

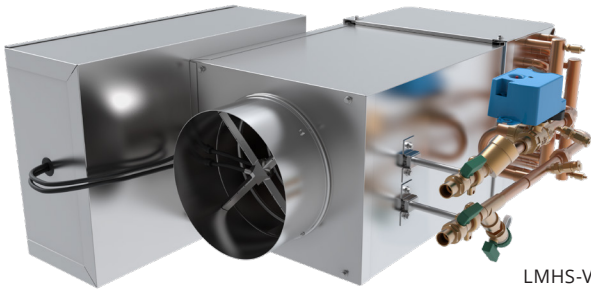
# LMHS-VP

Single Duct Terminal Unit | Valve Package

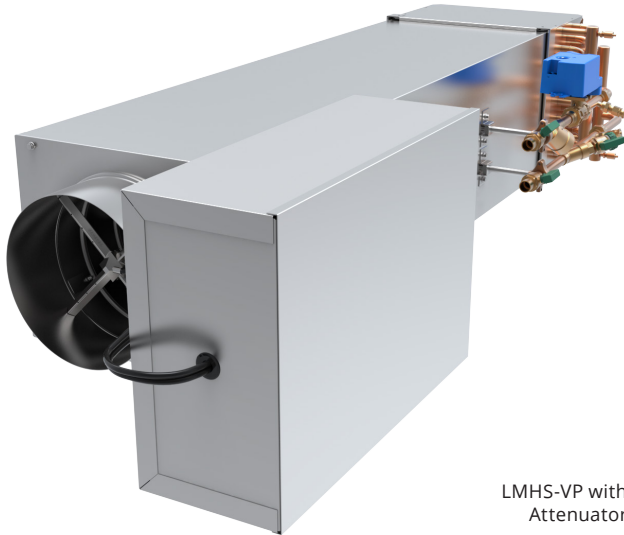


TERMINAL UNITS | SINGLE DUCT

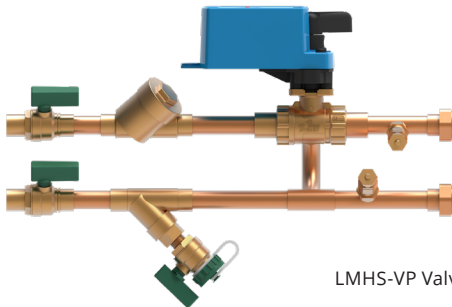
LMHS-VP



LMHS-VP



LMHS-VP with Attenuator



LMHS-VP Valve Package

## INTRODUCTION

The LMHS-VP terminal units are comprised of the same configurations and quality construction of a LMHS but is even easier to install due to a factory provided and mounted hot water coil valve package. The LMHS-VP valve package is assembled in a manufacturing setting giving you repeatable and reliable quality that is otherwise hard to replicate in a field setting without skilled labor. With multiple control options, construction options, and valve package configurations, the LMHS-VP is the easiest terminal unit to design with and to install.

## MODEL

LMHS-VP: Single Duct Terminal Unit with Factory Valve Package

## FEATURES

- 22 Gauge Galvanized steel casing construction with a 20 gauge casing option that provides strength and product durability.
- AHRI listings for certified performance in accordance with AHRI Standard 880 testing standard.
- 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.
- Pneumatic, analog, and digital controls may be customized for many building systems. BACnet/BMS compatible digital controls can be provided by Krueger.
- K4 Lineacross four quadrant, multi-point center averaging sensor or optional linear, multiple-point, averaging velocity sensor offers low resistance to airflow while providing amplified velocity pressure signal to the controller.
- Gasketed round volume control damper operates over a full 90° range and provides a low leakage shutoff position.
- Compact unit casing sizes accommodate installation in reduced ceiling plenum spaces.
- Find Revit models at [www.krueger-hvac.com/revit](http://www.krueger-hvac.com/revit).

### AHRI CERTIFIED PERFORMANCE DATA

#### DISCHARGE DATA

INLET SIZE	RATED CFM	MIN Δ Ps	SOUND POWER @ 1.5" Δ Ps						
			2	3	4	5	6	7	
04	150	0.100	69	64	55	51	49	44	
05	250	0.100	71	69	62	54	50	47	
06	400	0.100	71	70	62	54	50	47	
07	550	0.100	73	72	61	56	53	52	
08	700	0.100	74	71	62	58	54	51	
09	900	0.100	71	68	61	57	54	52	
10	1100	0.100	71	68	63	59	57	54	
12	1600	0.100	74	68	64	61	59	57	
14	2100	0.100	74	68	63	61	59	57	
16	2800	0.100	75	68	64	60	58	56	

#### RADIATED DATA

INLET SIZE	RATED CFM	MIN Δ Ps	SOUND POWER @ 1.5" Δ Ps						
			2	3	4	5	6	7	
04	150	0.100	56	49	42	40	37	33	
05	250	0.100	59	52	44	39	35	31	
06	400	0.100	60	58	50	40	36	33	
07	550	0.100	60	57	51	43	39	35	
08	700	0.100	62	59	49	43	38	38	
09	900	0.100	60	56	50	42	39	35	
10	1100	0.100	58	54	50	43	38	32	
12	1600	0.100	64	58	51	46	42	36	
14	2100	0.100	60	56	47	44	41	36	
16	2800	0.100	66	62	56	49	45	42	

NOTES: All sound data is based on tests conducted in accordance with AHRI 880-11. ΔPs is the difference in static pressure from inlet to discharge. Sound power levels are in dB, re 10<sup>-12</sup> Watts. Discharge sound power is the sound emitted from the unit discharge. Radiated sound power is the sound transmitted through the casing walls. Discharge sound power has been corrected for end reflection. NC application data is from AHRI Standard 885-08 Appendix E, as a function of flow rate shown. See Krueger's selection program for specific sound data for optional liners; 1/2", dual density liner shown. See Engineering section for reductions and definitions. AHRI certification points are shown in bold, white font in the sound performance data found on page A2-60 and A2-61.



### UNIT CAPACITIES

#### SELECTION EXAMPLE - BASED ON CFM CRITERIA

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

#### AIRFLOW CAPACITY DETAILS

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.
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. 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.

#### STANDARD UNIT CAPACITIES

INLET SIZE	MAX PRIMARY AIRFLOW - CFM	MIN AIRFLOW - CFM
		STANDARD*
04	230	40
05	360	62
06	515	89
07	700	121
08	920	159
09	1160	201
10	1430	248
12	2060	357
14	2800	486
16	3660	634
22	7000	1212

#### LOW PROFILE UNIT CAPACITIES

INLET SIZE	MAX PRIMARY AIRFLOW - CFM	MIN AIRFLOW - CFM
		STANDARD*
04	230	40
05	360	62
06	515	89
07	700	121
08	920	159
20	2100	420

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

### PRODUCT DESCRIPTION

#### CASING

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

#### INLET COLLARS

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

#### OUTLET CONNECTION

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

#### DAMPER ASSEMBLY

- Unit sizes 04-16 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, except size 22.

#### CASING LINERS

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

- **(Optional)** 1" Thick Insulation: 1" thick, 1 1/2 lb. dual density fiberglass insulation that meets UL 181 and NFPA 90A.
- **(Optional)** Cellular Insulation: 1/2" or 1" thick, 1 1/2 lb. density, smooth surface, polyolefin, closed-cell foam insulation for fiber free application. Cellular insulation meets UL 181 and NFPA 90A and does not support mold or bacteria growth.

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

#### AIRFLOW SENSOR

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

#### CONTROLS

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

#### ACCESS PANEL

- **(Optional)** Gasketed access panel in the terminal unit casing is available for viewing damper components and for upstream cleaning of the hot water coil fins. Available only on size 22 when ordered with integral attenuator. The access panel is insulated with the same liner as the unit.

#### HOT WATER HEAT

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

#### VALVE PACKAGE

- Valve package uses 1/2" nominal copper tubing. Factory pressure tested to 100 psi. Supplied with PT test port, union connections, 2 or 3-way valve, on/off normally closed actuator, and isolation manual ball valves.
- **(Optional)** 3-Point floating, fail in place actuator.
  - **(Optional)** Automatic flow control.
  - **(Optional)** Y-strainer with blowdown connection.

#### CONTROL TRANSFORMERS

- **(Optional)** Factory supplied and wired 50 VA transformer mounted inside the control enclosure. Multiple voltage options are available.

#### LABELS

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

### 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 or an LMHS-VP with 1-row hot water coil with a cooling-only or minimum heating control package; exterior zones are often controlled by an LMHS-VP with multi-rowed hot water reheat coils and a reheat control package.

Each LMHS-VP is supplied with either a 2 or 3-way valve package to control water flow through the hot water reheat coil. 2-way valve packages control water flow by fully opening and closing the valve or by 3-point floating water flow that is based on heating demand. 3-way valve packages are similar to 2-way valve packages, except water flow doesn't fully stop. Instead, water flow is either directed through the water coil or bypasses the water coil based on heating demand. 3-way valve packages ensure that a minimum amount of water is flowing through the hot water system, which helps return water temperature to the boiler.

