	60	60	55	49	47	44	-	63	65	61	54	53	50	**24**
	675	(319)	0.093	(23.14)	60	58	53	50	45	40	-	63	64	59	55	51	47	**22**	67	70	65	59	56	53	**29**
	920	(434)	0.173	(42.98)	63	61	56	54	48	42	-	66	67	62	59	53	49	**25**	70	73	68	63	59	56	**31**
9	200	(94)	0.005	(1.23)	43	41	32	30	32	32	-	45	46	36	33	37	38	-	48	50	41	37	42	44	-
	550	(260)	0.037	(9.29)	55	52	46	44	41	39	-	58	57	51	47	47	45	-	61	62	55	51	52	51	-
	875	(413)	0.095	(23.52)	61	58	53	50	46	42	-	64	63	57	54	51	48	-	67	67	62	58	56	54	**25**
	1160	(547)	0.166	(41.34)	64	61	57	54	49	44	-	67	66	61	58	54	50	**23**	70	71	66	61	59	56	**29**
10	250	(118)	0.005	(1.29)	42	43	36	35	36	34	-	46	48	41	39	41	40	-	49	53	46	44	47	46	-
	675	(319)	0.038	(9.37)	54	53	48	46	44	41	-	58	58	53	51	49	47	-	61	63	58	55	55	53	**21**
	1075	(507)	0.096	(23.77)	60	58	54	51	48	44	-	63	63	59	56	53	50	-	66	68	64	60	59	56	**25**
	1430	(675)	0.169	(42.05)	64	61	58	55	50	46	-	67	66	63	59	55	52	**23**	70	70	68	64	61	58	**28**
12	360	(170)	0.005	(1.26)	43	42	34	36	37	37	-	47	47	38	40	42	43	-	50	52	42	45	47	49	-
	1000	(472)	0.039	(9.72)	57	53	49	47	46	44	-	60	58	54	51	51	50	-	64	63	58	56	56	56	**20**
	1550	(731)	0.094	(23.35)	63	58	56	52	50	47	-	66	63	60	56	55	53	**20**	70	68	65	61	60	59	**26**
	2060	(972)	0.166	(41.25)	67	61	60	55	53	48	-	70	67	64	59	57	54	**24**	74	72	69	64	62	60	**30**
14	480	(227)	0.005	(1.30)	39	38	31	35	34	36	-	42	43	34	39	39	41	-	46	47	37	42	43	47	-
	1375	(649)	0.043	(10.67)	56	53	50	48	46	44	-	59	57	54	52	51	50	-	63	61	57	56	55	55	-
	2125	(1003)	0.102	(25.48)	63	59	58	53	51	48	-	66	63	61	57	55	53	-	70	67	65	61	60	59	**25**
	2800	(1321)	0.178	(44.24)	68	62	63	57	54	50	-	71	67	66	61	59	55	**24**	74	71	70	65	63	61	**29**
16	630	(297)	0.005	(1.26)	33	27	18	27	28	26	-	36	31	21	31	32	31	-	40	35	25	35	37	37	-
	1775	(838)	0.040	(10.00)	54	48	44	45	44	41	-	57	52	48	49	48	46	-	61	57	51	53	53	52	-
	2725	(1286)	0.095	(23.57)	63	57	55	52	50	47	-	66	61	59	56	55	53	-	69	65	62	60	59	58	**22**
	3660	(1727)	0.171	(42.52)	69	63	63	57	55	52	-	72	67	66	61	59	57	**24**	75	71	70	65	64	62	**30**
22	1200	(566)	0.005	(1.29)	52	46	44	38	35	26	-	58	54	47	44	40	32	-	64	62	50	49	45	38	-
	3300	(1557)	0.039	(9.74)	63	58	59	53	50	44	-	69	66	62	59	55	50	**23**	75	74	65	64	61	57	**32**
	5200	(2454)	0.097	(24.18)	68	63	66	60	57	52	**20**	74	71	69	65	62	59	**29**	80	79	72	71	68	65	**38**
	7000	(3304)	0.176	(43.81)	71	67	71	64	61	58	**24**	77	75	74	70	67	64	**33**	83	83	77	75	72	70	**43**

▼ ARI CERTIFICATION RATING POINTS

Inlet Size	Rated CFM	Min. Δ Ps	Sound Power @ 1.5" Δ Ps 2	3	4	5	6	7
4	150	0.100	61	61	55	51	49	45
5	250	0.100	61	62	57	52	50	47
6	400	0.100	63	68	61	54	50	48
7	550	0.100	67	69	59	55	52	49
8	700	0.100	67	70	61	57	54	51
9	900	0.100	67	66	61	57	55	52
10	1100	0.100	67	66	61	58	56	53
12	1600	0.100	68	68	64	60	57	54
14	2100	0.100	69	68	64	61	58	56
16	2800	0.100	70	68	64	62	59	57

► *All sound data is based on tests conducted in accordance with ARI 880-98. ΔPs 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. NC application data is from ARI Standard 885-98 Appendix E, as a function of flow rate shown. See K-Select 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.*

ARI PERFORMANCE CERTIFIED™
ARI Standard 880

LMHS RADIATED SOUND PERFORMANCE DATA

▼ LMHS, RADIATED SOUND DATA

Inlet Size	Flow Rate		Min Δ Ps		0.5" Δ Ps Octave Band Sound Power, Lw						Lp	1" Δ Ps Octave Band Sound Power, Lw						Lp	2" Δ Ps Octave Band Sound Power, Lw						Lp
	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	40	(19)	0.007	(1.77)	33	23	18	18	12	4	-	34	24	22	21	14	8	-	35	26	25	23	16	13	-
	103	(49)	0.047	(11.79)	48	40	32	31	28	20	-	49	41	35	33	30	24	-	50	43	38	35	32	29	-
	167	(79)	0.124	(30.74)	56	48	38	37	36	28	-	57	50	42	40	38	32	-	58	52	45	42	40	37	-
	230	(109)	0.235	(58.51)	61	54	43	42	41	33	24	62	56	46	44	43	38	25	63	57	50	46	45	42	26
5	62	(29)	0.006	(1.53)	37	19	14	11	6	3	-	42	24	19	14	10	9	-	48	29	24	17	14	15	-
	161	(76)	0.042	(10.35)	48	36	29	27	22	15	-	53	41	34	30	26	22	-	58	46	39	33	29	28	-
	261	(123)	0.109	(27.07)	53	45	36	34	30	22	-	58	49	41	38	34	28	-	63	54	46	41	37	34	26
	360	(170)	0.207	(51.60)	56	50	41	40	35	26	-	61	55	46	43	39	32	24	67	60	51	46	43	39	31
6	90	(42)	0.005	(1.26)	40	31	20	19	15	8	-	43	35	24	22	18	14	-	46	40	28	25	22	20	-
	233	(110)	0.034	(8.46)	50	43	35	32	28	22	-	53	47	39	35	32	27	-	56	52	43	39	36	33	-
	377	(178)	0.089	(22.08)	55	49	43	39	35	28	-	58	53	47	42	39	34	22	61	58	51	45	43	40	27
	520	(245)	0.169	(42.05)	58	53	48	44	40	33	22	61	57	52	47	43	39	26	64	62	56	50	47	44	32
7	120	(57)	0.005	(1.18)	36	38	21	14	9	3	-	39	44	27	19	13	8	-	43	50	33	23	17	14	-
	330	(156)	0.036	(8.96)	48	45	35	29	24	17	-	51	51	41	33	28	23	-	55	56	47	37	32	28	25
	525	(248)	0.091	(22.67)	53	48	41	36	31	23	-	57	54	47	40	35	29	22	61	59	53	44	39	35	29
	700	(330)	0.162	(40.31)	57	50	45	40	35	27	-	60	56	51	44	39	33	25	64	61	57	48	43	39	32
8	160	(76)	0.005	(1.30)	40	34	26	22	20	12	-	43	39	33	27	25	19	-	46	45	40	32	30	26	-
	440	(208)	0.040	(9.83)	50	43	37	33	30	22	-	53	49	44	38	35	29	-	56	54	51	43	40	36	25
	675	(319)	0.093	(23.14)	54	47	41	38	34	27	-	57	52	48	42	39	34	22	60	58	55	47	44	40	30
	920	(434)	0.173	(42.98)	57	49	44	41	37	30	-	60	55	51	46	42	37	26	63	61	58	51	47	44	33
9	200	(94)	0.005	(1.23)	36	31	19	20	18	15	-	40	37	23	24	24	23	-	43	43	28	28	29	32	-
	550	(260)	0.037	(9.29)	48	39	34	32	28	21	-	52	45	39	36	33	29	-	55	51	43	40	39	38	-
	875	(413)	0.095	(23.52)	54	43	41	37	32	23	-	57	49	46	41	38	32	-	61	55	50	45	43	40	24
	1160	(547)	0.166	(41.34)	57	45	46	41	35	25	-	61	51	50	45	40	33	24	64	57	54	49	46	42	29
10	250	(118)	0.005	(1.29)	29	29	16	14	8	-3	-	35	35	20	19	16	9	-	41	41	23	23	24	20	-
	675	(319)	0.038	(9.37)	42	38	36	29	21	9	-	48	44	39	34	29	21	-	54	50	43	38	37	32	-
	1075	(507)	0.096	(23.77)	48	42	45	36	27	15	-	54	48	48	41	35	26	22	60	54	52	45	43	38	26
	1430	(675)	0.169	(42.05)	52	44	51	40	30	18	25	58	51	54	45	39	30	29	64	57	58	50	47	41	32
12	360	(170)	0.005	(1.26)	36	41	26	21	19	12	-	40	45	30	25	23	18	-	45	50	35	29	28	24	-
	1000	(472)	0.039	(9.72)	47	46	39	35	32	24	-	51	50	43	39	36	30	-	56	55	48	43	41	35	23
	1550	(731)	0.094	(23.35)	52	48	44	40	37	29	-	56	52	49	44	42	35	23	60	57	54	48	47	40	28
	2060	(972)	0.166	(41.25)	55	49	48	44	41	32	22	59	54	53	48	46	38	27	63	59	57	52	50	44	32
14	480	(227)	0.005	(1.30)	31	31	19	23	22	20	-	36	37	23	26	25	25	-	41	42	26	30	29	29	-
	1375	(649)	0.043	(10.67)	45	41	37	35	34	30	-	49	47	40	38	37	35	-	54	52	43	42	41	39	20
	2125	(1003)	0.102	(25.48)	50	45	44	40	39	34	-	55	51	48	43	43	39	22	59	56	51	47	46	43	25
	2800	(1321)	0.178	(44.24)	53	48	49	43	42	37	23	58	53	52	47	46	41	27	63	59	55	50	49	46	30
16	630	(297)	0.005	(1.26)	35	33	26	26	23	17	-	39	38	31	31	30	25	-	44	44	36	36	37	33	-
	1775	(838)	0.040	(10.00)	48	43	40	37	32	25	-	52	49	45	42	39	33	-	57	54	50	47	46	41	24
	2725	(1286)	0.095	(23.57)	53	47	45	41	36	29	-	58	53	50	47	43	37	25	63	59	55	52	50	45	30
	3660	(1727)	0.171	(42.52)	57	50	49	45	38	31	23	62	56	54	50	46	39	29	66	62	59	55	53	47	34
22	1200	(566)	0.005	(1.29)	46	49	39	39	40	39	-	50	52	43	41	42	41	-	53	54	47	43	44	43	23
	3300	(1557)	0.039	(9.74)	55	55	50	48	49	48	24	59	58	54	50	51	50	28	63	61	58	52	53	52	32
	5200	(2454)	0.097	(24.18)	60	58	55	51	53	52	30	64	61	59	54	55	54	34	68	64	62	56	57	56	38
	7000	(3304)	0.176	(43.81)	63	60	58	54	56	55	33	67	63	62	56	58	57	37	70	66	66	58	60	59	41

▼ ARI CERTIFICATION RATING POINTS

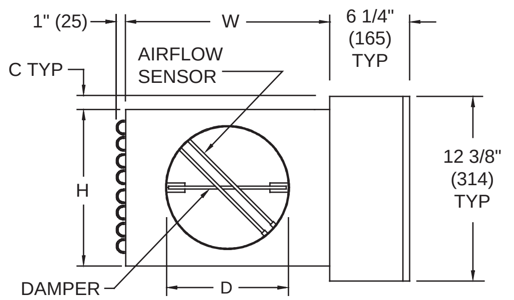
Inlet Size	Rated CFM	Min. Δ Ps	Sound Power @ 1.5" Δ Ps					
			2	3	4	5	6	7
4	150	0.100	58	50	43	38	35	31
5	250	0.100	59	53	45	38	35	32
6	400	0.100	60	58	50	39	36	33
7	550	0.100	60	58	50	41	36	34
8	700	0.100	60	59	50	42	37	35
9	900	0.100	60	56	50	42	39	35
10	1100	0.100	60	56	51	42	39	35
12	1600	0.100	60	57	51	47	44	36
14	2100	0.100	60	58	51	47	44	36
16	2800	0.100	62	59	53	49	44	40

► *All sound data is based on tests conducted in accordance with ARI 880-98. ΔPs is the difference in static pressure from inlet to discharge. Sound power levels are in dB, re 10^{-12} watts. Radiated sound power is the sound transmitted through the casing walls. NC application data is from ARI Standard 885-98 Appendix E, as a function of flow rate shown. See K-Select 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.*

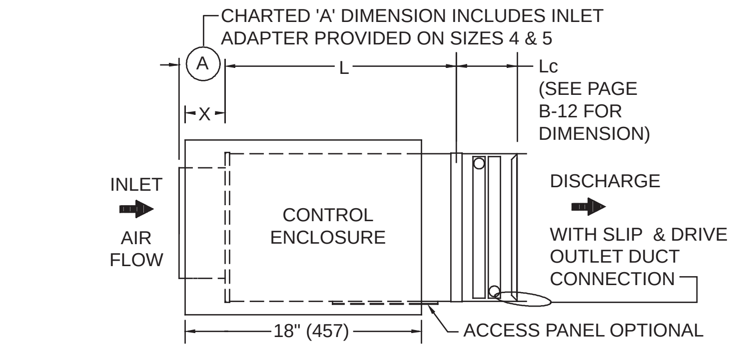
ARI PERFORMANCE CERTIFIED™
ARI Standard 880

