

Engineering Data Book



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LOW STATIC DUCT BASIC INFORMATION

External Appearance



Fig. 1 —40VML007/009/012---3



Fig. 2 —40VML015/018---3



Fig. 3 —40VML024--3

Specifications

Table 1 —Data Table

MODEL NAME			40VML007---3	40VML009---3
Power Source		V-Ph-Hz	208/230-1-60	
Total Cooling Capacity *1		Btu/h	7,000	9,000
Sensible Cooling Capacity *1		Btu/h	5,740	6,580
Heating Capacity*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 stranded shielded cable 18AWG	

*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

NOTES:

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

Table 2 —Data Table

MODEL NAME			40VML012---3	40VML015---3
Power Source		V-Ph-Hz	208/230-1-60	
Total Cooling Capacity *1		Btu/h	12,000	15,000
Sensible Cooling Capacity *1		Btu/h	8,290	10,560
Heating Capacity *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 stranded shielded cable 18AWG	

*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

NOTES:

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

Table 3 —Data Table

MODEL NAME			40VML018---3	40VML024---3
Power Source		V-Ph-Hz	208/230-1-60	
Total Cooling Capacity *1		Btu/h	18,000	24,000
Sensible Cooling Capacity *1		Btu/h	12,520	16,690
Heating Capacity *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 stranded shielded cable 18AWG	

*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

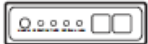
Heating: Return air temperature: 70°F FDB; Outdoor 47°F FDB/43°F FWB

NOTES:

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

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

LEGEND:

