

**40MKCB / 24AHA4 / 124ANS
40MKQB / 25HHA4 / 224ANS
High-Wall Ductless Split System
Sizes 18 to 32**

Service Manual

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SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start-up, and service this equipment.

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

Read this manual thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information. This is the safety-alert symbol . When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol.

DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label.



WARNING

EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury, and/or property damage.



Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.



CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

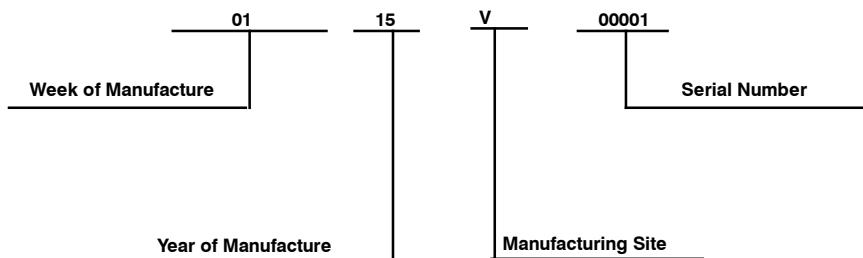
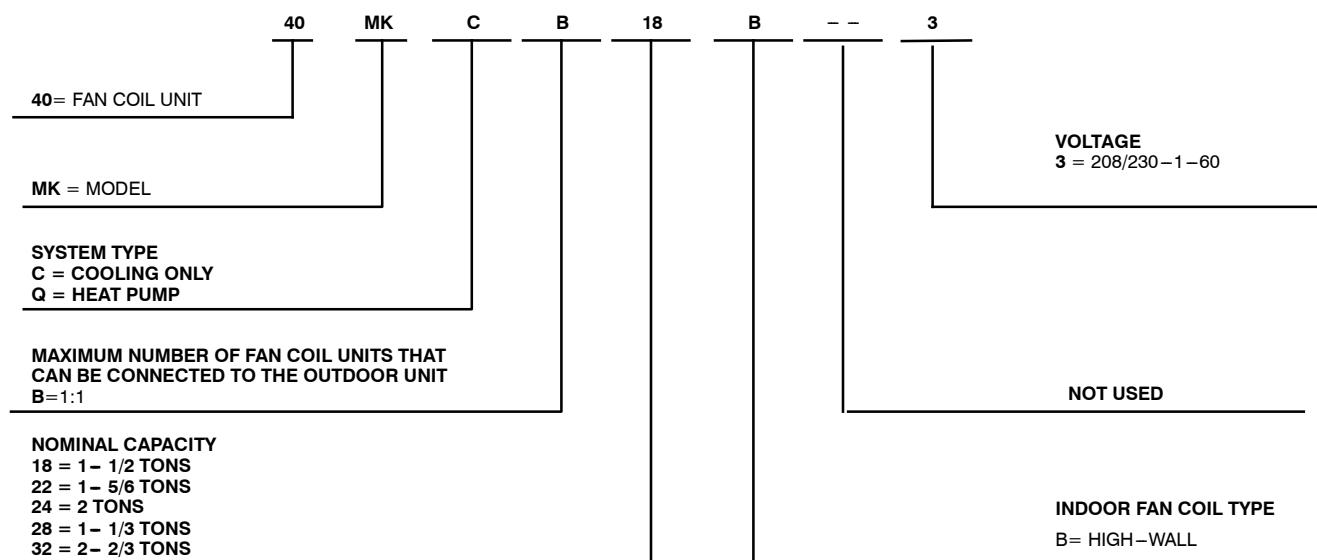
Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start-up.

INTRODUCTION

This Service Manual provides the necessary information to service, repair, and maintain the MK family of air conditioners and heat pumps. Section 2 of this manual is an appendix with data required to perform troubleshooting. Use the Table of Contents to locate a desired topic.

