

40VML
Low Static Ducted Indoor Unit for
Variable Refrigerant Flow (VRF) Systems

Engineering Data Book



Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

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I. Low Static Duct Basic information

1. External Appearance



Figure 1 – 40VML007/009/012---3



Figure 2 – 40VML015/018---3



Figure 3 – 40VML024---3

2. Specifications

Table 1 – Data Table

Model Name			40VML007---3	40VML009---3
Power Source		V-Ph-Hz	208/230-1-60	
Capacity Cooling*1		Btu/h	7,000	9,000
Capacity Heating*1		Btu/h	8,000	10,000
Electrical Supply	MCA	A	0.50	
	MOCP	A	15	
	Air flow rate (H/M/L)	cfm	283/253/224	
	Max. External static pressure (ESP)	in. WG	0.20	
	Min. External static pressure (ESP) (Factory setting)	In. WG	0	
Fan Motor	Type		DC	
	Output	W	100	
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Refrigerant Control			Electronic Expansion Valve	
Dimensions		H (in)	8-1/4	
		W (in)	30-3/4	
		D (in)	19-3/4	
Net Weight		lbs	41.0	
Sound pressure level*2		H - dBA	34.0	34.5
		M – dBA	32.0	32.0
		L – dBA	31.4	31.0
Piping Connections	Gas (Low) Pressure	In	1/2	
	Liquid (High) Pressure	In	1/4	
	Condensate	In	1	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Single Phase Heat Pump	
Casing			Galvanized Steel	
Filter			Included	
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core shielded twisted pair cable 20AWG – 16AWG	

*1 Rated per AHRI (Air-Conditioning, Heating and Refrigeration Institute) 1230 Standard:

Cooling: Return air temperature: 80°F FDB/67°F FWB; Outdoor 95°F FDB

Heating: Return air temperature: 70°F FDB; Outdoor 47°F FDB/43°F FWB

*2 These values are measured in anechoic chamber at a point 4.6 feet below the center of the unit

Remark

Table 2 – Data Table

Model Name			40VML012---3	40VML015---3
Power Source		V-Ph-Hz	208/230-1-60	
Capacity Cooling*1		Btu/h	12,000	15,000
Capacity Heating*1		Btu/h	13,500	17,000
Electrical Supply	MCA	A	0.60	0.80
	MOCP	A	15	
	Air flow rate (H/M/L)	cfm	353/294/236	459/367/306
	Max. External static pressure (ESP)	in. WG	0.20	
	Min. External static pressure (ESP) (Factory setting)	In. WG	0	
Fan Motor	Type		DC	
	Output	W	100	
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Refrigerant Control			Electronic Expansion Valve	
Dimensions	H (in)		8-1/4	8-1/4
	W (in)		30-3/4	39-1/4
	D (in)		19-3/4	19-3/4
Net Weight		lbs	41.0	48.5
Sound pressure level*2	H - dBA		37.0	36.7
	M - dBA		34.6	35.2
	L - dBA		33.0	33.2
Piping Connections	Gas (Low) Pressure	In	1/2	
	Liquid (High) Pressure	In	1/4	
	Condensate	In	1	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Single Phase Heat Pump	
Casing			Galvanized Steel	
Filter			Included	
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core shielded twisted pair cable 20AWG – 16AWG	

*1 Rated per AHRI (Air-Conditioning, Heating and Refrigeration Institute) 1230 Standard:

Cooling: Return air temperature: 80°F FDB/67°F FWB; Outdoor 95°F FDB

Heating: Return air temperature: 70°F FDB; Outdoor 47°F FDB/43°F FWB

*2 These values are measured in anechoic chamber at a point 4.6 feet below the center of the unit

Remark

Table 3 – Data Table

Model Name			40VML018---3	40VML024---3
Power Source		V-Ph-Hz	208/230-1-60	
Capacity Cooling*1		Btu/h	18,000	24,000
Capacity Heating*1		Btu/h	21,000	27,000
Electrical Supply	MCA	A	0.95	1.18
	MOCp	A	15	
	Air flow rate (H/M/L)	cfm	530/424/353	701/565/471
	Max. External static pressure (ESP)	in. WG	0.20	
	Min. External static pressure (ESP) (Factory setting)	In. WG	0	
Fan Motor	Type		DC	
	Output	W	100	
Heat Exchanger			Inner Groove Copper Tube and Hydrophilic Aluminum fin	
Refrigerant Control			Electronic Expansion Valve	
Dimensions		H (in)	8-1/4	8-1/4
		W (in)	39-1/4	48
		D (in)	19-3/4	19-3/4
Net Weight		lbs	48.5	59.5
Sound pressure level*2		H - dBA	40.2	41.3
		M - dBA	38.0	38.8
		L - dBA	36.0	37.0
Piping Connections	Gas (Low) Pressure	In	5/8	
	Liquid (High) Pressure	In	3/8	
	Condensate	In	1	
Connectable Outdoor Unit			38VMH – Heat Pump 38VMR – Heat Recovery 38VMH-1P – Single Phase Heat Pump	
Casing			Galvanized Steel	
Filter			Included	
Wiring	Power Wiring	AWG	Sized per NEC and Local Codes based on Nameplate Electrical Data	
	Control Wiring	AWG	2-core shielded twisted pair cable 20AWG – 16AWG	







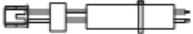

*1 Rated per AHRI (Air-Conditioning, Heating and Refrigeration Institute) 1230 Standard:

Remark Cooling: Return air temperature: 80°F FDB/67°F FWB; Outdoor 95°F FDB
Heating: Return air temperature: 70°F FDB; Outdoor 47°F FDB/43°F FWB

*2 These values are measured in anechoic chamber at a point 4.6 feet below the center of the unit

3. Accessories

Table 4 – Table of Accessories

Name of Accessories	Quantity	Outline	Usage
PQE connection wire	2		Connects the outdoor unit, indoor unit, and sub MDC.
Pipe Insulation material	2		Heat insulation
Condensate connection	1		For drainage
Clamp	1		Connects the drain hose to the condensate connection
Copper Nut	1		Use for pipe connection
Copper Pipes	2		Use for inlet and outlet connections
Connection Wire	1		For occupy sensor
LED display	1		Operation and error display

II. Piping Diagram

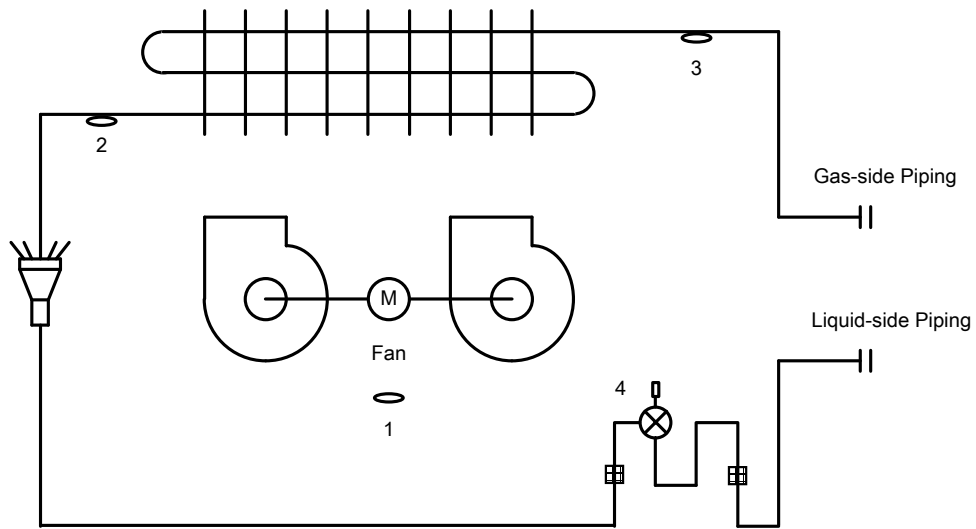


Figure 4 – Piping

Table 5 – Piping

NO.	Symbol	Name
1	T1	Room temperature sensor
2	T2A	Inlet pipe temperature sensor
3	T2B	Outlet pipe temperature sensor
4	EEV	Electronic expansion valve