MDC - Multiport Distribution Controller

PIPING DIAGRAM

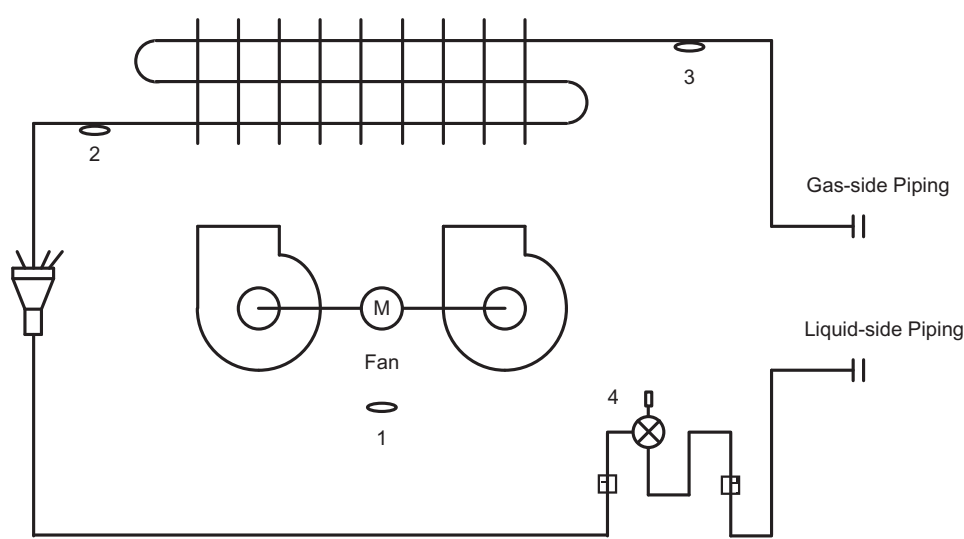


Fig. 4 —Piping

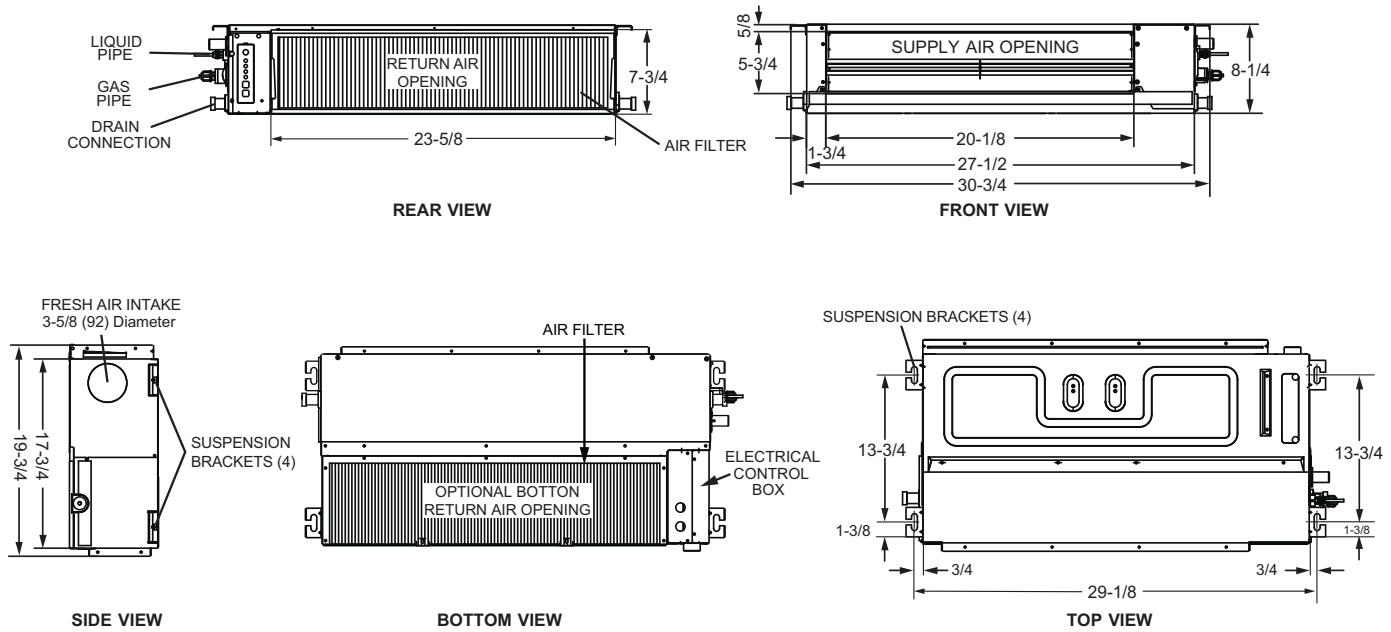
Table 5 —Piping

NUMBER	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

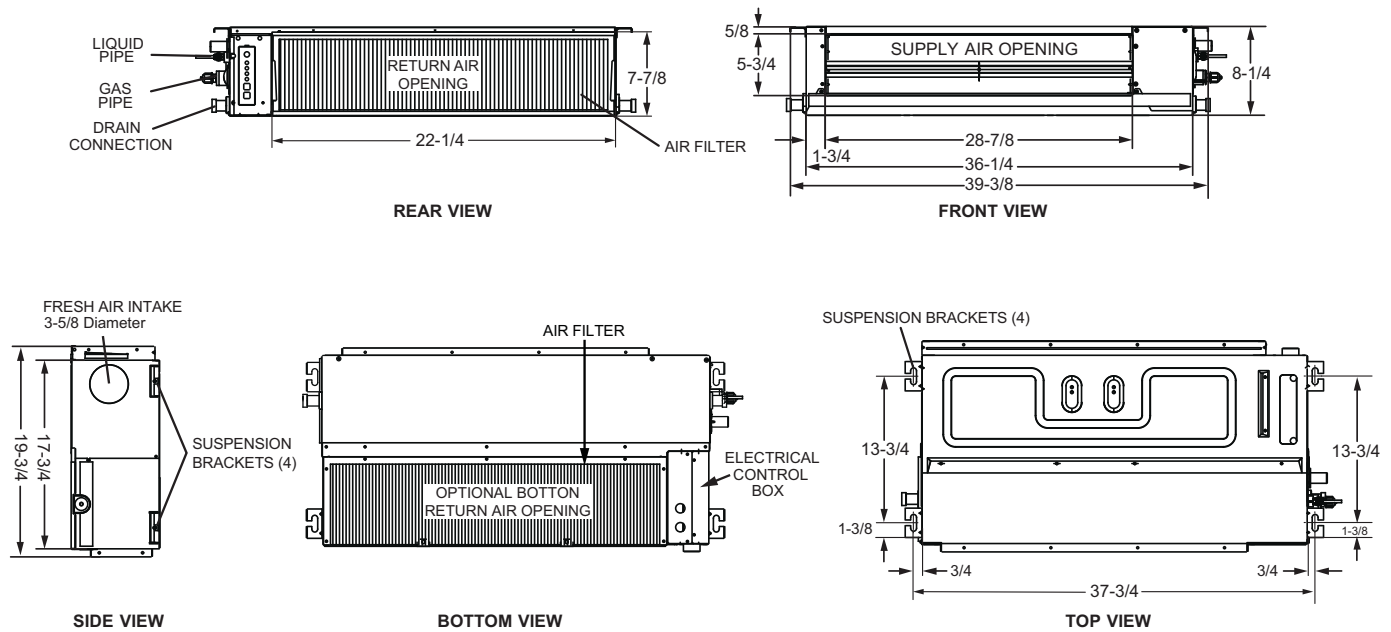
MODEL	GAS	LIQUID
40VML007/009/012/015---3	1/2	1/4
40VML018/024---3	5/8	3/8

DIMENSIONS



NOTE: All dimensions are shown in inches.