MODEL / SERIAL NUMBER NOMENCLATURES

INDOOR 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

Table 1—Standard Features

Ease Of Installation	
Indoor and Outdoor Compact Size	S
Outdoor Unit Wall Mounting Kit	A
Outdoor Unit Stacking Kit	A
Indoor Mounting Bracket	S
Comfort Features	
Microprocessor Controls	S
Wireless Remote Control	S
Automatic Air Sweep	S
Air Direction Control	S
Auto Restart Function	S
Cold Blow Protection On Heat Pumps	S
Turbo Mode	S
Silence Mode	S
Follow Me	S
Energy Saving Features	
Sleep Mode	S
Stop/Start Timer	S
46 °F Heating Mode (Heating Setback)	S
Safety And Reliability	
3 Minute Time Delay For Compressor	S
Over Current Protection For Compressor	S
Crankcase Heater (standard on size 30 Heat Pump)	A
Indoor Coil Freeze Protection	S
Indoor Coil High Temperature Protection On Heat Pumps	S
Condenser High Temperature Protection On Heat Pumps	S
Accumulator On Heat Pumps	S
Ease Of Service And Maintenance	
Cleanable Filters	S
Diagnostics	S
Liquid Line Pressure Taps	S
Suction And Discharge Pressure Taps	S
Application Flexibility	
Low Ambient Controls (-20° F) (-28.9 °C)	A
3-Phase on size 32 (Cooling Only)	S
Wind Baffles	A
Condensate Pumps	A
Wired Controls	A

Legend

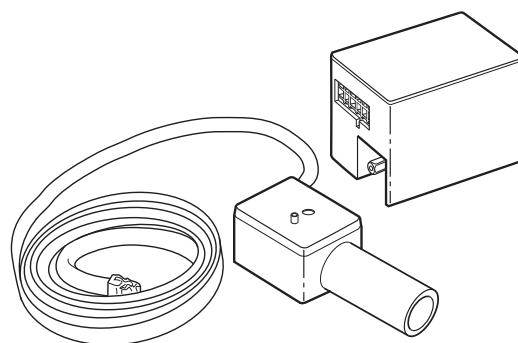
S Standard
A Accessory

Table 2—Accessories

Part Number	Description	For Models
KSACN0101AAA	Wired Remote Control	Only Sizes 18, 22
53DS-900---118	Condensate Pump (230v)	All Sizes
KAAVC0101AAA	Controls Kit (Required on High Walls Cooling Only units)	40MKC
KHAVC0101AAA	Controls Kit (Required on High Walls Heat Pump units)	40MKQ
KSALA0801AAA	Low Ambient Control (for cooling -20F)	24AHA4/25HHA4 /124ANS/224ANS (208/230V)
KSALA0901AAA	Low Ambient Control (for cooling -20F)	24AHA4 /124ANS (460V-3)
KAACHI1401AAA	Crankcase Heater	24AHA4/124ANS Sizes 18-36 (208/230V)
KAACHI1501AAA	Crankcase Heater	24AHA4/124ANS Size 36 (460V-3)
KAACHI1701AAA	Crankcase Heater	25HHA4/224ANS Size 24 (208/230V)
KAAWS0101AAA	Winter Start Kit (for low ambient on cooling only systems)	24AHA4/124ANS All Sizes
KHAIR0201AAA	Isolation Relay (Required when using Low Ambient cooling with HP)	25HHA4/224ANS All Sizes
KSAHS1501AAA	Hard Start Kit (Capacitor & Relay)	24AHA4/25HHA4 /124ANS/224ANS (208/230V-1)
53DS-900---087	Wind Baffle	24AHA4/124ANS Sizes 18 & 24; 25HHA4/224ANS Size 24
53DS-900---071	Wind Baffle	24AHA4/124ANS Sizes 30 - 36; 25HHA4/224ANS Size 30
53DS-900---075	Stacking Kit	24AHA4/124ANS Sizes 18, 24
53DS-900---076	Stacking Kit	24AHA4/124ANS Sizes 30, 36
53DS-900---077	Wall Mount Kit	24AHA4/25HHA4/124ANS/224ANS Sizes 18, 24
53DS-900---078	Wall Mount Kit	24AHA4/25HHA4 /124ANS/224ANS Sizes 30, 36
KAALS0201LLS	Liquid Line Solenoid for Cooling Only	24AHA4/124ANS All Sizes - Required for Long Line Applications
KHALS0401LLS	Liquid Line Solenoid for Heat Pump	25HHA4 /224ANS All Sizes - Required for Long Line Applications

INDOOR UNIT ACCESSORIES

Condensate Pump



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Fig. 1 – Condensate Pump Accessory

On high wall fan coils, the condensate pump has a lift capability of 12 ft (3.6 m) on the discharge side with the pump mounted in the fan coil or 6 ft (1.8 m) on the suction side if the pump is remote mounted. The pump is recommended when adequate drain line pitch cannot be provided, or when the condensate must move up to exit.

Wired Remote Controller

For applications where the use of wireless remote control is not desired, the MK units can be controlled by means of a wired wall-mounted control with an LCD display.