LMHS UNIT WITH HOT WATER HEAT DIMENSIONAL INFORMATION

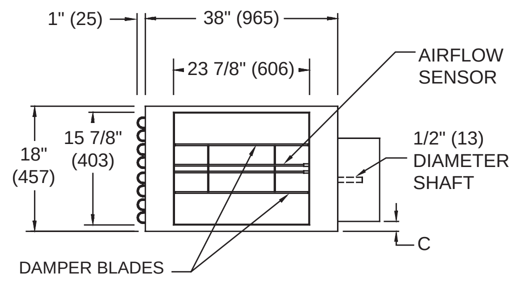
▼ LMHS UNIT WITH HOT WATER HEAT, INLET, SIDE, & BOTTOM VIEWS



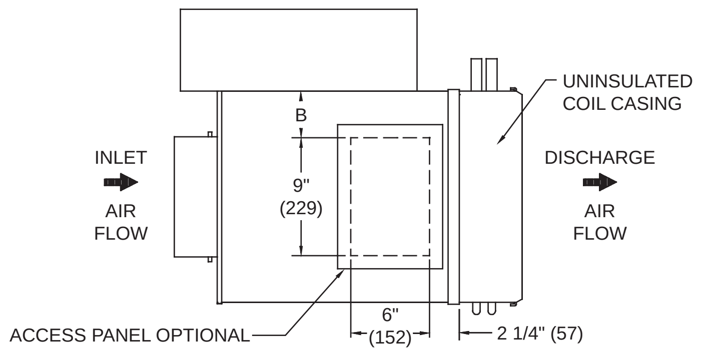
INLET VIEW - SIZES 4 - 16



SIDE VIEW



INLET VIEW - SIZE 22



BOTTOM VIEW

▼ LMHS UNIT WITH HOT WATER HEAT, DIMENSIONAL DETAILS

Inlet Size	Nominal Max CFM [L/s]	L	W	H	A	B	C	D	X
4	230 [109]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	3 7/8" (98)	7 1/4" (184)
5	360 [170]	15 1/2" (394)	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	2 1/8" (54)	4 7/8" (124)	7 1/4" (184)
6	515 [243]	15 1/2" (394)	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	2 1/8" (54)	5 7/8" (149)	7 1/4" (184)
7	700 [330]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	6 7/8" (175)	7 1/4" (184)
8	920 [434]	15 1/2" (394)	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	7 7/8" (200)	7 1/4" (184)
9	1160 [547]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	8 7/8" (225)	5 1/4" (133)
10	1430 [675]	15 1/2" (394)	14" (356)	12 1/2" (318)	3 3/8" (86)	2 1/2" (64)	-	9 7/8" (251)	5 1/4" (133)
12	2060 [972]	15 1/2" (394)	16" (406)	15" (381)	3 3/8" (86)	3 1/2" (89)	-	11 7/8" (302)	5 1/4" (133)
14	2800 [1321]	15 1/2" (394)	20" (508)	17 1/2" (445)	3 3/8" (86)	5 1/2" (140)	-	13 7/8" (352)	3 1/4" (83)
16	3660 [1727]	15 1/2" (394)	24" (610)	18" (457)	3 3/8" (86)	7 1/2" (191)	-	15 7/8" (403)	3 1/4" (83)
22	7000 [3304]	15" (381)	38" (965)	18" (457)	4 1/4" (108)	14 1/2" (368)	1 1/8" (29)	See Above	5 1/4" (133)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS UNIT WITH HOT WATER HEAT FEATURES & OPTIONS

▼ STANDARD FEATURES

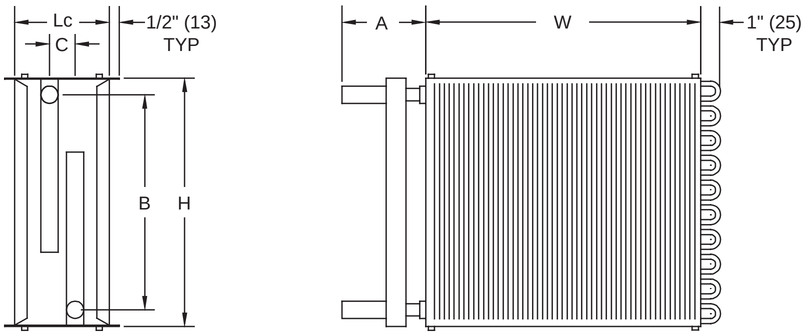
- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2” Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Hot Water Coils
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems
- ETL Listed - Adherence to UL 429 for Electrically Operated Valves

▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1” Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Left-hand or Right-hand Water Coil Connection
- Bottom Access Panel
- Cam Locks
- Hanger Brackets
- Vent and Drain Water Coils

LMHS HOT WATER COIL DIMENSIONAL INFORMATION

▼ LMHS HOT WATER COIL, SIDE & FACE VIEWS



▼ LMHS HOT WATER COIL, DIMENSIONAL DETAILS

LMHS Size	Number of Coils	H	W	Lc	A	B	C	Water Connection
4, 5, 6	1 Row	8" (203)	12" (304)	5" (127)	3" (76)	6 1/4" (159)	-	1/2" (13)
	2 Row	8" (203)	12" (304)	5" (127)	4 1/4" (108)	6 7/8" (175)	1 1/8" (29)	7/8" (22)
	3 Row	8" (203)	12" (304)	7 1/4" (184)	4 1/4" (108)	6 7/8" (175)	2 1/8" (54)	7/8" (22)
	4 Row	8" (203)	12" (304)	7 1/4" (184)	4 1/4" (108)	6 7/8" (175)	3 1/4" (83)	7/8" (22)
7, 8	1 Row	10" (254)	12" (304)	5" (127)	3" (76)	8 3/4" (222)	-	1/2" (13)
	2 Row	10" (254)	12" (304)	5" (127)	4 1/4" (108)	9" (229)	1 1/8" (29)	7/8" (22)
	3 Row	10" (254)	12" (304)	7 1/4" (184)	4 1/4" (108)	9" (229)	2 1/8" (54)	7/8" (22)
	4 Row	10" (254)	12" (304)	7 1/4" (184)	4 1/4" (108)	9" (229)	3 1/4" (83)	7/8" (22)
9, 10	1 Row	12 1/2" (317)	14" (356)	5" (127)	4 1/4" (108)	10 7/8" (276)	1 1/4" (32)	7/8" (22)
	2 Row	12 1/2" (317)	14" (356)	5" (127)	4 1/4" (108)	11 1/2" (292)	1 1/8" (29)	7/8" (22)
	3 Row	12 1/2" (317)	14" (356)	7 1/4" (184)	4 1/4" (108)	10 1/4" (260)	2 1/8" (54)	7/8" (22)
	4 Row	12 1/2" (317)	14" (356)	7 1/4" (184)	4 1/4" (108)	10 1/4" (260)	3 1/4" (83)	7/8" (22)
12	1 Row	15" (381)	16" (406)	5" (127)	4 1/4" (108)	13 3/4" (349)	1 1/4" (32)	7/8" (22)
	2 Row	15" (381)	16" (406)	5" (127)	4 1/4" (108)	13 3/4" (349)	1 1/8" (29)	7/8" (22)
	3 Row	15" (381)	16" (406)	7 1/4" (184)	4 1/4" (108)	14" (356)	2 5/8" (67)	7/8" (22)
	4 Row	15" (381)	16" (406)	7 1/4" (184)	4 1/4" (108)	14" (356)	3 1/4" (83)	7/8" (22)
14	1 Row	17 1/2" (445)	20" (508)	7 1/2" (191)	4 1/4" (108)	15 7/8" (403)	1 1/4" (32)	7/8" (22)
	2 Row	17 1/2" (445)	20" (508)	7 1/2" (191)	4 1/4" (108)	16 1/2" (419)	1 1/8" (29)	7/8" (22)
	3 Row	17 1/2" (445)	20" (508)	9 3/4" (248)	4 1/4" (108)	14" (356)	2 1/8" (54)	7/8" (22)
	4 Row	17 1/2" (445)	20" (508)	9 3/4" (248)	4 1/4" (108)	14" (356)	3 1/4" (83)	7/8" (22)
16	1 Row	18" (457)	24" (609)	7 1/2" (191)	4 1/4" (108)	15 7/8" (403)	1 1/4" (32)	7/8" (22)
	2 Row	18" (457)	24" (609)	7 1/2" (191)	4 1/4" (108)	16 1/2" (419)	1 1/8" (29)	7/8" (22)
	3 Row	18" (457)	24" (609)	9 3/4" (248)	4 1/4" (108)	14" (356)	2 1/8" (54)	7/8" (22)
	4 Row	18" (457)	24" (609)	9 3/4" (248)	4 1/4" (108)	14" (356)	3 1/4" (83)	7/8" (22)
20	1 Row	10 1/4" (260)	15 7/8" (403)	5" (127)	3" (76)	8 3/4" (222)	-	7/8" (22)
	2 Row	10 1/4" (260)	15 7/8" (403)	5" (127)	4 1/4" (108)	9" (229)	1 1/16" (28)	7/8" (22)
	3 Row	10 1/4" (260)	15 7/8" (403)	5" (127)	4 1/4" (108)	9" (229)	2 3/16" (55)	7/8" (22)
	4 Row	10 1/4" (260)	15 7/8" (403)	5" (127)	4 1/4" (108)	9" (229)	3 1/4" (83)	7/8" (22)
22	1 Row	18" (457)	38" (965)	5" (127)	3 5/8" (92)	15 7/8" (403)	1 5/16" (33)	7/8" (22)
	2 Row	18" (457)	38" (965)	5" (127)	3 5/8" (92)	16 1/2 (419)	1 3/32" (27)	7/8" (22)
	3 Row	18" (457)	38" (965)	7 1/4" (184)	3 5/8" (92)	14" (356)	2 5/32" (54)	7/8" (22)
	4 Row	18" (457)	38" (965)	7 1/4" (184)	3 5/8" (92)	14" (356)	3 1/4" (82)	7/8" (22)

► *Dimensions in ( ) are mm.*

LMHS HOT WATER COIL FEATURES & OPTIONS

▼ STANDARD FEATURES

- LMHS coils are shipped from the factory attached to the unit discharge. Coil discharge is configured for slip and drive field ductwork installation. Coil section is uninsulated.
- Coils are not for steam applications. Contact your Krueger representative for steam coil information.
- Connection Tubing – 0.032" Thick Copper, Male Solder Connection. Refer to connection diameter shown in the table above.
- Coil Casing – 20 Gage Galvanized Steel
- Coil Tubing – 1/2" O. D. x 0.016" Thick Copper
- Coil Fins – 0.0045" Thick Aluminum, 10 per inch, Mechanically Bonded to Tubing
- Coil Accessories: Optional Air Vent and Drain

LMHS HOT WATER COIL PERFORMANCE DATA

▼ LMHS HOT WATER COIL PERFORMANCE DATA, SIZES 4 - 12, 1 & 2 ROWS

SIZES 4-5-6

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			50	100	150	200	250	300	350	400	450
1 Row Single Circuit	0.5	0.20	4.0	5.4	6.3	6.9	7.6	8.1	8.6	9.1	9.4
	1.0	0.50	4.2	6.0	7.0	7.8	8.7	9.5	10.2	10.8	11.3
	2.0	1.80	4.4	6.3	7.5	8.4	9.4	10.4	11.2	11.9	12.6
	3.0	3.70	4.4	6.4	7.7	8.6	9.7	10.7	11.6	12.4	13.2
	Airside Δ Ps		0.05	0.06	0.02	0.03	0.05	0.07	0.09	0.12	0.14
2 Rows Multi-Circuit	1.0	0.30	5.3	8.7	11.1	13.0	14.5	15.8	16.9	17.9	18.7
	2.0	0.90	5.5	9.2	12.1	14.5	16.5	18.2	19.7	21.0	22.2
	3.0	1.80	5.5	9.4	12.5	15.0	17.2	19.2	20.9	22.4	23.8
	4.0	3.00	5.6	9.5	12.7	15.4	17.7	19.7	21.5	23.1	24.6
	Airside Δ Ps		0.01	0.02	0.04	0.07	0.10	0.13	0.18	0.22	0.27
CFM Range	Size 4										
	Size 5										
	Size 6										

SIZES 7-8

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			100	200	300	400	500	600	700	800	900
1 Row Single Circuit	0.5	0.20	6.3	8.1	9.3	10.4	11.2	11.9	12.5	13.0	13.4
	1.0	0.70	6.9	9.2	10.8	12.3	13.6	14.6	15.5	16.3	17.0
	2.0	2.50	7.2	9.9	11.8	13.6	15.2	16.5	17.7	18.8	19.7
	3.0	5.10	7.4	10.2	12.1	14.2	15.9	17.3	18.6	19.8	20.9
	Airside Δ Ps		0.01	0.02	0.04	0.07	0.10	0.14	0.19	0.24	0.30
2 Rows Multi-Circuit	1.0	0.40	9.4	14.4	17.8	20.3	22.2	23.8	25.1	26.1	27.1
	2.0	1.20	9.9	15.9	20.3	23.7	26.5	28.9	30.9	32.6	34.1
	3.0	2.50	10.1	16.5	21.3	25.2	28.4	31.1	33.5	35.6	37.5
	4.0	4.10	10.2	16.8	21.9	26.0	29.4	32.4	35.0	37.3	39.4
	Airside Δ Ps		0.01	0.04	0.08	0.13	0.20	0.27	0.36	0.46	0.56
CFM Range	Size 7										
	Size 8										

