

**38MGQ
Multi-Zone Ductless System
Sizes 18, 27, 36 and 48**



Product Data



NOTE: Image for illustration purposes only. Actual model may be slightly different.

INDUSTRY LEADING FEATURES / BENEFITS

AN INEXPENSIVE AND CREATIVE SOLUTION TO DESIGN PROBLEMS.

The 38MGQ ductless inverter driven multi-zone system provides individual comfort control for up to 5 separate zones. Two, three, four or five space-saving cassette, floor console, high wall, or ducted style fan coils can be matched with one outdoor heat pump. The indoor fan coils are connected to the outdoor unit by refrigerant tubing and wires.

The different styles of indoor units can be mounted in several locations to accommodate the application. This selection of fan coils permits inexpensive and creative solutions to design problems such as:

- When adding air conditioning to spaces that are heated by hydronic or electric heat and have no ductwork.
- Historical renovations or any application where preserving the look of the original structure is essential.
- Commercial add-on jobs where the existing air conditioning system cannot be stretched.

These compact indoor fan coil units take up very little space in the room and do not obstruct windows. The fan coils are attractively styled to blend with most room decors.

Advanced system components incorporate innovative technology to provide reliable cooling and heating performance at low sound levels.

INVERTER TECHNOLOGY

The inverter driven compressor is designed to run at various input power frequencies (Hz) which controls the compressor's motor speed.

Even Temperature – The control package, including the inverter, monitors the outdoor and indoor temperatures as they relate to the selected indoor set point and adjusts the compressor speed to match the load and keep the system operating continuously rather than cycling and creating temperature swings. This translates to higher comfort levels for the occupants.

Rapid Pull Down/Warm-Up – Comfort is increased by the inverter system's ability to ramp up the compressor speed enabling the system to reach the user selected room temperature set point quicker.

Humidity Control – Running the system for longer periods and continuously varying the compressor speed enhances the humidity control.

INDIVIDUAL ROOM COMFORT

Maximum comfort is provided because each space can be controlled individually based on the usage pattern.

LOW SOUND LEVELS

When noise is a concern, ductless systems are the answer. The indoor units are whisper quiet. There are no compressors indoors, either in the conditioned space or directly over it, and there is none of the noise usually generated by air being forced through the ductwork.

When sound ordinances and proximity to neighbors demand quiet operation, the 38MGQ unit is the right choice. With the inverter technology, these units run at lower speeds most of the time resulting in reduced sound levels.

INVERTER TECHNOLOGY – ENHANCED ECONOMICAL OPERATION

Ductless systems are inherently economical to operate. Individual rooms are heated or cooled only when required, and since the air is delivered directly to the space, there is no need to use additional energy to move the air in the ductwork. This economical operation is enhanced further when the inverter system output matches the load resulting in a more efficient system.

EASY-TO-USE CONTROLS

The multi-zone systems have microprocessor-based controls to provide the ultimate in comfort and efficiency. The user friendly wired and wireless remote controls provide the interface between the user and the unit.

SECURE OPERATION

If security is an issue, outdoor and indoor units are connected only by refrigerant piping and wiring to prevent intruders from crawling through ductwork or wall openings. In addition, since the 38MGQ can be installed close to an outside wall, coils are protected from vandals and severe weather.

FAST INSTALLATION

This compact ductless split system is simple to install. A mounting bracket is included with the indoor units and only wires and piping need to run between the indoor and outdoor units. These units are fast and easy to install ensuring minimal disruption to customers in homes or the workplace. This makes the 38MGQ systems the equipment of choice for retrofit applications.

SIMPLE SERVICING AND MAINTENANCE

Removing the top panel of the outdoor unit provides immediate access to the control compartment, providing the service technician access to the diagnostic LEDs to facilitate the troubleshooting process. In addition, the draw-thru design of the outdoor unit means that dirt accumulates on the outside surface of the coil. Coils can be cleaned quickly from the inside using a pressure hose and detergent.

On the indoor units, service and maintenance expense is reduced due to the permanent easy to clean filters. Also, error codes are displayed on the front panel to alert the user to certain system malfunctions

BUILT-IN RELIABILITY

Ductless system indoor and outdoor units are designed to provide years of trouble-free operation.

Both the indoor and outdoor units are well protected. Whenever the microprocessor detects abnormal conditions, the unit stops and an error code appears.

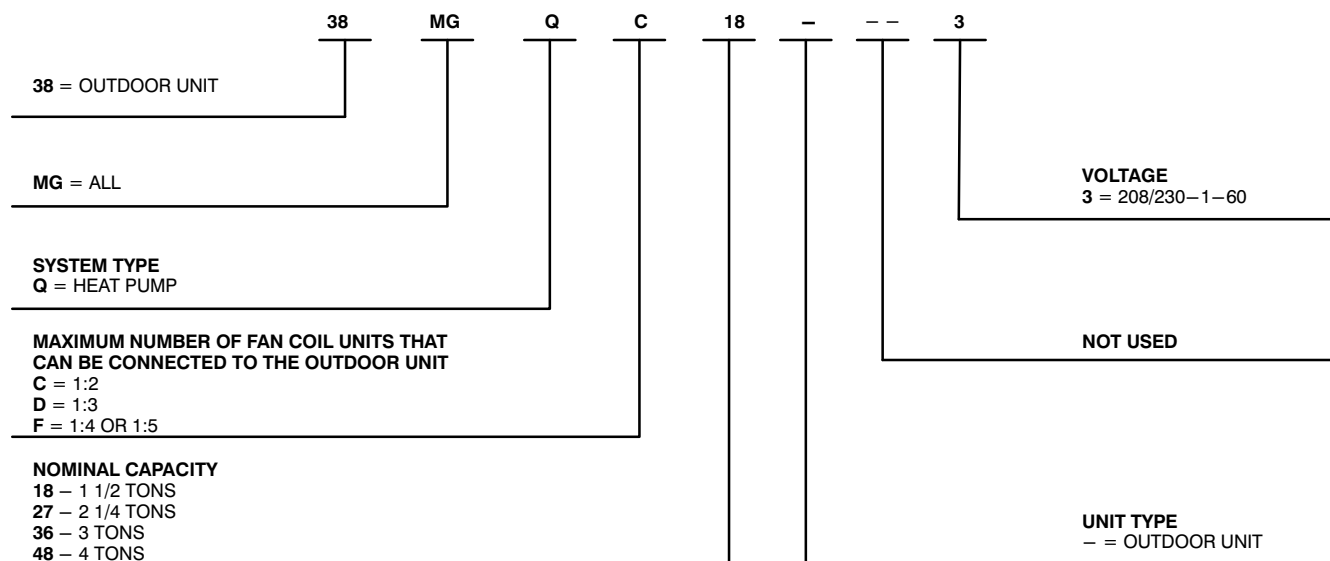
Inverter systems provide additional reliability due to the soft start. This refers to the ability of the inverter to start the compressor motor using reduced voltage and reduced current. This feature is beneficial from an electrical standpoint (eliminates current spikes) as well as an overall reliability standpoint due to reduced stress on all associated system components.

AGENCY LISTINGS

All systems are listed with AHRI (Air conditioning, Heating, and Refrigeration Institute) and are ETL certified per UL 1995 standard.

MODEL NUMBER NOMENCLATURE

OUTDOOR UNIT



Use of the AHRI Certified
TM Mark indicates a
manufacturer's
participation in the
program For verification
of certification for individual
products, go to
www.ahridirectory.org.



STANDARD FEATURES AND ACCESSORIES

Ease of Installation	
Low Voltage Controls	S
Comfort Features	
Microprocessor Control	S
Auto Restart Function	S
Auto Changeover	S
Energy Saving Features	
Inverter Driven Compressor	S
46° F Heating Mode (Heating Setback)	S
Safety And Reliability	
3 Minute Time Delay For Compressor	S
High Compressor Discharge Temperature	S
Low Voltage Protection	S
Compressor Overload Protection	S
Compressor Over Current Protection	S
IPM Module Protection	S
Ease of Service	
Diagnostic	S
Error Messages Displayed On Front Panel	S
Application Flexibility	
Crankcase Heater	S
Basepan Heater	S

Legend

S Standard

A Accessory

OUTDOOR UNITS

Crankcase Heater

The crankcase heater is standard on all unit sizes. Heater clamps must be placed around the compressor oil stump.

Base pan Heater

The base pan heater is standard on all unit sizes.

COMBINATION TABLE

INDOOR UNIT	NOMINAL UNIT BTUH	INDOOR MODEL NUMBER	OUTDOOR MODEL NUMBER
High Wall	9,000	40MAQB09B--3	38MGQC18---3
	12,000	40MAQB12B--3	
Cassette	9,000	40MBQB09C--3	
	12,000	40MBQB12C--3	
Ducted	9,000	40MBQB09D--3	
	12,000	40MBQB12D--3	
Floor Console	9,000	40MBQB09F--3	
	12,000	40MBQB12F--3	

INDOOR UNIT	NOMINAL UNIT BTUH	INDOOR MODEL NUMBER	OUTDOOR MODEL NUMBER
High Wall	9,000	40MAQB09B--3	38MGQD27---3
	12,000	40MAQB12B--3	
	18,000	40MAQB18B--3	
Cassette	9,000	40MBQB09C--3	
	12,000	40MBQB12C--3	
	18,000	40MBQB18C--3	
Ducted	9,000	40MBQB09D--3	
	12,000	40MBQB12D--3	
	18,000	40MBQB18D--3	
Floor Console	9,000	40MBQB09F--3	
	12,000	40MBQB12F--3	

INDOOR UNIT	NOMINAL UNIT BTUH	INDOOR MODEL NUMBER	OUTDOOR MODEL NUMBER
High Wall	9,000	40MAQB09B--3	38MGQF36---3 38MGQF48---3
	12,000	40MAQB12B--3	
	18,000	40MAQB18B--3	
	24,000	40MAQB24B--3	
Cassette	9,000	40MBQB09C--3	
	12,000	40MBQB12C--3	
	18,000	40MBQB18C--3	
Ducted	9,000	40MBQB09D--3	
	12,000	40MBQB12D--3	
	18,000	40MBQB18D--3	
	24,000	40MBQB24D--3	
Floor Console	9,000	40MBQB09F--3	
	12,000	40MBQB12F--3	