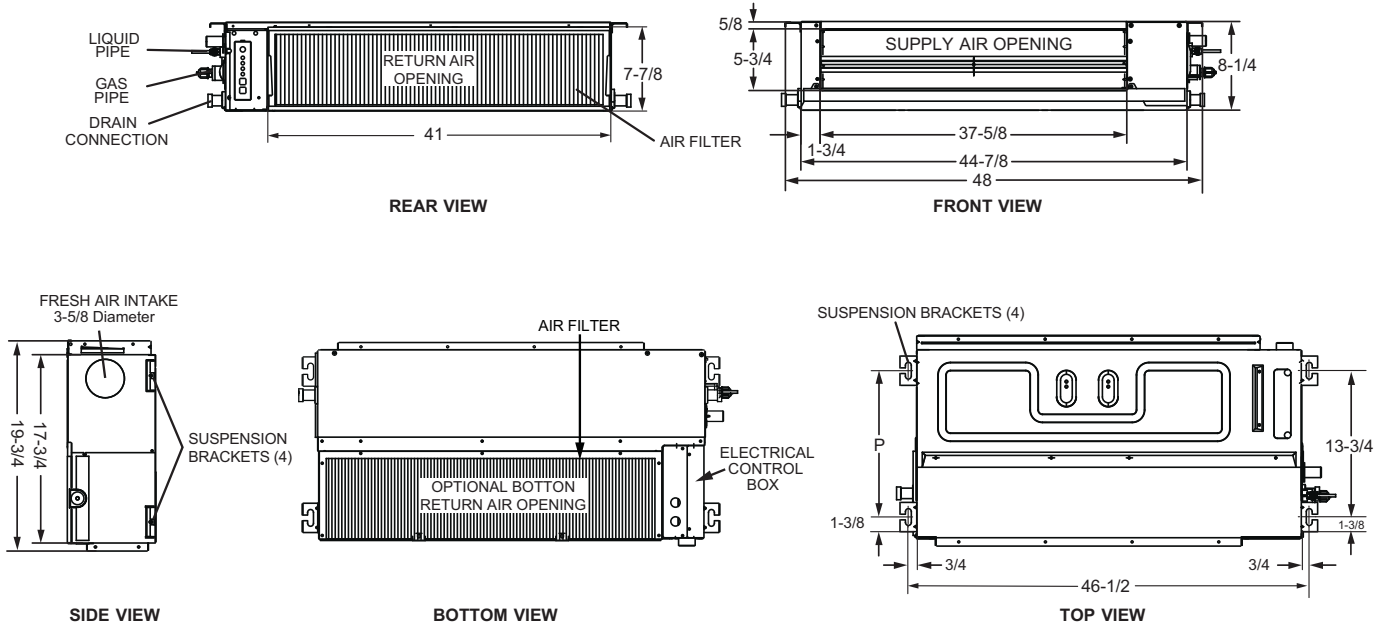
Fig. 5 —40VML007 to 012---3



NOTE: All dimensions are shown in inches.

Fig. 6 —40VML015 to 018---3

DIMENSIONS (CONT.)



NOTE: All dimensions are shown in inches.