SIZES 9-10

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			250	380	510	640	770	900	1030	1160	1290
1 Row Multi-Circuit	0.5	0.10	9.8	10.9	12.0	12.9	13.6	14.1	14.6	15.0	15.3
	1.0	0.20	11.7	13.3	15.1	16.5	17.6	18.6	19.5	20.2	20.9
	2.0	0.70	12.9	15.0	17.3	19.3	20.9	22.3	23.5	24.7	25.7
	3.0	1.50	13.4	15.7	18.3	20.5	22.3	23.9	25.4	26.7	27.9
	Airside Δ Ps		0.02	0.03	0.06	0.08	0.12	0.15	0.19	0.24	0.29
2 Rows Multi-Circuit	1.0	0.20	17.9	21.9	24.7	26.9	28.6	29.9	31.1	32.1	32.9
	2.0	0.70	20.2	25.8	30.0	33.4	36.2	38.6	40.7	42.5	44.0
	3.0	1.40	21.1	27.4	32.3	36.4	39.8	42.8	45.3	47.6	49.7
	4.0	2.30	21.6	28.3	33.6	38.1	41.9	45.2	48.1	50.8	53.1
	Airside Δ Ps		0.03	0.06	0.11	0.16	0.22	0.29	0.37	0.45	0.55
CFM Range	Size 9										
	Size 10										

SIZE 12

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			300	500	700	900	1100	1300	1500	1700	1900
1 Row Multi-Circuit	0.5	0.10	12.3	13.9	15.3	16.4	17.2	17.8	18.3	18.8	19.2
	1.0	0.30	14.8	17.5	19.8	21.7	23.2	24.5	25.6	26.5	27.3
	2.0	0.90	16.5	20.0	23.2	26.0	28.3	30.2	31.9	33.4	34.7
	3.0	1.90	17.2	21.1	24.7	27.8	30.5	32.8	34.8	36.6	38.2
	Airside Δ Ps		0.01	0.03	0.06	0.09	0.12	0.17	0.21	0.27	0.33
2 Rows Multi-Circuit	1.0	0.30	21.9	27.7	31.5	34.1	36.1	37.7	38.9	40.0	40.8
	2.0	0.90	24.9	33.5	39.6	44.2	47.9	51.0	53.5	55.7	57.6
	3.0	1.80	26.1	35.9	43.2	48.9	53.6	57.6	61.0	64.0	66.6
	4.0	2.90	26.7	37.2	45.2	51.6	57.0	61.6	65.5	69.0	72.1
	Airside Δ Ps		0.02	0.06	0.11	0.16	0.24	0.32	0.41	0.51	0.62

► *See notes on page B-15.*

LMHS HOT WATER COIL PERFORMANCE DATA

▼ LMHS HOT WATER COIL PERFORMANCE DATA, SIZES 14 - 22, 1 & 2 ROWS

SIZE 14

Rows/ Circuits	GPM	Head Loss	Airflow (CFM) & Resulting MBH								
			400	700	1000	1300	1600	1900	2200	2500	2800
1 Row Multi-Circuit	0.5	0.00	15.1	17.0	18.3	19.3	20.1	20.7	21.2	21.5	21.9
	1.0	0.10	19.1	22.5	25.2	27.4	29.1	30.4	31.5	32.5	33.3
	2.0	0.50	22.0	27.0	31.0	34.5	37.4	39.7	41.7	43.5	45.0
	3.0	1.00	23.2	28.9	33.6	37.9	41.4	44.3	46.9	49.1	51.1
	Airside Δ Ps		0.01	0.03	0.05	0.08	0.12	0.17	0.22	0.27	0.33
2 Rows Multi-Circuit	1.0	0.20	27.7	34.8	38.8	41.5	43.4	44.8	45.9	46.8	47.6
	2.0	0.60	32.7	44.2	51.9	57.4	61.7	65.1	67.8	70.1	72.1
	3.0	1.20	34.6	48.4	58.1	65.5	71.3	76.1	80.1	83.5	86.5
	4.0	2.00	35.7	50.8	61.8	70.3	77.2	83.0	87.9	92.2	95.9
	Airside Δ Ps		0.02	0.05	0.10	0.16	0.23	0.32	0.41	0.51	0.63

SIZE 16

Rows/ Circuits	GPM	Head Loss	Airflow (CFM) & Resulting MBH								
			600	1000	1400	1800	2200	2600	3000	3400	3800
1 Row Multi-Circuit	0.5	0.00	17.9	19.6	21.0	22.0	22.7	23.2	23.6	23.9	24.2
	1.0	0.10	23.8	27.2	30.3	32.5	34.1	35.5	36.6	37.5	38.3
	2.0	0.50	28.3	33.5	38.6	42.4	45.5	48.0	50.2	52.0	53.6
	3.0	1.00	30.2	36.4	42.5	47.3	51.2	54.5	57.3	59.8	61.9
	Airside Δ Ps		0.02	0.04	0.07	0.11	0.16	0.21	0.27	0.34	0.41
2 Rows Multi-Circuit	1.0	0.10	33.1	38.8	42.1	44.1	45.6	46.7	47.6	48.2	48.8
	2.0	0.30	41.8	52.8	59.8	64.8	68.5	71.4	73.8	75.8	77.4
	3.0	0.50	45.7	59.7	69.3	76.3	81.8	86.3	90.0	93.1	95.8
	4.0	0.90	47.8	63.8	75.1	83.7	90.6	96.2	100.9	105.0	108.5
	Airside Δ Ps		0.03	0.07	0.13	0.21	0.30	0.40	0.51	0.64	0.78

SIZE 22

Rows/ Circuits	GPM	Head Loss	Airflow (CFM) & Resulting MBH								
			600	1200	1800	2400	3000	3600	4200	4800	5400
1 Row Multi-Circuit	0.5	0.00	21.7	24.1	25.3	26.3	26.9	27.4	27.7	27.9	28.2
	1.0	0.20	29.6	35.4	38.8	41.6	43.6	45.1	46.3	47.2	48.0
	2.0	0.50	35.6	45.2	51.6	57.2	61.5	64.9	67.7	70.0	72.0
	3.0	1.10	38.1	49.7	57.7	65.0	70.8	75.5	79.4	82.8	85.8
	Airside Δ Ps		0.01	0.02	0.05	0.08	0.12	0.17	0.22	0.28	0.34
2 Rows Multi-Circuit	1.0	0.10	38.2	47.0	50.8	52.8	54.2	55.1	55.8	56.3	56.7
	2.0	0.30	48.3	66.8	76.8	83.2	87.6	90.9	93.4	95.4	97.1
	3.0	0.50	52.4	76.6	91.2	101.2	108.5	114.1	118.5	122.2	125.3
	4.0	0.90	54.6	82.4	100.2	112.9	122.5	130.1	136.3	141.4	145.8
	Airside Δ Ps		0.01	0.05	0.09	0.15	0.23	0.31	0.41	0.52	0.64

► *Hot water capacities are in MBH. Data is based upon 180°F entering water and 55°F entering air. Head loss is in feet of water. Air Temperature Rise = 927xMBH/CFM. Water Temperature Drop = 2.04xMBH/GPM. Coils are not for steam application. Contact your local Krueger representative for steam coil information. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBH values by correction factors below. See K-Select for specific hot water coil data. Airside ΔPs is defined as the minimum static pressure at the maximum CFM with the damper full open.*

▼ MBH CORRECTION FACTORS

Δ T	50	60	70	80	90	100	115	125	140	150
Factor	0.40	0.48	0.56	0.64	0.72	0.80	0.88	1.00	1.12	1.20

LMHS HOT WATER COIL PERFORMANCE DATA

▼ LMHS HOT WATER COIL PERFORMANCE DATA, SIZES 4 - 12, 3 & 4 ROWS

SIZES 4-5-6

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			50	100	150	200	250	300	350	400	450
3 Rows Multi-Circuit	2.0	1.40	6.2	11.0	14.9	18.2	21.0	23.5	25.6	27.5	29.2
	3.0	2.80	6.2	11.2	15.4	18.9	22.0	24.7	27.1	29.3	31.3
	4.0	4.70	6.2	11.3	15.6	19.2	22.5	25.3	27.9	30.3	32.4
	5.0	6.90	6.3	11.4	15.7	19.5	22.8	25.8	28.5	30.9	33.2
	Airside Δ Ps		**0.01**	**0.03**	**0.06**	**0.10**	**0.14**	**0.20**	**0.26**	**0.33**	**0.40**
4 Rows Multi-Circuit	3.0	1.70	6.5	12.1	17.0	21.1	24.8	28.0	31.0	33.6	36.0
	4.0	2.80	6.5	12.2	17.2	21.5	25.4	28.9	32.0	34.9	37.5
	5.0	4.10	6.5	12.3	17.3	21.8	25.8	29.4	32.7	35.7	38.4
	6.0	5.70	6.5	12.3	17.4	22.0	26.0	29.7	33.1	36.2	39.1
	Airside Δ Ps		**0.01**	**0.04**	**0.08**	**0.13**	**0.19**	**0.26**	**0.34**	**0.43**	**0.53**
CFM Range		Size 4									
		Size 5									
		Size 6									

SIZES 7-8

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			100	200	300	400	500	600	700	800	900
3 Rows Multi-Circuit	2.0	0.80	11.5	19.3	25.0	29.5	33.1	36.1	38.6	40.8	42.7
	3.0	1.70	11.7	20.0	26.4	31.5	35.8	39.4	42.6	45.3	47.7
	4.0	2.80	11.8	20.4	27.2	32.7	37.3	41.3	44.9	48.0	50.8
	5.0	4.10	11.8	20.6	27.6	33.4	38.3	42.6	46.4	49.7	52.8
	Airside Δ Ps		**0.02**	**0.06**	**0.12**	**0.20**	**0.29**	**0.40**	**0.53**	**0.67**	**0.83**
4 Rows Multi-Circuit	3.0	1.30	12.5	22.2	29.8	36.0	41.2	45.5	49.3	52.6	55.5
	4.0	2.10	12.6	22.6	30.7	37.4	43.1	48.0	52.2	56.0	59.4
	5.0	3.20	12.6	22.9	31.2	38.3	44.3	49.5	54.2	58.3	62.0
	6.0	4.40	12.7	23.0	31.6	38.9	45.1	50.7	55.6	59.9	63.9
	Airside Δ Ps		**0.02**	**0.08**	**0.16**	**0.26**	**0.39**	**0.53**	**0.70**	**0.89**	**1.10**
CFM Range		Size 7									
		Size 8									

SIZES 9-10

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			250	380	510	640	770	900	1030	1160	1290
3 Rows Multi-Circuit	2.0	0.60	24.3	31.7	37.3	41.7	45.2	48.2	50.8	53.0	54.9
	3.0	1.20	25.4	33.8	40.4	45.8	50.4	54.3	57.6	60.6	63.2
	4.0	2.00	26.0	34.9	42.2	48.2	53.4	57.8	61.8	65.2	68.4
	5.0	3.00	26.4	35.7	43.3	49.8	55.3	60.2	64.5	68.4	71.9
	Airside Δ Ps		**0.04**	**0.09**	**0.16**	**0.23**	**0.32**	**0.42**	**0.54**	**0.67**	**0.80**
4 Rows Multi-Circuit	3.0	1.10	28.1	38.1	46.1	52.6	58.1	62.7	66.7	70.2	73.3
	4.0	1.80	28.7	39.4	48.2	55.5	61.8	67.2	72.0	76.2	79.9
	5.0	2.60	29.0	40.2	49.5	57.4	64.2	70.2	75.5	80.2	84.5
	6.0	3.70	29.3	40.7	50.4	58.7	65.9	72.3	78.0	83.1	87.8
	Airside Δ Ps		**0.06**	**0.12**	**0.21**	**0.31**	**0.43**	**0.56**	**0.71**	**0.88**	**1.06**
CFM Range		Size 9									
		Size 10									

SIZE 12

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			300	500	700	900	1100	1300	1500	1700	1900
3 Rows Multi-Circuit	2.0	0.70	29.8	40.9	48.7	54.5	59.1	62.7	65.7	68.3	70.5
	3.0	1.50	31.2	44.1	53.7	61.2	67.3	72.4	76.7	80.4	83.6
	4.0	2.50	31.9	45.8	56.5	65.1	72.2	78.3	83.4	88.0	92.0
	5.0	3.80	32.4	46.9	58.3	67.7	75.5	82.2	88.1	93.2	97.8
	Airside Δ Ps		**0.04**	**0.09**	**0.16**	**0.24**	**0.35**	**0.47**	**0.60**	**0.75**	**0.91**
4 Rows Multi-Circuit	3.0	1.30	34.3	49.6	61.1	70.1	77.3	83.1	88.1	92.3	95.9
	4.0	2.20	35.0	51.6	64.5	74.9	83.4	90.6	96.7	102.1	106.7
	5.0	3.30	35.5	52.8	66.6	77.9	87.5	95.6	102.6	108.8	114.3
	6.0	4.50	35.7	53.6	68.1	80.1	90.4	99.2	106.9	113.7	119.8
	Airside Δ Ps		**0.05**	**0.11**	**0.21**	**0.32**	**0.46**	**0.62**	**0.79**	**0.99**	**1.20**

► *See notes on page B-17.*

LMHS HOT WATER COIL PERFORMANCE DATA

▼ LMHS HOT WATER COIL PERFORMANCE DATA, SIZES 14 - 22, 3 & 4 ROWS

SIZE 14

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			400	700	1000	1300	1600	1900	2200	2500	2800
3 Rows Multi-Circuit	2.0	0.60	39.0	53.9	63.4	70.0	74.9	78.7	81.7	84.2	86.3
	3.0	1.20	41.4	59.4	72.0	81.4	88.7	94.5	99.4	103.4	106.9
	4.0	2.00	42.6	62.5	77.1	88.3	97.3	104.7	110.9	116.2	120.8
	5.0	2.90	43.3	64.5	80.4	92.9	103.1	111.7	118.9	125.2	130.7
	Airside ∆ Ps		0.03	0.08	0.15	0.24	0.34	0.46	0.60	0.75	0.92
4 Rows Multi-Circuit	3.0	0.80	45.2	66.2	80.7	91.2	99.3	105.6	110.7	115.0	118.5
	4.0	1.40	46.4	69.8	86.8	99.8	110.1	118.4	125.3	131.1	136.1
	5.0	2.00	47.1	72.0	90.8	105.6	117.5	127.3	135.7	142.8	148.9
	6.0	2.80	47.6	73.5	93.6	109.6	122.9	133.9	143.4	151.6	158.7
	Airside ∆ Ps		0.04	0.10	0.20	0.31	0.45	0.61	0.80	1.00	1.22