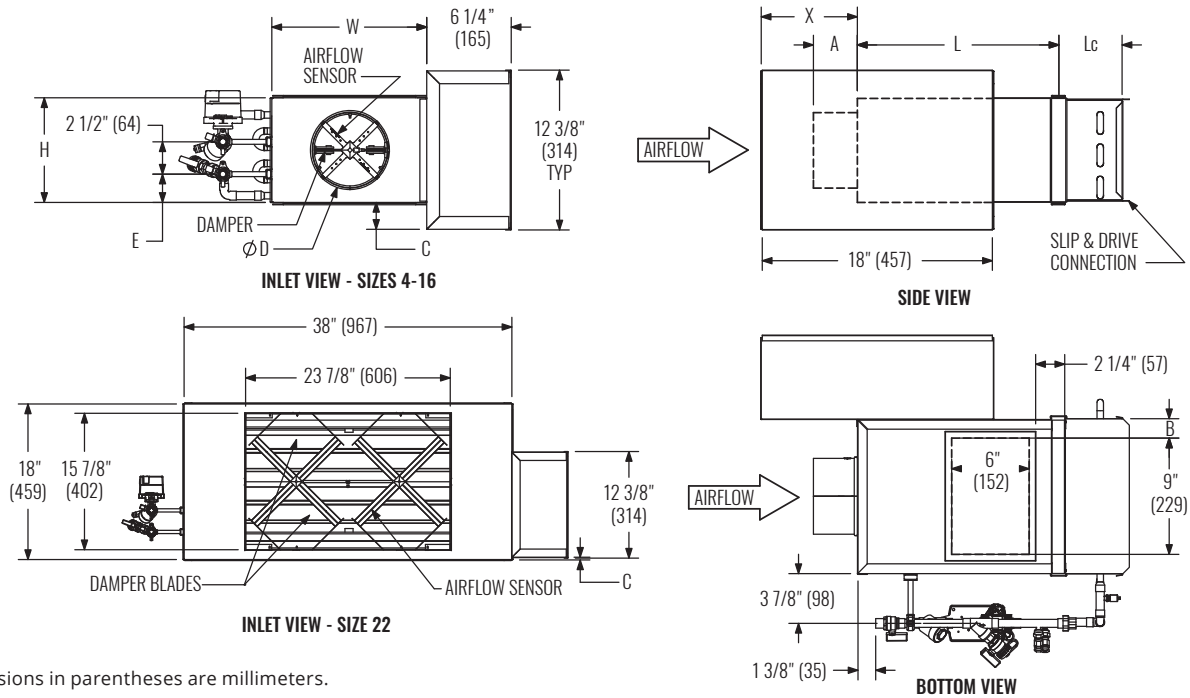
NOTE: Reference the Design Guidelines in the Engineering section of this catalog for more details on Oversizing Terminal Units, Capacity Concentrated in Too Few Terminal Units, Insufficient Space, and Improper Discharge Conditions.

### DAMPER AND CASING LEAKAGE

INLET SIZE	DAMPER LEAKAGE			CASING LEAKAGE			
	1.5" WG	3.0" WG	6.0" WG	0.5" WG	1.0" WG	1.5" WG	3.0" WG
	CFM	CFM	CFM	CFM	CFM	CFM	CFM
04	4	5	7	2	3	4	5
05	4	5	7	2	3	4	5
06	4	5	7	2	3	4	5
07	4	5	7	4	5	6	9
08	4	5	7	4	5	6	9
09	4	5	7	4	6	7	10
10	4	5	7	4	6	7	10
12	4	5	7	5	7	9	12
14	4	6	8	6	9	11	16
16	5	7	9	7	10	13	17

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

## DIMENSIONAL DATA | BASE UNIT WITH HOT WATER HEAT AND VALVE PACKAGE



Dimensions in parentheses are millimeters.

INLET SIZE	MAX CFM [L/s]	L	W	H	A	B	C	D	E	X	Lc
04	230 [109]	15 1/2"	12"	8"	5 3/8"	1 1/2"	2 1/8"	3 7/8"	2 3/16"	7 1/4"	SEE PAGE A2-54
05	360 [170]	15 1/2"	12"	8"	5 3/8"	1 1/2"	2 1/8"	4 7/8"	2 3/16"	7 1/4"	
06	515 [243]	15 1/2"	12"	8"	3 3/8"	1 1/2"	2 1/8"	5 7/8"	2 3/16"	7 1/4"	
07	700 [330]	15 1/2"	12"	10"	3 3/8"	1 1/2"	1 1/8"	6 7/8"	3 3/16"	7 1/4"	
08	920 [434]	15 1/2"	12"	10"	3 3/8"	1 1/2"	1 1/8"	7 7/8"	3 3/16"	7 1/4"	
09	1160 [547]	15 1/2"	14"	12 1/2"	3 3/8"	2 1/2"	-	8 7/8"	3 3/16"	5 1/4"	
10	1430 [675]	15 1/2"	14"	12 1/2"	3 3/8"	2 1/2"	-	9 7/8"	3 3/16"	5 1/4"	
12	2060 [972]	15 1/2"	16"	15"	3 3/8"	3 1/2"	-	11 7/8"	3 3/16"	5 1/4"	
14	2800 [1321]	15 1/2"	20"	17 1/2"	3 3/8"	5 1/2"	-	13 7/8"	3 3/16"	3 1/4"	
16	3660 [1727]	15 1/2"	24"	18"	3 3/8"	7 1/2"	-	15 7/8"	3 3/16"	3 1/4"	
22	7000 [3304]	15"	38"	18"	4 1/4"	N/A	1 1/8"	N/A	3 3/16"	5 1/4"	

NOTES: \*Right-hand base unit with electronic control enclosure shown; left-hand is available. Water coil handing is always opposite of control handing.

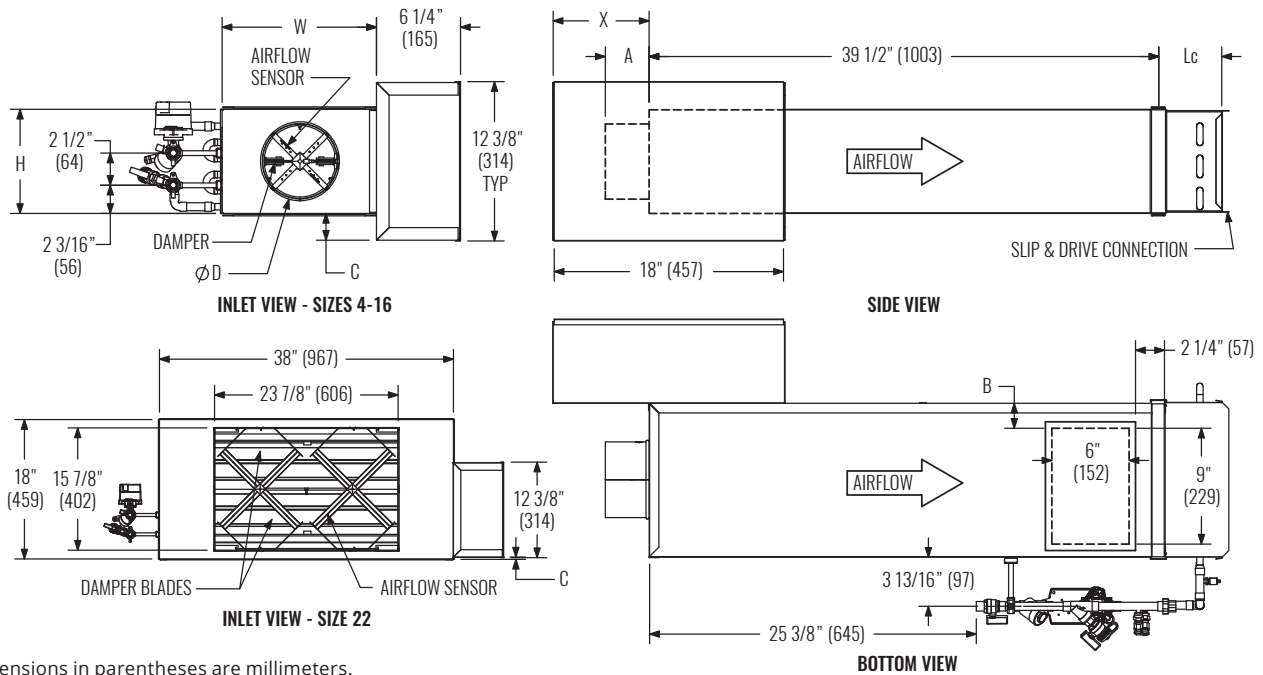
### STANDARD FEATURES

- 22 gauge galvanized steel casing construction
- 1/2" dia shaft extending from the unit casing
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" thick dual density fiberglass insulation that meets NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging airflow sensor
- Hot water coils
- 2 or 3-way valve packages
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- Field installation of controls
- AHRI 880 certified sound ratings

### OPTIONAL FEATURES\*

- 20 gauge galvanized steel casing construction
- Liners: 1/2" or 1" cellular insulation, 1" dual density fiberglass, Sterilwall with 1" fiberglass, Steriliner, perforated doublewall with 1" fiberglass, or no liner
- Linear averaging airflow sensor
- 24-volt transformer
- Disconnect switch for electronic controls
- Dust tight control enclosure
- Left or right-hand control enclosure
- Bottom access panel (not available on size 22)
- Cam locks (bottom access panel)
- Hanger brackets

**DIMENSIONAL DATA | BASE UNIT WITH HOT WATER HEAT, VALVE PACKAGE, AND ATTENUATOR**



Dimensions in parentheses are millimeters.