DIMENSIONS – OUTDOOR

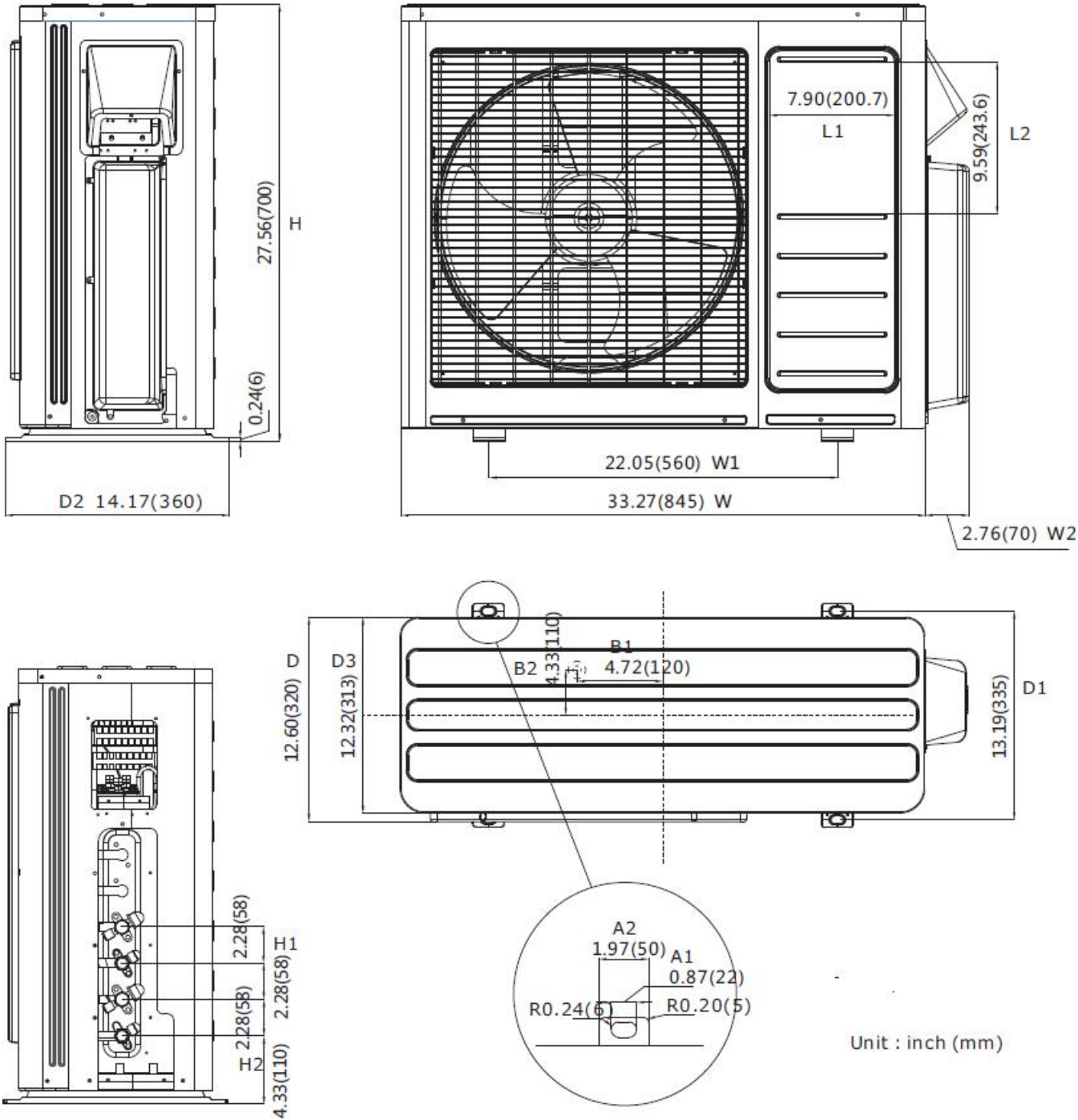


Fig. 1 – Outdoor Dimensions Size 18

UNIT SIZE			18
Height	in (mm)		27.56(700)
Width	in (mm)		33.27(845)
Depth	in (mm)		12.60(320)
Weight –Net	lbs (kg)		114.63(52)

DIMENSIONS – OUTDOOR (CONTINUED)

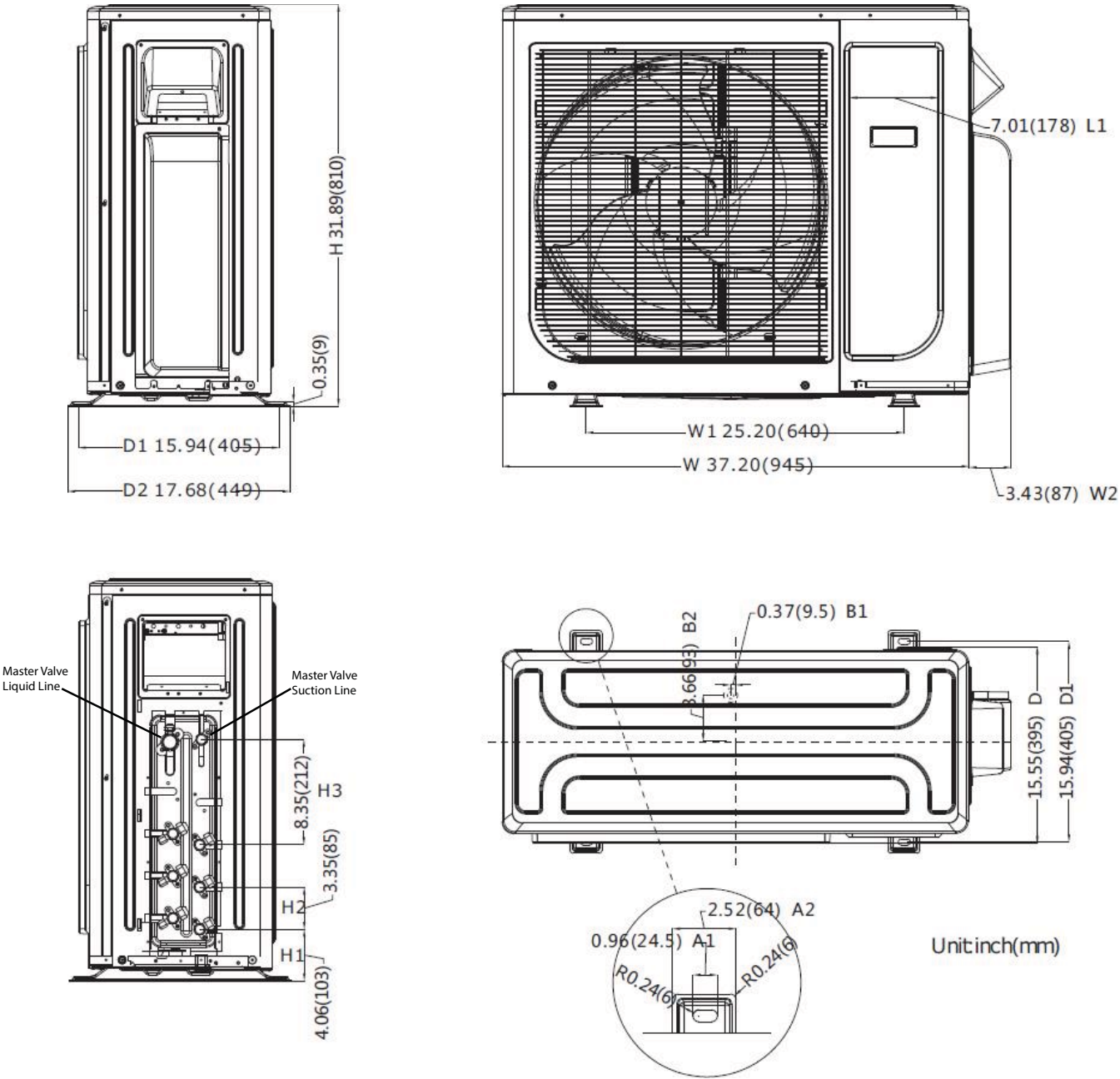


Fig. 2 – Outdoor Dimensions Size 27

UNIT SIZE		27
Height	in (mm)	31.89(810)
Width	in (mm)	37.20(945)
Depth	in (mm)	15.55(395)
Weight –Net	lbs (kg)	154.76(70.2)

DIMENSIONS – OUTDOOR (CONTINUED)