Table 6 – Gas/Liquid Line Sizes

Model	Gas	Liquid
40VML007/009/012/015---3	1/2	1/4
40VML018/024---3	5/8	3/8

III. Dimensions

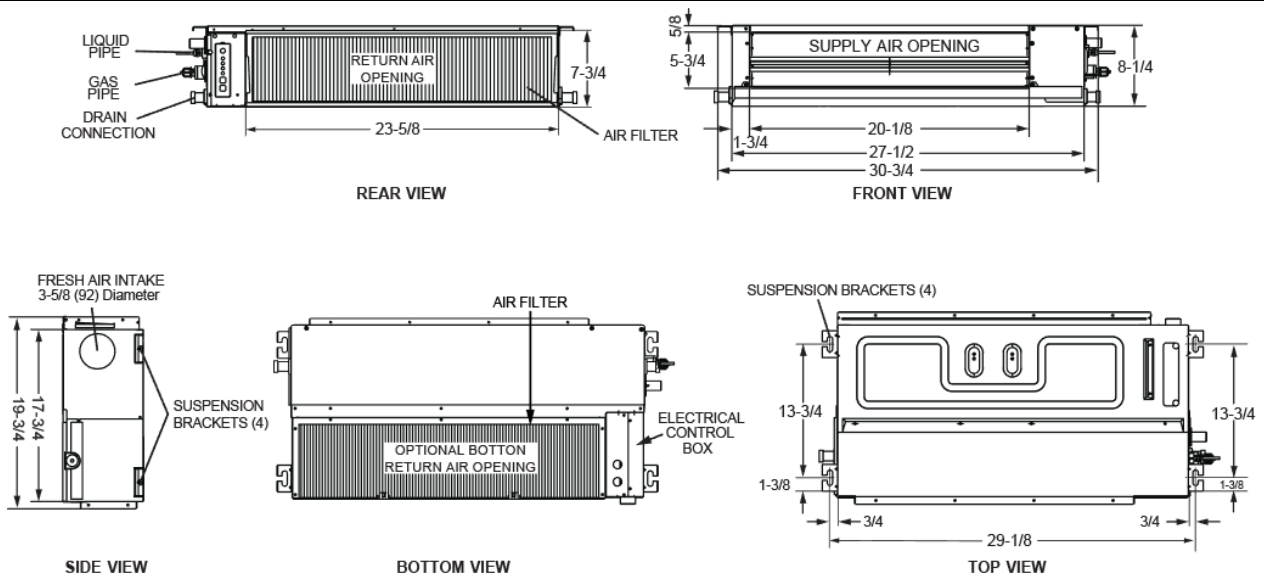


Figure 5 - 40VML007-012---3

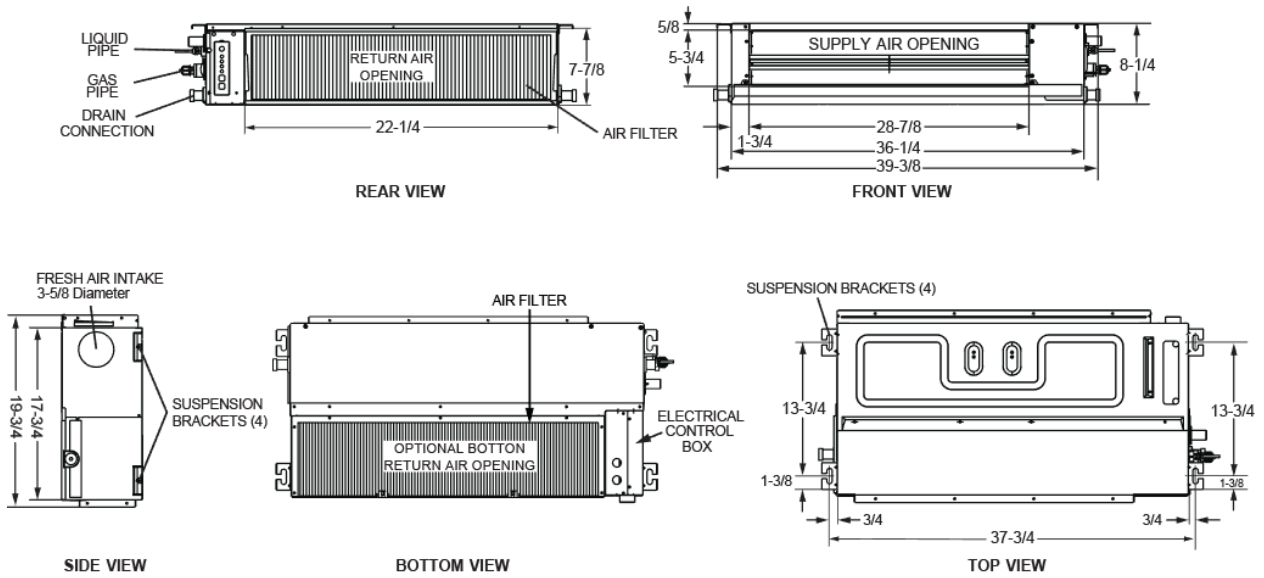


Figure 6 - 40VML015-018---3

NOTE: dimensions are in inches

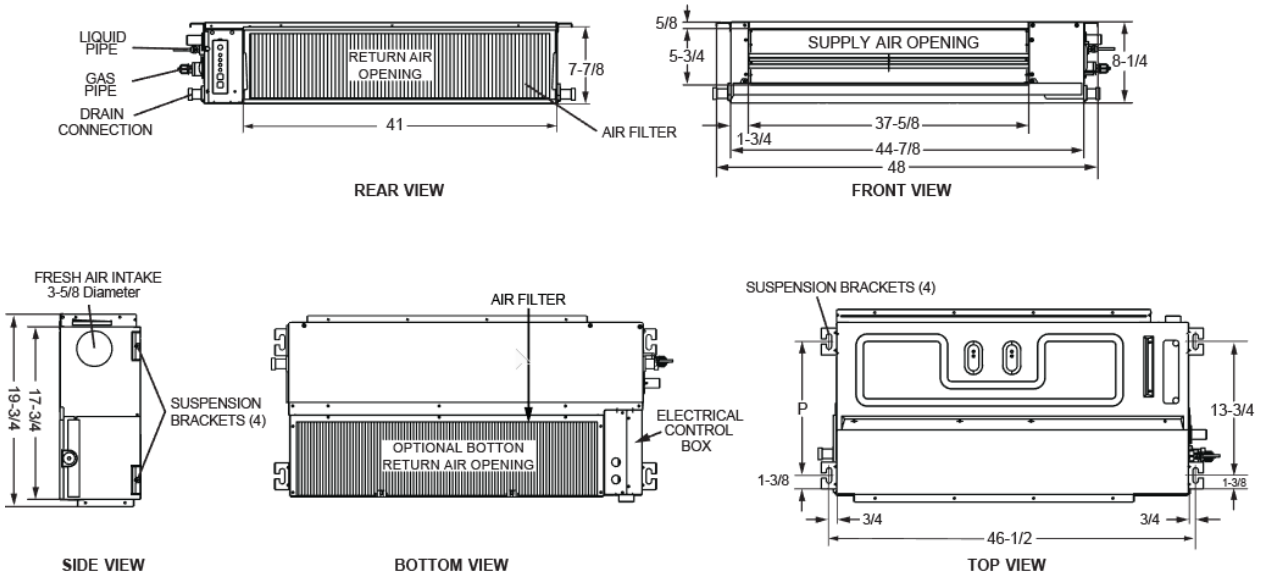


Figure 7 - 40VML024---3

NOTE: dimensions are in inches

IV. Wiring Diagrams

1. 40VML007/009/012/015/018/024---3

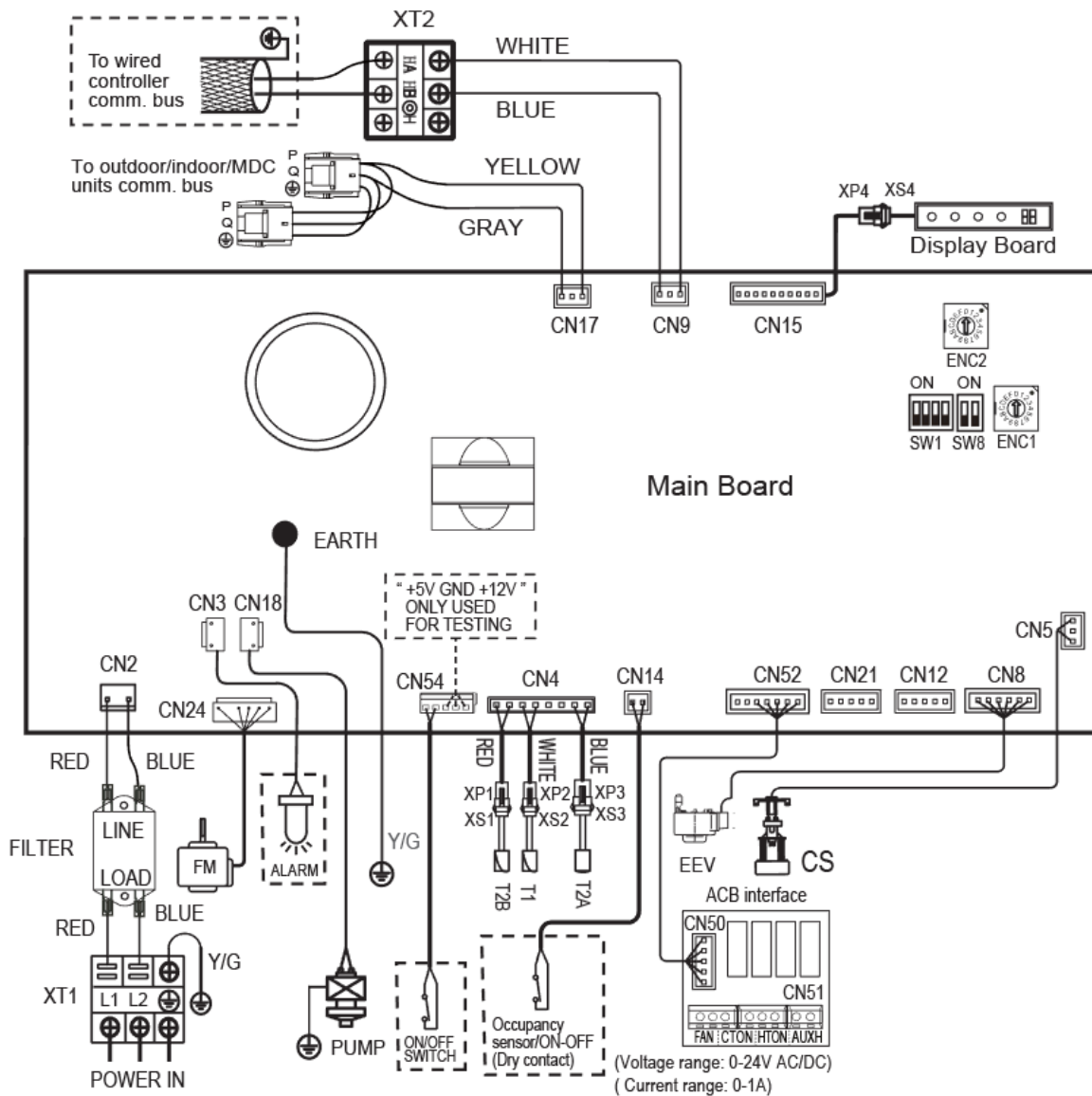


Figure 8 – Wiring Diagram



Legend:

ACB – Auxiliary Control Board	FAN – Output for Fan Operation	FM – Indoor Fan Motor
T2B – Outlet Pipe Temperature Sensor	CTON – Output for Cooling Operation	XP1-4 – Connectors
AUXH – Output for Auxiliary Heat	HTON – Output for Heating Operation	XS1-4 – Terminal Block
CS – Condensate Switch	PUMP – Pump Motor	XT1-2 – Terminal Block
----- – Optional Component or Field Wiring	T1 – Room Temperature Sensor	ALARM – Warning Lamp
EEV – Electronic Expansion Valve	T2A – Inlet Pipe Temperature Sensor	

Wiring Diagram Definitions and Settings (40VML007/009/012/018/024---3)



Code	Title
FM	Indoor Fan Motor
T1	Room Temperature Sensor
T2A	Inlet Pipe Temperature Sensor
T2B	Outlet Pipe Temperature Sensor
ALARM	Warning Lamp
EEV	Electronic Extension Valve
XP1-4	Connectors
XS1-4	
XT1-2	Terminal
PUMP	Pump Motor
CS	Condensate Switch
ACB	Auxiliary Control Board
AXUH	Output for Auxiliary Heat
CTON	Output for Cooling Operation
HTON	Output for Heating Operation

ENC1 Definition





	Reserved		Reserved
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ENC2 Definition



O/1 Definition

	Means 0		Means 1
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SW1 Definition

	0 means auto addressing mode (Default)
	1 means factory test mode
	0 means normal mode (Default)
	1 means factory self-checking mode (Reserved)
	(Reserved)
	0 means standard indoor unit (Default)
	1 means main indoor unit (Must be addressed #63)

J1 Definition

	Without jumper "J1" for auto restart function
	With jumper "J1" for manual restart function

SW8 Definition

	(Reserved)
	(Reserved)

Wiring Diagram Error Codes (40VML007/009/012/015/018/024---3)