INLET SIZE	MAX CFM [L/s]	W	H	A	B	C	D	E	X	Lc
04	230 [109]	12"	8"	5 3/8"	1 1/2"	2 1/8"	3 7/8"	2 3/16"	7 1/4"	SEE PAGE A2-54
05	360 [170]	12"	8"	5 3/8"	1 1/2"	2 1/8"	4 7/8"	2 3/16"	7 1/4"	
06	515 [243]	12"	8"	3 3/8"	1 1/2"	2 1/8"	5 7/8"	2 3/16"	7 1/4"	
07	700 [330]	12"	10"	3 3/8"	1 1/2"	1 1/8"	6 7/8"	3 3/16"	7 1/4"	
08	920 [434]	12"	10"	3 3/8"	1 1/2"	1 1/8"	7 7/8"	3 3/16"	7 1/4"	
09	1160 [547]	14"	12 1/2"	3 3/8"	2 1/2"	-	8 7/8"	3 3/16"	5 1/4"	
10	1430 [675]	14"	12 1/2"	3 3/8"	2 1/2"	-	9 7/8"	3 3/16"	5 1/4"	
12	2060 [972]	16"	15"	3 3/8"	3 1/2"	-	11 7/8"	3 3/16"	5 1/4"	
14	2800 [1321]	20"	17 1/2"	3 3/8"	5 1/2"	-	13 7/8"	3 3/16"	3 1/4"	
16	3660 [1727]	24"	18"	3 3/8"	7 1/2"	-	15 7/8"	3 3/16"	3 1/4"	
22	7000 [3304]	38"	18"	4 1/4"	N/A	1 1/8"	N/A	3 3/16"	5 1/4"	

NOTES: \*Right-hand base unit with electronic control enclosure shown; left-hand is available. Water coil handing is always opposite of control handing.

**STANDARD FEATURES**

- 22 gauge galvanized steel casing construction
- 1/2" dia shaft extending from the unit casing
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" thick dual density fiberglass insulation that meets NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging airflow sensor
- Hot water coils
- 2 or 3-way valve packages
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- AHRI 880 certified sound ratings

**OPTIONAL FEATURES\***

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

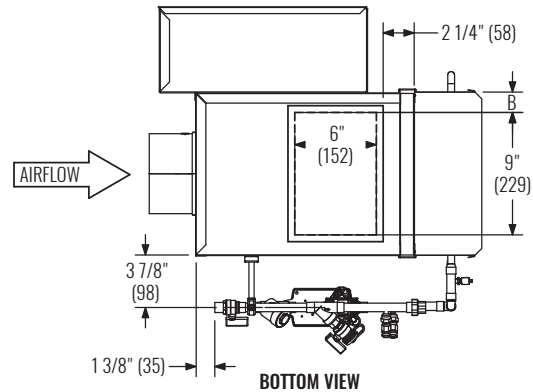
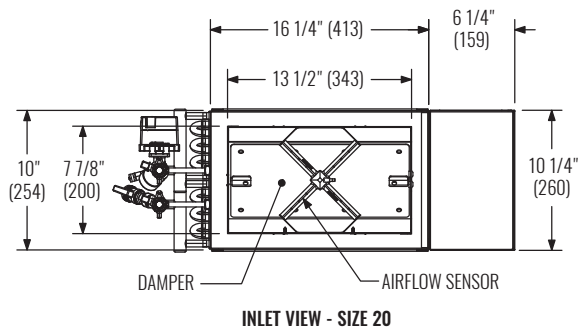
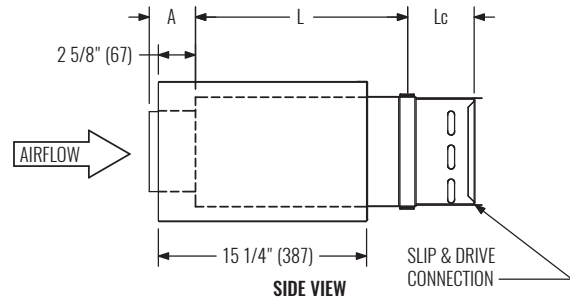
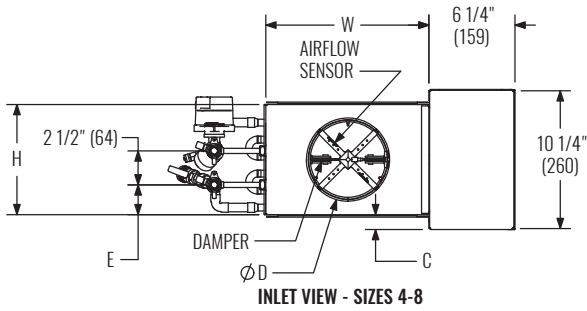
# LMHS-VP

Single Duct Terminal Unit | Valve Package



TERMINAL UNITS | SINGLE DUCT

## DIMENSIONAL DATA | LOW PROFILE UNIT WITH HOT WATER HEAT AND VALVE PACKAGE



Dimensions in parentheses are millimeters.

INLET SIZE	MAX CFM [L/s]	L	W	H	A	B	C	D	E	Lc
04	230 [109]	15 1/2"	12"	8"	5 3/8"	1 1/2"	1 1/8"	3 7/8"	2 3/16"	SEE PAGE A2-54
05	360 [170]	15 1/2"	12"	8"	5 3/8"	1 1/2"	1 1/8"	4 7/8"	2 3/16"	
06	515 [243]	15 1/2"	12"	8"	3 3/8"	1 1/2"	1 1/8"	5 7/8"	2 3/16"	
07	700 [330]	15 1/2"	12"	10"	3 3/8"	1 1/2"	1/8"	6 7/8"	3 3/16"	
08	920 [434]	15 1/2"	12"	10"	3 3/8"	1 1/2"	1/8"	7 7/8"	3 3/16"	
20	2100 [991]	15 1/2"	16 1/4"	10"	2 7/8"	3 5/8"	1/8"	N/A	3 3/16"	

NOTES: \*Right-hand base unit with electronic control enclosure shown; left-hand is available. Water coil handing is always opposite of control handing.