Fig. 2 – Wall Mounted Control with LCD Display

SPECIFICATIONS

Table 3—Specifications

			COOLING ONLY						HEAT PUMP	
System	Size		18	22	28	32	32	32	24	28
	Outdoor Model		24AHA418A003 124ANS018000	24AHA424A003 124ANS024000	24AHA430A003 124ANS030000	24AHA436A003 124APS036000	24AHA436A005 124AES036000	24AHA436A006 124AES036000	25HHA424A003 224ANS024000	25HHA430A003 224ANS030000
	Indoor Model		40MKCB18B--3	40MKCB22B--3	40MKCB28B--3	40MKCB32B--3	40MKCB32B--3	40MKCB32B--3	40MKQB24B--3	40MKQB28B--3
Performance	Cooling Rated Capacity	Btu/h	18,000	21,600	28,000	32,000	32,000	32,000	22,800	27,600
	SEER		14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0
	EER		12.2	12.2	12.2	12.2	12.2	12.2	12.0	12.2
	Heating Rated Capacity	Btu/h				N/A			22,000	27,800
	HSPF				N/A				8.2	8.2
	COP	W/W			N/A				3.86	3.72
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
Operating Range	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	N/A	N/A	N/A	N/A	N/A	N/A
	Cooling Outdoor DB Min - Max	°F			55~125 (-20° F w / Low-Ambient Kit)				55~125 (-20° F w / Low-Ambient Kit)	
	Heating Outdoor DB Min - Max	°F			N/A				17~75	17~75
	Cooling Indoor DB Min - Max	°F	64~90	64~90	64~90	64~90	64~90	64~90	64~90	64~90
	Heating Indoor DB Min - Max	°F			N/A				32~80	32~81
Piping	Total Piping Length**	Ft.	200'	200'	200'	200'	200'	200'	200'	200'
	Drop (OD above ID)	Ft.	200'	200'	200'	200'	200'	200'	200'	200'
	Lift (OD below ID)	Ft.	65'	65'	65'	65'	65'	65'	65'	65'
	Outdoor Pipe Connection Size - Liquid*	In.	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
	Outdoor Pipe Connection Size - Suction	In.	5/8"	3/4"	3/4"	7/8"	7/8"	7/8"	3/4"	3/4"
	Indoor Pipe Connection Size - Liquid	In.	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"	3/8"
	Indoor Pipe Connection Size - Suction	In.	5/8"	3/4"	3/4"	7/8"	7/8"	7/8"	3/4"	3/4"
Refrigerant	Type		R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A	R-410A
	Design Pressure	PSIG	550	550	550	550	550	550	550	550
	Metering Device		Type B Acculator						Type B Acculator	
Outdoor Coil	Charge	Lb.	6.4	6.5	8.6	8.9	8.9	8.9	7.7	12.1
	Face Area	Sq. Ft.	7.3	7.3	12.1	12.1	12.1	12.1	7.3	12.1
	No. Rows		2	2	2	2	2	2	2	2
	Fins per inch		20	20	20	20	20	20	20	20
Indoor Coil	Circuits		3	3	3	3	3	3	3	6
	Face Area (sq. ft.)	Sq. Ft.	3.9	3.9	4.7	4.7	4.7	4.7	4.7	4.7
	No. Rows		2	2	3	3	3	3	3	3
	Fins per inch		21	21	18	18	18	18	18	18
Compressor	Circuits		6	6	9	9	9	9	9	9
	Type		Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
	Model		ZP16K6E-PFV-130	ZP20K6E-PFV-130	ZP25K5E-PFV-130	ZP29K5E-PFV-130	ZP29K5E-TFD-130	ZP21K5E-PFV-130	ZP24K5E-PFV-130	
Electrical	Outdoor Voltage, Phase, Cycle	V/Ph/Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-3-60	460-3-60	208/230-1-60	208/230-1-60
	Indoor Voltage, Phase, Cycle	V/Ph/Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	Power Supply		Indoor and outdoor units have dedicated power supply						Indoor and outdoor units have dedicated power supply	
	MCA (Outdoor)	A.	11.8	14.1	18.3	18.3	12.5	7.6	16.5	17.2
	MOCP - Fuse Rating (Outdoor)	A.	20	25	30	30	20	15	25	30
	MCA (Indoor)	A.	1	1	1	1	1	1	1	1
	MOCP - Fuse Rating (Indoor)	A.	15	15	15	15	15	15	15	15
Outdoor	Unit Width	In.	36.9	36.9	44.5	44.5	44.5	44.5	36.9	44.5
	Unit Height	In.	31.1	31.1	37.1	37.1	37.1	37.1	31.1	.1
	Unit Depth	In.	14.6	14.6	17.1	17.1	17.1	17.1	14.6	.1
	Net Weight	Lbs.	146.0	148.0	183.0	184.0	184.0	.0	161.0	196.0
	Airflow	CFM	1285	1285	1900	2615	2615	2615	1285	2615
Indoor	Unit Width	In.	46.7	46.7	57.1	57.1	57.1	.1	57.1	57.1
	Unit Height	In.	13.4	13.4	13.4	13.4	13.4	.4	13.4	13.4
	Unit Depth	In.	10.2	10.2	10.4	10.4	10.4	.4	10.4	10.4
	Net Weight	Lbs.	37.5	37.5	55.1	55.1	55.1	.1	55.1	55.1
	Number of Fan Speeds		4	4	4	4	4	4	4	4
	Airflow (lowest to highest)	CFM	475/570/695/710	475/570/695/710	525/685/834/847	525/685/834/847	525/685/834/847	525/685/834/847	525/685/834/847	525/685/834/847
	Sound Pressure (lowest to highest)	dB(A)	44/47/50/51	44/47/50/51	46/48/52/53	46/48/52/53	46/48/52/53	46/48/52/53	46/48/52/53	46/48/52/53
	Air throw Data	Ft.	20	20	25	25	25	25	25	25