Fig. 7 —40VML024---3

WIRING DIAGRAM

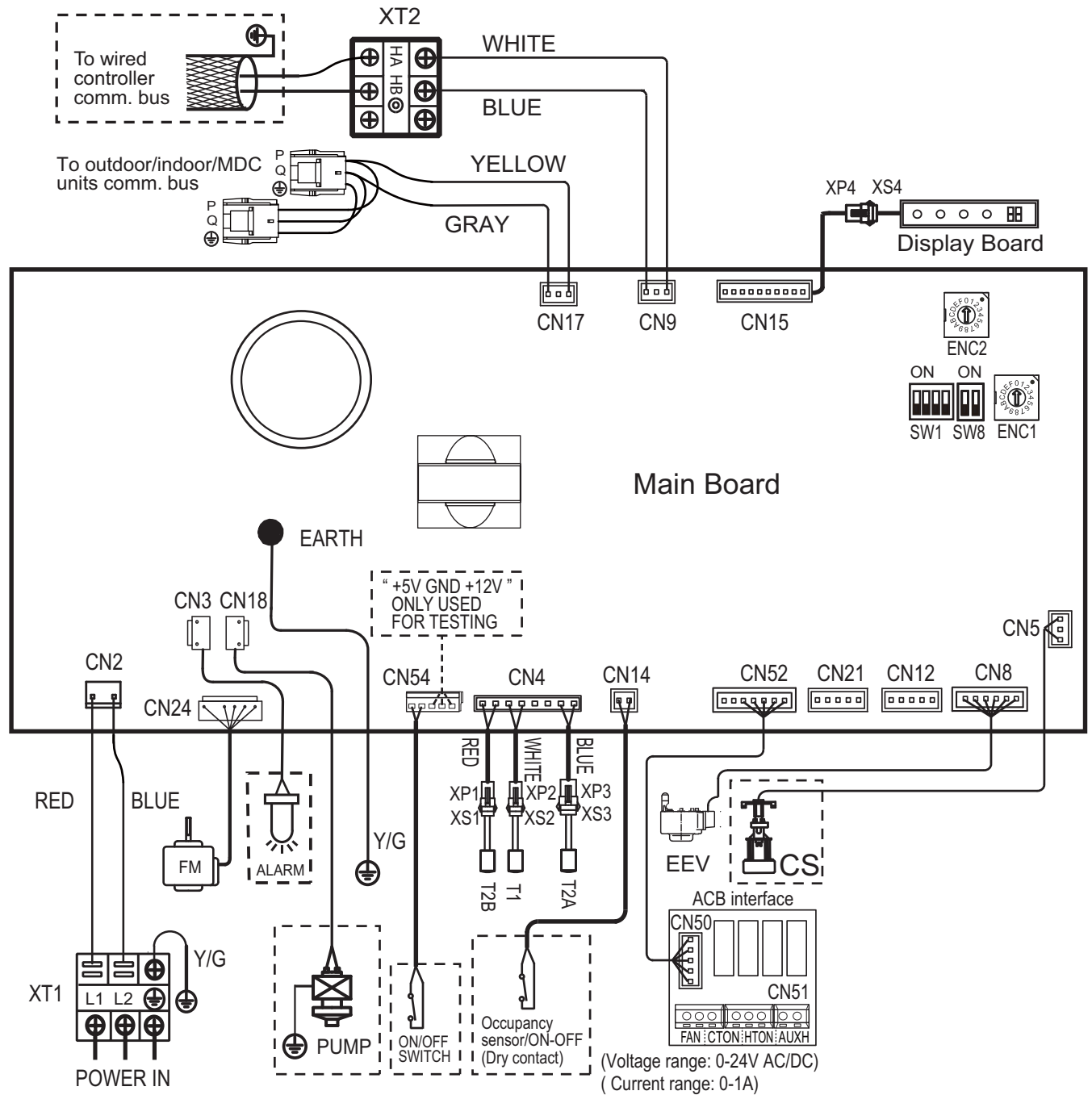


Fig. 8 —Wiring Diagram (40VML007/009/012/015/018/024---3)

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 to 024---3)

Table 7 —SW1 Definition

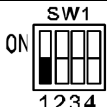
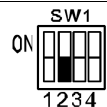
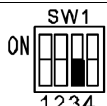
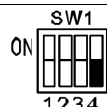
	0 means auto addressing mode (Default)
	1 means factory test mode
	0 means normal mode (Default)
	1 means factory self-checking mode (Reserved)
	Reserved
	0 means standard indoor unit (Default)
	1 means main indoor unit (must be addressed #63)

Table 8 — J1 Definition

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

Table 9 —ENC1 / ENC2

	Reserved		Reserved
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Table 10 —SW8 Definition

	Reserved
	Reserved

Table 11 —0/1 Definition

	Means 0
	Means 1

Table 12 —Wiring Diagram Error Codes (40VML007/009/012/015/018/024---3)

ERROR CODE	ERROR CONTENT
dd	Heating/Cooling Conflict
E1	Communication Error with Outdoor Unit
E2	Temperature Sensor (T1) Error
E4	Temperature 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	Communication Error with Wired Controller
Eb	EEV Error
Ed	Outdoor Unit Error
EE	Condensate Error
FE	No Address when Power On for First Time

ELECTRICAL CHARACTERISTICS

Table 13 —Electrical Characteristics

MODEL	POWER SUPPLY					IFM	
	HZ	VOLTS	VOLTAGE RANGE	MCA	MOCP	kW	FLA
40VML007---3	60	208/230V	Max.253V Min.187V	5.70	15	0.75	4.50
40VML009---3				7.10	15	0.75	5.60
40VML012---3				7.30	15	0.75	5.80
40VML015---3				7.60	15	0.75	6.00
40VML018---3				7.80	15	0.75	6.20
40VML024---3				9.70	15	0.75*2	4.2 + 4.3

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

FAN PERFORMANCE

There are 6 external static pressure (ESP) settings for each model.