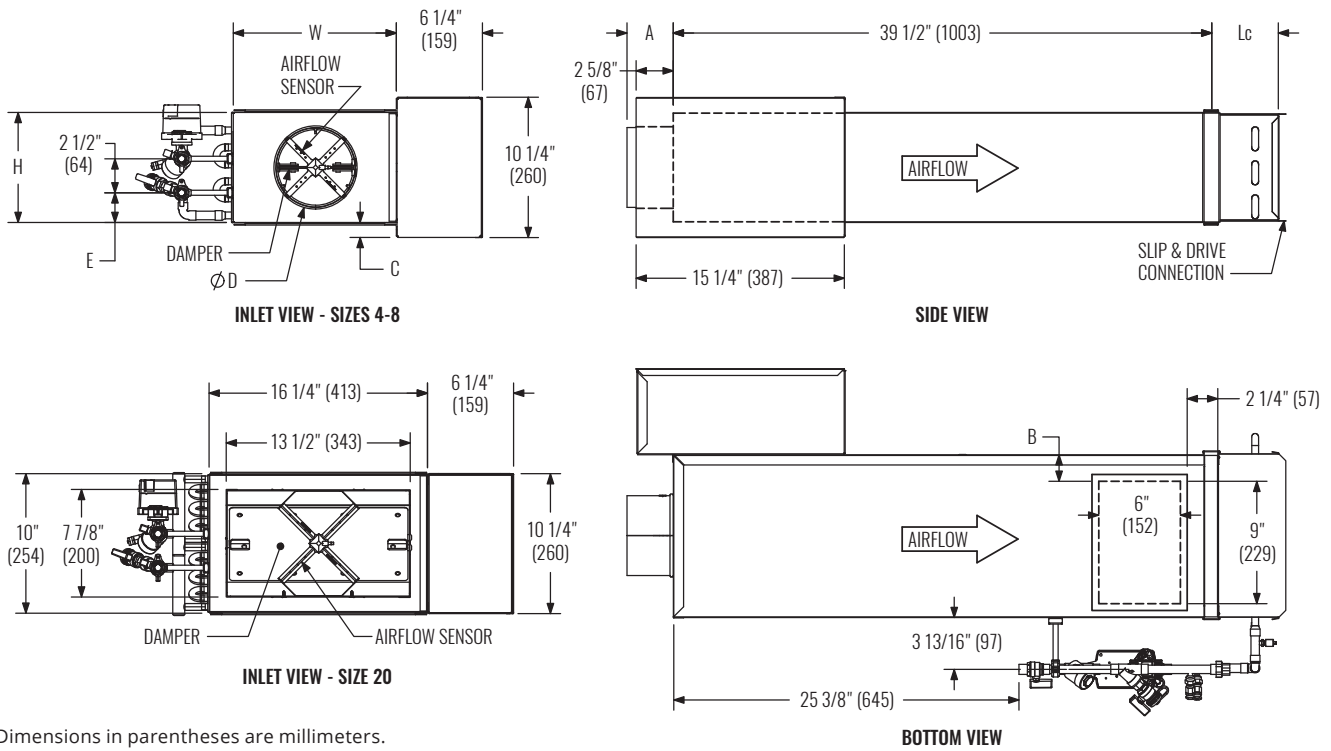
### STANDARD FEATURES

- 22 gauge galvanized steel casing construction
- 1/2" diameter shaft extending from the unit casing
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" thick dual density fiberglass insulation that meets NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging airflow sensor
- Hot water coils
- 2 or 3-way valve packages
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- AHRI 880 certified sound ratings

### OPTIONAL FEATURES\*

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

## DIMENSIONAL DATA | LOW PROFILE UNIT WITH HOT WATER HEAT, VALVE PACKAGE, AND ATTENUATOR



Dimensions in parentheses are millimeters.

INLET SIZE	MAX CFM [L/s]	W	H	A	B	C	D	E	Lc
04	230 [109]	12"	8"	5 3/8"	1 1/2"	1 1/8"	3 7/8"	2 3/16"	SEE PAGE A2-54
05	360 [170]	12"	8"	5 3/8"	1 1/2"	1 1/8"	4 7/8"	2 3/16"	
06	515 [243]	12"	8"	3 3/8"	1 1/2"	1 1/8"	5 7/8"	2 3/16"	
07	700 [330]	12"	10"	3 3/8"	1 1/2"	1/8"	6 7/8"	3 3/16"	
08	920 [434]	12"	10"	3 3/8"	1 1/2"	1/8"	7 7/8"	3 3/16"	
20	2100 [991]	16 1/4"	10"	2 7/8"	3 5/8"	1/8"	N/A	3 3/16"	

NOTES: \*Right-hand base unit with electronic control enclosure shown; left-hand is available. Water coil handing is always opposite of control handing.

### STANDARD FEATURES

- 22 gauge galvanized steel casing construction
- 1/2" diameter shaft extending from the unit casing
- NEMA 1 steel control enclosure for electric or electronic components
- 1/2" thick dual density fiberglass insulation that meets NFPA 90A and UL 181 safety requirements
- Four quadrant center averaging airflow sensor
- Hot water coils
- 2 or 3-way valve packages
- Variety of pneumatic, analog, and factory mounted direct digital control packages for pressure dependent and pressure independent systems
- AHRI 880 certified sound ratings

### OPTIONAL FEATURES\*

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

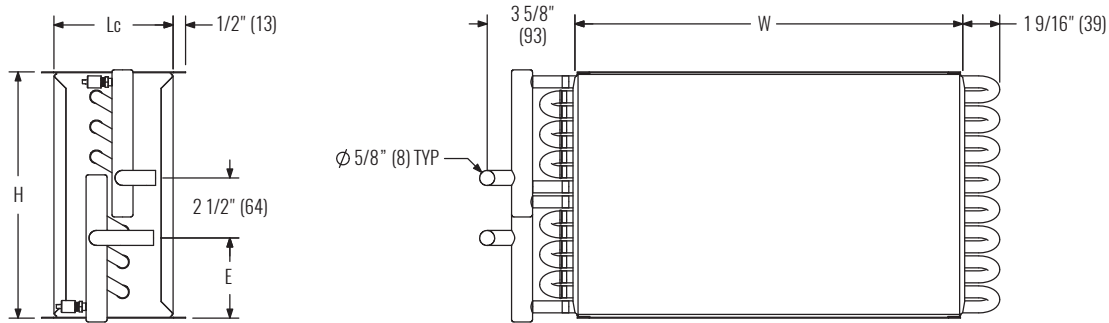


# LMHS-VP

Single Duct Terminal Unit | Valve Package



## DIMENSIONAL DATA | HOT WATER COIL



NOTES: Dimensions in parentheses are millimeters

UNIT SIZE	COIL ROWS	H	W	Lc	E
04, 05, 06	1	7 7/8"	12"	5"	2 3/16"
	2	7 7/8"	12"	5"	2 3/16"
	3	7 7/8"	12"	7 1/4"	2 3/16"
	4	7 7/8"	12"	7 1/4"	2 3/16"
07, 08	1	10 1/4"	12"	5"	3 3/16"
	2	10 1/4"	12"	5"	3 3/16"
	3	10 1/4"	12"	7 1/4"	3 3/16"
	4	10 1/4"	12"	7 1/4"	3 3/16"
9, 10	1	12 3/4"	14"	5"	3 3/16"
	2	12 3/4"	14"	5"	3 3/16"
	3	12 3/4"	14"	7 1/4"	3 3/16"
	4	12 3/4"	14"	7 1/4"	3 3/16"
12	1	15 1/4"	16"	5"	3 3/16"
	2	15 1/4"	16"	5"	3 3/16"
	3	15 1/4"	16"	7 1/4"	3 3/16"
	4	15 1/4"	16"	7 1/4"	3 3/16"
14	1	17 3/4"	20"	7 1/2"	3 3/16"
	2	17 3/4"	20"	6 1/2"	3 3/16"
	3	17 3/4"	20"	9 3/4"	3 3/16"
	4	17 3/4"	20"	9 3/4"	3 3/16"
16	1	17 3/4"	24"	7 1/2"	3 3/16"
	2	17 3/4"	24"	6 1/2"	3 3/16"
	3	17 3/4"	24"	9 3/4"	3 3/16"
	4	17 3/4"	24"	9 3/4"	3 3/16"
20	1	10 1/4"	16"	5"	3 3/16"
	2	10 1/4"	16"	5"	3 3/16"
	3	10 1/4"	16"	7 1/4"	3 3/16"
	4	10 1/4"	16"	7 1/4"	3 3/16"
22	1	17 3/4"	38"	5"	3 3/16"
	2	17 3/4"	38"	5"	3 3/16"
	3	17 3/4"	38"	7 1/4"	3 3/16"
	4	17 3/4"	38"	7 1/4"	3 3/16"

NOTES: Water connection dimension is O.D.

### STANDARD FEATURES

- LMHS-VP coils are shipped from the factory attached to the unit discharge
- Coil discharge is configured for slip and drive field duct work installation
- Coil section is uninsulated
- Coils are not for steam applications
- Coil Casing – 20 gauge 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
- Air vent and drain

### OPTIONAL FEATURES

- Coil Fins – 0.0045" Thick aluminum, 12 per inch, mechanically bonded to tubing

**NOTE:**

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

**GLOSSARY OF ABBREVIATIONS**

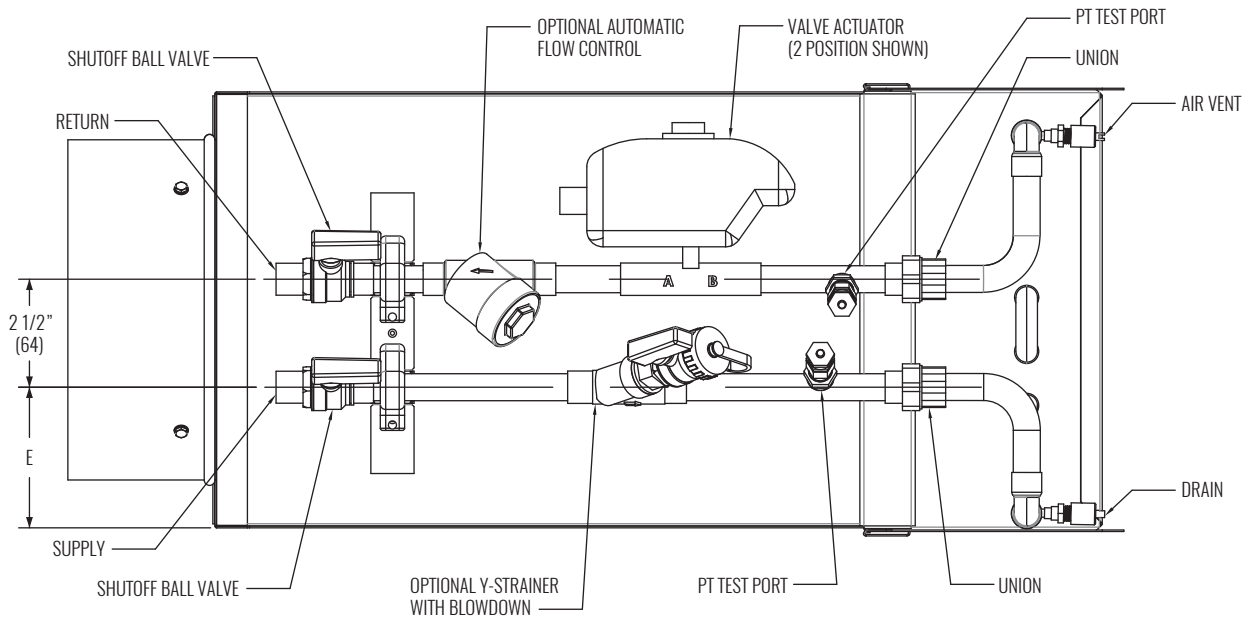
- EAT - Entering Air Temperature (°F)
- EWT - Entering Water Temperature (°F)
- CFM - Cubic Feet/Minute (Air Volume)
- Btuh - Heating Capacity (British Thermal Units/hr)
- MBH - 1,000 Btuh
- WTD - Water Temperature Drop (°F)
- ATR - Air Temperature Rise (°F)
- LAT - Leaving Air Temperature (°F)
- kW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