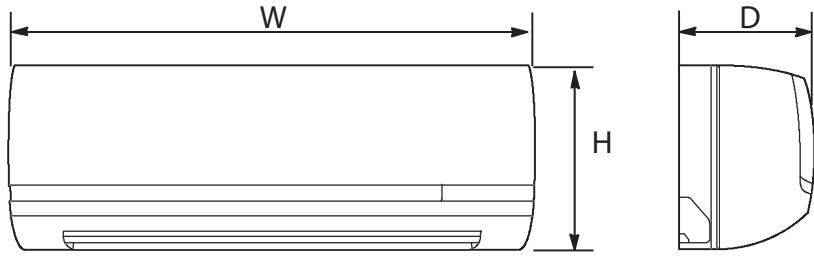
* Liquid line needs to be insulated

** Refer to Ductless Split System Long Line Guide for additional information. Long Line accessories required beyond 80 ft (24.4 m).

Legend

- SEER --- Seasonal Energy Efficiency Ratio
- EER --- Energy Efficiency Ratio
- MCA --- Minimum Circuit Amps
- MOCP --- Max. Over---Current Protection

DIMENSIONS - INDOOR



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Fig. 3 – 40MKC**B, 40MKQ**B Unit Dimensions

Table 4—Dimensions Indoor

High wall Indoor Unit size (BTU/Hr)	Height (H) in. (mm)	Width (W) in. (mm)	Depth (D) in. (mm)	Operating Weight lb (kg)
AC				
18K and 22K	13.39 (343)	46.69 (1186)	10.16 (258)	17 (7.71)
28K and 32K	13.38 (340)	57.09 (1450)	10.43 (265)	25 (11.34)
HP				
24K and 28K	13.38 (340)	57.09 (1450)	10.43 (265)	25 (11.34)