SIZE 16

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			600	1000	1400	1800	2200	2600	3000	3400	3800
3 Rows Multi-Circuit	2.0	0.20	50.1	63.5	71.7	77.2	81.2	84.2	86.6	88.6	90.2
	3.0	0.50	55.0	72.9	84.8	93.3	99.8	104.9	109.0	112.4	115.3
	4.0	0.80	57.7	78.5	93.0	103.8	112.3	119.1	124.7	129.4	133.5
	5.0	1.10	59.4	82.2	98.6	111.2	121.2	129.4	136.3	142.1	147.2
	Airside ∆ Ps		0.04	0.11	0.20	0.31	0.44	0.59	0.76	0.95	1.15
4 Rows Multi-Circuit	3.0	0.40	61.1	82.1	95.6	105.1	112.2	117.6	121.9	125.4	128.3
	4.0	0.70	64.0	88.7	105.7	118.2	127.7	135.3	141.4	146.6	150.9
	5.0	1.00	65.8	93.0	112.5	127.3	138.9	148.3	156.1	162.7	168.3
	6.0	1.40	67.0	96.0	117.5	134.1	147.4	158.3	167.5	175.3	182.0
	Airside ∆ Ps		0.06	0.14	0.26	0.41	0.58	0.78	1.00	1.25	1.52

SIZE 22

Rows/ Circuits	GPM	Head Loss	Airflow, CFM & Resulting MBH								
			600	1200	1800	2400	3000	3600	4200	4800	5400
3 Rows Multi-Circuit	2.0	0.20	56.6	78.6	89.5	95.8	100.0	102.9	105.0	106.7	108.1
	3.0	0.50	61.6	91.9	109.3	120.5	128.3	134.1	138.6	142.1	145.0
	4.0	0.80	64.1	99.7	121.9	137.1	148.2	156.6	163.3	168.8	173.3
	5.0	1.20	65.7	104.8	130.5	148.8	162.6	173.5	182.2	189.4	195.5
	Airside ∆ Ps		0.02	0.07	0.14	0.23	0.34	0.46	0.61	0.77	0.95
4 Rows Multi-Circuit	3.0	0.40	67.2	102.2	121.4	133.2	141.1	146.7	150.9	154.1	156.7
	4.0	0.70	69.8	111.4	136.8	153.6	165.5	174.3	181.1	186.5	190.9
	5.0	1.00	71.2	117.2	147.3	168.2	183.6	195.4	204.7	212.2	218.4
	6.0	1.40	72.2	121.2	154.8	179.1	197.4	211.8	223.3	232.8	240.8
	Airside ∆ Ps		0.03	0.09	0.18	0.30	0.44	0.61	0.80	1.02	1.25

► *Hot water capacities are in MBH. Data is based upon 180°F entering water and 55°F entering air. Head loss is in feet of water. Air Temperature Rise = 927xMBH/CFM. Water Temperature Drop = 2.04xMBH/GPM. Coils are not for steam application. Contact your local Krueger representative for steam coil information. Tables are based upon a temperature difference of 125°F between entering air and entering water. For other temperature differences, multiply MBH values by correction factors below. See K-Select for specific hot water coil data. Airside ∆Ps is defined as the minimum static pressure at the maximum CFM with the damper full open.*

▼ MBH CORRECTION FACTORS

∆ T	50	60	70	80	90	100	115	125	140	150
Factor	0.40	0.48	0.56	0.64	0.72	0.80	0.88	1.00	1.12	1.20

LMHS HOT WATER COIL ENGINEERING DATA

▼ ETHYLENE AND PROPYLENE GLYCOL

For performance of hot water coils with Ethylene or Propylene Glycol, use Krueger's K-Select selection software. The program shows only Ethylene Glycol, but Propylene Glycol has very similar performance. Heat capacity is reduced as a function of the percentage of Glycol, and head loss increases. The minimum GPM required to maintain turbulent flow increases with glycol percentages.

▼ 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)

▼ FEATURES LIST

- 1/2 O.D. Copper tubing
- Aluminum Corrugated Fins, 10 per Inch
- Galvanized Steel Casing
- Slip and Drive Discharge Duct Connection
- Tubes Mechanically Expanded in Fins

▼ SAMPLE CALCULATION HOT WATER COIL

Condition 1, Size 8 LMHS:
Scheduled Air Volumes (CFM): 715 Maximum, 225 Minimum
180°F Entering Water Temperature (EWT), 55°F Entering Air Temperature
(EAT) (Correction Factor = 1.00 for 125°F Water-Air Temperature Differential) 8.0 MBH

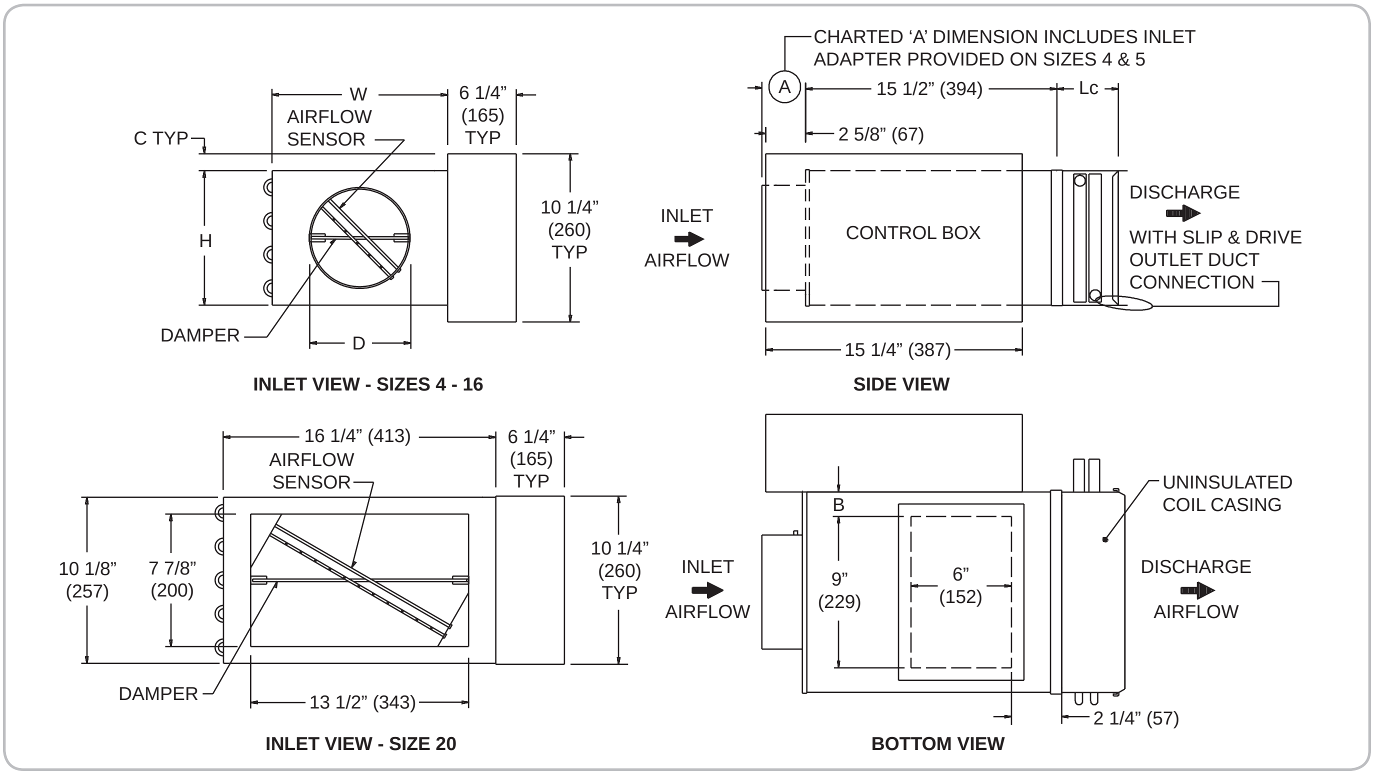
Solution 1, Hot Water Coil Performance Table:
Size 8 LMHS with 1 Row Coil Delivers 8.4 MBH* at a Flow Rate of 0.5 GPM
WPD will be 0.20 ft WG; Air Pressure Drop will be .03” WG

LMHS Size 8 at 225 CFM
1 Row Achieves 8.4 MBH* at 0.5 GPM
WPD at 0.5 GPM = 0.20 ft WG
Air Pressure Drop at 715 CFM** = 0.19” WG

► (*) *MBH must be adjusted to match the data table conditions.*
A greater or lower water-air differential will not provide the same heat transfer capacity as shown on the data tables.
(**) *Air pressure drop is determined by highest airflow through coil.*

LMHS LOW PROFILE UNIT WITH HOT WATER HEAT DIMENSIONAL INFORMATION

▼ LMHS LOW PROFILE UNIT WITH HOT WATER HEAT, INLET, SIDE, & BOTTOM VIEWS



▼ LMHS LOW PROFILE UNIT WITH HOT WATER HEAT, DIMENSIONAL DETAILS

Inlet Size	Nominal Max. CFM [L/s]	W	H	A	B	C	D	Lc	
								1-Row	2-Row
4	230 [109]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	3 7/8" (98)	5" (127)	7 1/4" (184)
5	360 [170]	12" (305)	8" (203)	5 3/8" (136)	1 1/2" (38)	1 1/8" (29)	4 7/8" (124)	5" (127)	7 1/4" (184)
6	515 [243]	12" (305)	8" (203)	3 3/8" (86)	1 1/2" (38)	1 1/8" (29)	5 7/8" (149)	5" (127)	7 1/4" (184)
7	710 [335]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	6 7/8" (175)	5" (127)	7 1/4" (184)
8	920 [434]	12" (305)	10" (254)	3 3/8" (86)	1 1/2" (38)	1/8" (3)	7 7/8" (200)	5" (127)	7 1/4" (184)
20	2100 [991]	16 1/4" (305)	10" (254)	2 7/8" (73)	3 5/8" (92)	1/8" (3)	N/A	5" (127)	7 1/4" (184)

► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS LOW PROFILE UNIT WITH HOT WATER HEAT FEATURES & OPTIONS

▼ STANDARD FEATURES

- 22 Gage Galvanized Steel Casing Construction
- NEMA 2 Steel Control Enclosure for Electric or Electronic Components
- 1/2" Thick Dual Density Fiberglass Insulation Meeting NFPA 90A and UL 181 Safety Requirements
- Linear Averaging Airflow Sensor
- Hot Water Coils
- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems

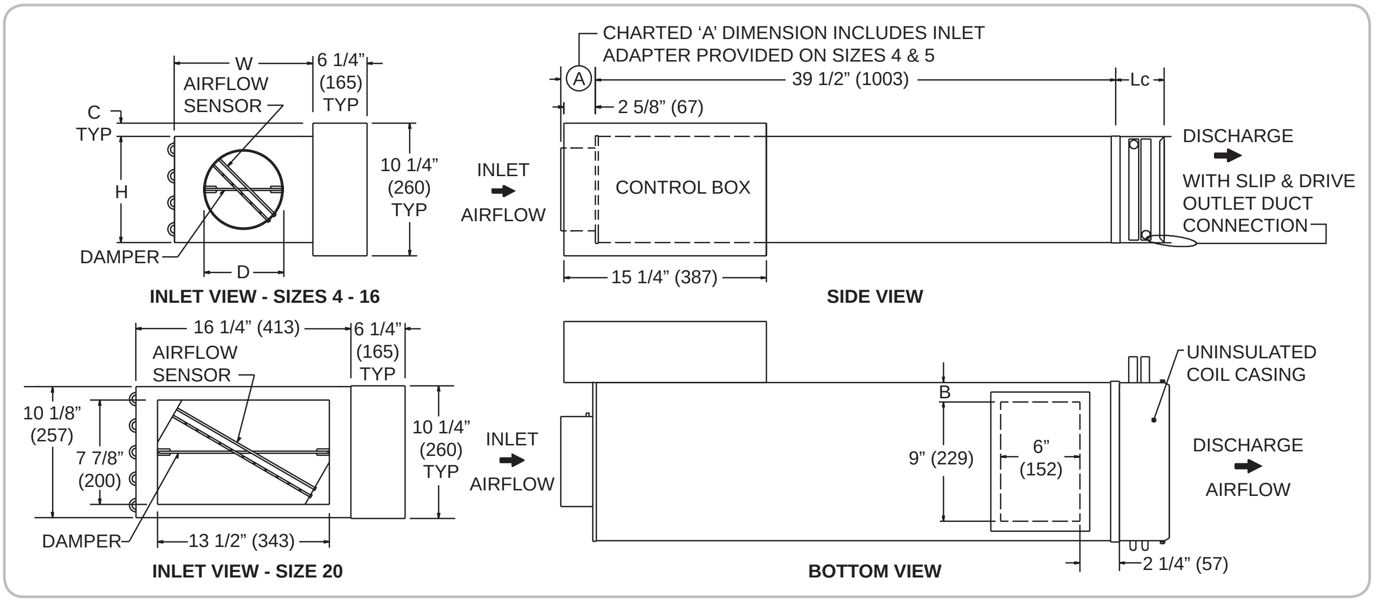
▼ OPTIONAL FEATURES

- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
- 24 Volt Transformer
- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Left-hand or Right-hand Water Coil Connection
- Bottom Access Panel*
- Cam Locks (Bottom Access Panel)*
- Hanger Brackets

► *See pages B-13 through B-18 for hot water coil dimensional and engineering information as well as performance data.*
(*) Not available with Size 20 and Doublewall Liner.