# LMHS-VP

Single Duct Terminal Unit | Valve Package



## DIMENSIONAL DATA | 2-WAY VALVE PACKAGE



NOTES: \*Right hand valve package configuration shown, left hand available. Water coil handing is always opposite of control handing.

### STANDARD FEATURES

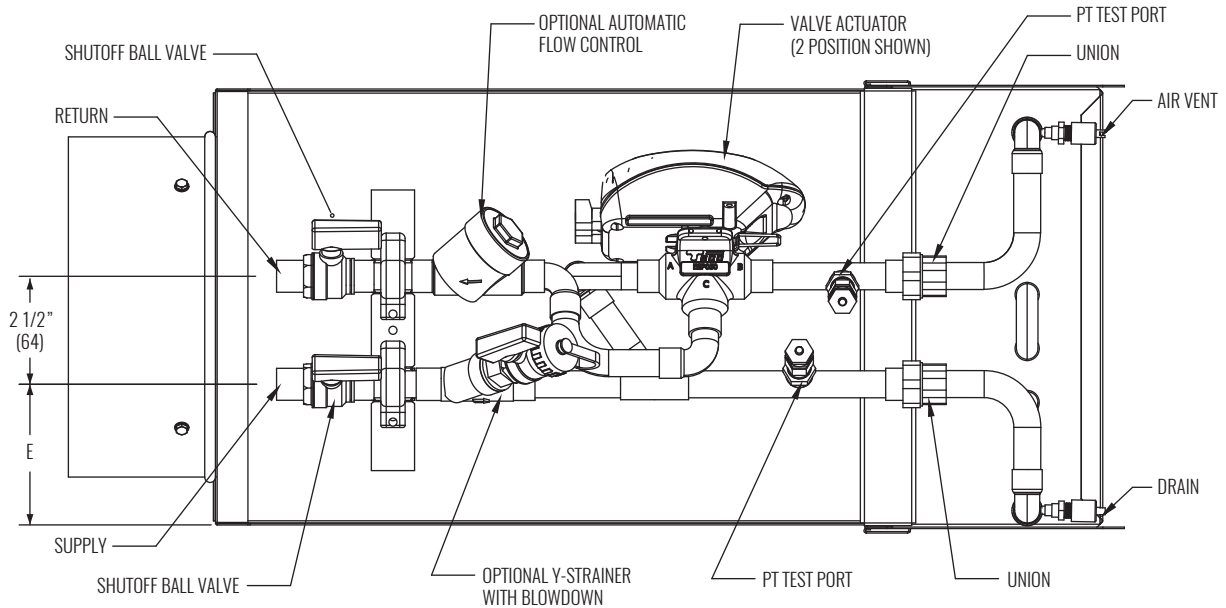
- Air vent and drain
- Union connections to water coil
- PT test ports
- 1/2" OD copper tube
- Factory pressure tested to 100psi
- Shipped at 20-30 psi for defect detection
- Supply and return connections to receive 1/2" OD tube
- Coil connections and valve package opposite controls, except attenuated units

### OPTIONAL FEATURES\*

- Actuator
  - On/Off, normally closed
  - 3-Point floating, fail in place
- Flow Control
  - 0.5 - 7.0 GPM (0.5 increments)
  - 8.0 - 9.0 GPM (1.0 increments)
- Y-strainer with blowdown
- Left or right-hand valve packages

INLET SIZE	E
4-6	2 3/16"
8-22	3 3/16"

**DIMENSIONAL DATA | 3-WAY VALVE PACKAGE**



NOTES: \*Right hand valve package configuration shown, left hand available. Water coil handing is always opposite of control handing.

**STANDARD FEATURES**

- Air vent and drain
- Union connections to water coil
- PT test ports
- 1/2" OD copper tube
- Factory pressure tested to 100psi
- Shipped at 20-30 psi for defect detection
- Supply and return connections to receive 1/2" OD tube
- Coil connections and valve package opposite controls, except attenuated units

**OPTIONAL FEATURES\***

- Actuator
  - On/Off, normally closed
  - 3-Point floating, fail in place
- Flow Control
  - 0.5 - 7.0 GPM (0.5 increments)
  - 8.0 - 9.0 GPM (1.0 increments)
- Y-strainer with blowdown
- Left or right-hand valve packages

INLET SIZE	E
4-6	2 3/16"
8-22	3 3/16"

## VALVE COMPONENTS



### 2-WAY, 2-POSITION CONTROL VALVE

- Taco Zone Sentry
- Normally closed
- Nominal Size: ½"
- Body Material: Brass
- Connection: Sweat
- Pressure Rating (psig): 300
- Temp Rating, (F): 135
- Cv: 4.9
- Max Close-off Pressure, Std. (psig): 125
- Tool-less actuator removal
- Power Consumption, Charging, (W): 11.4
- Power Consumption, Power On, (W): 1.44



### 3-WAY, 2-POSITION CONTROL VALVE

- Taco Zone Sentry
- Normally closed
- Nominal Size: ½"
- Body Material: Brass
- Connection: Sweat
- Pressure Rating (psig): 300
- Temp Rating, (F): 135
- Cv: 1.5
- Max Close-off Pressure, Std. (psig): 125
- Tool-less actuator removal
- Power Consumption, Charging, (W): 11.4
- Power Consumption, Power On, (W): 1.44



### 2-WAY, 3-POINT FLOATING CONTROL VALVE

- Johnson Controls VA9104 & VG1271
- Fail in place
- Nominal Size: ½"
- Body Material: Brass
- Connection: Sweat
- Pressure Rating (psig): 300
- Temp Rating, (F): 200
- Cv: 2.0
- Max Close-off Pressure Operating Mode, (psig): 50
- Power Consumption: 1VA



### 3-WAY, 3-POINT FLOATING CONTROL VALVE

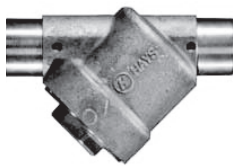
- Johnson Controls VA9104 & VG1871
- Fail in place
- Nominal Size: ½"
- Body Material: Brass
- Connection: Sweat
- Pressure Rating (psig): 300
- Temp Rating, (F): 200
- Cv: 2.0
- Max Close-off Pressure Operating Mode, (psig): N/A
- Power Consumption: 1VA

## VALVE COMPONENTS (CONTINUED)



### MANUAL BALL VALVE WITH MEMORY STOP

- Nexus NXS
- Nominal Size: ½"
- Body Material: Brass
- Ball: Hard chrome plated
- Seats: Teflon
- Stem Seal: (2) Viton O-Rings
- Connection: Sweat
- Pressure Rating, (psig): 600
- Temp. Rating, (F): 325
- Cv: 17



### AUTOMATIC FIXED FLOW CONTROL

- Hays 2517
- Nominal Size: ½"
- Body Material: Brass
- Connection: Sweat
- Pressure Rating (psig): 600
- Temp Rating, (F): 220
- Cv: Variable With Inlet Pressure



### UNIONS

- Nibco 733
- Nominal Size: ½"
- Body Material: Bronze/Copper
- Connection: Sweat
- Pressure Rating (psig): 500
- Temp Rating, (F): 200



### Y-STRAINER

- Nexus YSS
- Nominal Size: ½"
- Body Material: Forged Brass
- Connection: Sweat
- Pressure Rating (psig): 600
- Temp Rating, (F): 325
- Screen: 20 Mesh Stainless Steel



### BLOW DOWN VALVE

- Nexus BD
- Nominal Size: ¼"
- Body Material: Bronze
- Connection: MPT
- Pressure Rating (psig): 600
- Temp Rating, (F): 200