DIMENSIONS - OUTDOOR

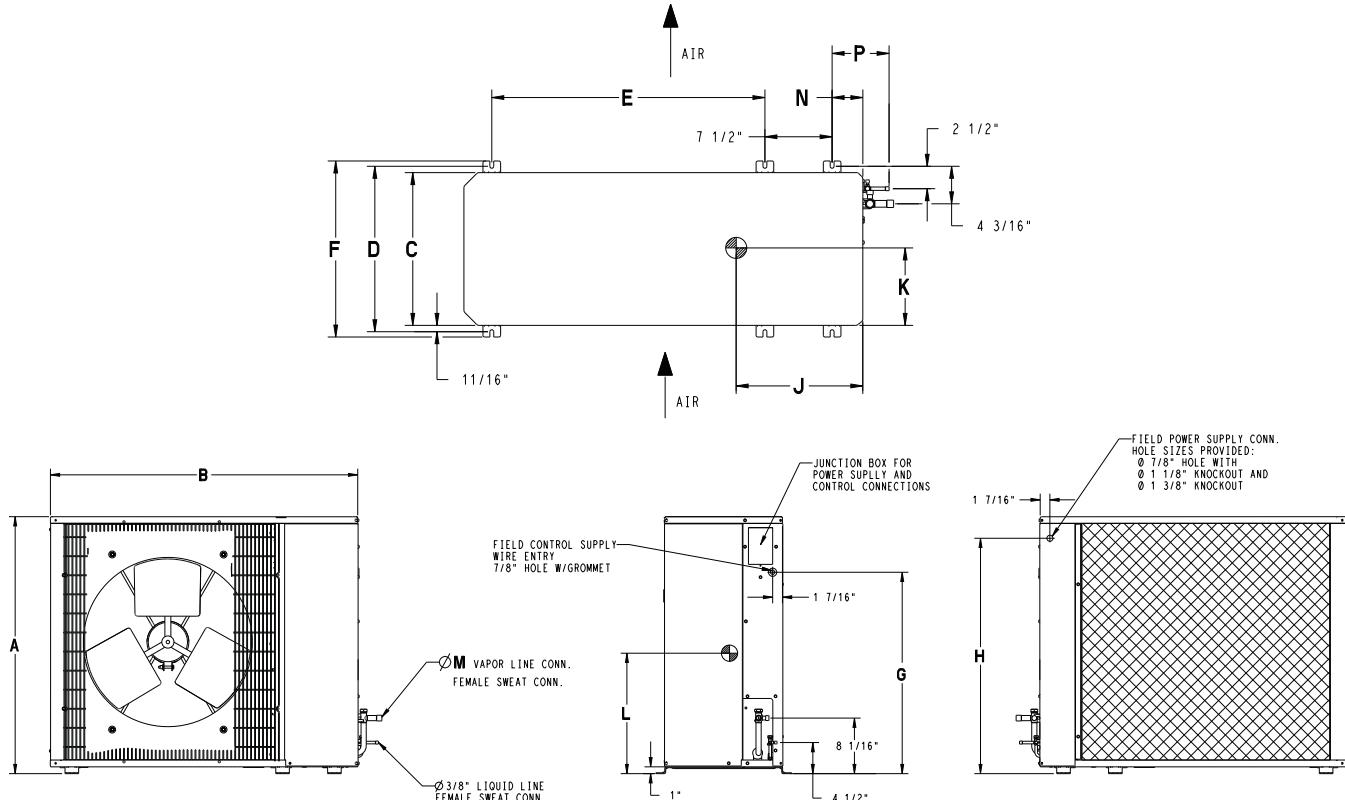


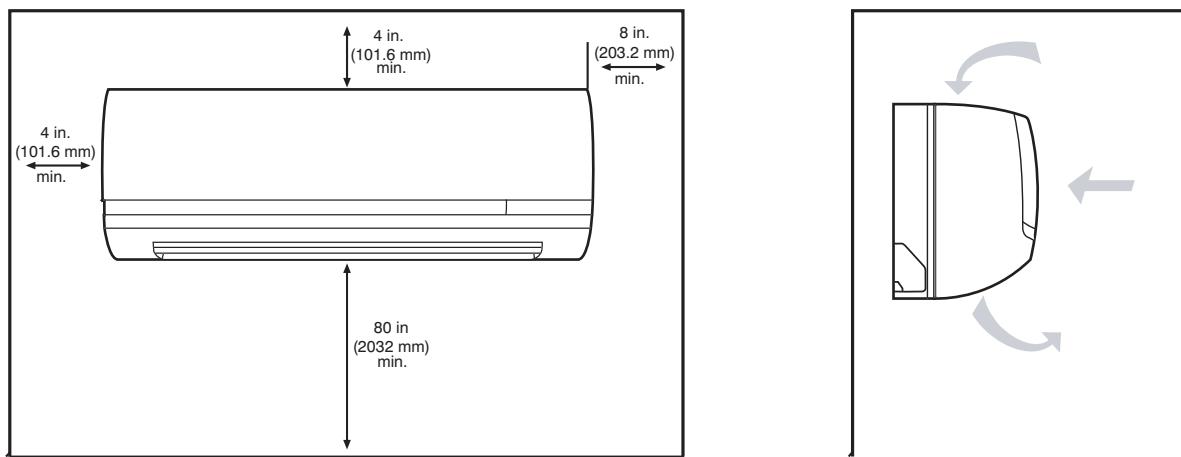
Fig. 4 – Outdoor Unit Dimensions

Table 5—Outdoor Dimensions Indoor

	UNIT SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	OPERATING WEIGHT lbs
Cooling Only	18	31.1	36.9	14.6	16.0	23.4	17.2	23.1	28.1	13.0	6.6	11.3	0.6	2.9	5.8	146.0
	24	31.1	36.9	14.6	16.0	23.4	17.2	23.1	28.1	14.0	6.8	11.6	0.8	2.9	5.8	148.0
	30	37.1	44.5	17.1	18.4	30.5	19.6	29.1	34.1	13.7	8.1	15.9	0.8	3.4	6.4	183.0
	36	37.1	44.5	17.1	18.4	30.5	19.6	29.1	34.1	13.7	8.1	15.9	0.9	3.4	6.4	184.0
Heat Pump	24	31.1	36.9	14.6	16.0	23.4	17.2	23.1	28.1	14.0	6.8	11.6	0.8	2.9	4.9	161.0
	30	37.1	44.5	17.1	18.4	30.5	19.6	29.1	34.1	13.7	8.1	15.9	0.8	3.4	5.5	196.0

NOTE: Dimensions shown in feet-inches. Dimensions in () are millimeters.

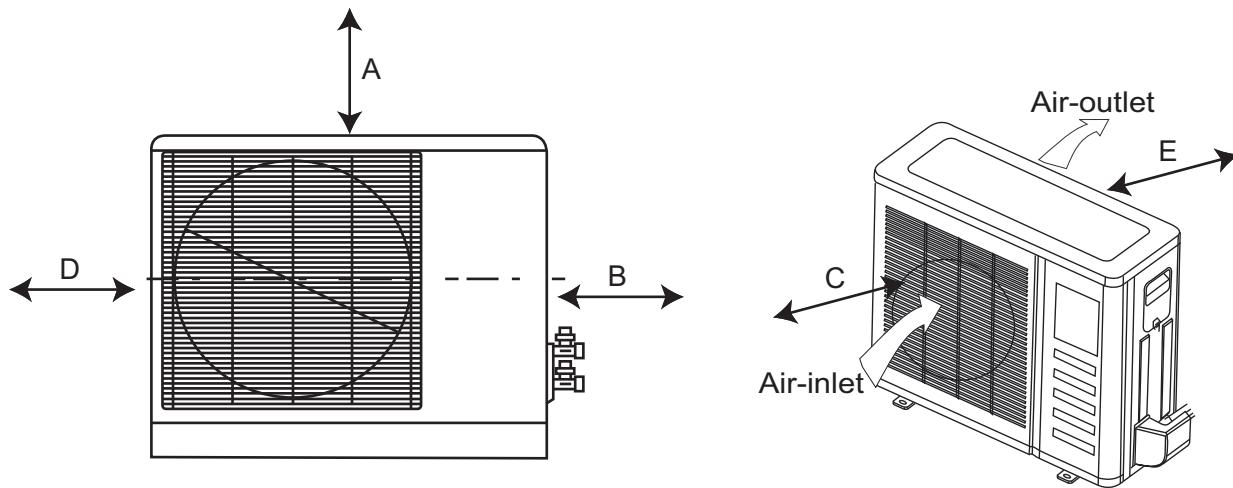
CLEARANCES - INDOOR



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Fig. 5 – Indoor Unit Clearance

CLEARANCES - OUTDOOR



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Fig. 6 – Outdoor Unit Clearance

Table 6—Outdoor Clearances