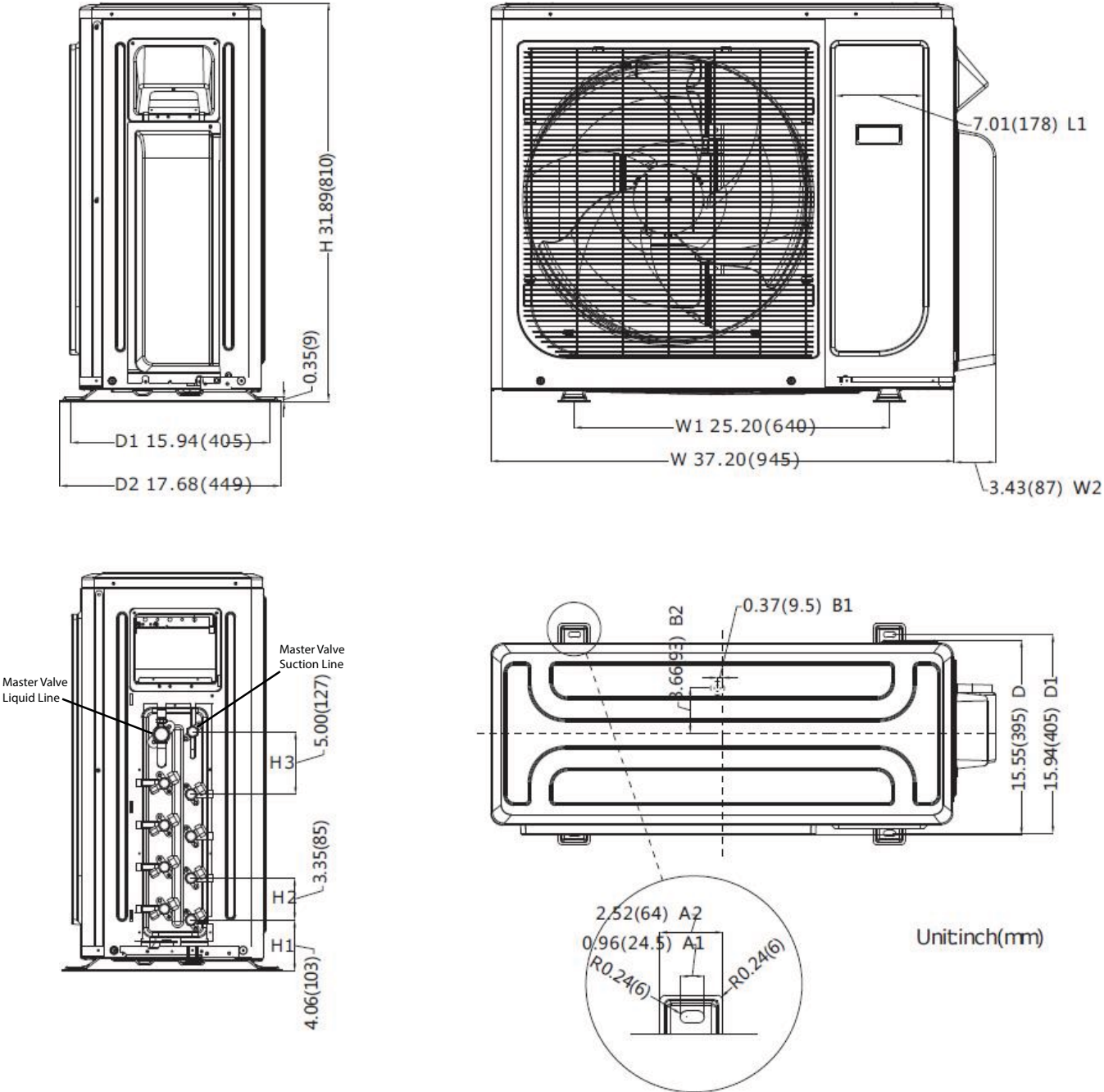


Fig. 3 – Outdoor Dimensions Size 36

UNIT SIZE			36
Height	in (mm)		31.89(810)
Width	in (mm)		37.20(945)
Depth	in (mm)		15.55(395)
Weight – Net	lbs (kg)		169.75(77)

DIMENSIONS – OUTDOOR (CONTINUED)

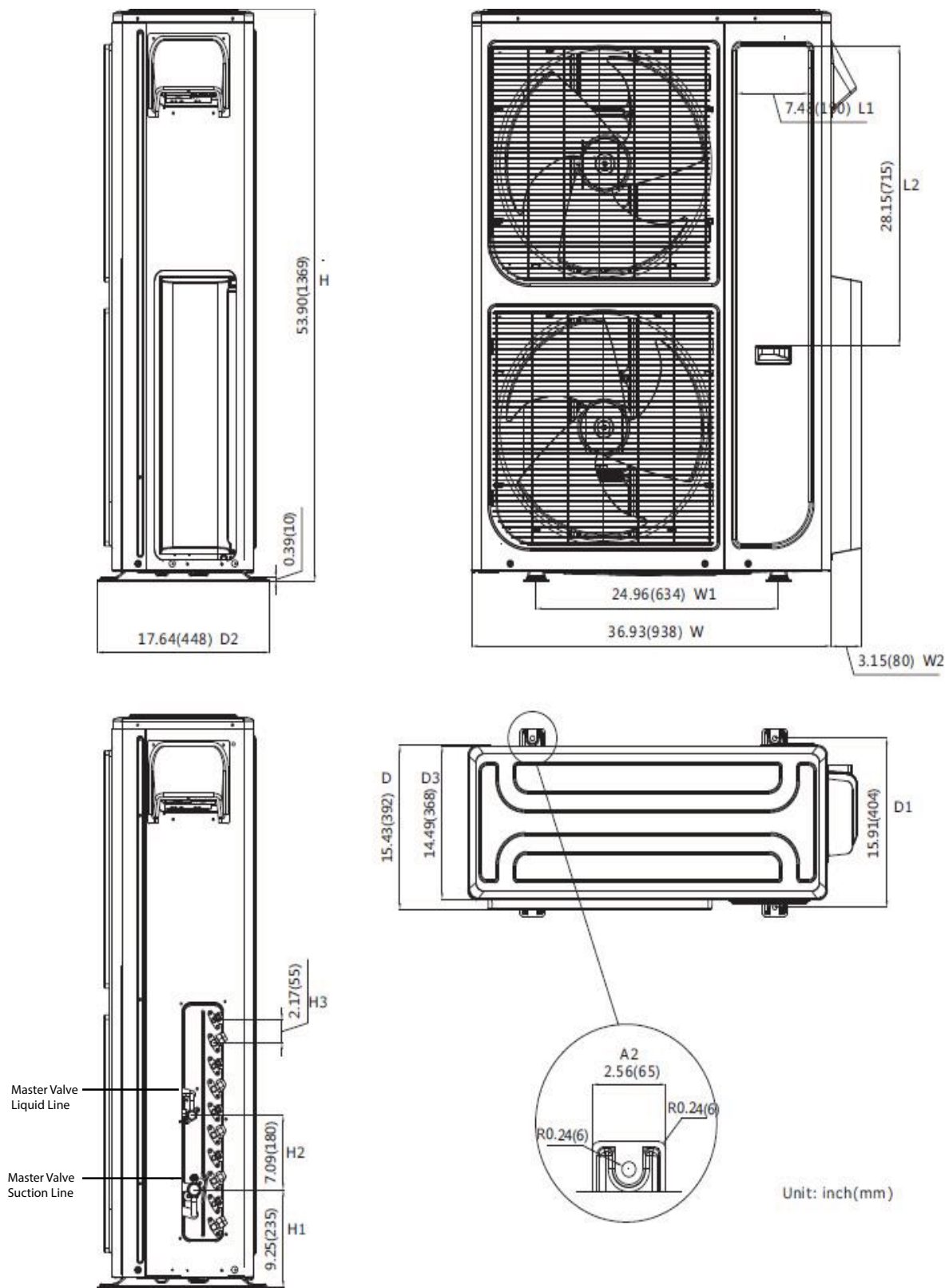


Fig. 4 – Outdoor Dimensions Size 48

UNIT SIZE			48
Height	in (mm)		36.93(1369)
Width	in (mm)		53.9(938)
Depth	in (mm)		15.43(392)
Weight – Net	lbs (kg)		255.50(115.9)

CLEARANCES – OUTDOOR

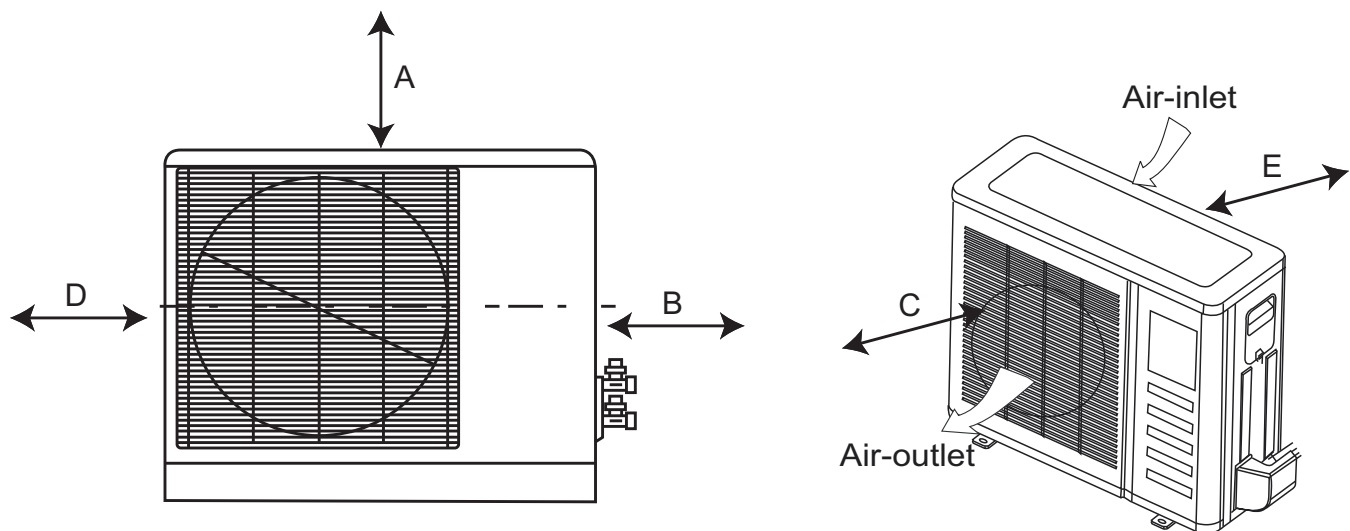


Fig. 5 – Clearances Outdoor

UNIT	MINIMUM VALUE in. (mm)
A	24 (609)
B	24 (609)
C	24 (609)
D	4 (101)
E	4 (101)

COMPATIBILITY TABLE

INDOOR UNIT		OUTDOOR UNIT			
		38MGQC18---3	38MGQD27---3	38MGQF36---3	38MGQF48---3
High Wall	40MAQB09B--3	•	•	•	•
	40MAQB12B--3	•	•	•	•
	40MAQB18B--3		•	•	•
	40MAQB24B--3			•	•
Cassette	40MBQB09C--3	•	•	•	•
	40MBQB12C--3	•	•	•	•
	40MBQB18C--3		•	•	•
	40MBQB09D--3	•	•	•	•
Ducted	40MBQB12D--3	•	•	•	•
	40MBQB18D--3		•	•	•
	40MBQB24D--3			•	•
	40MBQB09F--3	•	•	•	•
Floor Console	40MBQB12F--3	•	•	•	•