### PRESSURE/TEMPERATURE TEST PORT

- Nexus PT
- Nominal Size: ¼"
- Body Material: Brass
- Connection: MPT
- Pressure Rating (psig): 400
- Temp Rating, (F): 200

# LMHS-VP

Single Duct Terminal Unit | Valve Package



## PERFORMANCE DATA | DISCHARGE SOUND

TERMINAL UNITS | SINGLE DUCT

LMHS-VP

INLET SIZE	FLOW RATE		MIN ΔPs		0.75" ΔPs							1.5" ΔPs							2.5" ΔPs									
					OCTAVE BAND SOUND POWER, Lw							Lp	OCTAVE BAND SOUND POWER, Lw							Lp	OCTAVE BAND SOUND POWER, Lw							Lp
					2	3	4	5	6	7	NC		2	3	4	5	6	7	NC		2	3	4	5	6	7	NC	
CFM	(L/s)	"WG	(Pa)																									
04	50	(24)	0.011	(2.76)	53	41	35	34	29	25	-	54	42	39	38	33	31	-	55	43	42	41	36	35	-			
	110	(52)	0.054	(13.37)	63	56	47	43	40	34	-	64	58	51	47	44	40	<b>20</b>	65	59	53	50	47	44	<b>21</b>			
	<b>150</b>	(71)	<b>0.100</b>	(24.88)	68	62	52	47	45	38	<b>24</b>	<b>69</b>	<b>64</b>	<b>55</b>	<b>51</b>	<b>49</b>	<b>44</b>	<b>26</b>	69	65	58	54	51	48	<b>27</b>			
	230	(109)	0.235	(58.51)	73	71	58	52	51	43	<b>32</b>	74	72	62	56	55	49	<b>33</b>	75	73	64	59	57	53	<b>34</b>			
05	60	(28)	0.006	(1.43)	49	41	39	31	30	25	-	52	44	44	35	35	31	-	55	47	47	38	38	35	-			
	140	(66)	0.031	(7.80)	60	55	50	43	39	34	-	63	59	55	47	44	40	-	66	61	58	50	48	45	<b>22</b>			
	<b>250</b>	(118)	<b>0.100</b>	(24.88)	67	66	58	50	46	41	<b>25</b>	<b>71</b>	<b>69</b>	<b>62</b>	<b>54</b>	<b>50</b>	<b>47</b>	<b>29</b>	73	72	66	57	54	51	<b>32</b>			
	360	(170)	0.207	(51.60)	72	72	63	55	50	45	<b>31</b>	76	75	67	59	55	51	<b>35</b>	78	78	70	62	58	55	<b>38</b>			
06	100	(47)	0.006	(1.56)	51	47	35	31	33	29	-	55	52	40	35	38	36	-	57	56	44	39	42	41	-			
	250	(118)	0.039	(9.72)	62	59	49	44	41	36	-	66	64	54	48	46	43	<b>23</b>	68	68	58	51	50	48	<b>28</b>			
	<b>400</b>	(189)	<b>0.100</b>	(24.88)	68	65	56	50	45	40	<b>23</b>	<b>71</b>	<b>70</b>	<b>62</b>	<b>54</b>	<b>50</b>	<b>47</b>	<b>29</b>	74	74	66	57	54	52	<b>33</b>			
	520	(245)	0.169	(42.05)	71	68	60	54	47	43	<b>27</b>	74	73	66	58	53	50	<b>33</b>	77	77	70	61	57	55	<b>37</b>			
07	120	(57)	0.005	(1.18)	56	54	33	28	32	32	-	60	60	39	32	38	40	-	63	65	43	34	43	45	<b>25</b>			
	330	(156)	0.036	(8.96)	65	61	48	44	42	41	-	69	68	54	48	48	48	<b>27</b>	72	73	58	50	52	54	<b>32</b>			
	<b>550</b>	(260)	<b>0.100</b>	(24.88)	69	65	56	53	47	45	<b>23</b>	<b>73</b>	<b>72</b>	<b>61</b>	<b>56</b>	<b>53</b>	<b>52</b>	<b>31</b>	76	76	66	59	57	58	<b>37</b>			
	700	(330)	0.162	(40.31)	71	67	59	57	49	47	<b>24</b>	75	73	65	60	55	54	<b>32</b>	78	78	69	62	59	60	<b>38</b>			
08	160	(76)	0.005	(1.30)	57	51	42	34	37	33	-	60	57	48	39	42	40	-	62	61	53	42	47	45	-			
	440	(208)	0.040	(9.83)	66	61	52	47	45	41	-	69	67	58	52	51	48	-	72	71	62	55	55	53	<b>30</b>			
	<b>700</b>	(330)	<b>0.100</b>	(24.88)	70	66	56	53	49	44	<b>24</b>	<b>74</b>	<b>71</b>	<b>62</b>	<b>58</b>	<b>54</b>	<b>51</b>	<b>31</b>	76	76	67	61	58	56	<b>36</b>			
	920	(434)	0.173	(42.98)	73	68	59	56	51	46	<b>26</b>	76	74	65	61	57	53	<b>33</b>	78	78	69	64	61	58	<b>38</b>			
09	200	(94)	0.005	(1.23)	50	46	35	32	35	35	-	53	51	39	36	40	42	-	55	54	43	39	44	46	-			
	550	(260)	0.037	(9.29)	62	57	49	46	44	42	-	65	62	54	50	50	48	-	67	66	57	53	53	53	<b>24</b>			
	<b>900</b>	(425)	<b>0.100</b>	(24.88)	68	63	56	53	49	46	-	<b>71</b>	<b>68</b>	<b>61</b>	<b>57</b>	<b>54</b>	<b>52</b>	<b>25</b>	73	71	64	59	58	56	<b>30</b>			
	1160	(547)	0.166	(41.34)	72	66	60	56	52	47	<b>23</b>	74	71	65	60	57	53	<b>29</b>	76	74	68	63	60	58	<b>33</b>			
10	250	(118)	0.005	(1.29)	50	48	40	38	39	37	-	53	53	45	42	45	43	-	55	57	48	45	49	48	-			
	700	(330)	0.040	(10.08)	62	58	52	49	48	45	-	65	63	57	54	53	51	<b>21</b>	68	67	61	57	57	55	<b>26</b>			
	<b>1100</b>	(519)	<b>0.100</b>	(24.88)	68	63	58	54	51	48	-	<b>71</b>	<b>68</b>	<b>63</b>	<b>59</b>	<b>57</b>	<b>54</b>	<b>26</b>	73	72	67	62	61	58	<b>30</b>			
	1450	(684)	0.174	(43.24)	71	66	61	58	53	50	<b>23</b>	74	71	66	62	59	56	<b>29</b>	77	74	70	65	63	61	<b>33</b>			
12	400	(189)	0.006	(1.56)	52	47	39	42	42	42	-	56	52	43	46	47	48	-	58	56	46	50	50	52	-			
	1000	(472)	0.039	(9.72)	64	58	53	52	50	48	-	68	63	57	56	55	54	-	70	67	60	60	58	58	<b>24</b>			
	<b>1600</b>	(755)	<b>0.100</b>	(24.88)	71	63	60	57	54	51	<b>22</b>	<b>74</b>	<b>68</b>	<b>64</b>	<b>61</b>	<b>59</b>	<b>57</b>	<b>26</b>	77	72	67	65	62	61	<b>30</b>			
	2060	(972)	0.166	(41.25)	74	66	63	59	56	52	<b>26</b>	78	71	68	64	61	58	<b>30</b>	80	75	71	67	64	63	<b>34</b>			
14	480	(227)	0.005	(1.30)	47	44	33	39	38	40	-	50	48	37	43	42	46	-	52	52	39	46	45	50	-			
	1375	(649)	0.043	(10.67)	64	58	53	52	50	48	-	67	62	56	56	54	54	-	69	65	58	59	57	58	<b>22</b>			
	<b>2100</b>	(991)	<b>0.100</b>	(24.88)	71	63	60	58	55	52	<b>22</b>	<b>74</b>	<b>68</b>	<b>63</b>	<b>61</b>	<b>59</b>	<b>57</b>	<b>26</b>	76	71	66	64	62	62	<b>29</b>			
	2800	(1321)	0.178	(44.24)	75	67	66	61	58	54	<b>28</b>	78	71	69	65	62	60	<b>32</b>	81	75	71	68	65	64	<b>35</b>			
16	630	(297)	0.005	(1.26)	41	37	22	31	30	29	-	44	41	26	34	35	34	-	47	45	28	37	38	38	-			
	1775	(838)	0.040	(10.00)	62	55	49	48	46	44	-	65	60	52	52	51	50	-	68	63	55	55	54	54	-			
	<b>2800</b>	(1321)	<b>0.100</b>	(24.88)	71	63	60	56	53	51	<b>23</b>	<b>75</b>	<b>68</b>	<b>64</b>	<b>60</b>	<b>58</b>	<b>56</b>	<b>27</b>	77	71	66	63	61	60	<b>30</b>			
	3660	(1727)	0.171	(42.52)	77	68	67	61	58	55	<b>30</b>	80	72	71	64	62	60	<b>34</b>	83	76	73	67	65	64	<b>37</b>			
22	1200	(566)	0.005	(1.27)	67	57	55	50	46	38	-	73	65	58	55	51	44	<b>25</b>	78	70	60	59	55	49	<b>31</b>			
	3300	(1557)	0.039	(9.64)	78	69	71	65	61	56	<b>31</b>	84	77	73	70	67	62	<b>39</b>	88	82	76	74	71	67	<b>44</b>			
	5300	(2501)	0.100	(24.86)	83	75	78	72	69	65	<b>37</b>	89	82	81	77	74	71	<b>45</b>	93	88	83	81	78	76	<b>51</b>			
	7000	(3304)	0.174	(43.37)	86	78	82	76	73	70	<b>41</b>	92	86	85	81	78	76	<b>49</b>	96	91	87	85	82	81	54			