UNIT	Coil Facing Wall - in. (mm)	Fan Facing Wall - in. (mm)
A	24 (610)	24 (610)
B	24 (610)	24 (610)
C	20 (508)	6 (152)
D	6 (152)	8 (203)
E	6 (152)	20 (508)

ELECTRICAL DATA

Table 7—24AHA4/124ANS Electrical Data

Unit Size - voltage series	V/PH	OPER VOLTS*		COMPRESSOR		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA			
18-30	208/230/1	253	197	56.3	9.0	0.50	11.8	20
24-30				62.9	10.9	0.50	14.1	25
30-30				73.0	14.1	0.70	18.3	30
36-30				77.0	14.1	1.20	18.8	30
36-50	208/230/3	253	197	71.0	9.0	1.20	12.5	20
36-60	460/3	506	414	38.0	5.6	0.60	7.6	15

Table 8—25HHA4/224ANS Electrical Data

Unit Size - voltage series	V/PH	OPER VOLTS*		COMPRESSOR		FAN	MCA	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA			
24-30	208/230/1	253	197	58.3	12.8	0.50	16.5	25
30-30				64.0	12.8	1.20	17.2	30

Table 9—40MKCB**B Electrical Data

Cooling Only Nominal Indoor Size	Voltage	Voltage Range		Fan	Power	
		Min	Max		Min Ckt Amps	Fuse HACR Bkr Amps
018, 022	208/230---1---60	187	253	0.485	1.0	15
028, 032	208/230---1---60	187	253	0.51	1.0	15

*Permissible limits of the voltage range at which unit will operate satisfactorily.