LMHS LOW PROFILE UNIT WITH HOT WATER HEAT & ATTENUATOR DIMENSIONAL INFORMATION

▼ LMHS LOW PROFILE UNIT WITH HOT WATER HEAT & ATTENUATOR, INLET, SIDE, & BOTTOM VIEWS



▼ LMHS LOW PROFILE UNIT WITH HOT WATER HEAT & ATTENUATOR, DIMENSIONAL DETAILS

Inlet Size	Nominal Max. CFM [L/s]	W	H	A	B	C	D	Lc	
								1-Row	2-Row
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► *Dimensions in ( ) are mm. Right-hand base unit with electronic control enclosure shown; left-hand is available.*

LMHS LOW PROFILE UNIT WITH HOT WATER HEAT & ATTENUATOR FEATURES & OPTIONS

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- 22 Gage Galvanized Steel Casing Construction
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- Variety of Pneumatic, Analog, and Factory Mounted Digital Control Packages for Pressure Dependent and Pressure Independent Systems

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- 20 Gage Galvanized Steel Casing Construction
- Liners: Cellular Insulation, 1" Dual Density Fiberglass Insulation, Sterilwall, Steriliner, Perforated Doublewall, or No Liner
- Four Quadrant Center Averaging Airflow Sensor
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- Disconnect Switch for Electronic Controls
- Dust Tight Control Enclosure
- Left-hand or Right-hand Control Enclosure
- Left-hand or Right-hand Water Coil Connection
- Bottom Access Panel
- Cam Locks (Bottom Access Panel)
- Hanger Brackets

► *See pages B-13 through B-18 for hot water coil dimensional and engineering information as well as performance data.*

Models LMHS
Form No. SIDOM.1 10/06

KRUEGER Single-Duct Terminal Units

PRE-INSTALLATION

General — The LMHS single duct terminals available with factory installed Pneumatic, Analog electronic, and DDC control options. Figure 1 shows a basic box.

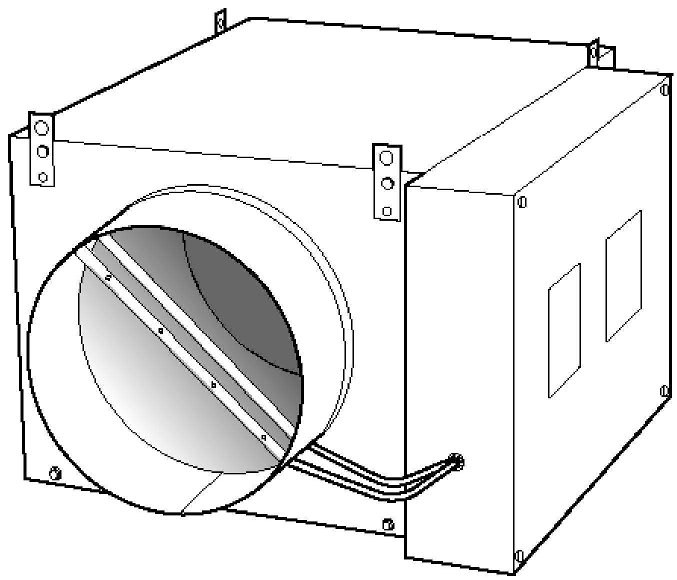


FIGURE 1 – Single Duct Box (with pneumatic controls shown)

STORAGE AND HANDLING — Inspect for damage upon receipt. Shipping damage claims should be filed with shipper at time of delivery. Store in a clean, dry, and covered location. Do not stack cartons. When unpacking units, care should be taken that the inlet collars and externally mounted components do not become damaged. Do not lift units using collars, inlet flow sensors, or externally mounted components as handles. Do not lay uncrated units on end or sides. Do not stack uncrated units over 6 ft high. Do not handle control boxes by tubing connections or other external attachments. Table 1 shows component weights.

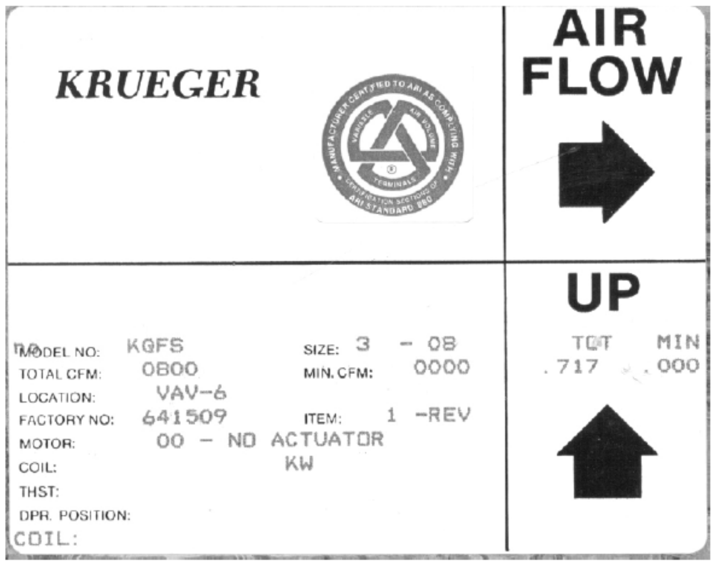
Table 1 – LMHS Unit Weights

LMHS SIZE	UNIT ONLY (lb)	W/ PNEUMATIC CONTROLS (lb)	W/DDC OR ANALOG CONTROLS (lb)	W/ELECTRIC HEAT CONTROLS (lb)	W/HOT WATER (1 ROW/ 2 ROW) (lb)
4, 5, 6	14	18	23	32	19/20
7, 8	16	20	25	39	21/23
9, 10	21	35	30	44	28/30
12	26	30	35	56	35/38
14	34	38	43	65	44/49
16	38	42	47	75	50/55
22	65	69	74	91	82/90

DDC – Direct Digital Controls
NOTE: Data is base on the following conditions:
1. Unit casing is 22 gage.
2. Unit insulation is ½-in. thick, 1.5-lb toughskin.
3. Units rated with standard linear flow sensor.

INITIAL INSPECTION — Once items have been removed from the carton, check carefully for damage to duct connections, inlet probes or controls. File damage claim immediately with transportation agency and notify Factory.

UNIT IDENTIFICATION — Each unit is supplied with a shipping label and an identification label:



INSTALLATION PRECAUTION — Check that construction debris does not enter unit or ductwork. Do not operate the central-station air-handling fan without final or construction filters in place. Accumulated dust and construction debris distributed through the ductwork can adversely affect unit operation.

SERVICE ACCESS — Provide service clearance for unit access.

CODES — Install units in compliance with all applicable code requirements.

UNIT SUSPENSION — See Fig. 3 for optional unit suspension details:

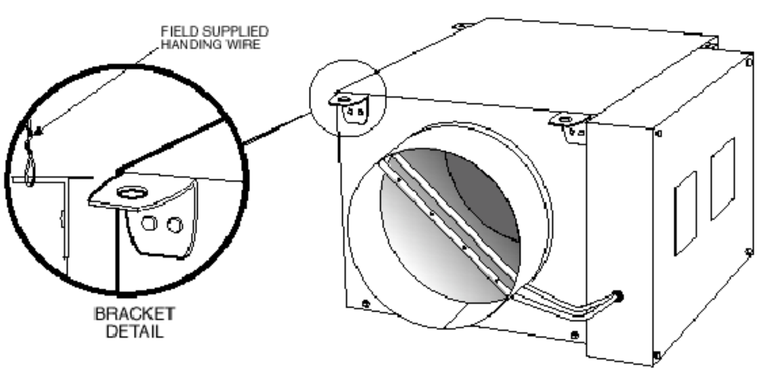


FIGURE 3 – Typical Unit Suspension with Brackets

Warranty — All Krueger furnished items carry the standard 1-year warranty.

MAINTENANCE

No periodic preventative maintenance required, unless called for specific control sequence.

CONTROL ARRANGEMENTS

The LMHS single duct units are offered with a wide variety of factory-mounted controls that regulate the volume of air delivery from the unit and respond to cooling and heating load requirements of the conditioned space. Stand-alone controls will fulfill the thermal requirements of a given control space. These devices are available in both pneumatic and electronic arrangements. A number of DDC (Direct Digital Controls) control packages by others are available for consignment mounting, as indicated.

Each control approach offers a variety of operating functions; a control package number identifies combinations of control functions. The following listings contain the basic function arrangements for each control offering. Because of the variety of functions available, circuit diagrams, operating sequences, and function descriptions are contained in separate Application Data publications. Refer to the specific control publication for details.

Analog Electronic Control Arrangement — Pressure independent control packages are available without supplemental heat, with on/off hot water or electric heat, proportional hot water heat, or with cooling/heating automatic changeover control. All analog control arrangements include an inlet flow sensor, 24V transformer (optional), control enclosure and wall thermostat to match the control type.

2100: Heating control
2101: Cooling control
2102: Cooling with on/off electric heat control
2103: Cooling with on/off hot water heat control
2104: Cooling/heating automatic changeover control
2105: Cooling with proportional hot water heat control

Direct Digital Electronic Control Arrangement (Field Supplied) — Control packages are field supplied for factory mounting, unless otherwise noted. All DDC control arrangements include a flow sensor, control enclosure and optional 24-volt transformer. Contact factory for details about mounting field-supplied controls.

Pneumatic Control Arrangement — All control packages are pressure independent (unless otherwise noted) and available with or without hot water heat, dual maximum airflow, heating and cooling maximum airflow and dual minimum airflow. All control arrangements include a standard linear inlet flow sensor.

1100 (Actuator only): DA-NC Pressure dependent control
1101 (Actuator only): RA-NO Pressure dependent control
1102 (Single function controller): DA-NO with or without hot water or electric heat
1103 (Single function controller): RA-NC with or without hot water or electric heat
1104 (Multi-function controller): DA-NO with or without hot water or electric heat
1105 (Multi-function controller): DA-NC with or without hot water or electric heat
1106 (Multi-function controller): RA-NO with or without hot water or electric heat
1107 (Multi-function controller): RA-NC with or without hot water or electric heat
1108 (Dual Maximum Control): DA-NO with or without hot water or electric heat
1109 (Heating/Cooling Maximum Control): DA-NO with or without hot water or electric heat
1110 (Dual Minimum Control): DA-NO with or without hot water or electric heat

PNEUMATIC CONTROL LEGEND
DA: Direct acting thermostat
RA: Reverse acting thermostat
NO: Normally open damper position
NC: Normally closed damper position
Single function controller: Provides single function, i.e., DA-NO
Multi-function controller: Capable of providing DA-NO,
DA-NC, RA-NC or RA-NO functions

No Control
0000: LMHS with no control box.
D000: LMHS with control enclosure and transformer.
D001: LMHS with control enclosure and no transformer. Also used for control enclosure and electric heat.

INSTALLATION

Step 1 — Install Volume Control Box
1. Move unit to installation area. Remove unit from shipping package. Do not handle by controls, flow sensors or damper extension rod.
2. Optionally, the unit may have factory-installed brackets.
3. Suspend units from building structure with straps, rods, or hanger wires. Secure the unit and level it in each direction.

Step 2 — Make Duct Connections
1. Install supply ductwork on each of the unit inlet collars. Check that air-supply duct connections are airtight and follow all accepted medium-pressure duct installation procedures. (Refer to Table 2 for pressure and flow data.)

2. Install the discharge ducts. Fully open all balancing dampers. A straight length of inlet duct is not required before the unit inlet. Ninety-degree elbows or tight radius flexible duct immediately upstream of inlet collar should be avoided.