PHYSICAL DATA – OUTDOOR

HEAT PUMP						
System	Size		18	27	36	48
	Outdoor Model		38MGQC18---3	38MGQD27---3	38MGQF36---3	38MGQF48---3
Performance Non-Ducted	Max Number of Zones		2	3	4	5
	Energy Star		YES	YES	NO	YES
	Cooling System Tons		1.5	2.1	3.0	3.5
	Cooling Rated Capacity	Btu/h	18,000	25,000	36,000	42,000
	Cooling Cap. Range Min – Max	Btu/h	8,500~20,000	9,000~30,000	9,500~37,000	10,000~50,000
	SEER		21	22	18	20
	EER		12.5	12.5	8.8	12.5
	Heating Rated Capacity (47°F)	Btu/h	18,500	32,000	36,000	49,000
	Heating Cap. Range Min – Max	Btu/h	9,000~22,000	9,500~32,000	10,000~39,000	10,500~55,000
	HSPF		9.6	9.6	10.0	10.0
	COP	W/W	3.7	3.5	3.4	3.4
Performance Combination Ducted and Non-Ducted	Energy Star		YES	NO	NO	NO
	Cooling System Tons		1.5	2.2	2.9	3.5
	Cooling Rated Capacity	Btu/h	17,500	26,000	35,000	42,000
	Cooling Cap. Range Min – Max	Btu/h	8,500~20,000	9,000~30,000	9,500~36,500	10,000~50,000
	SEER		19.5	19.25	16.5	19
	EER		12.5	11	8.5	11.75
	Heating Rated Capacity (47°F)	Btu/h	18,250	32,000	36,000	50,000
	Heating Cap. Range Min – Max	Btu/h	9,000~22,000	9,500~32,000	10,000~39,000	10,500~55,000
	HSPF		9.1	9.2	9.7	9.8
	COP	W/W	3.7	3.5	3.4	3.4
Performance Ducted	Energy Star		YES	NO	NO	NO
	Cooling System Tons		1.4	2.3	2.8	3.5
	Cooling Rated Capacity	Btu/h	17,000	27,000	34,000	42,000
	Cooling Cap. Range Min – Max	Btu/h	8,500~20,000	9,000~30,000	9,500~36,000	10,000~5,0000
	SEER		18	16.5	15	18
	EER		12.5	9.5	8.2	11
	Heating Rated Capacity (47°F)	Btu/h	18,000	32,000	36,000	51,000
	Heating Cap. Range Min – Max	Btu/h	9,000~22,000	9,500~32,000	10,000~39,000	10,500~55,000
	HSPF		8.5	8.8	9.3	9.5
	COP	W/W	3.7	3.5	3.3	3.4
Operating Range	Cooling Outdoor DB Min – Max	°F(°C)	-4~122 (-20~50)	-4~122 (-20~50)	-4~122 (-20~50)	-4~122 (-20~50)
	Heating Outdoor DB Min – Max	°F(°C)	-4~86 (-20~30)	-4~86 (-20~30)	-4~86 (-20~30)	-4~86 (-20~30)
Piping	Total Piping Length	ft (m)	98 (30)	147 (45)	196 (60)	245 (75)
	Piping to furthest FCU	ft (m)	98 (30)	98 (30)	98 (30)	98 (30)
	Drop (OD above ID)	ft (m)	32 (10)	32 (10)	32 (10)	32 (10)
	Lift (OD below ID)	ft (m)	49 (15)	49 (15)	49 (15)	49 (15)
	Pipe Connection Size – Liquid	in (mm)	1/4*2 (6.35*2)	1/4*3 (6.35*3)	1/4*4 (6.35*4)	1/4*5 (6.35*5)
	Pipe Connection Size – Suction	in (mm)	3/8 (9.52*2)	3/8 (9.52*3)	1/2 *1+ 3/8*3 (12.7*1+9.52*3)	1/2 *2+ 3/8*3 (12.7*2+9.52*3)
Refrigerant	Type		R410A	R410A	R410A	R410A
	Charge	lbs (kg)	4.19 (1.9)	6.17 (2.8)	7.94 (3.6)	10.14 (4.6)
	Metering Device		EEV	EEV	EEV	EEV
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	208/230–1–60	208/230–1–60	208/230–1–60	208/230–1–60
	Power Supply		Indoor unit powered from outdoor unit			
	MCA	A.	15	19	27	29
	MOCP – Fuse Rating	A.	20	25	40	50
Compressor	Type		Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter
	Model		DA150S1C–20FZ	DA250S2C–30MT	TNB306FPGMC–L	MNB36FAAMC–L
	Oil Type		ESTER OIL VG74	ESTER OIL VG74	FV50S	FV50S
	Oil Charge	Fl. Oz.	16.9	27.7	36.2	47.3
	Rated Current	RLA	10	12.3	22	22
Outdoor	Unit Width	in (mm)	33.27 (845)	37.20 (945)	37.20 (945)	53.9 (938)
	Unit Height	in (mm)	27.56 (700)	31.89 (810)	31.89 (810)	36.93 (1369)
	Unit Depth	in (mm)	12.60 (320)	15.55 (395)	15.55 (395)	15.43 (392)
	Net Weight	lbs (kg)	105.82 (48)	143.29 (65)	158.72 (72)	227.72 (103.3)
	Airflow	CFM	1,390	2,130	2,130	3,500
	Sound Pressure	dB(A)	60	63	63	64

COOLING PERFORMANCE

MODEL	COOLING			OUTDOOR CONDITIONS (DB)			
	Indoor Conditions DB			75F(24C)	85F(29.5C)	95F(35C)	105F(40.5C)
	DB	WB					
18	69.8F(21C)	59F(15C)	TC	18.07	18.74	17.22	13.28
			SC	15.00	15.37	14.64	13.01
			Input	1.17	1.54	1.72	1.88
	80.6F(27C)	66.2F(19C)	TC	20.75	21.48	20.43	16.42
			SC	15.97	16.33	15.93	14.62
			Input	1.16	1.56	1.76	1.59
27	69.8F(21C)	59F(15C)	TC	23.99	27.20	24.55	19.31
			SC	22.67	24.08	22.56	19.31
			Input	1.50	2.42	2.67	2.39
	80.6F(27C)	66.2F(19C)	TC	27.40	31.78	29.90	23.85
			SC	23.72	25.06	25.12	22.94
			Input	1.51	2.52	2.83	2.51
36	69.8F(21C)	59F(15C)	TC	28.80	32.69	30.25	23.15
			SC	26.32	28.18	27.02	23.15
			Input	2.17	3.45	3.81	2.99
	80.6F(27C)	66.2F(19C)	TC	33.47	38.11	36.60	28.42
			SC	28.83	30.55	32.94	26.99
			Input	2.21	3.57	3.94	3.25
48	69.8F(21C)	59F(15C)	TC	44.06	42.04	38.95	34.05
			SC	37.89	36.57	35.44	33.37
			Input	3.32	3.78	4.19	4.45
	80.6F(27C)	66.2F(19C)	TC	46.88	49.74	45.99	41.31
			SC	40.32	43.27	41.85	40.07
			Input	2.64	3.90	4.33	4.61

LEGEND

DB --- Dry Bulb

WB --- Wet Bulb

TC --- Total Net Cooling Capacity (1000 Btu/hour)

SC --- Sensible Capacity (1000 Btu/hour)

Input --- Total Power (kW)

HEATING PERFORMANCE

MODEL	HEATING		OUTDOOR CONDITIONS (DB)					
	Indoor Conditions (DB)		57F(13.9C)	47F(8.3C)	35F(1.7C)	17F(−8.3C)	5F(−15C)	−4F(−20C)
18	55F(12.7C)	TC	23.27	20.85	16.80	13.29	10.92	8.63
		Input	1.25	1.33	1.30	1.42	1.35	1.31
		COP	5.45	4.59	3.78	2.75	2.38	1.94
	70F(21.1C)	TC	21.69	20.19	16.19	12.32	9.09	7.70
		Input	1.45	1.51	1.49	1.56	1.48	1.41
		COP	4.39	3.93	3.18	2.31	1.80	1.60
27	55F(12.7C)	TC	37.85	34.34	28.36	22.77	19.38	16.23
		Input	2.27	2.29	2.29	2.46	2.44	2.40
		COP	4.89	4.39	3.63	2.71	2.33	1.98
	70F(21.1C)	TC	36.29	3.23	27.54	20.09	16.37	13.42
		Input	2.68	2.64	2.51	2.53	2.39	2.29
		COP	3.97	0.36	3.21	2.32	2.00	1.72
36	55F(12.7C)	TC	41.10	38.52	28.84	28.16	22.87	19.43
		Input	3.17	3.31	2.92	3.22	2.97	2.91
		COP	3.80	3.41	2.89	2.56	2.26	1.96
	70F(21.1C)	TC	40.86	38.83	29.89	26.02	20.15	16.70
		Input	3.62	3.73	3.37	3.38	3.05	2.90
		COP	3.30	3.05	2.60	2.26	1.93	1.69
48	55F(12.7C)	TC	60.91	53.30	42.81	33.02	26.16	20.01
		Input	4.26	4.04	3.78	3.82	3.56	3.42
		COP	4.19	3.87	3.32	2.53	2.15	1.71
	70F(21.1C)	TC	55.22	50.58	40.56	31.81	23.48	17.17
		Input	4.64	4.59	4.20	4.27	3.98	3.88
		COP	3.49	3.23	2.83	2.19	1.73	1.30

LEGEND

DB --- Dry Bulb

TC --- Total Net Heating Capacity (1000 Btu/hour)

Input --- Total Power (kW)

PIPING REQUIREMENTS

SYSTEM SIZE			18K	27K	36K	48K
Piping	Min. Piping Length per each indoor unit	ft (m)	10 (3)	10 (3)	10 (3)	10 (3)
	Standard Piping Length per each indoor unit	ft (m)	25 (7.5)	25 (7.5)	25 (7.5)	25 (7.5)
	Max. outdoor—indoor height difference (OU higher than IU)	ft (m)	32(10)	32(10)	32(10)	32(10)
	Max. outdoor—indoor height difference (IU higher than OU)	ft (m)	49(15)	49(15)	49(15)	49(15)
	Max. height different between indoor units	ft (m)	32(10)	32(10)	32(10)	32(10)
	Max. Length per each indoor unit	ft (m)	66(20)	82(25)	98(30)	98(30)
	Max. Piping Length with no additional refrigerant charge per System (Standard Piping length x No. of Zones)	ft (m)	49(15)	74(22.5)	98(30)	123(37.5)
	Total Maximum Piping Length per system	Ft. (m)	98(30)	147(45)	196(60)	245(75)
	Additional refrigerant charge (between Standard – Max piping length)	Oz/ft (g/m)	0.16(15)	0.16(15)	0.16(15)	0.16(15)
	Gas Pipe Size	in (mm)	3/8*2 (9.52*2)	3/8*2 (9.52*3)	1/2 *1 (12.7*1) + 3/8*3 (9.5*3)	1/2 *2 (12.7*2) + 3/8*3 (9.5*3)
Refrigerant	Liquid Pipe Size	in (mm)	1/4 *2 (6.35*2)	1/4 *3 (6.35*3)	1/4 *4 (6.35*4)	1/4 *5 (6.35*5)
	Refrigerant Type		R410A	R410A	R410A	R410A
	Charge Amount	Lbs (kg)	4.19 (1.9)	6.17 (2.8)	7.94 (3.6)	10.14 (4.6)

NOTE: The refrigerant charge included is adequate for the outdoor unit's maximum number of zones multiplied by the standard piping length per zone.

APPLICATION DATA

UNIT SELECTION

When selecting a variable speed system match the system capacity range to the anticipated load range. Since a variable speed system can accommodate a wide range of loads it is important to understand the percentage of time that the system will be required to run at both the maximum and the minimum load points. This differential is most evident when a residential application is compared with a commercial application.