LEGEND

FLA -Full Load Amps

HACR- Heating, Air Conditioning, Refrigeration

LRA- Locked Rotor Amps

NEC- National Electrical Code

RLA- Rated Load Amps (compressor)

*Permissible limits of the voltage range at which the unit will operate satisfactorily

**Time-Delay fuse.

Complies with 2007 requirements of ASHRAE Standards 90.1

NOTES:

1. In compliance with NEC requirements for multi-motor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or equipped with a breaker.

2. Motor RLA values are established in accordance with UL (Underwriters Laboratories) Standard 465.

Table 10—40MKQB**B Electrical Data

Heat Pump Nominal Indoor Size	Voltage	Voltage Range		Fan	Power	
		Min	Max		Min Ckt Amps	Fuse HACR Bkr Amps
024, 028	208/230---1---60	187	253	0.51	1.0	15

POWER AND CONNECTING CABLES - FIELD SUPPLIED

Recommended Connection Method for Power and Communication Wiring (To minimize communication wiring interference)

Power Wiring:

The main power is supplied to both, the indoor and the outdoor units. The field supplied connecting cable consists of three (3) wires. Two wires are high voltage AC power and one is a ground wire.

Consult your local building codes and the NEC (National Electrical Code) or CEC (Canadian Electrical Code) for special requirements.

All wires must be sized per NEC or CEC and local codes. Use Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.

Per caution note, only copper conductors with a minimum 300 volt rating and 2/64-inch thick insulation must be used.

Communication Wiring:

A separate shielded Stranded copper conductor only, with a 600 volt rating and double insulated copper wire, must be used as the communication wire from the outdoor unit to the indoor unit. To minimize voltage drop of the communication wire, use the wire size and maximum lengths shown in Table 11.

Table 11—Maximum Lengths

Wire Size	Length ft. (m)
18AWG	50 ft. (15 m)
16AWG	50 ft. (15 m) to 100 ft. (30 m)
13AWG	100 ft. (30 m) to 200 ft. (60 m)



CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

- Wires should be sized based on NEC and local codes.
- Use copper conductors only with a 600 volt rating and double insulated copper wire.



WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death. The kit requires high voltage (230V) non-metallic field wire to connect the indoor unit to the kit in the outdoor unit. Some regions may require metal conduit for this wire. Check relevant local building codes before installing. DO NOT USE regular low voltage (24V) thermostat wire for communication wiring between indoor unit and kit in outdoor unit.



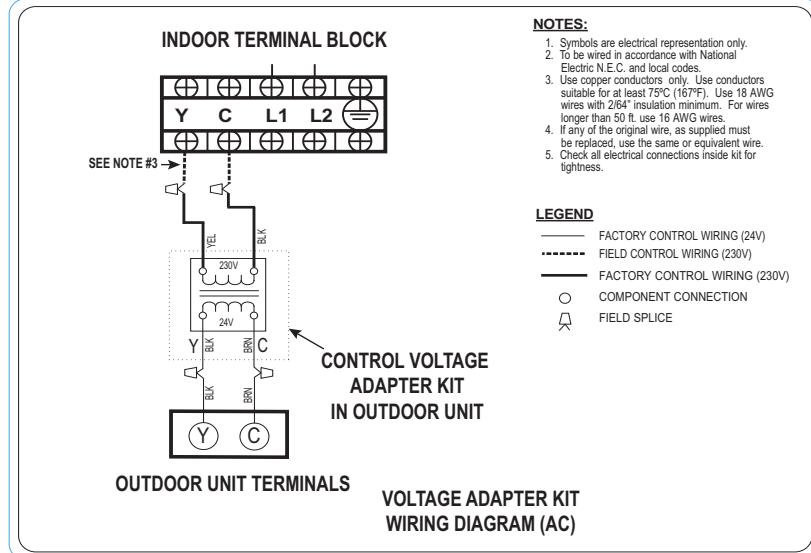
CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