Error Code	Error Content
dd	Heating/Cooling Conflict
E1	Comm. Error with Outdoor Unit
E2	Temp Sensor (T1) Error
E4	Temp Sensor (T2B) Error
E5	Temp Sensor (T2A) Error
E6	DC Fan Error
E7	EEPROM Error (Data Storage)
UU	MDC Error in Auto System-Check Mode
E9	Comm. Error with Wired Controller
Eb	EEV Error
Ed	Outdoor Unit Error
EE	Condensate Error
FE	No Address when Power On for First Time

V. Electrical Characteristics

Table 7 – Electrical Characteristics

Model	Power supply					IFM	
	Hz	Volts	Voltage range	MCA	MOCP	KW	FLA
40VMM007---3	60	208/230V	Max.253V Min.187V	0.50	15	0.10	0.40
40VMM009---3				0.50	15	0.10	0.40
40VMM012---3				0.60	15	0.10	0.48
40VMM015---3				0.80	15	0.10	0.64
40VMM018---3				0.95	15	0.10	0.76
40VMM024---3				1.18	15	0.10	0.94

MCA: Minimum Circuit Amps (A)

MOCP: Maximum Overcurrent Protection (A)

Symbols:

kW : Fan Motor Rated Output (KW)

FLA : Full Load Amps (A)

IFM : Indoor Fan Motor

VI. Fan Performance

There are six external static pressure (ESP) settings for each model.

The figures below on the left show "MAX. ESP", "Rating ESP", and "Min. ESP" as an example of fan characteristics.

The tables below on the right show air flows at "H-Speed" in each ESP for field setting.

Allowable ESP selections are listed in the first column.

Select ESP setting according to resistance of a connected duct.

Controller can be used to change indoor unit fan speed "H", "M", and "L".

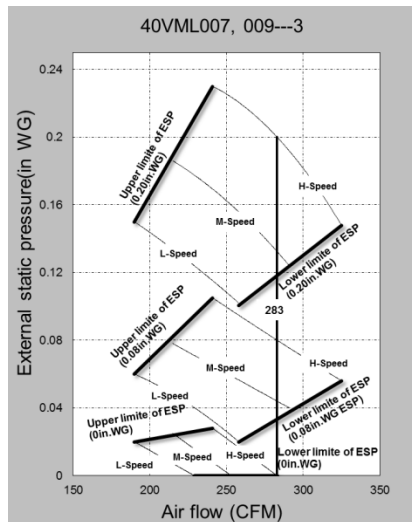


Figure 9 – Fan Performance 007, 009

Table 8 – Fan Performance 007, 009

External Static Pressure	Fan speed	Rang of available air flow rate in H-Speed					
		Max Point		Rating Point		Min Point	
		Max CFM	SP(in)	Mid CFM	SP(in)	Min CFM	SP(in)
0.00	H	283	0.00	283	0.00	241	0.03
0.04	H	325	0.02	283	0.04	241	0.06
0.08	H	325	0.06	283	0.08	241	0.10
0.12	H	325	0.08	283	0.12	241	0.15
0.16	H	325	0.12	283	0.16	241	0.19
0.20	H	325	0.15	283	0.20	241	0.23

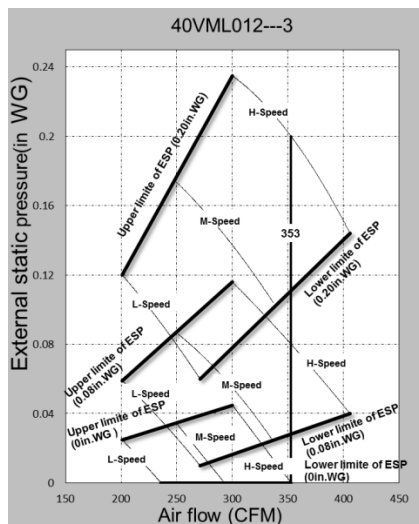


Figure 10 – Fan Performance 012

Table 9 – Fan Performance 012

External Static Pressure	Fan Speed	Rang of available air flow rate in H-Speed					
		Max Point		Rating Point		Min Point	
		Max CFM	SP(in)	Mid CFM	SP(in)	Min CFM	SP(in)
0.00	H	353	0.00	353	0.00	300	0.04
0.04	H	406	0.00	353	0.04	300	0.07
0.08	H	406	0.04	353	0.08	300	0.11
0.12	H	406	0.08	353	0.12	300	0.15
0.16	H	406	0.10	353	0.16	300	0.20
0.20	H	406	0.14	353	0.20	300	0.23