Generally there will be more load diversification in the residential application (shifting from low load to high load).

The commercial application tends to be more steady during the normal day time hours, and will go to low load levels after normal business hours. If it is anticipated that the system needs to run at the maximum load point for the majority of the time, the next larger system capacity should be selected.

The Application Data table on the following page is a guideline for selecting the proper size for the application.

APPLICATION DATA

OUTDOOR UNIT MODEL		COOLING CAPACITY (Btu/h)					HEATING CAPACITY (Btu/h)				
38MGQC18---3	Type	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
9K+9K	2-Zone	9,000	9,000				9,500	9,500			
9K+12K		8,500	10,500				9,000	11,000			
12K+12K		9,500	9,500				10,000	10,000			
38MGQD27---3		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
9K+9K	2-Zone	9,500	9,500				10,000	10,000			
9K+12K		9,500	12,000				10,000	13,000			
9K+18K		8,400	16,600				9,000	18,000			
12K+12K		12,000	12,000				13,000	13,000			
12K+18K		10,000	15,000				11,200	16,800			
9+9+9	3-Zone	9,000	9,000	9,000			9,500	9,500	9,500		
9+9+12		8,667	8,667	11,667			9,500	9,500	12,000		
9+9+18		8,333	8,333	13,333			9,000	9,000	14,000		
9+12+12		8,500	10,000	10,000			8,500	11,000	11,000		
12+12+12		9,667	9,667	9,667			10,667	10,667	10,667		
38MGQF36---3		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
9+18	2-Zone	9,500	17,500				10,000	18,000			
12+12		12,000	12,000				13,000	13,000			
12+18		12,000	18,000				13,000	18,000			
18+18		16,500	16,500				17,000	17,000			
9+24		8,500	22,500				9,500	22,500			
12+24	3-Zone	10,500	21,000				11,000	22,000			
9+9+9		9,333	9,333	9,333			9,667	9,667	9,667		
9+9+12		9,000	9,000	12,000			9,500	9,500	12,500		
9+9+18		8,000	8,000	16,000			8,500	8,500	17,000		
9+12+12		8,500	11,500	11,500			9,000	12,000	12,000		
9+12+18		8,000	11,000	15,000			8,500	11,500	16,000		
9+18+18		8,000	14,000	14,000			8,500	14,500	14,500		
12+12+12		11,333	11,333	11,333			12,000	12,000	12,000		
12+12+18		11,000	11,000	14,000			12,000	12,000	15,000		
12+18+18		9,333	13,333	13,333			9,500	14,000	14,000		
9+9+9+9	4-Zone	9,000	9,000	9,000	9,000		9,500	9,500	9,500	9,500	
9+9+9+12		8,500	8,500	8,500	11,500		9,000	9,000	9,000	12,000	
9+9+9+18		8,000	8,000	8,000	14,000		8,500	8,500	8,500	14,000	
9+9+12+12		8,000	8,000	10,500	10,500		8,500	8,500	11,000	11,000	
9+9+12+18		7,500	7,500	9,000	14,000		8,000	8,000	9,500	14,500	
9+12+12+12		7,000	10,000	10,000	10,000		8,000	10,500	10,500	10,500	
12+12+12+12		9,500	9,500	9,500	9,500		10,000	10,000	10,000	10,000	
38MGQF48---3		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5
18+18	2-Zone	18,500	18,500				19,000	19,000			
18+24		17,500	22,500				18,000	23,000			
24+24		21,000	21,000				22,000	22,000			
9+24		9,000	23,000				10,000	23,000			
9+18		9,500	18,500				10,500	19,000			
9+9+18	3-Zone	9,500	9,500	18,000			10,000	10,000	19,000		
9+9+24		9,000	9,000	22,500			9,500	9,500	23,500		
9+12+12		9,500	12,500	12,500			10,000	10,000	13,000		
9+12+18		9,000	12,000	18,000			9,500	9,500	19,000		
9+12+24		9,000	12,000	21,500			9,500	12,500	22,000		
9+18+18		9,000	18,000	18,000			9,500	18,500	18,500		
9+18+24		8,500	15,500	21,000			9,000	16,000	21,500		
9+24+24		8,000	20,000	20,000			8,500	21,000	21,000		
12+12+12		12,000	12,000	12,000			13,000	13,000	13,000		
12+12+18		12,000	12,000	17,000			12,500	12,500	18,000		
12+12+24		11,000	11,000	22,000			11,500	11,500	23,000		
12+18+18		11,000	16,500	16,500			11,500	17,000	17,000		
12+18+24		10,500	15,500	21,500			11,000	16,000	22,000		
12+24+24		10,000	20,000	20,000			11,000	20,500	20,500		
18+18+18		16,000	16,000	16,000			16,500	16,500	16,500		
18+18+24		15,000	15,000	20,000			15,500	15,500	21,000		
9+9+9+9	4-Zone	9,250	9,250	9,250	9,250		9,500	9,500	9,500	9,500	
9+9+9+12		9,000	9,000	9,000	12,000		9,500	9,500	9,500	12,500	
9+9+9+18		9,000	9,000	9,000	17,000		9,500	9,500	9,500	17,500	
9+9+9+24		8,500	8,500	8,500	20,500		9,000	9,000	9,000	21,000	
9+9+12+12		9,000	9,000	12,000	12,000		9,500	9,500	13,000	13,000	
9+9+12+18		9,000	9,000	11,000	17,000		9,500	9,500	11,500	17,500	
9+9+12+24		8,500	8,500	10,500	20,500		9,000	9,000	11,100	21,000	
9+9+18+18		8,500	8,500	15,500	15,500		9,000	9,000	16,000	16,000	
9+9+18+24		8,000	8,000	14,500	20,000		8,500	8,500	15,000	20,000	
9+12+12+12		9,000	12,000	12,000	12,000		9,500	12,500	12,500	12,500	
9+12+12+18		9,000	11,000	11,000	16,000		9,500	11,500	11,500	16,500	
9+12+12+24		8,500	10,000	10,000	20,000		9,000	10,500	10,500	20,500	
9+12+18+18		8,500	10,000	15,000	15,000		9,000	10,500	15,500	15,500	
9+18+18+18		8,000	14,000	14,000	14,000		8,500	14,500	14,500	14,500	
12+12+12+12		12,000	12,000	12,000	12,000		12,500	12,500	12,500	12,500	
12+12+12+18		11,000	11,000	11,000	16,000		11,500	11,500	11,500	16,500	
12+12+12+24		10,000	10,000	10,000	20,000		10,500	10,500	10,500	20,500	
12+12+18+18		10,000	10,000	15,000	15,000		10,500	10,500	15,500	15,500	
9+9+9+9+9	5-Zone	9,000	9,000	9,000	9,000	9,000	9,500	9,500	9,500	9,500	9,500
9+9+9+9+12		9,000	9,000	9,000	9,000	12,000	9,500	9,500	9,500	9,500	13,000
9+9+9+9+18		8,500	8,500	8,500	8,500	16,000	9,000	9,000	9,000	9,000	16,500
9+9+9+9+24		7,750	7,750	7,750	7,750	19,500	8,000	8,000	8,000	8,000	20,000
9+9+9+12+12		9,000	9,000	9,000	11,500	11,500	9,500	9,500	9,500	12,000	12,000
9+9+9+12+18		8,000	8,000	8,000	11,000	16,000	8,500	8,500	8,500	11,500	16,500
9+9+9+18+18		8,000	8,000	8,000	11,000	16,000	8,500	8,500	8,500	16,500	16,500
9+9+12+12+12		8,500	8,500	11,000	11,000	11,000	9,000	9,000	12,000	12,000	12,000
9+9+12+12+18		8,500	8,500	10,000	10,000	15,000	8,500	8,500	10,500	10,500	15,500
9+12+12+12+12		8,000	11,000	11,000	11,000	11,000	8,500	11,500	11,500	11,500	11,500
9+12+12+12+18		7,500	10,000	10,000	10,000	14,500	8,000	10,500	10,500	10,500	15,000
12+12+12+12+12	10,500	10,500	10,500	10,500	10,500	11,000	11,000	11,000	11,000	11,000	

UNIT MOUNTING (OUTDOOR)

Refer to the unit's installation instructions for further details.

Support – A location which can bear the weight of outdoor unit. Refer to the Physical Data section for weights, and base dimensional drawings.

Unit Leveling – For reliable operation, units should be level in all planes.

Clearances – Minimum clearances, as shown in Fig. 5, must be provided for airflow. The outdoor units are designed for free-blow applications. Air inlets and outlets should not be restricted.

Unit location – A location which is convenient to installation and not exposed to strong wind.

NOTE: Do not install the indoor or outdoor units in a location with special environmental conditions. For those applications, contact your sales representative.

SYSTEM OPERATING CONDITIONS

Cooling operating range:

OPERATING RANGE (Min / Max °F (°C))		
	Cooling	Heating
Outdoor DB	–4 / 122 (–20 / 50)	–4 / 86 (–20 / 30)

Heating operating range:

NON-OPERATING TEMPERATURE RANGE (Min / Max °F (°C))	
Outdoor DB	32 / 86 (0 / 30)

METERING DEVICES

The outdoor unit has multiple electronic expansion valves to manage the refrigerant flow to the different indoor fan coils connected to that unit.

REFRIGERANT LINES

General Guidelines:

1. The outdoor units are shipped with a full charge of R-410A refrigerant. All charges, line sizing, and capacities are based on runs of 25 ft. (7.6 m). For runs over 25 ft. (7.6m), consult long-line section on this page for proper charge adjustments.
2. Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, do not bury more than 36 inches (914 mm). Provide a minimum of 6 inch (152 mm) vertical rise to the service valves to prevent refrigerant migration.
3. Both lines must be insulated. Use a minimum of ½-inch (12.7 mm) thick insulation. Closed-cell insulation is recommended in all long-line applications.
4. Special consideration should be given to isolating the interconnecting tubing from the building structure. Isolate the tubing so vibration or noise does not transmit into the structure.

Long Line Applications:

- No change in line sizing is required.

UNIT SIZE	ZONES	CHARGE oz. (kg.)	ADDITIONAL CHARGE REQUIRED AFTER FT. (m)	ADDITIONAL CHARGE oz./ft. (g/m)	TOTAL MAX. PIPING LENGTH FT. (m.)
18	2	67.02 (1.9)	49 (15)	0.16 (15)	98 (30)
27	3	98.76 (2.8)	74 (22.5)	0.16 (15)	147 (45)
36	4	126.98 (3.6)	98 (30)	0.16 (15)	196 (60)
48	5	162.26 (4.6)	123 (37.5)	0.16 (15)	245 (75)

NOTE: Additional Refrigerant Calculation Sum Total Liquid Pipe ft. (m) Additional Charge Required After ft. (m.) x Additional Charge oz./ft. (g/m) 0.16 (15).