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

## PERFORMANCE DATA | RADIATED SOUND

INLET SIZE	FLOW RATE		MIN Δ Ps		0.75" Δ Ps							1.5" Δ Ps							2.5" Δ Ps						
					OCTAVE BAND SOUND POWER, Lw							Lp	OCTAVE BAND SOUND POWER, Lw							Lp	OCTAVE BAND SOUND POWER, Lw				
	CFM	(L/s)	"WG	(Pa)	2	3	4	5	6	7	NC		2	3	4	5	6	7	NC		2	3	4	5	6
04	50	(24)	0.011	(2.76)	37	28	24	23	17	10	-	38	29	27	25	19	15	-	38	30	30	27	21	18	-
	110	(52)	0.054	(13.37)	50	42	34	33	30	23	-	51	43	38	35	32	28	-	51	45	40	37	34	31	-
	150	(71)	0.100	(24.88)	55	47	39	37	35	29	-	56	49	42	40	37	33	-	56	50	45	41	39	37	-
	230	(109)	0.235	(58.51)	62	55	45	43	42	36	24	62	57	48	45	44	40	26	63	58	51	47	46	44	27
05	60	(28)	0.006	(1.43)	38	21	17	12	8	6	-	43	26	22	15	11	12	-	47	30	26	18	14	17	-
	140	(66)	0.031	(7.80)	47	36	30	26	22	17	-	52	41	35	29	25	23	-	56	45	39	32	28	28	-
	250	(118)	0.100	(24.88)	53	47	39	36	31	25	-	59	52	44	39	35	31	20	62	55	47	41	38	36	25
06	360	(170)	0.207	(51.60)	57	53	44	42	37	30	21	62	58	49	45	41	36	27	66	62	53	47	44	41	31
	100	(47)	0.006	(1.56)	43	35	24	15	10	6	-	46	40	28	20	16	13	-	49	44	31	24	20	19	-
	250	(118)	0.039	(9.72)	52	47	38	28	23	19	-	56	52	43	33	29	26	-	58	55	46	37	33	32	24
	400	(189)	0.100	(24.88)	57	53	46	35	30	26	21	60	58	50	40	36	33	27	63	61	53	43	40	38	31
07	520	(245)	0.169	(42.05)	60	56	50	39	34	29	25	63	61	54	43	39	37	30	65	64	57	47	43	42	35
	120	(57)	0.005	(1.18)	38	42	25	17	12	7	-	42	47	31	21	16	14	-	44	51	35	24	19	19	-
	330	(156)	0.036	(8.96)	50	48	38	31	27	22	-	54	54	44	36	31	28	22	57	58	49	39	34	33	27
	550	(260)	0.100	(24.88)	56	52	45	39	34	29	-	60	57	51	43	39	35	26	63	61	55	46	42	40	31
08	700	(330)	0.162	(40.31)	59	53	48	42	38	32	23	63	59	54	46	42	38	29	66	63	59	50	45	43	34
	160	(76)	0.005	(1.30)	45	39	27	22	18	16	-	48	45	34	27	23	23	-	50	49	39	30	27	28	-
	440	(208)	0.040	(9.83)	55	49	38	33	28	26	-	58	54	45	38	33	33	23	60	59	50	41	37	38	28
	700	(330)	0.100	(24.88)	59	53	43	38	32	31	21	62	59	49	43	38	38	28	64	63	55	46	41	43	33
09	920	(434)	0.173	(42.98)	62	56	45	41	35	34	24	65	62	52	46	40	41	31	67	66	57	49	44	46	37
	200	(94)	0.005	(1.23)	38	36	21	22	21	19	-	42	42	26	26	26	27	-	44	47	29	29	30	33	-
	550	(260)	0.037	(9.29)	50	45	38	33	30	24	-	54	51	42	37	35	32	-	56	56	45	40	39	38	25
	900	(425)	0.100	(24.88)	56	49	46	38	34	27	-	60	56	50	42	39	35	24	62	60	53	45	43	41	30
10	1160	(547)	0.166	(41.34)	59	52	50	41	37	28	24	63	58	54	45	42	36	28	65	63	57	48	46	42	32
	250	(118)	0.005	(1.29)	33	33	17	16	11	3	-	39	39	21	20	19	14	-	43	44	23	24	25	23	-
	700	(330)	0.040	(10.08)	46	43	37	31	24	15	-	52	50	41	36	32	27	-	56	54	44	40	38	35	23
	1100	(519)	0.100	(24.88)	52	48	46	38	30	21	20	58	54	50	43	38	32	24	62	59	52	46	44	41	28
12	1450	(684)	0.174	(43.24)	55	51	52	42	33	24	26	61	57	55	47	42	36	30	66	62	58	51	48	44	33
	400	(189)	0.006	(1.56)	42	44	29	24	20	15	-	46	49	33	28	24	20	-	50	53	37	31	28	25	21
	1000	(472)	0.039	(9.72)	54	50	41	36	32	25	-	58	55	45	40	36	31	23	61	58	48	43	40	35	27
	1600	(755)	0.100	(24.88)	60	53	47	42	38	31	22	64	58	51	46	42	36	28	67	61	54	49	46	41	32
14	2060	(972)	0.166	(41.25)	63	55	50	45	41	33	26	67	59	54	49	46	39	32	71	63	58	52	49	43	36
	480	(227)	0.005	(1.30)	35	35	19	24	21	18	-	39	40	22	27	24	22	-	43	44	25	30	27	26	-
	1375	(649)	0.043	(10.67)	50	46	37	36	33	28	-	54	51	40	39	37	32	-	58	55	43	42	39	36	24
	2100	(991)	0.100	(24.88)	56	51	44	41	38	32	-	60	56	47	44	41	36	25	64	60	50	47	44	40	29
16	2800	(1321)	0.178	(44.24)	60	54	49	44	41	34	23	65	59	52	48	45	39	28	68	63	55	50	47	42	33
	630	(297)	0.005	(1.26)	38	36	29	28	25	22	-	43	43	34	33	32	30	-	47	48	38	37	38	36	-
	1775	(838)	0.040	(10.00)	54	49	44	39	34	30	-	59	56	49	44	41	38	25	62	61	53	48	47	44	31
	2800	(1321)	0.100	(24.88)	60	55	51	44	38	34	25	66	62	56	49	45	42	31	69	67	60	53	51	48	38
22	3660	(1727)	0.171	(42.52)	64	58	55	47	41	36	30	70	65	60	52	48	44	36	73	70	64	55	53	50	42
	1200	(566)	0.005	(1.27)	51	50	41	42	39	37	-	56	55	51	49	44	41	25	59	59	58	54	48	44	33
	3300	(1557)	0.039	(9.64)	65	61	55	53	51	47	30	69	66	65	60	56	51	41	73	69	73	66	60	54	49
	5300	(2501)	0.100	(24.86)	71	66	62	58	56	52	37	76	71	72	66	61	56	48	79	74	79	71	65	59	56
7000	(3304)	0.174	(43.37)	75	69	66	62	59	55	42	80	74	76	69	65	59	52	83	77	83	74	69	61	60	

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



### CONTROL INFORMATION

The following list of standard control arrangements are available with the LMHS-VP product offering. Each control approach offers a variety of pressure independent, pressure dependent or manual operating functions. Control functions are identified by the Krueger control package number.