Model: LMHS **Basic Pressure and Flow Data**

Inlet Size (area)	Minimum Airflow (CFM)*** Cooling Only or cooling with HW	Minimum Airflow (CFM)*** Electric Heat**	CFM	Electric Heat * Max Kw @55F EAT	Minimum Inlet Static Pressure (Unit & Heat Pressure Drop) Velocity Press. ΔV_{PS}	Basic Unit ΔP_S	Basic + 1 R - Coil ΔP_S	Basic + 2 R - Coil ΔP_S	Basic + 3 R - Coil ΔP_S	Basic + 4 R - Coil ΔP_S	Basic + Heater** ΔP_S
	40		40	n/a	0.01	0.00	0.00	0.00	0.00	0.01	0.00
4	or	55	103	2.1	0.09	0.01	0.01	0.02	0.03	0.04	0.01
(0.09)	0		167	3 !	0.23	0.02	0.04	0.06	0.08	0.10	0.02
			230	3 !	0.43	0.03	0.07	0.11	0.15	0.18	0.03
	63		62	n/a	0.01	0.00	0.01	0.01	0.01	0.01	0.00
5	or	85	161	3.3	0.09	0.02	0.04	0.05	0.07	0.09	0.02
(0.14)	0		261	5 !	0.22	0.04	0.09	0.14	0.19	0.24	0.04
			360	5 !	0.43	0.08	0.18	0.27	0.36	0.45	0.08
	90		90	n/a	0.01	0.01	0.01	0.02	0.02	0.03	0.01
6	or	110	233	4.8	0.08	0.03	0.08	0.11	0.15	0.19	0.03
(0.20)	0		377	7.5!	0.22	0.09	0.20	0.30	0.40	0.49	0.09
			520	7.5!	0.42	0.17	0.38	0.57	0.75	0.94	0.17
	123		120	n/a	0.01	0.00	0.01	0.02	0.02	0.03	0.00
7	or	140	330	6.8	0.09	0.04	0.08	0.12	0.16	0.20	0.04
(0.27)	0		525	9.5!	0.23	0.09	0.20	0.30	0.40	0.50	0.09
			700	9.5!	0.40	0.16	0.36	0.53	0.71	0.88	0.16
	160		160	n/a	0.01	0.01	0.02	0.02	0.03	0.04	0.01
8	or	190	440	9.1	0.09	0.04	0.12	0.19	0.25	0.32	0.04
(0.35)	0		675	13 !	0.21	0.09	0.27	0.44	0.60	0.76	0.09
			920	13 !	0.39	0.17	0.51	0.81	1.11	1.42	0.17
	203		200	n/a	0.01	0.01	0.02	0.02	0.03	0.04	0.01
9	or	240	550	11.3	0.08	0.07	0.12	0.17	0.22	0.27	0.07
(0.44)	0		875	16 !	0.21	0.17	0.31	0.44	0.57	0.69	0.17
			1160	16 !	0.38	0.30	0.55	0.77	1.00	1.22	0.30
	251		250	n/a	0.01	0.01	0.02	0.03	0.04	0.05	0.01
10	or	300	675	13.9	0.08	0.04	0.12	0.20	0.27	0.35	0.04
(0.55)	0		1075	21 !	0.20	0.10	0.31	0.50	0.69	0.89	0.10
			1430	21 !	0.35	0.17	0.55	0.89	1.23	1.57	0.17
	361		360	n/a	0.01	0.01	0.02	0.03	0.04	0.05	0.01
12	or	425	1000	20.6	0.08	0.04	0.14	0.22	0.31	0.40	0.04
(0.78)	0		1550	30!	0.19	0.09	0.33	0.54	0.75	0.96	0.09
			2060	30!	0.33	0.17	0.58	0.95	1.32	1.69	0.17
	491		480	n/a	0.01	0.01	0.02	0.03	0.03	0.04	0.01
14	or	580	1375	28.3	0.07	0.04	0.13	0.21	0.28	0.36	0.04
(1.07)	0		2125	36 !	0.17	0.10	0.31	0.49	0.68	0.86	0.10
			2800	36 !	0.29	0.18	0.53	0.85	1.17	1.49	0.18
	642		630	n/a	0.01	0.01	0.02	0.03	0.04	0.05	0.01
16	or	750	1775	36 !	0.06	0.04	0.14	0.22	0.31	0.40	0.04
(1.40)	0		2725	36 !	0.14	0.09	0.32	0.53	0.73	0.94	0.09
			3660	36 !	0.24	0.17	0.58	0.95	1.32	1.69	0.17
	1211		1200	n/a	0.01	0.00	0.02	0.04	0.06	0.07	0.00
22	or	1800	3300	36 !	0.07	0.04	0.17	0.30	0.42	0.55	0.04
(2.63)	0		5200	36 !	0.16	0.09	0.43	0.74	1.05	1.36	0.09
			7000	36 !	0.30	0.17	0.79	1.34	1.90	2.46	0.17

Notes:
1.) ΔP_S is the difference in static pressure across the assembly, with the damper fully open.
2.) To obtain Total Pressure, add the Velocity Pressure for a given CFM to the Static Pressure drop (D P_S) of the
Example: Pt for a Size 8 Basic Unit @925 CFM = 0.39 + 0.17 = 0.56
3.) Max Kw shown assumes 55F entering air and is limited by unit's selected voltage, phase and max capacity.
Minimum cfm for electric heat is based on UL/ETL listings. Note: Diffuser performance will likely be poor at this low flow rate.
4.) Maximum discharge temperatures with Electric Heat are set at 120F by the National Electric Code.
* The ASHRAE Handbook of Fundamentals does not recommend a discharge temperature exceeding 90F
** A minimum 0.03 discharge static pressure is required to set the flow switch in the electric heater
*** Minimums for DDC by others is the responsibility of the controls' provider.
! Max Kw is limited by design

Table 2

Step 3 — Install Sensors and Make Field Wiring Connections — Electric Analog or DDC (Direct Digital Controls) — Refer to specific unit dimensional submittals and control application diagrams for control specifications. All field wiring must comply with National Electrical Code (NEC) and local requirements. Refer to the wiring diagram on the unit for specific wiring connections. A field-supplied transformer is required if the unit was not equipped with a factory-installed transformer. See Fig. 4.

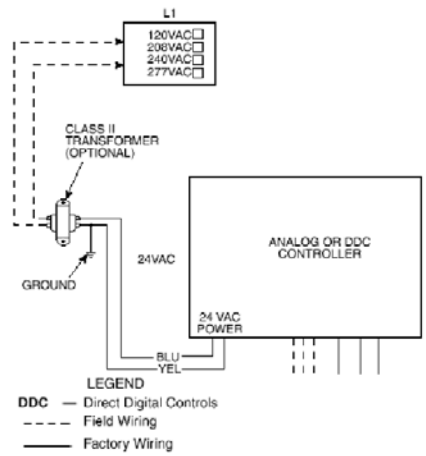


FIGURE 4 – Wiring of Optional Factory-Mounted Transformer

NOTE: Refer to wiring diagram attached to each unit for specific information on that particular unit. Unit airflow should not be set outside of the range noted in Fig. 4A-4B and the performance data section of this document.

Single duct terminal units with electric heat are supplied with a single point wiring connection in the heater control box. All unit power is supplied through this connection. Models with electric heat are factory equipped with a control transformer. See Fig. 5.

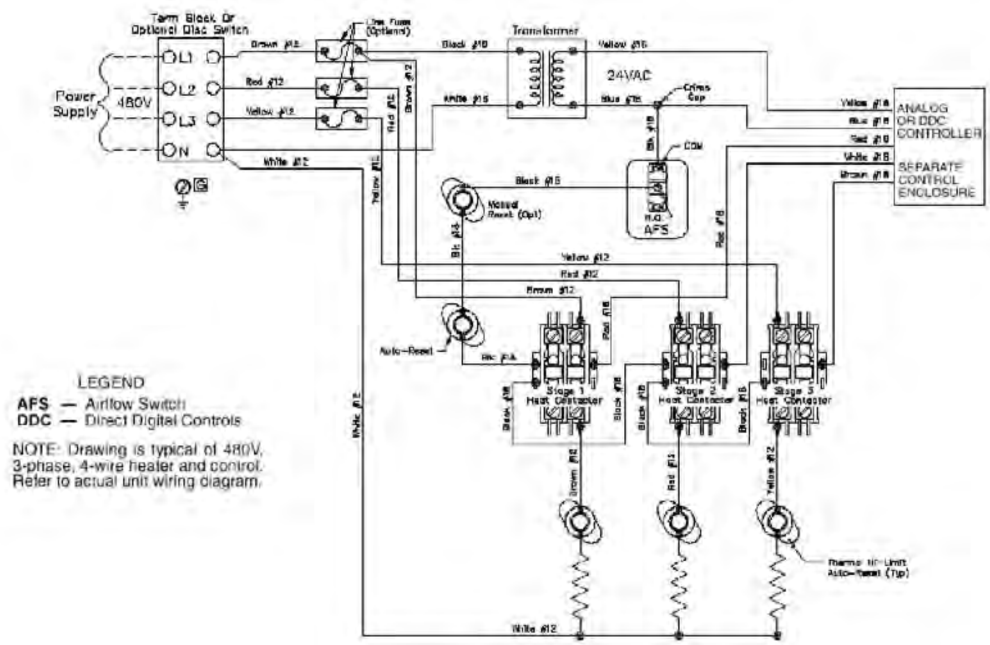


FIGURE 5 – Typical Power Connections for LMHS units with 3-Stage Electric Heat

Wiring and unit ampacities are referenced in Table 3.

TABLE 3- LMHS Heater Power Wiring

HEATER SIZE (Kw)	BTUH	120V Heater		208V Heater		240V Heater		277V Heater		208V 3Φ Heater		480V 3Φ Heater	
		FLA	AWG*	FLA	AWG*	FLA	AWG*	FLA	AWG*	FLA	AWG*	FLA	AWG*
0.5	1,707	4.2	14	2.4	14	2.1	14	1.8	14	1.4	14	0.6	14
1.0	3,413	8.3	14	4.8	14	4.2	14	3.6	14	2.8	14	1.2	14
2.0	6,826	16.7	10	9.6	14	8.3	14	7.2	14	5.6	14	2.4	14
3.0	10,239	25.0	8	14.4	12	12.5	12	10.8	14	8.3	14	3.6	14
4.0	13,652	33.3	8	19.2	10	16.7	10	14.4	12	11.1	14	4.8	14
5.0	17,065	41.7	5	24.0	10	20.8	10	18.1	10	13.9	12	6.0	14
6.0	20,478			28.8	8	25.0	8	21.7	10	16.7	10	7.2	14
7.0	23,891			33.7	8	29.2	8	25.3	8	19.4	10	8.4	14
8.0	27,304			38.5	6	33.3	8	28.9	8	22.2	10	9.6	14
9.0	30,717			43.3	6	37.5	6	32.5	8	25.0	8	10.8	12
10.0	34,130						6	36.1	6	27.8	8	12.0	12
11.0	37,543						6	39.7	6	30.5	8	13.2	12
12.0	40,956						6	43.3	6	33.3	8	14.4	12
14.0	47,782									38.9	6	16.8	10
16.0	54,608									44.4	6	19.2	10
18.0	61,434											21.7	10
20.0	68,260											24.1	10
22.0	75,086											26.5	8
24.0	81,912											28.9	8
26.0	88,738											31.3	8
28.0	95,564											33.7	8
30.0	102,390											36.1	6
32.0	109,216											38.5	6
34.0	116,042											40.9	6
36.0	122,868											43.3	6

NOTE: Refer to wiring diagram attached to each unit for specific information on that particular unit. Units with 480-3-60 electric heater REQUIRE 4-wire, wye connected power. Units with 208/230 v, 3-phase heater can be connected with 3-wire power. Unit airflow should not be set outside of the range noted in Figure 6, Figure 7 and the performance data section of this document. The minimum recommended airflow for units with electric heat must be at least 75 cfm per kW and not drop below the minimum values listed in the performance data table. The maximum unit discharge temperature should not exceed 120 F. Prevent air stratification by setting the discharge temperature no more than 15 degrees above the room temperature. Example: 90 F discharge in a 75 F room.

CONTROL SET UP

General — The LMHS single duct VAV terminal is designed to supply a varying quantity of cold primary air to a space in response to a thermostat demand. Some units have reheat options to provide heating demand requirements as well. Most VAV terminals are equipped with pressure compensating controls to regulate the response to the thermostat independent of the pressure in the supply ductwork. To balance the unit it is necessary to set both the maximum and minimum set points of the controller. The many types of control options available each have specific procedures required for balancing the unit.

Set Points — Maximum and minimum airflow set points are normally specified for the job and specific for each unit on the job. Where maximum and minimum airflow levels are not specified on the order, default values are noted on unit ID label.

Field Adjustment of Minimum and Maximum Airflow Set Points

Each unit is equipped with an amplifying flow probe that measures a differential pressure proportional to the airflow. The relationship between flow probe pressures and cfm is shown in the Flow Probe Graphs (Fig.6). This chart is attached to each unit. There are several conventions (and no universally accepted method) in use for representing this flow factor:

2. **Magnification Factor:** The magnification factor may be expressed as the ratio of either velocity or pressure, of the output of the sensor to that of a pitot tube.
   a. For example, a velocity magnification may be used. All Krueger probes develop an average signal of 1" w.g. @2625 fpm. This gives a velocity magnification of 4005/2625, or 1.52.
   b. It may be a pressure magnification factor. In this case, the ratio of pressures at a given air velocity is presented. For a velocity constant of 2626, at 1000 fpm, this is 0.1451 / 0.0623 = 2.33.

3. **K-Factor:** The 'K-factor' may be represented in two ways –
   a. It may be a velocity K-factor, which is the velocity factor times the inlet area, (which for all Krueger probes, both Linear and the new "LineaCross", is 2625 fpm/in w.g.).
   b. Alternatively, it may be the airflow K-Factor, which is the velocity factor times the inlet area. For an 8 inch Krueger unit, therefore, this would be 2625 * 0.349, or 916. A separate airflow factor is required for each size. All Krueger VAV terminals have round inlets. Below is a K-Factor table for all Krueger VAV terminal inlets.

Inlet Probe Area and K Factor

LMHS,LMHD	04	05	06	07	08	09	10	12	14	16	22
Inlet Diameter, in.	4	5	6	7	8	9	10	12	14	16	22
Velocity Magnification	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52
Velocity Constant	2625	2625	2625	2625	2625	2625	2625	2625	2625	2625	2625
CFM K Factor.	229	358	515	702	916	1160	1432	2062	2806	3665	7000
Inlet Area, Sq. ft.	0.087	0.136	0.196	0.267	0.349	0.442	0.545	0.785	1.069	1.396	2.667
Recommended Min cfm	40	62	89	122	159	201	248	357	486	635	1212

Table 4

System Calibration of the Flow Probe — To achieve accurate pressure independent operation, the velocity sensor and flow probe must be calibrated to the controller. This will ensure that airflow measurements will be accurate for all terminals at system start-up. System calibration is accomplished by calculating a flow coefficient that adjusts the pressure fpm characteristics. The flow coefficient is determined by dividing the flow for a given unit (design air volume in cfm), at a pressure of 1.0 in. w.g differential pressure, by the standard Pitot tube coefficient of 4005.

This ratio is the same for all sizes, no matter which probe type is installed. Determine the design air velocity by dividing the design air volume (the flow at 1.0 in. w.g) by the nominal inlet area (sq. ft). This factor is the K factor.