NOTE: If the calculation results in a negative number, no additional refrigerant is required.

DRAIN CONNECTIONS

Install drains that meet the local sanitation codes.

WIRING

The main power is supplied to the outdoor unit. Four field supplied connecting cables from the outdoor unit to each of the indoor units are: L1, L2, Ground, and S for communication between the outdoor unit and each indoor unit.

CONTROL SYSTEM

The 38MGQ unit is equipped with a microprocessor control to operate the system and give optimum levels of comfort and operating efficiency. There are microprocessor boards and thermistors located in both the indoor and outdoor units. The thermistors monitor the system operation and control the operating mode.

SEQUENCE OF OPERATION

NOTE: Simultaneous heating and cooling is not allowed.

The Heating Mode is the priority in the system and controls the mode of operation for the rest of the indoor units connected to the same outdoor unit. If any unit in the system is set into Heating Mode the system switches to Heat. If any unit is setup in **COOLING**, while any unit in the system is setup as Heating, the ones on **COOLING** would enter in conflict mode and an error message would appear on the units set as **COOLING**.

All units must be set in cooling or fan mode for the system to cool.

When a unit is set to **COOL**, **HEAT** or the **DRY** mode, the electronic expansion valve is first initialized (closed) and then is opened to a preset position.

Superheat heating for each fan coil (the ones that are energized) is monitored and the position of the electronic expansion valve is adjusted to ensure that each fan coil gets the appropriate amount of refrigerant to maintain the required superheat. In the **COOLING** mode, after the set point is satisfied, the electronic expansion valve remains open for a specified time to ensure the system pressures equalize. In the **HEATING** mode, after the set point is satisfied, the electronic expansion valve remains open to ensure proper oil flow back and keep low pressure.

When the system is set for **COOL**, **HEAT** or **DRY** mode, the compressor speed is varied by comparing the indoor air temperature with the set point and continuously adjusting the compressor speed (to keep the compressor running as long as possible) in an effort to maintain the greatest comfort possible.

The indoor fan can run in either the **MANUAL** or **AUTO** mode. When the fan is runs in the **AUTO** mode, the speed is determined by comparing the room temperature to the set point.

For High Walls and Floor Consoles Fan Coils, when the set point is satisfied, the fan speed is reduced. For Cassettes and Ducted Fan Coils when the set point is satisfied, the fan continues to run. The Fan Coils are not de-energized.

When the unit goes through the defrost cycle, the indoor fans are de-energized and the refrigerant is circulated through all the fan coils (even if they were off or on standby before the defrost cycle) to maximize the heat transfer surface area available for defrost operation.

AIR FLOW DATA

OUTDOOR MULTI-ZONE				
SYSTEM SIZE	18	27	36	48
Outdoor (CFM)	1390	2130	2130	3500

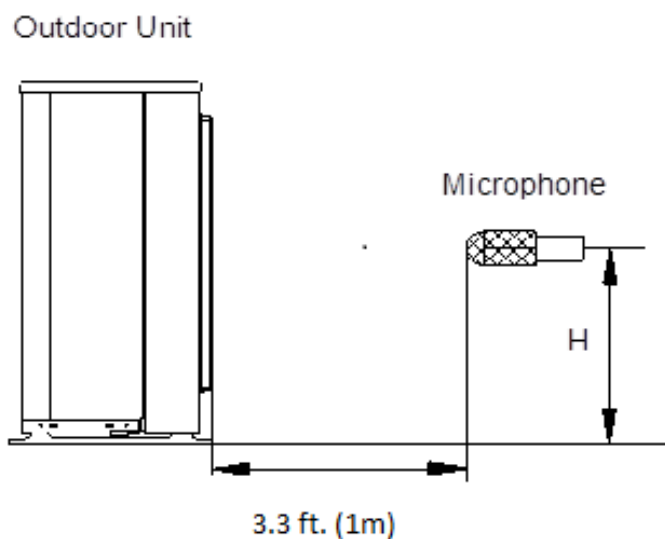
SOUND PRESSURE

OUTDOOR MULTI-ZONE					
SYSTEM SIZE		18	27	36	48
Outdoor Sound Pressure Level	DB(A)	60	63	63	64

SOUND POWER

SYSTEM SIZE		18K	27K	36K	48K
Outdoor Sound Power Level	dB(A)	65	68	68	70

OUTDOOR UNIT SOUND PRESSURE TEST CONDITIONS



NOTE: H=0.5 x Height of outdoor unit

	INDOOR CONDITION		OUTDOOR CONDITION	
	DB	WB	DB	WB
Cooling	80.6F (27C)	66.2F (19C)	95F (35C)	75.2F (24C)
Heating	68F (20C)	59F (15C)	44.6F (7C)	42.8F (6C)

FAN AND MOTOR SPECIFICATIONS

SYSTEM SIZE			18K	27K	36K	48K
Outdoor Fan Propeller	Material	--	AS	AS	AS	AS
	Type	--	ZL-460*180*10-3N	ZL-560*139*12-3KN	ZL-560*139*12-3KN	ZL-525*135*12-3KFN
	Diameter	mm	460	560	560	525
	Height	mm	180	139	139	135
Outdoor Fan Motor	Model	--	WZDK50-38G	WZDK120-38G-1	WZDK120-38G-W	WZDK85-38G
	Phase	--	DC	DC	DC	DC
	FLA	A	3	3	3	3
	Type	--	0.48	0.47	1.21	0.33
	Insulation class	--	E	E	E	E
	Safe class	--	IPX0	IPX0	IPX0	IPX0
	Input	W	150	145	150	98
	Output	W	50	120	120	85
	Range of current	A	0.48±10%	0.47±10%	1.21±10%	0.33±10%
	Rated current	A	0.48	0.47	1.21	0.33
	Rated HP	HP	0.16	0.16	0.16	0.11
	Speed	rev/min	750/700/600	850/700/600	950/850/750	800/700/600
	Rated RPM	rev/min	900	1050	1050	850
	Max. input	W	150	145	150	98

ELECTRICAL DATA

MULTI-ZONE OUTDOOR UNIT								
UNIT SIZE	SYSTEM VOLTAGE	OPERATING VOLTAGE	COMPRESSOR	OUTDOOR FAN			MCA	MAX FUSE/CB AMP
	VOLT / PHASE / HZ	MAX / MIN	RLA	FLA	HP	W		
18	208-230/1/60	253 / 187	9.7	3	0.16	50	15	20
27			8.85	3	0.16	120	19	25
36			13.4	3	0.16	120	27	40
48			13.5	3	0.11	85	29	50

WIRING DIAGRAM

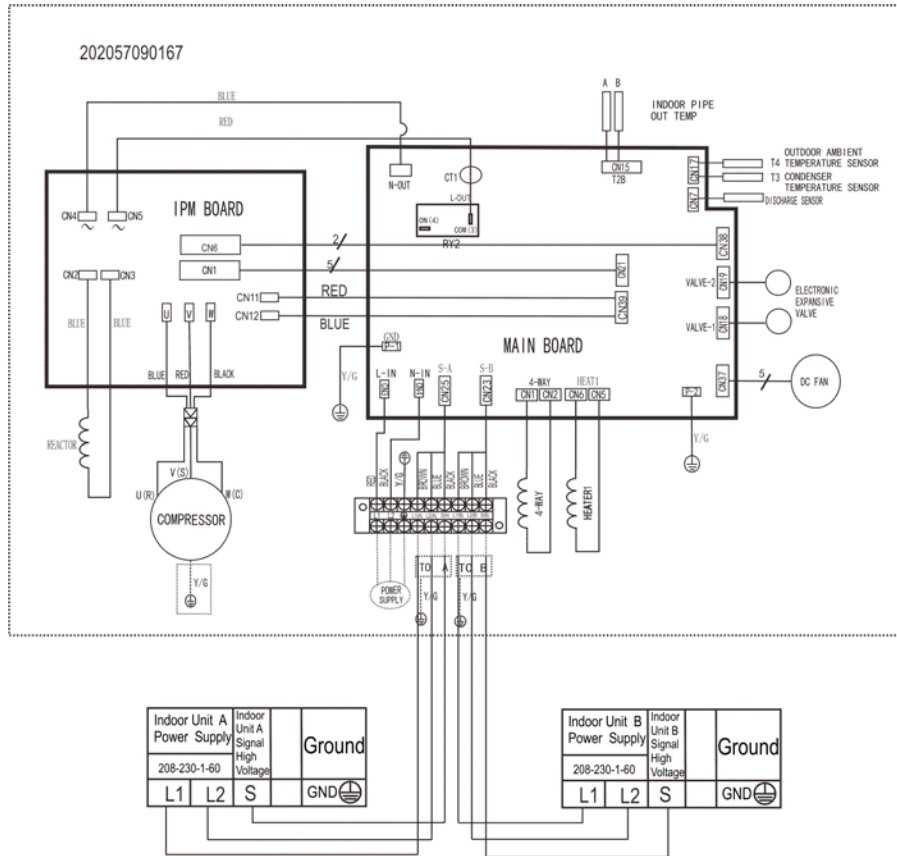


Fig. 20 – Wiring Diagrams 18k

OUTDOOR UNIT CONTROL BOARD SIZE 18

CODE	PART NAME
CN18/CN19/CN22	Output: Pin5&6(12V) Pin1 – Pin4: Pulse waveform, (0 – 12V)
CN17	Input: Pin3~4 (5V) Pin2(0V), Pin1, Pin5(0~5V)
CN7	Input: Pin1 (0~5V) Pin2(5V)
CN1~CN2, CN5~CN6	Output: CN1~CN2, CN5~CN6 (230VAC High voltage)
P1~P2	Output: Connection of the high voltage
CN3~CN4	Input: 230VAC High voltage
CN14	Input: Pin1, Pin3(0V), Pin2, Pin4 (0~5V)
P-1, P-2	Connection to the earth
CN20, CN23, CN25	Output: Pin1 (Connection of the high voltage), Pin2~Pin3 (230VAC High voltage)
CN15	Input: Pin1, Pin3, Pin5(5V), Pin2, Pin4, Pin6 (0~5V)
CN37	Output: Pulse(0~320VDC) for DC FAN
CN38	Input: Pin1~Pin2 (17VDC)
N-OUT~L-OUT	Output: 230VAC High voltage
CN21	input: Pin1~Pin3 (12VDC), Pin2~Pin3 (5VDC), Pin4~Pin3 (0~5VDC), Pin5~Pin3 (0~5VDC)
CN39	Input: 270~370VDC High voltage
OUTDOOR UNIT IPM BOARD	
CN4~CN5	Output: 230VAC High voltage
CN2, CN3	Connect to Reactor, (270~370VDC)
CN6	Output: Pin1~Pin2 (17VDC)
CN1	Output: Pin1~Pin3 (12VDC), Pin2~Pin3 (5VDC), Pin4~Pin3 (0~5VDC), Pin5~Pin3 (0~5VDC),
CN11~CN12	Output: 270~370VDC High voltage
U~V~W	Connect to compressor voltage among phases 0~200VAC