#### PNEUMATIC CONTROL ARRANGEMENTS

All control packages are pressure independent, unless otherwise noted, and are available with or without hot water and electric heat, dual maximum airflow, heating and cooling maximum airflow and dual minimum airflow. All control arrangements include a standard linear inlet airflow 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
- 1103 - Single Function Controller;  
RA-NC With or Without Hot Water
- 1104 - Multi-function Controller;  
DA-NO With or Without Hot Water
- 1105 - Multi-function Controller;  
DA-NC With or Without Hot Water
- 1106 - Multi-function Controller;  
RA-NO With or Without Hot Water
- 1107 - Multi-function Controller;  
RA-NC With or Without Hot Water
- 1108 - Dual Maximum Control;  
DA-NO With or Without Hot Water
- 1109 - Heating/Cooling Maximum Control;  
DA-NO With or Without Hot Water
- 1110 - Dual Minimum Control;  
DA-NO With or Without Hot Water

#### 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,  
DA-NO or RA-NC
- Multi-function Controller - Capable of Providing DA-NO,  
DA-NC, RA-NC or RA-NO  
Functions

#### MANUAL CONTROL

Manual control package consists of a manual handle fixed to the unit damper shaft.

- 4100 - Manual Damper Control

**CONTROL INFORMATION (CONTINUED)**

**DIRECT DIGITAL CONTROL ARRANGEMENTS**

Smart Equipment control packages are provided and programmed by the factory for in-house mounting, piping, and wiring.

- BACnet Compatible: 7101-7109
- Standalone: 6101-6109

Standard Features

- Single Duct, Series Fan, and Parallel Fan Terminal Units
- Occupied, Unoccupied, and Standby modes
- Plug and Play connection with the Smart Equipment system
- BACnet compatible for ease of communication with building automation systems
- Standalone option available for non-communicating systems
- Factory programming tailored to customer specified airflow values and control sequence
- Control sequences for warm supply air are available

Optional Features

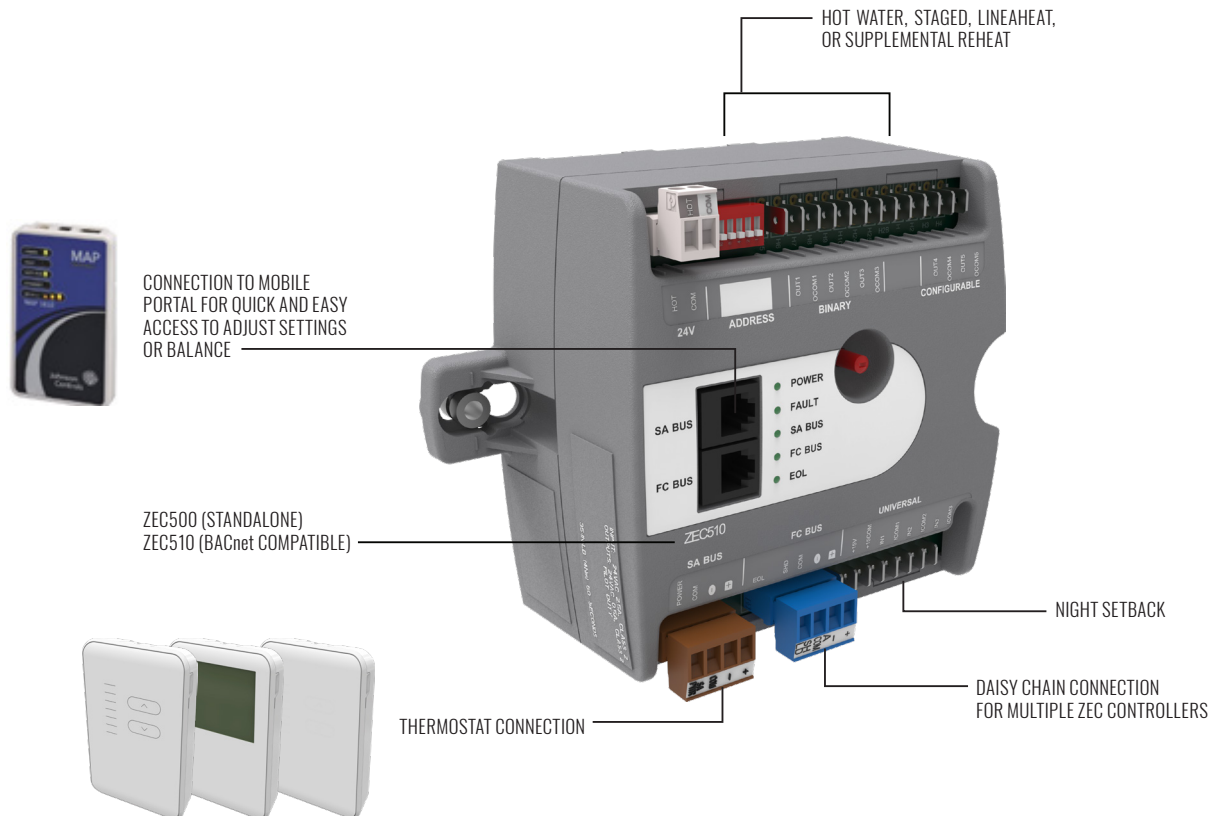
- LCD Display Thermostat
- Warmer/Cooler Interface Thermostat
- No Display Thermostat
- Supply or Discharge Air Temperature Sensors
- Night Setback Mode
- Mobile Access Portal with RJ12 connections for easy settings adjustments
- Balancing tool with RJ12 connection for ease of balancing either at controller or thermostat

Other Digital Control packages can be supplied to the factory for mounting, piping, and wiring.

All DDC control arrangements include an inlet airflow sensor and control enclosure and are available with an optional 24-volt transformer mounted and wired inside the control enclosure.

Contact your Krueger representative for a complete list of direct digital control arrangements.

**SMART EQUIPMENT CONTROLLER DETAIL**



### SUGGESTED SPECIFICATION & CONFIGURATION

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

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

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

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

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

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

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

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

Provide balancing taps to allow for easy airflow verification.

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

#### SOUND ATTENUATOR

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

#### CASING LINERS

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

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

1/2" cellular insulation is enclosed between the unit casing and a non-perforated internal sheet metal cover extending over the cellular insulation, as well as covering the liner cut edges.

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

#### HOT WATER COILS

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

#### VALVE PACKAGE

Valve package shall be factory assembled and tested to 100 psi and consist of unions to separate valve package from water coil, PT test ports on supply and return, and manual shutoff ball valves to isolate water coil and valve package from water supply. Actuated valve shall be 2-way valve with on/off 24vac controlled actuator, normally closed.

- **(Optional)** 3-way valve.
- **(Optional)** 3-point floating actuator, fail in place.
- **(Optional)** Y-strainer with blowdown port.
- **(Optional)** Automatic flow control.

#### ACCESS PANEL

Access panel shall be in the unit casing for viewing of damper components and/or for upstream cleaning of the hot water coil fins. (Access panel not available with electric heat.)

## SUGGESTED SPECIFICATION & CONFIGURATION (CONTINUED)

### 1. SERIES: (XXXX-XX)

LMHS-VP - Single Duct Terminal Unit with Factory Valve Package

### 2. SENSOR TYPE: (X)

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

### 3. UNIT STYLE: (X)

0 - Standard LMHS  
1 - LMHS with Attenuator  
6 - LMHS Low Profile  
7 - LMHS Low Profile with Attenuator

### 4. LINER TYPE: (X)

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

### 5. UNIT CASING: (XX)

#### (CONTROLS HANDING, GAUGE, ACCESS)

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

### 6. INLET CODE: (XX)

04 - 4"	05 - 5"	06 - 6"
07 - 7"	08 - 8"	09 - 9"
10 - 10"	12 - 12"	14 - 14"
16 - 16"	20 - 13 1/2"x 7 7/8"	22 - 24"x16"

### 7. CONTROL TYPE: (XXXX)

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

### 8. CONTROL ACCESSORIES: (X)

0 - None  
4 - 2-Pipe DA Thermostat \*  
5 - 2-Pipe RA Thermostat \*

### 9. UNIT ACCESSORIES: (X) (X) (X) (X) (X) (X)

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

### 10. WATER HEAT: (XXX)

#### (ROWS/CONNECTION HAND)

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

### 11. HEAT COIL ACCESSORIES: (X)

0 - None  
P - Vent & Drain (standard)

### 12. VALVE MOUNTING (X)

M - Factory Mounted  
L - Shipped Loose

### 13. VALVE/ACTUATOR MANUFACTURING (X)

K - Krueger Provided Valve/Actuator  
X - Provided by others

### 14. VALVE (XX)

20 - 2-Way Sweat Connection  
30 - 3-Way Sweat Connection

### 15. ACTUATOR (XX)

20 - 2-Position ON/OFF, NC  
30 - 3-Point Floating, Fail-In-Place

### 16. VP ACCESSORIES (X)

0 - None  
Y - Y-Strainer with Blow Down

### 17. AUTOMATIC FLOW CONTROL (GPM) (X.X)

0.0 - None  
0.5-7.0 - GPM (1/2" GPM increments)  
8.0 - 8 GPM  
9.0 - 9 GPM

\* Control accessory code '4' and '5' require a pneumatic controller.

\*\* Dust-tight control enclosure not available with pneumatic control types.

**SAMPLE CONFIGURATION:** LMHS-VP - 3 - D - 1 - 0L - 12 - 7105 - 0 - HSDE00 - W12 - P - MK2020 - Y - 2.5