The figures below on the left show MAX. ESP, Rating ESP, 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 the ESP setting according to resistance of a connected duct.

The controller can be used to change the indoor unit fan speed H, M, or L.

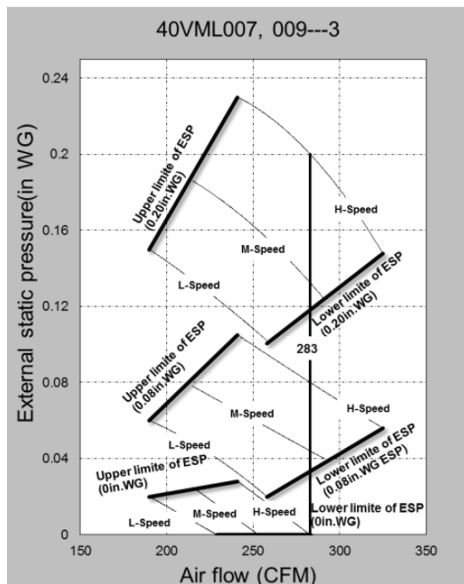


Fig. 9 —Fan Performance 007, 009

Table 14 —Fan Performance 007, 009

External Static Pressure	Fan speed	Range 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	0.0
0.04	H	325	0.02	283	0.04	241	0.0
0.08	H	325	0.06	283	0.08	241	0.1
0.12	H	325	0.08	283	0.12	241	0.1
0.16	H	325	0.12	283	0.16	241	0.1
0.20	H	325	0.15	283	0.20	241	0.2

LEGEND:

SP - Static Pressure

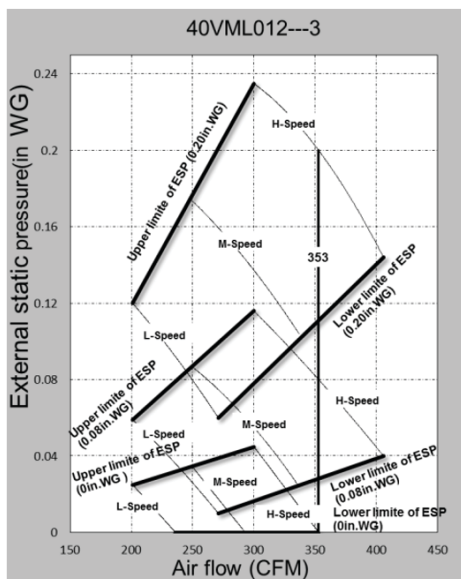


Fig. 10 —Fan Performance 012

Table 15 —Fan Performance 012

External Static Pressure	Fan speed	Range 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

LEGEND:

SP - Static Pressure

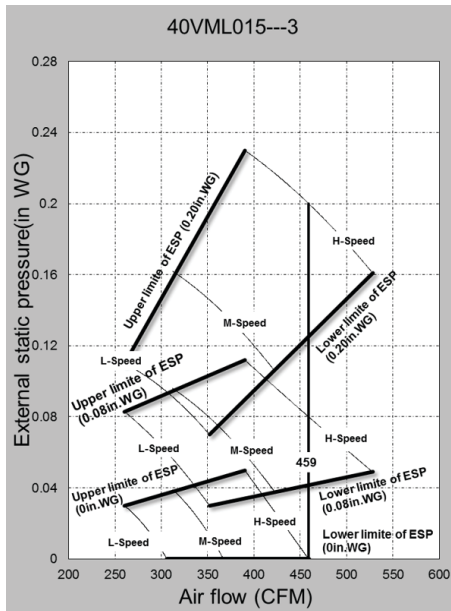


Fig. 11 —Fan Performance 015

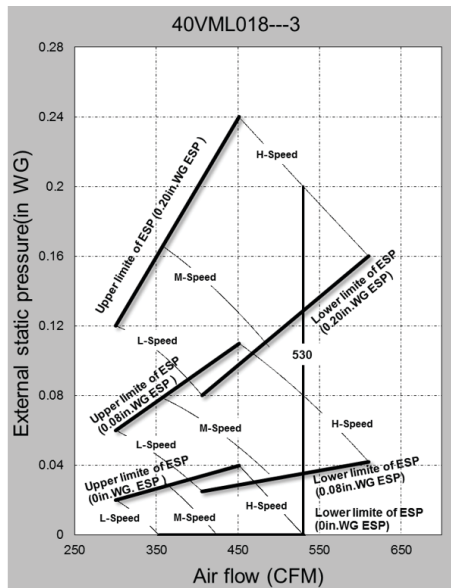


Fig. 12 —Fan Performance 018

Table 16 —Fan Performance 015

External Static Pressure	Fan Speed	Range 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