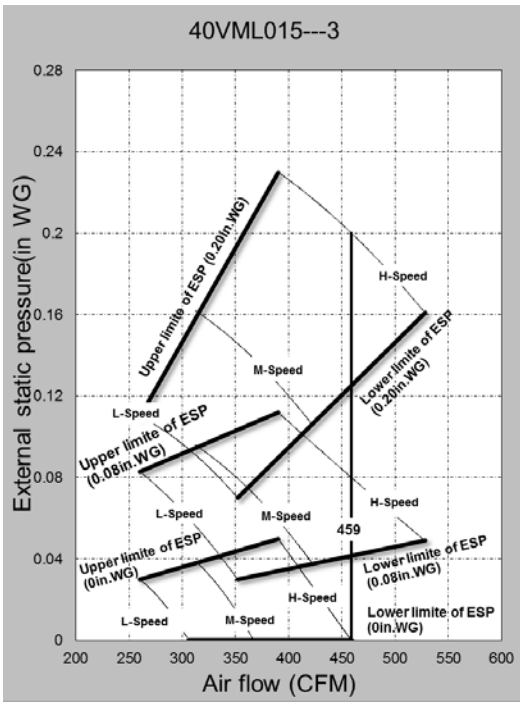


Figure 11 – Fan Performance 015

Table 10 – Fan Performance 015

External Static Pressure	Fan Speed	Rang of available air flow rate in H-Speed					
		Max Point		Rating Point		Min Point	
		Max CFM	SP(in)	Mid CFM	SP(in)	Min CFM	SP(in)
0.00	H	459	0.00	459	0.00	390	0.05
0.04	H	528	0.01	459	0.04	390	0.07
0.08	H	528	0.05	459	0.08	390	0.11
0.12	H	528	0.08	459	0.12	390	0.15
0.16	H	528	0.12	459	0.16	390	0.19
0.20	H	528	0.16	459	0.20	390	0.23

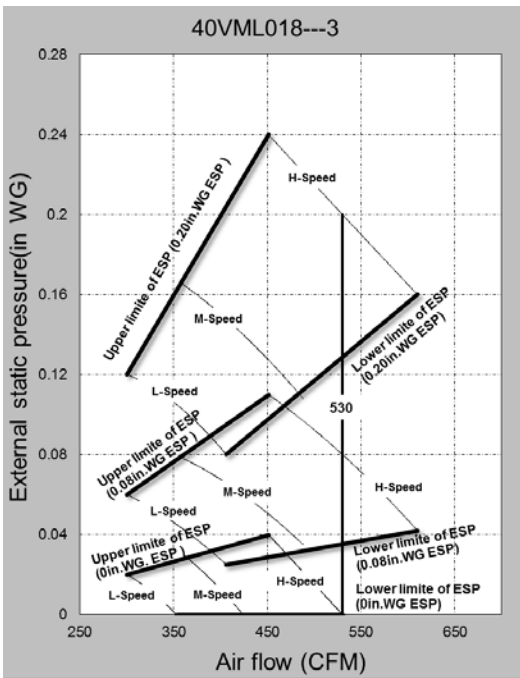


Figure 12 – Fan Performance 018

Table 11 – Fan Performance 018

External Static Pressure	Fan Speed	Rang of available air flow rate in H-Speed					
		Max Point		Rating Point		Min Point	
		Max CFM	SP(in)	Mid CFM	SP(in)	Min CFM	SP(in)
0.00	H	530	0.00	530	0.00	451	0.04
0.04	H	610	0.00	530	0.04	451	0.07
0.08	H	610	0.04	530	0.08	451	0.11
0.12	H	610	0.08	530	0.12	451	0.16
0.16	H	610	0.12	530	0.16	451	0.20
0.20	H	610	0.16	530	0.20	451	0.24

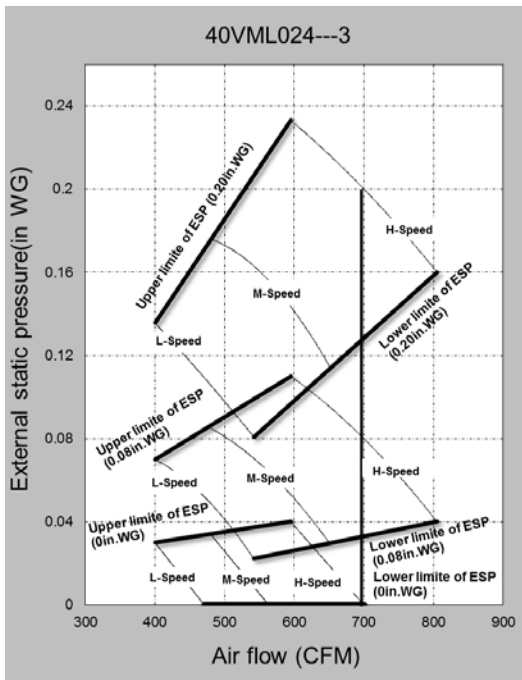


Figure 13 - Fan Performance 024

Table 12 – Fan Performance 024

External Static Pressure	Fan Speed	Rang of available air flow rate in H-Speed					
		Max Point		Rating Point		Min Point	
		Max CFM	SP(in)	Mid CFM	SP(in)	Min CFM	SP(in)
0.00	H	701	0.00	701	0.00	595	0.04
0.04	H	805	0.02	701	0.04	595	0.07
0.08	H	805	0.04	701	0.08	595	0.11
0.12	H	805	0.10	701	0.12	595	0.15
0.16	H	805	0.12	701	0.16	595	0.19
0.20	H	805	0.16	701	0.20	595	0.23