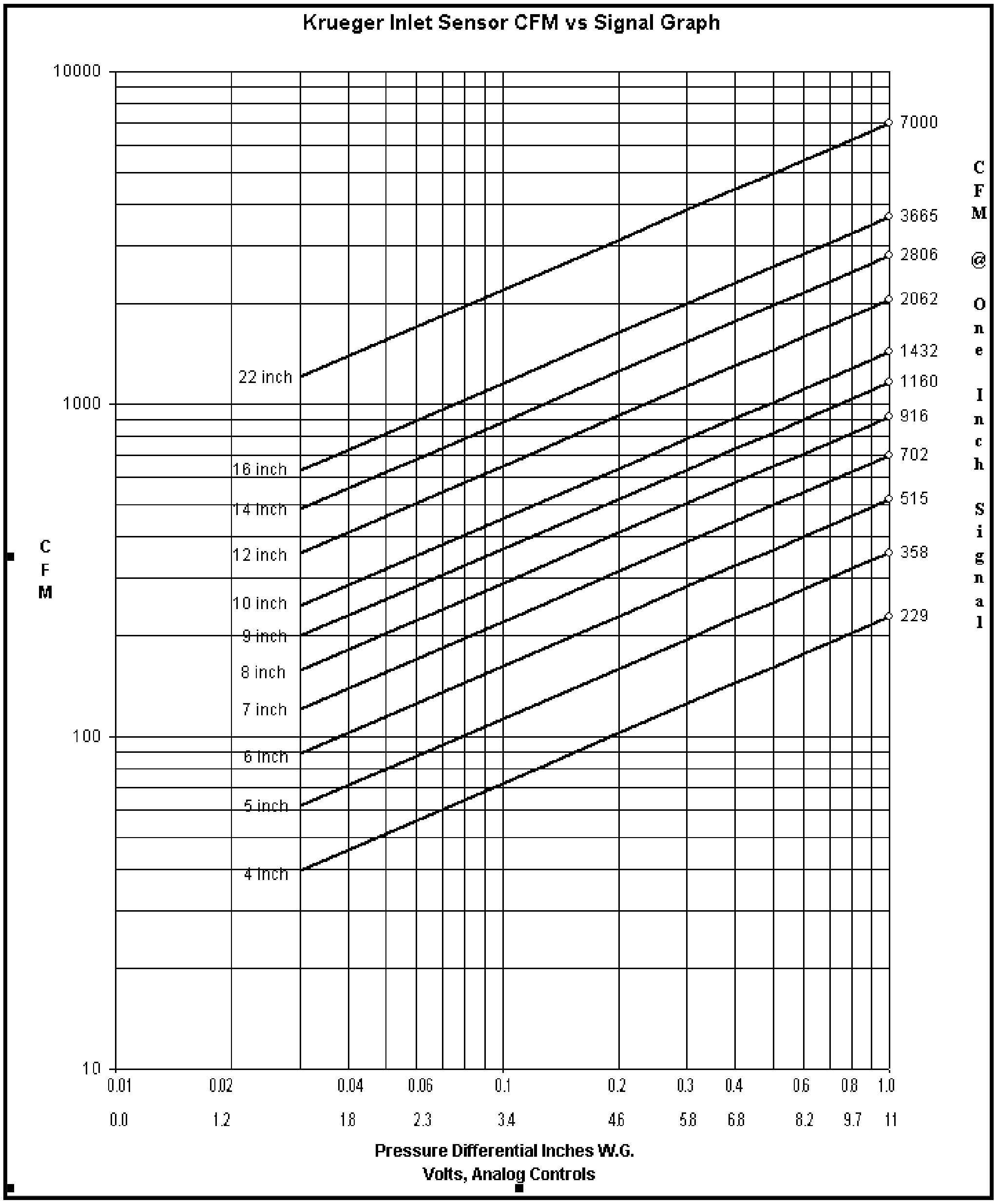


Figure 6 – Inlet Sensor Pressure Chart

PNEUMATIC CONTROLS

Volume controllers for LMHS units are shown in Fig. 7, 8 and 9. Identification for each controller is shown in Table 5.

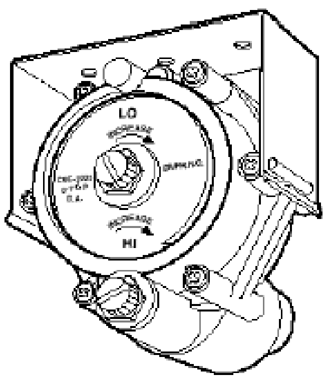


FIGURE 7 – Pneumatic Volume Controller (Normally Open) for Pneumatic Control Unit (Beige Color)

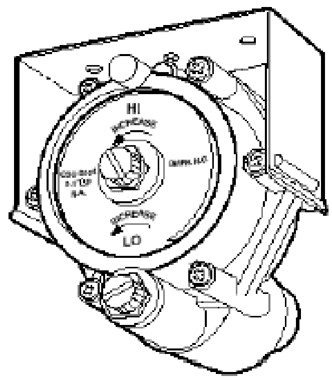


FIGURE 8 – Pneumatic Volume Controller (Normally Closed) for Pneumatic Control Unit (Grey Color)

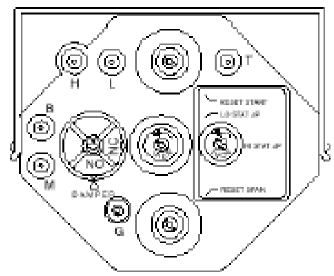


FIGURE 9 – CSC 3000 Series Reset Volume Controller

TABLE 5 – Pneumatic Volume Controller Identification

CONTROL SEQUENCE	FUNCTION ARRANGEMENT IDENTIFICATION	FIGURE NUMBER	KREUTER PART NUMBER
1102	DA-NO	8	CSS-2003
1103	RA-NC	9	CSC-2004
1104	DA-NO	10	CSC-3011
1105	DA-NC	10	CSC-3011
1106	RA-NO	10	CSC-3011
1107	RA-NC	10	CSC-3011
1108	DUAL MAXIMUM	10	CSC-3011
1109	HEATING/COOLING MAXIMUM	10	(2) CSC-3011
1110	DUAL MINIMUM	10	CSC-3011

LEGEND: **DA –** DIRECT ACTING, **NC –** NORMALLY CLOSED, **NO –** NORMALLY OPEN, **RA –** REVERSE ACTING

Preparation for Balancing (Control Sequences 1102 and 1103)

1. Inspect all pneumatic connections to assure tight fit and proper location.

2. Verify that the thermostat being used is compatible with the control sequence provided (direct acting or reverse acting).

3. Check main air pressure at the controller(s). The main air pressure must be between 15 psi and 25 psi. (If dual or switched-main air pressure is used, check the pressure at both high and low settings.) The difference between “high” pressure main and “low” pressure main should be at least 4 psi, unless otherwise noted, and the “low” set-ting difference should exceed 15 psi.

4. Check that the unit damper will fail to the proper position when main air pressure is lost. Disconnect the pneumatic actuator line from the velocity controller and observe the VAV damper position. The damper should fail to either a normally open position (indicator mark on shaft end is horizontal) or a normally closed position (indicator mark on shaft end is vertical).

5. Check that there is primary airflow in the inlet duct.

6. Connect a Magnehelic gage, inclined manometer or other differential pressure measuring device to the balancing taps provided in the velocity probe sensor lines. The manometer should have a full scale reading of 0.0 to 1.0 in. wg. The high-pressure signal is delivered from the front sensor tap (away from the valve), and the low pressure signal is delivered from the back line (near the valve). The pressure differential between high and low represents the amplified velocity pressure in the inlet duct.

7. Read the differential pressure and enter the Linear Aver-aging Probe Chart to determine the airflow in the terminal unit. This chart is shown in Fig. 6 and is also attached to the side of each unit. For example, a differential pressure of 0.10 in. wg for a size 8 unit yields an airflow of 275 cfm.

Balancing Procedure (Control Sequences 1102 and 1103)

DIRECT ACTING THERMOSTAT, NORMALLY OPEN DAMPER (CONTROL SEQUENCE 1102) — Refer to Fig. 8.

1. Minimum Volume Setting:
    a. Disconnect the thermostat line from the volume controller.
    b. Adjust the minimum volume control knob (marked “LO” and located in the center of the controller) to achieve the required minimum flow. To determine the required pressure differential, refer to Tables 2 and 5 and the Probe Chart provided on the side of the VAV unit and in Fig. 6.
    c. Reconnect the thermostat line.
2. Maximum Volume Setting:
    a. Disconnect the thermostat line from the volume controller.
    b. Apply 15 + psi to the thermostat port on the volume controller (marked “T”) by tapping into the main air pressure line.
    c. Adjust the maximum volume control knob (marked “HI” and located at the side of the controller) until the desired pressure differential is registered on the manometer. To determine the required pressure differential, refer to Table 5 and the Probe Chart provided on the side of the VAV unit and in Fig. 6.
    d. Reconnect the thermostat line.

REVERSE ACTING THERMOSTAT, NORMALLY CLOSED DAMPER (CONTROL SEQUENCE 1103) —Refer to Fig. 9

1. Maximum Volume Setting:
    a. Disconnect the thermostat line from the velocity controller.
    b. Adjust the maximum volume control knob (marked “HI” and located in the center of the controller)
    c. To achieve the required minimum flow. To determine the required pressure differential, refer to Tables 2 and 5 and the Probe Chart provided on the side of the VAV unit and in Fig. 6.
    d. Reconnect the thermostat line.
2. Minimum Volume Setting:
    a. Disconnect the thermostat line from the velocity controller.
    b. Apply 15 + psi to the thermostat port on the volume controller (marked “T”) by tapping into the main air pressure line.
    c. Adjust the minimum volume control knob (marked “LO” and located at the side of the controller)
    d. until the desired pressure differential is registered on the manometer. To determine the required pressure differential, refer to Table 5 and the Probe Chart provided on the side of the VAV unit and in Fig. 6.
    e. Reconnect the thermostat line.

Balancing Procedure (Control Sequences 1104-1110)

1. Damper action is factory set at N.O. (normally open), or N.C. (normally closed). To reselect loosen damper selection switch screw and align pointer with damper pointer and tighten screw. The spring range of the actuator is not critical since the controller will output the necessary pressure to the actuator to position the damper according to set point. (See Fig. 10.)
2. Pipe the controller: Connect port "B" to the damper actuator. Connect port "M" to the clean, dry main air. Connect port "T" to the thermostat output. Connect port "H" to the total pressure tap on the airflow sensor. Connect port "L" to the static pressure tap on the airflow sensor. The controller can be set up for cooling or heating applications using either a Direct Acting (DA) or Reverse Acting (RA) thermostat signal. The two flow adjustments are labeled "LO STAT ΔP" and "HI STAT ΔP".

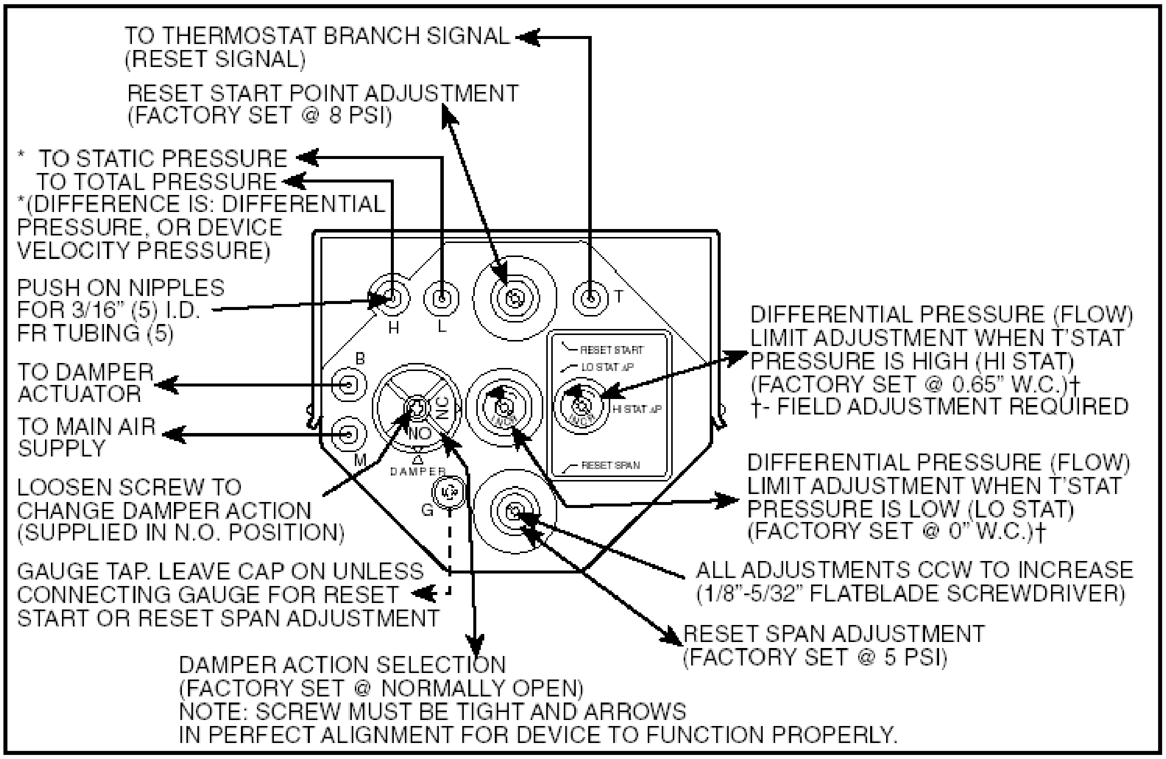


Figure 10 CSC 3011 Controller

LO STAT ΔP setting is the desired airflow limit when the thermostat pressure is less than, or equal to, the reset start point.

- For DA Cooling or RA Heating: Adjust LO STAT ΔP to the desired minimum airflow with 0 psig (or a pressure less than the reset start point) at port "T". The LO STAT ΔP must be set first. The LO STAT ΔP will affect the HI STAT ΔP setting.

- For RA Cooling or DA Heating: Adjust LO STAT ΔP to the desired maximum airflow with 0 psig (or a pressure less than the reset start point) at port "T". The LO STAT ΔP must be set first. The LO STAT ΔP will affect the HI STAT ΔP setting.

HI STAT ΔP setting is the desired airflow limit when the thermostat pressure is greater than, or equal to, the reset stop-point. The reset stop-point is the reset span pressure added to the reset start-point pressure.