WIRING DIAGRAMS (CONT)

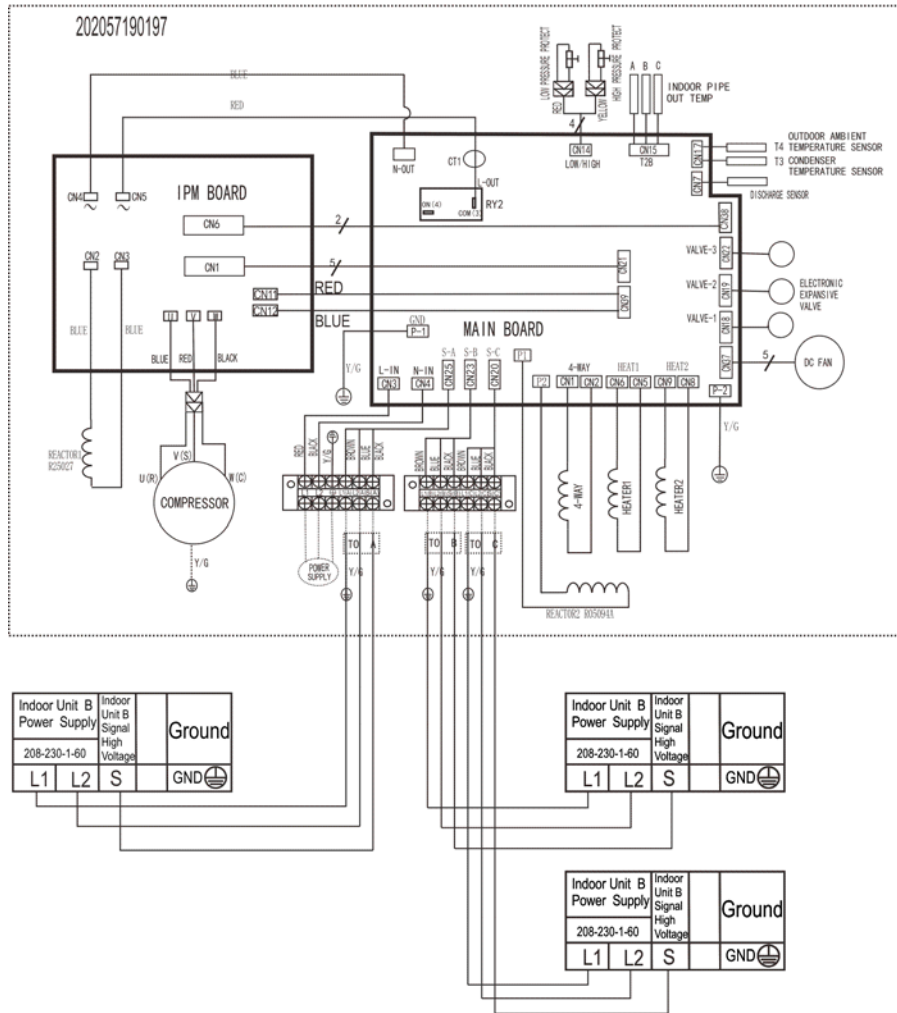


Fig. 21 – Wiring Diagrams 27k

OUTDOOR UNIT CONTROL BOARD SIZE 27

CODE	PART NAME
CN18/CN19/CN22	Output:Pin5&6(12V) Pin1–Pin4:Pulse waveform,(0–12V)
CN17	Input:Pin3~4 (5V) Pin2(0V),Pin1,Pin5(0–5V)
CN7	Input:Pin1 (0–5V) Pin2(5V)
CN1~CN2, CN5~CN6	Output: CN1~CN2, CN5~CN6 (230VAC High voltage)
P1~P2	Output: Connection of the high voltage
CN3~CN4	Input:230VAC High voltage
CN14	Input: Pin1,Pin3(0V), Pin2,Pin4 (0~5V)
P–1,P–2	Connection to the earth
CN20,CN23,CN25	Output: Pin1 (Connection of the high voltage) , Pin2~Pin3 (230VAC High voltage)
CN15	Input: Pin1,Pin3,Pin5(5V), Pin2,Pin4,Pin6 (0~5V)
CN37	Output: Pulse(0–320VDC) for DC FAN
CN38	Input: Pin1~Pin2 (17VDC)
N–OUT~L–OUT	Output: 230VAC High voltage
CN21	input: Pin1~Pin3 (12VDC) , Pin2~Pin3 (5VDC) , Pin4~Pin3 (0~5VDC) , Pin5~Pin3 (0~5VDC)
CN39	Input: 270~370VDC High voltage
OUTDOOR UNIT IPM BOARD	
CN4~CN5	Output: 230VAC High voltage
CN2,CN3	Connect to Reactor, (270~370VDC)
CN6	Output: Pin1~Pin2 (17VDC)
CN1	Output: Pin1~Pin3 (12VDC) , Pin2~Pin3 (5VDC) , Pin4~Pin3 (0~5VDC) , Pin5~Pin3 (0~5VDC) ,
CN11~CN12	Output: 270~370VDC High voltage
U~V~W	Connect to compressor voltage among phases 0~200VAC

WIRING DIAGRAMS (CONT)

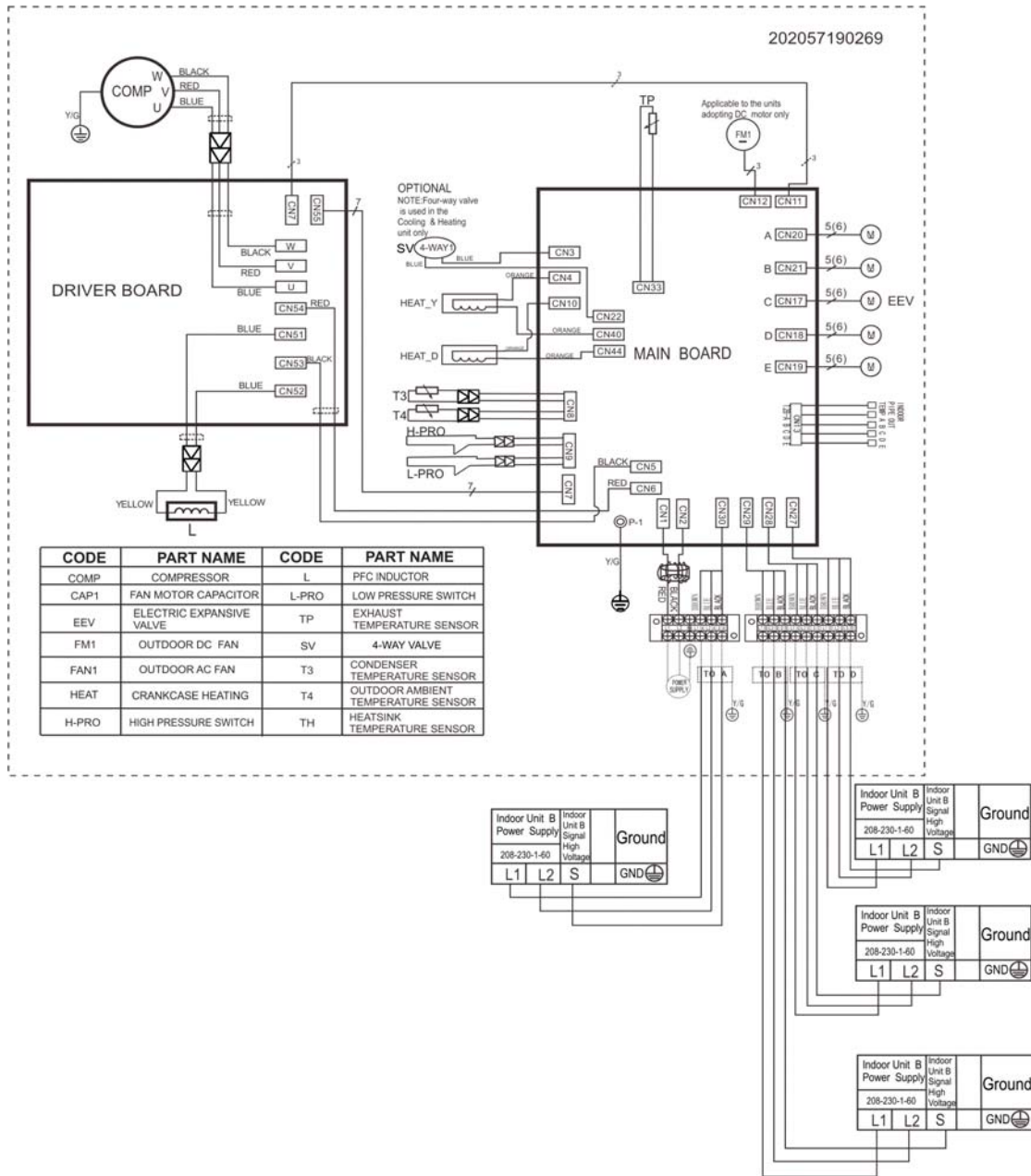


Fig. 22 – Wiring Diagram 36k

OUTDOOR UNIT CONTROL BOARD SIZE 36

CODE	PART NAME
CN17/CN18/CN19/CN20/CN21	Output:Pin5&6(12V) Pin1~Pin4:Pulse waveform.(0~12V)
CN8	Input:Pin3~4 (5V) Pin2(0V),Pin1,Pin5(0~5V)
CN33	Input:Pin1 (0~5V) Pin2(5V)
CN4~CN40, CN10~CN44	Output: CN4~CN40, CN10~CN44 (230VAC High voltage)
CN3~CN22	Output: High voltage for 4~way control
CN1~CN2	Input:230VAC High voltage
CN9	Input: Pin1,Pin3(0V), Pin2,Pin4 (0~5V)
P-1	Connection to the earth
CN27,CN28,CN29,CN30	Output: Pin1 (Connection of the high voltage), Pin2~Pin3 (230VAC High voltage)
CN13	Input: Pin1,Pin3,Pin5(5V), Pin2,Pin4,Pin6 (0~5V)
CN12	Output: Pulse(0~200VAC) for DC FAN
CN11	Output: Pulse(0~200VAC) for DC FAN
CN5~CN6	Output: 230VAC High voltage
CN7	input: Pin1~Pin3 (12VDC), Pin2~Pin3 (5VDC), Pin4~Pin3 (0~5VDC), Pin5~Pin3 (0~5VDC), Pin6~Pin3 (0~5VDC), Pin7~Pin3 (0~5VDC)