LEGEND:

SP - Static Pressure

Table 17 —Fan Performance 018

External Static Pressure	Fan Speed	Range 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

LEGEND:

SP - Static Pressure

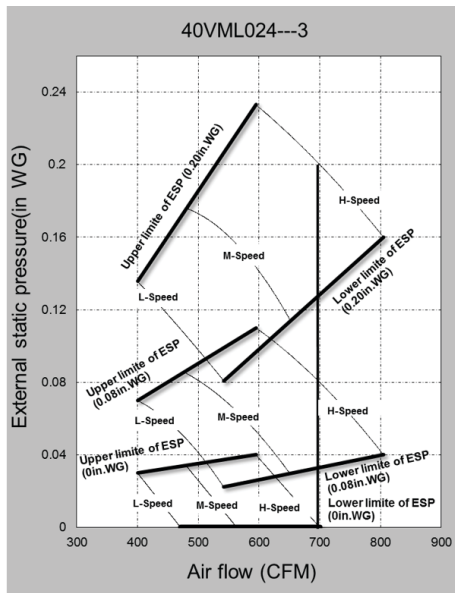


Fig. 13 —Fan Performance 024

Table 18 —Fan Performance 024

External Static Pressure	Fan Speed	Range 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

LEGEND:

SP - Static Pressure

SOUND DATA

Sound Pressure Levels

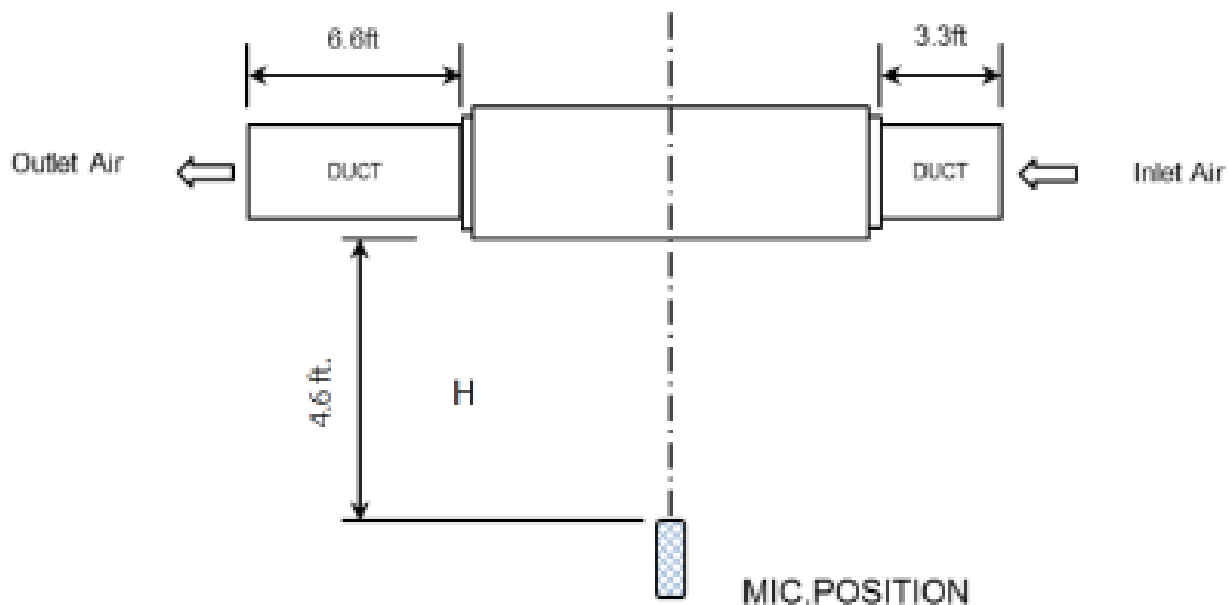


Fig. 14 —Overall Sound Levels

Table 19 —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 dBA.
2. These values are the maximum one between fan, cooling, and heating mode.