- For DA Cooling or RA Heating (see Fig. 6): Adjust HI STAT ΔP to the desired maximum airflow with 20 psig (or a pressure greater than the reset stop point) at port “T”. The HI STAT ΔP must be set last. The HI STAT ΔP setting will be affected by the LO STAT ΔP setting.

- For RA Cooling or DA Heating (see Fig. 6): Adjust HI STAT ΔP to the desired minimum airflow with 20 psig (or a pressure greater than the reset stop point) at port “T”. The HI STAT ΔP must be set last. The HI STAT ΔP setting will be affected by the LO STAT ΔP setting.

NOTE: After the “LO STAT ΔP” and “HI STAT ΔP” initial adjustments are made, cycle the thermostat pressure a few times to settle the internal reset mechanisms and verify settings. Fine-tune the settings if necessary. The thermostat pressure may be left at a high pressure and the “G” port cap may be removed and replaced to cycle the reset mechanism.

RESET START setting is factory set at 8.0 psig. This is the lowest thermostat pressure that the LO STAT ΔP airflow will begin to reset towards the HI STAT ΔP airflow. To change the RESET START setting; regulate thermostat pressure to the “T” port to the desired reset start point pressure, adjust RESET START adjustment until pressure at the “G” port is slightly higher than 0 psig, i.e., 0.1 psig.

NOTE: The “G” port taps into the controller’s internal reset chamber, which always starts at 0 psig. The RESET START adjustment is a positive bias adjustment that sets the desired thermostat start point to the controller’s internal reset start point of 0 psig.

RESET SPAN setting is factory set at 5.0 psig. This is the required change in thermostat pressure that the controller will reset between the LO STAT ΔP setting and the HI STAT ΔP setting. To change the RESET SPAN setting; adjust RESET SPAN adjustment until pressure at the “G” port equals the desired reset span pressure.

NOTE: The “G” port taps into the controller’s internal reset chamber, which will always be at a pressure between 0 psig and the RESET SPAN pressure.

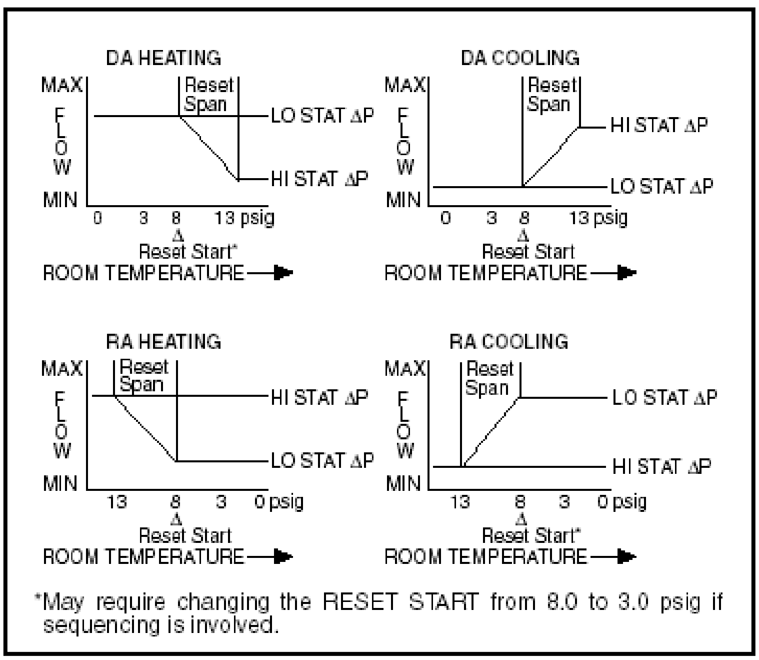


Figure 11 Reset Cycle for CSC-3011 Control

Preventative Maintenance

1. Inspect pneumatic tubing for loose connections or leaks.
2. Clean out pneumatic line filters regularly according to manufacturer's recommendations.

Pneumatic Control Troubleshooting.

PROBLEM	PROBABLE CAUSE
Controller does not reset to maximum or minimum set point during balance procedure.	Balancer is using the thermostat for control signal. An artificial signal must be provided in place of the thermostat.
Controller does not reset to maximum or minimum set point during operation.	Thermostat is not demanding maximum or minimum air volume. Main air pressure at the controller is less than 15 psi.
Pneumatic actuator does not stroke fully.	Leak in pneumatic line between the controller and the actuator. Main air pressure at the controller is less than 15 psi. Leak in the diaphragm.
Air valve stays in wide open position.	Velocity probe is blocked by an obstruction (sandwich bag, etc.). Insufficient supply air in the inlet duct.

NOTE: Always check:
- Main air pressure (15 psi to 25 psi) at the controller.
- Disconnected or kinked pneumatic lines to the controller
- Quality of compressed air (oil or water in lines).
- Proper thermostat signal and logic (Direct/Reverse Acting).
- Blocked velocity probe or insufficient primary supply air.
- Leaks in the actuator diaphragm.
- Mechanical linkage of the actuator/air valve.

Table 6 – Pneumatic Controls troubleshooting:

Analog Controls

Balancing Procedures (Control Sequences 2100-2105) — The Analog Electronic Control System is a pressure independent volume reset control that use uses a Krueger CSO-5001 controller-actuator (see Fig. 12).

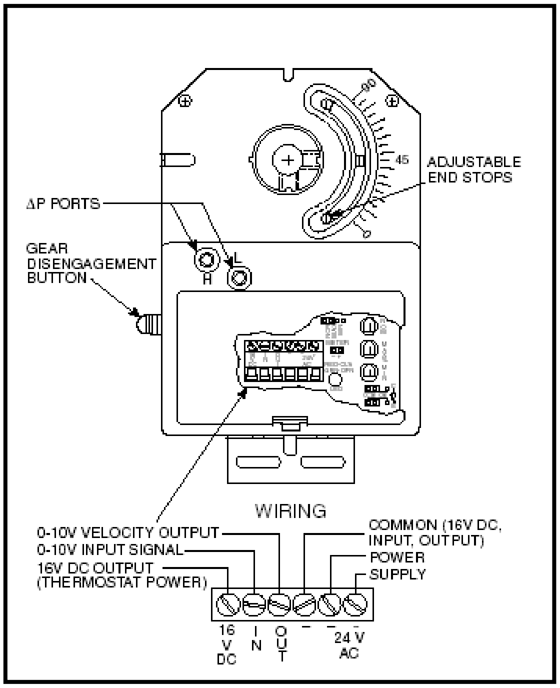


Figure 12 CSO 5001 Controller

Adjustments for the minimum and maximum airflows are made at the thermostat.

The thermostat (CTE-5100 Series) operates on a 16 vdc power supply from the CSP controller and outputs a 0 to 10 vdc signal on the T terminals; T1 in the cooling mode (DA [Direct Acting]) and T2 in the heating mode (RA [Reverse Acting]). See the reference sequence diagram on unit for details on which ‘T’ terminals are used on each model thermostat, but in general T1 and T3 are used for the cooling mode, T2 and T4 for heating. Terminals T1 and T2 are adjustable to limit minimum and maximum flow. T3 and T4 have a fixed 0 to 10 vdc output signal.

1. Required Tools:
   A. 1/16 in. hex/key wrench
   B. Small flat blade (1/8 in.) screwdriver
   C. Digital voltmeter capable of displaying a 0 to 10 vdc range which will display in hundredths of 1 vdc
   D. HSO-5001 Test Leads (optional for meter taps)

2. Remove thermostat cover. Thermostat cover is removed by loosening the setscrews on each side of the thermostat. Using a 1/16 in. hex/key wrench turn the setscrews clockwise until cover is loose.

3. Check voltages. Verify 16 vdc between (+) and (–) terminals.

CONTROL SEQUENCE 2100 (Heating Only)

1. Be certain the ambient room temperature at the thermostat is within the range of the thermostat (55 to 85 F).

2. Adjust the heating set point slider all the way to the left for minimum heating.

3. Read the DC voltage across the meter taps on the heating (left) side. Adjust the minimum set point (MIN INCR) potentiometer (clockwise to increase or counterclockwise to decrease) to the DC voltage equal to the desired air-flow (CFM) as shown on the calibration curve (Fig. 14).

4. NOTE: The minimum set point must be adjusted **firs**t. Adjustment of the MIN INCR potentiometer directly affects the maximum set point.

5. Adjust the heating set point slider all the way to the right for maximum heating.

6. Read the DC voltage across the meter taps on the heating (left) side. Adjust the maximum set point (MAX INCR) potentiometer (clockwise to increase or counterclockwise to decrease) to the DC voltage equal to the desired air-flow (CFM) as shown on the calibration curve (Fig. 14).

NOTE: The maximum set point must be adjusted **las**t. Adjustment of the MIN INCR potentiometer directly affects the maximum set point.

7. Return the heating set point slider to the desired set point. Insert set point slider stops. Replace thermostat cover.

CONTROL SEQUENCE 2101 (Cooling Only)

1. Be certain the ambient room temperature is within the range of the thermostat (55 to 85 F).

2. Adjust the cooling set point slider all the way to the right for minimum cooling.

3. Read the DC voltage across the meter taps on the cooling (right) side. Adjust the minimum set point (MIN INCR) potentiometer (clockwise to increase or counterclockwise to decrease) to the DC voltage equal to the desired air-flow (CFM) as shown on the calibration curve.

NOTE: The minimum set point must be adjusted **first**. Adjustment of the MIN INCR potentiometer directly affects the maximum set point.

4. Adjust the cooling set point slider all the way to the left for maximum cooling.

5. Read the DC voltage across the meter taps on the cooling (right) side. Adjust the maximum set point (MAX INCR) potentiometer (clockwise to increase or counterclockwise to decrease) to the DC voltage equal to the desired air-flow (CFM) as shown on the calibration curve.

NOTE: The maximum set point must be adjusted **last**. Adjustment of the MIN INCR potentiometer directly affects the maximum set point.

6. Return the cooling set point slider to the desired set point. Insert set point slider stops. Replace thermostat cover.

CONTROL SEQUENCE 2102 (Cooling with up to Three-Stage Reheat) Cooling Side of the Thermostat

1. Follow steps 1 through 5 for cooling sequence 2101.
2.

NOTE: Be sure to adjust the cooling set point slider all the way to the left for maximum cooling. (The heating set point slider will have to be adjusted all the way to the left also.)

NOTE: The minimum set point must be adjusted **first**. Adjustment of the MIN INCR potentiometer directly affects the maximum set point and auxiliary set point.

3. Adjustment of auxiliary set point if required: Read the DC voltage across the meter taps on the heating (left) side. Adjust the MAX/AUX INCR potentiometer (clockwise to increase or counterclockwise to decrease) to the DC voltage equal to the desired airflow (CFM).

4. Return the cooling set point slider and the heating set point slider to their desired set points. Insert or reinsert set point slider stops. Replace thermostat cover.

CONTROL SEQUENCE 2104 (Cooling with Duct Temperature Changeover) Cooling Side of the Thermostat — Follow steps 1 through 5 for cooling sequence 2101.

NOTE: Be sure to adjust the cooling set point slider all the way to the left for maximum cooling. (The heating set point slider will have to be adjusted all the way to the left also.)

CONTROL SEQUENCE 2103 or 2105 (Cooling with up Modulating Reheat) Cooling Side of the Thermostat — Follow steps 1 through 5 for cooling sequence 2101.

NOTE: Be sure to adjust the cooling set point slider all the way to the left for maximum cooling. (The heating set point slider will have to be adjusted all the way to the left also.)

NOTE: The minimum set point must be adjusted **first**. Adjustment of the MIN INCR potentiometer directly affects the maximum set point and auxiliary set point.

Analog Control Troubleshooting — The following troubleshooting guide is directed towards single duct cooling applications, the same concepts can be applied to other configurations.

CONTROLLER

1. Verify 24 VAC at terminals “~” (phase) and “-” (ground). Tolerance can be –15% to +20% (20.4 to 28.8 VAC).

2. Verify 16 vdc at terminals “(16 VDC)” and “(-)”.
    b. Tolerance is 15.0 to 17.0 vdc power supply to thermostat.
    c. If not correct, disconnect thermostat and recheck.
    d. If still incorrect, replace CSP controller.

3. Check “Requested Flow” voltage on terminal “IN” and “-”.
    a. Use charts on pages 7 and 8, Fig. 4A-4C to correlate into cubic feet per minute (CFM).
    b. If reading is not what is desired, see “Calibration” to adjust thermostat.

4. Check “Actual Flow” voltage on terminal “OUT” and “-” for 0 to 10 vdc). Use Fig. 4A-4C to correlate into cfm.

5. Check box movement, damper rotation, etc.
    a. Review “Requested Flow” and “Actual Flow” above to determine if unit should be satisfied (within 50 fpm) or driving open or closed.
    b. If damper is not moving, verify damper is not stuck or at end of travel. Check rotation jumpers for proper position.
    c. Change “Requested Flow” to make unit drive opposite direction. This can be accomplished by moving the set point sliders or 1) and 2) below.

        1.) To manually open the box, remove wiring from terminal “IN” and jumper terminal “IN” to terminal “16VDC”. This will tell unit to control at 3300 fpm/full airflow, and the green LED should turn on (and the box should drive open).

        2.) To manually close the box, remove wiring from terminal “IN”, jumper and “IN” terminal to “-” terminal. This will tell unit to control at zero fpm/no airflow, and the red LED should be on (and the box should drive closed).

NOTE: Never jumper terminal 16 VDC to “-” as this would cause a short, and possibly damage the power supply.

NOTE: When using the same transformer for more than one control, the phase and ground must be consistent with each device
.

WATER VALVE INSTALLATION
WARNING: Disconnect power before wiring or electrical shock and personal injury could result.
Water valves are field supplied. Krueger and most digital control manufacturers offer two different hot water valve applications; on/off and floating point modulating proportional control. See Table 16 for specifications for compatible water valves for Krueger supplied analog controls. Controls contractor should provide water valve specs used on controls supplied by others. To connect the field-supplied water valves to the controller, refer to the wiring labels for the control package.