VII. Sound Data

2. Sound Pressure Levels

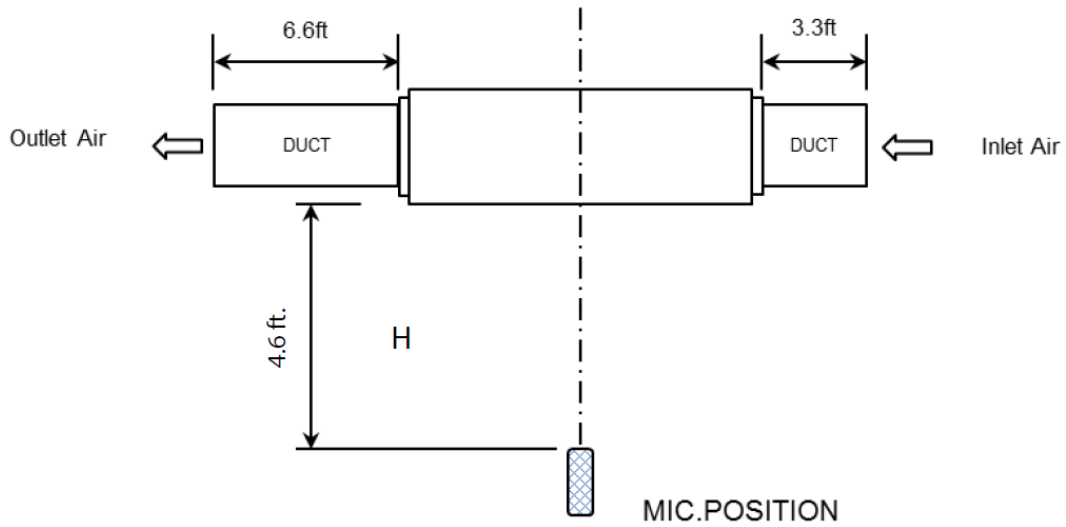


Figure 14 – Overall Sound Levels

Table 13 – Sound Pressure

Model	H	M	L
40VML007---3	34.0	32.0	31.4
40VML009---3	34.5	32.0	31.0
40VML012---3	37.0	34.6	33.0
40VML015---3	36.7	35.2	33.2
40VML018---3	40.2	38.0	36.0
40VML024---3	41.3	38.8	37.0

NOTES:

1. Units are dB(A)
2. These values are the maximum one between fan, cooling and heating mode

3. NC Curves

NOTES:

External Static Pressure: 0.1in. (25Pa)