NC Curves

NOTES:

External Static Pressure: 0.1 in. (25 Pa)

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

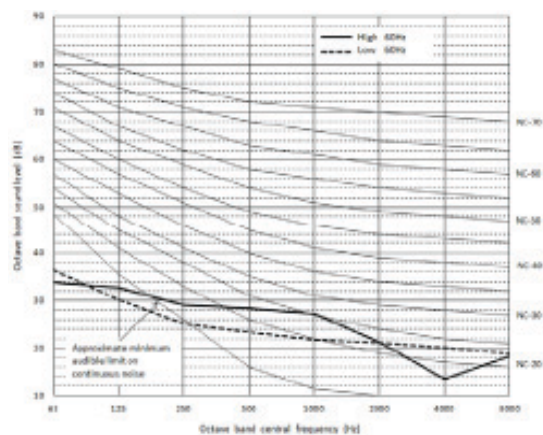


Fig. 15—40VML007---3

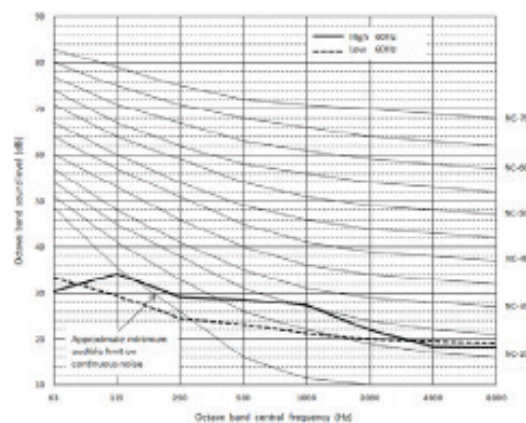


Fig. 16—40VML009---3

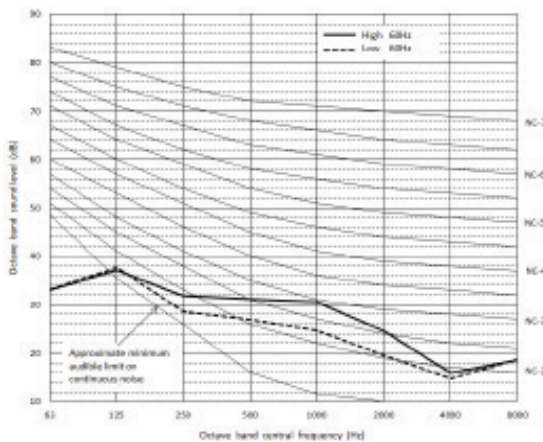


Fig. 17—40VML012---3

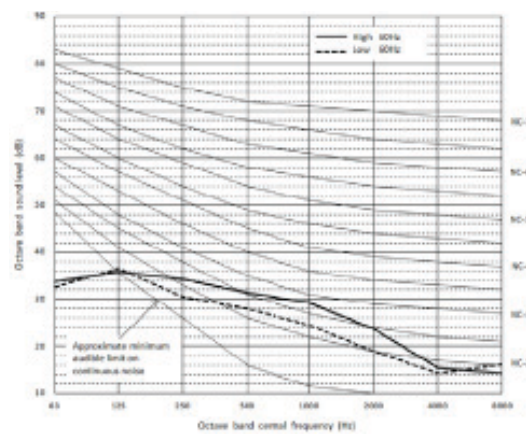


Fig. 18—40VML015---3

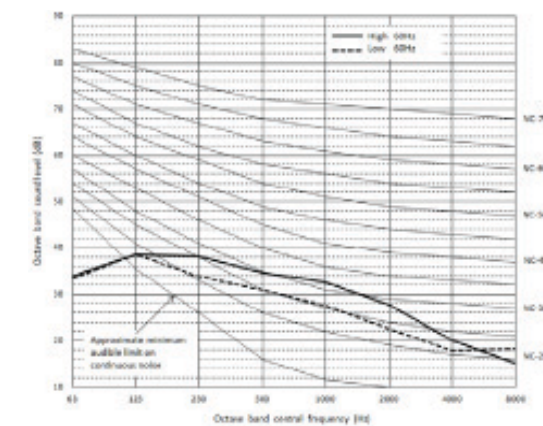


Fig. 19—40VML018---3

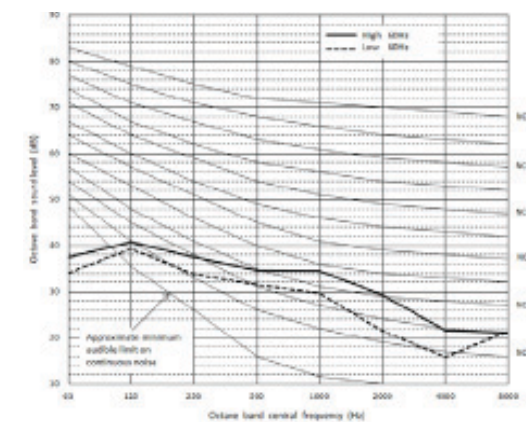


Fig. 20—40VML024---3

CAPACITY DATA TABLES

Table 20 —Cooling Capacity

INDOOR UNIT ENTERING AIR CONDITIONS:		COOLING CAPACITY INDICATION											
		7K		9K		12K		15K		18K		24K	
drybulb (°F)	wetbulb (°F)	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC	TC	SC
70	58	4.4	4.22	5.65	4.83	7.54	6.07	9.42	7.8	11.31	9.21	15.07	11.99
70	62	5.55	3.68	7.14	4.43	9.52	5.72	11.9	7.26	14.28	8.62	19.04	11.39
70	67	7	2.93	9	3.82	12	5.15	15	6.4	18	7.67	24	10.35
70	72	/	/	/	/	/	/	/	/	/	/	/	/
70	76	/	/	/	/	/	/	/	/	/	/	/	/
75	58	4.43	4.40	5.69	5.65	7.59	7.34	9.49	9.42	11.39	11.18	15.18	14.44
75	62	5.59	4.78	7.19	5.53	9.59	6.99	11.98	8.96	14.38	10.59	19.17	13.84
75	67	7.05	4.03	9.06	4.92	12.08	6.41	15.11	8.10	18.13	9.64	24.17	12.80
75	72	7.58	2.83	9.74	3.71	12.99	5.00	16.24	6.21	19.49	7.46	25.98	10.07
75	76	/	/	/	/	/	/	/	/	/	/	/	/
80	58	4.46	4.40	5.73	5.65	7.65	7.54	9.55	9.42	11.47	11.31	15.28	15.07
80	62	5.63	5.55	7.24	6.63	9.65	8.27	12.07	10.67	14.48	12.57	19.31	16.29