OUTDOOR UNIT IPM BOARD	
CN4~CN5	Output: 230VAC High voltage
CN2,CN3	Connect to Reactor, (270~370VDC)
CN6	Output: Pin1~Pin2 (17VDC)
CN1	Output: Pin1~Pin3 (12VDC), Pin2~Pin3 (5VDC), Pin4~Pin3 (0~5VDC), Pin5~Pin3 (0~5VDC),
CN11~CN12	Output: 270~370VDC High voltage
U~V~W	Connect to compressor voltage among phases 0~200VAC

WIRING DIAGRAMS (CONT)

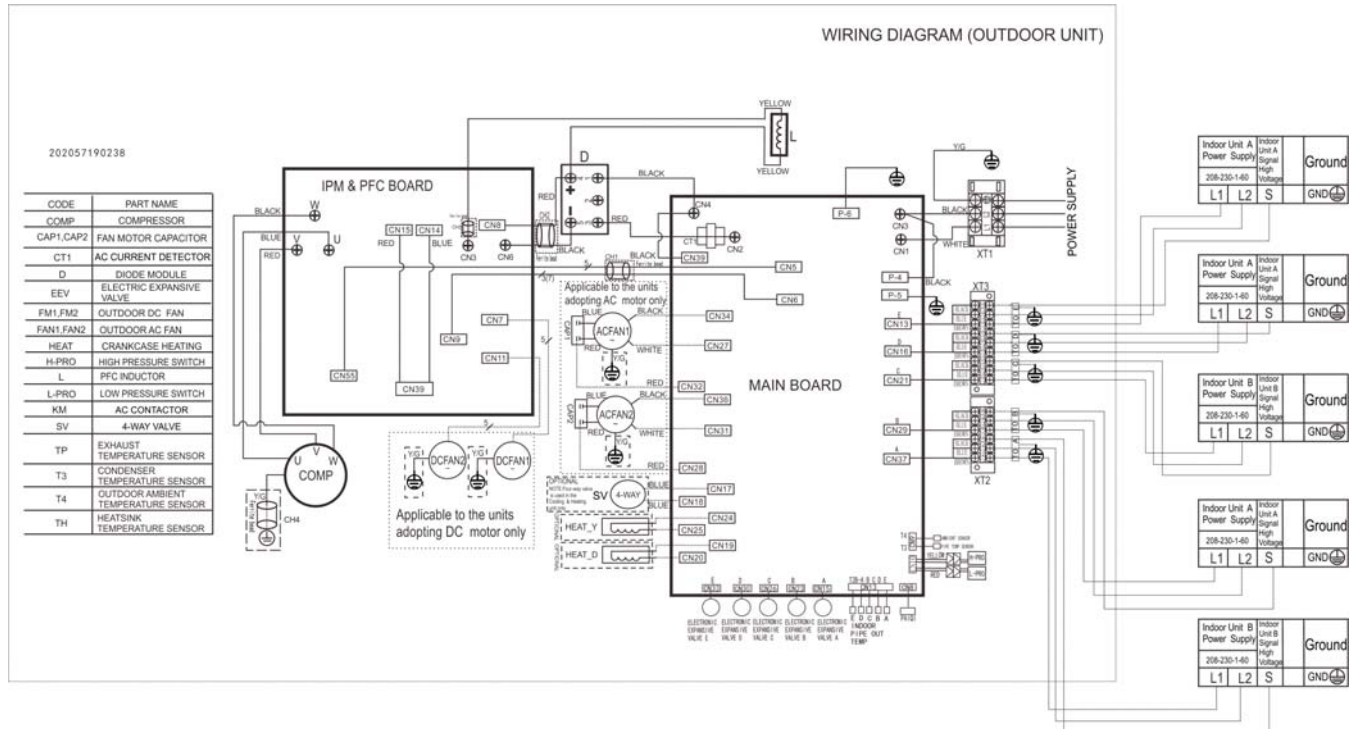


Fig. 23 – Wiring Diagrams 48K

OUTDOOR UNIT CONTROL BOARD SIZE 48

CODE	PART NAME
CN1,CN3、P-1	Power input: 230V AC
CN2,CN4	Output: Power output for DRIVER BOARD (230V AC)
CN5	Input: Communication Main board and IPM Board ,Pin1(5V DC)
CN6	Input: DC FAN motor1 and DC FAN motor2 control, (Pin7 5V DC)
CN8,CN9	Input: Temperature sensor(5V DC)
CN10	Input: Pressure test (5V DC)
CN13	Input: Indoor pipe Temperature sensor,Pin1&Pin3&Pin5&Pin7&Pin9&Pin11 (5V DC)
CN15,CN23,CN26, CN30,CN33	Output: PMV control, Pin5(12V DC),Pin6(12V DC)
CN17,CN18	Output: High voltage for 4-way(SV) control (230V AC)
CN19,CN20	Output: High voltage for HEAT_D control (230V AC)
CN13,CN16,CN21, CN29,CN37	Output: Communication to indoor unit,Pin2 and Pin3 (230V AC),Pin1 (S, connection to high voltage)
CN24,CN25	Output: High voltage for HEAT_Y control(230V AC)
CN27、CN32、CN34、CN28、CN31、CN36	Output: Power output for AC FAN motor1 and AC FAN motor2 (230V AC)
CN39	Output: L2 for AC FAN、SV and HEAT ,High voltage (AC)
P-5,P-6	Connection to the earth

OUTDOOR UNIT IPM BOARD	
U V W	Output: Pulse(0-380VDC) for COMPRESSOR
CN3	Output: Connect PFC Inductance, high DC voltage
CN6 ,CN8	Input: Power input for DRIVER BOARD (200-320V DC)
CN7,CN11	Output: DC FAN motor1 and DC FAN motor2 control (Pin1 310V or 380V DC)
CN9	Output: Communication Main board and IPM Board Pin7(5V DC)
CN55	Output: Communication IPM Board and Main board Pin1(12V DC)
CN14、CN15-- CN39,	Output: High DC voltage (310V or 380V DC)

GUIDE SPECIFICATIONS

HORIZONTAL DISCHARGE OUTDOOR UNITS

Size Range: 1 1/2, 2 1/4, 3 and 4 Ton Nominal Cooling and Heating Capacity
Carrier Model Number: **38MGQ**

PART 1 – GENERAL

1.01 System Description

- A. Outdoor air-cooled split system compressor sections suitable for on-the-ground, rooftop, wall hung or balcony mounting. Units consist of a variable speed rotary compressor, an air-cooled coil, propeller-type draw-through outdoor fan, reversing valve, accumulator, electronic expansion valves, multiple service valves, and controls that allows multiple indoor units to be connected to the outdoor unit. Units discharge horizontally as shown on the contract drawings. Units function as the outdoor component of an air-to-air heat pump system.
- B. Units are designed to be used in a refrigeration circuit matched to two, three, four, or five multi style heat pump fan coil units.

1.02 Agency Listings

- A. Unit construction complies with ANSI/ASHRAE 15, latest revision, and with NEC.
- B. Units are evaluated in accordance with UL standard 1995.
- C. Units are listed in CEC directory.
- D. Unit cabinet is capable of withstanding 500-hour salt spray test per Federal Test Standard no. 141 (method 6061).
- E. Air-cooled condenser coils are leak tested at 550 psig.

1.03 Delivery, Storage, And Handling

Units are shipped in one piece and are stored and handled per the manufacturer's recommendations.

1.04 Warranty (For Inclusion By Specifying Engineer)

PART 2 – PRODUCTS

2.01 Equipment

A. General:

Factory assembled, single piece, air-cooled outdoor unit. Contained within the enclosure are the factory wiring, piping, controls, and compressor.

B. Unit Cabinet:

- 1. The unit cabinet is constructed of galvanized steel, bonderized and coated with baked-enamel finish on inside and outside.
- 2. The unit access panel is removable with the minimal screws and provides full access to the compressor, fan, and control components.
- 3. The outdoor compartment is isolated and has an acoustic lining to assure quiet operation.

C. Fans:

- 1. The outdoor fans are direct-drive propeller type, and discharge air horizontally. The fan draws air through the outdoor coil.
- 2. Outdoor fan motors are multi-speed, totally-enclosed, single phase motors with permanently lubricated ball bearings. The motor is protected by internal thermal overload protection.
- 3. The shaft has an inherent corrosion resistance.
- 4. Outdoor fan openings are equipped with metal/mesh PVC coated protection grille over fan.

D. Compressor

- 1. The compressor is fully hermetic variable speed rotary type.
- 2. The compressor is inverter driven.
- 3. The compressor is equipped with an oil system, operating oil charge, and motor.
- 4. The motor is suitable for operation in a refrigerant and oil atmosphere.
- 5. The compressor assembly is installed on rubber vibration isolators.
- 6. The inverter and compressor are protected against over temperature and over current.

E. Outdoor Coil:

The coil is constructed of aluminum blue hydrophilic pre-coated fins mechanically bonded to seamless copper tubes, which are cleaned, dehydrated and sealed.

F. Refrigerant Components:

Refrigerant circuit components include multiple brass external liquid line service valves with service gauge connection port, multiple suction line service valves with a service gage connection port, accumulator, reversing valve, electronic expansion valves.

G. Safeties:

Operating safeties are factory selected, assembled, and tested. The minimum functions include the following:

- 1. Compressor discharge over temperature protection.
- 2. System low voltage protection.
- 3. Compressor overload protection.
- 4. Compressor over current protection.
- 5. IPM module protection.

H. Electrical Requirements:

- 1. Units shall operate on single-phase, 60 Hz power at 208/230 v.
- 2. The unit electrical power is a single point connection.
- 3. All power and control wiring must be installed per NEC and all local electrical codes.
- 4. Units have multiple terminal blocks to connect to multiple indoor units.