Power source: 208/230V-1Ph-60Hz

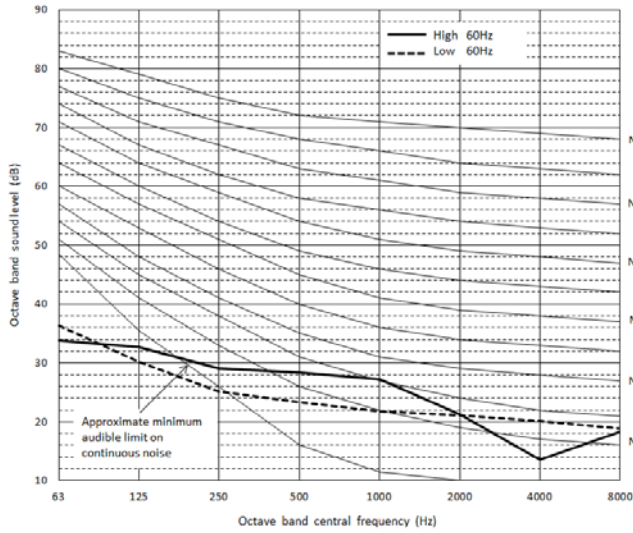


Figure 15 – 40VML007---3

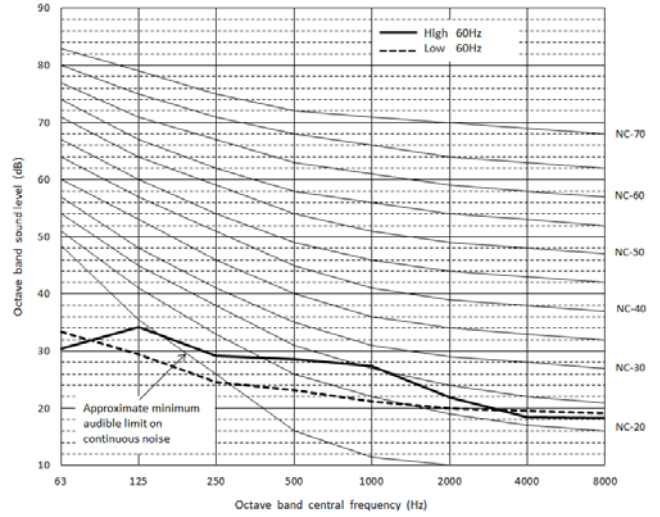


Figure 16 – 40VML009---3

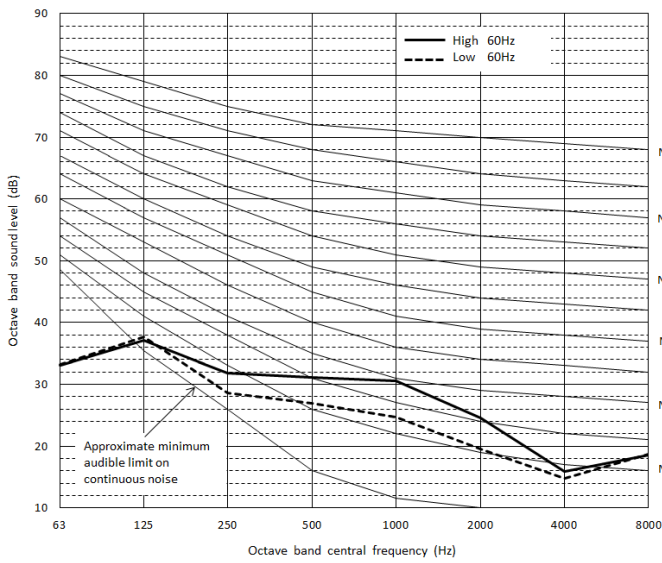


Figure 17 – 40VML012---3

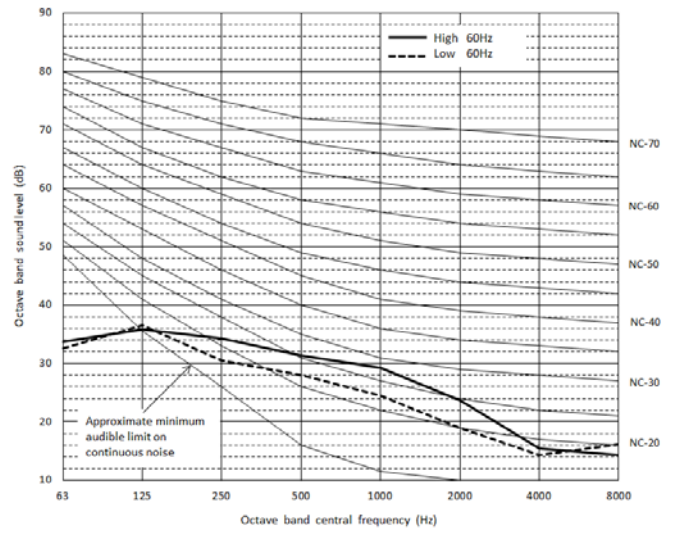


Figure 18 – 40VML015---3

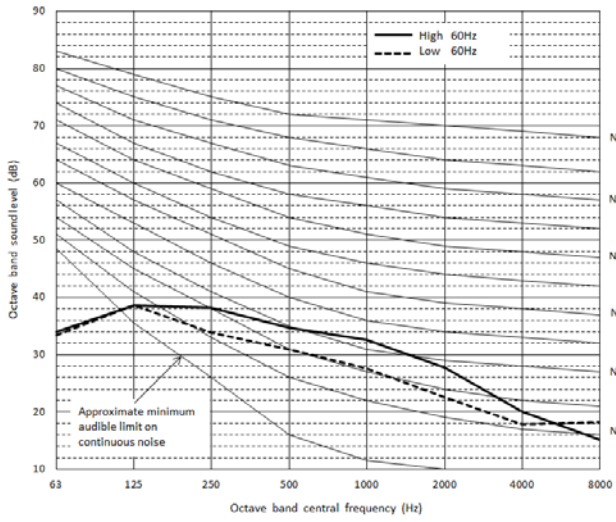


Figure 19 – 40VML018---3

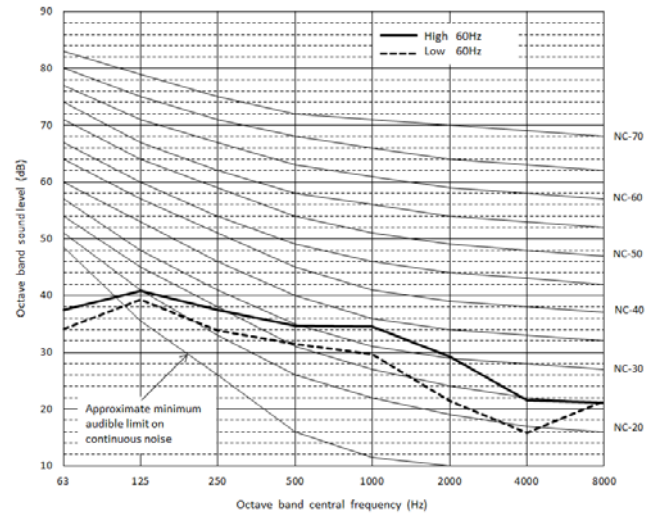


Figure 20 – 40VML024---3

VIII. Capacity Data Tables

Table 14 – Cooling Capacity

Model	Unit size	Indoor air temp.											
		68°F DB / 57°F WB		71°F DB / 60°F WB		75°F DB / 63°F WB		80°F DB / 67°F WB		85°F DB / 71°F WB		90°F DB / 75°F WB	
		TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC
40VML	7	4.11	4.11	4.98	4.70	5.84	5.21	7.00	5.74	7.46	5.94	7.93	6.12
	9	5.28	4.99	6.40	5.35	7.51	5.95	9.00	6.58	9.60	6.77	10.19	6.93
	12	7.04	6.19	8.53	6.68	10.02	7.46	12.00	8.29	12.79	8.53	13.59	8.73
	15	8.80	7.92	10.66	8.52	12.52	9.52	15.00	10.56	15.99	10.88	16.98	11.14
	18	10.56	9.37	12.79	10.10	15.02	11.28	18.00	12.52	19.19	12.88	20.38	13.19
	24	14.08	12.50	17.06	13.48	20.03	15.04	24.00	16.69	25.59	17.17	27.17	17.57

Rated Condition: Evaporation temperature is 42.8°F with high speed airflow.

Table 15 – Heating Capacity

Model	Unit size	Indoor air temp.					
		61°F DB	64°F DB	67°F DB	70°F DB	73°F DB	75°F DB
		TC	TC	TC	TC	TC	TC
40VML	7	8.48	8.32	8.16	8.00	7.46	7.11
	9	10.60	10.40	10.20	10.00	9.33	8.88
	12	14.31	14.04	13.77	13.50	12.60	11.99
	15	18.02	17.68	17.34	17.00	15.86	15.10
	18	22.27	21.84	21.42	21.00	19.59	18.66
	24	28.63	28.08	27.54	27.00	25.19	23.99

Rated Condition: Condensation temperature is 114.8°F.

TC = Total capacity; KBTU/h

SC = Sensible capacity; KBTU/h

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