80	67	7.10	5.13	9.13	6.02	12.17	7.68	15.21	9.80	18.25	11.61	24.34	15.24
80	72	7.63	3.93	9.81	4.80	13.08	6.27	16.35	7.91	19.63	9.43	26.16	12.51
80	76	8.04	2.94	10.34	3.81	13.79	5.10	17.23	6.36	20.68	7.62	27.57	10.25
85	58	4.49	4.40	5.77	5.65	7.70	7.54	9.62	9.42	11.55	11.31	15.39	15.07
85	62	5.67	5.43	7.29	7.14	9.72	9.52	12.15	11.90	14.58	14.28	19.44	19.04
85	67	7.15	6.23	9.19	7.12	12.25	8.96	15.32	11.50	18.38	13.59	24.51	17.69
85	72	7.69	5.03	9.88	5.90	13.17	7.54	16.47	9.62	19.76	11.40	26.34	14.96
85	76	8.10	4.04	10.41	4.91	13.89	6.37	17.35	8.06	20.82	9.59	27.76	12.69
90	58	4.52	4.40	5.81	5.65	7.75	7.54	9.69	9.42	11.63	11.31	15.50	15.07
90	62	5.71	5.55	7.34	7.14	9.79	9.52	12.24	11.90	14.68	14.28	19.58	19.04
90	67	7.20	7.00	9.25	9.00	12.34	12.00	15.42	15.00	18.51	18.00	24.68	24.00
90	72	7.74	6.13	9.95	7.00	13.26	8.81	16.58	11.32	19.90	13.37	26.53	17.41
90	76	8.15	5.15	10.49	6.00	13.98	7.64	17.47	9.76	20.97	11.56	27.96	15.14

Table 21 —Heating Capacity

MODEL	UNIT SIZE	HEATING INDOOR AIR TEMPERATURE							
		61°F DB	64°F DB	67°F DB	70°F DB	73°F DB	75°F DB	77°F DB	80°F DB
		TC	TC	TC	TC	TC	TC	TC	TC
40VML	7	8.48	8.32	8.16	8.00	7.46	7.11	6.75	6.21
	9	10.60	10.40	10.20	10.00	9.33	8.88	8.44	7.77
	12	14.31	14.04	13.77	13.50	12.60	11.99	11.39	10.49
	15	18.02	17.68	17.34	17.00	15.86	15.10	14.34	13.21
	18	22.27	21.84	21.42	21.00	19.59	18.66	17.72	16.31
	24	28.63	28.08	27.54	27.00	25.19	23.99	22.78	20.97