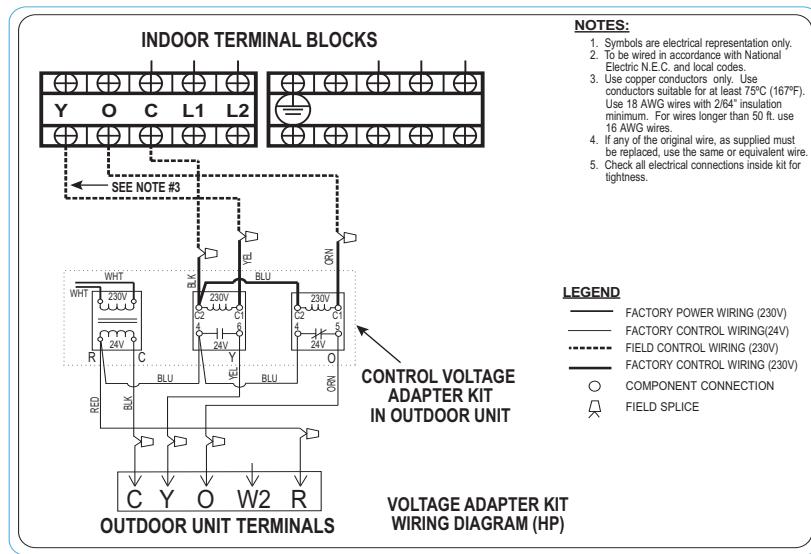
- Be sure to comply with local codes while running wire from indoor unit to outdoor unit.
- Every wire must be connected firmly. Loose wiring may cause terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.
- No wire should be allowed to touch refrigerant tubing, compressor or any moving parts.
- Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.
- Connecting cable with conduit shall be routed through hole in the conduit panel.

CONNECTION DIAGRAMS



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Fig. 7 – 40MKCB**B / 24AHA4 or 124ANS Connecting diagram



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Fig. 8 – 40MKQB**B / 25HHA4 or 224ANS Connecting diagram

Notes:

1. Do not use thermostat wire for any connection between indoor and outdoor units.
2. All connections between indoor and outdoor units must be as shown. **The connections are sensitive to polarity and will result in a fault code.**

WIRING DIAGRAM (INDOOR UNIT)

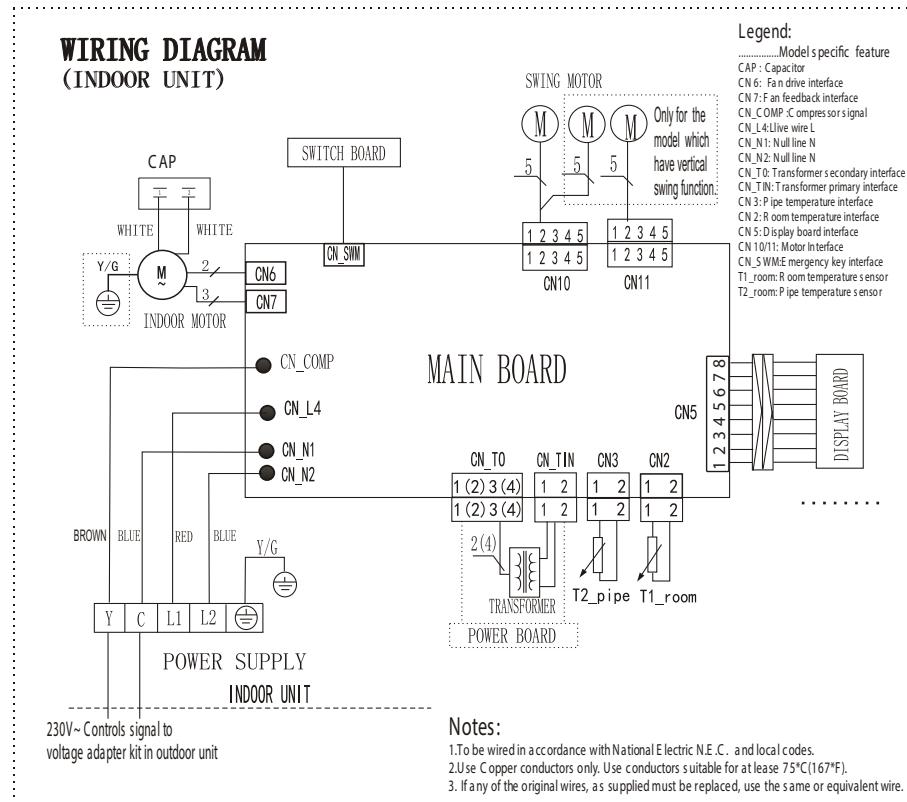


Fig. 9 – 40MKC**B wiring diagram

OUTDOOR UNIT SCHEMATIC DIAGRAM

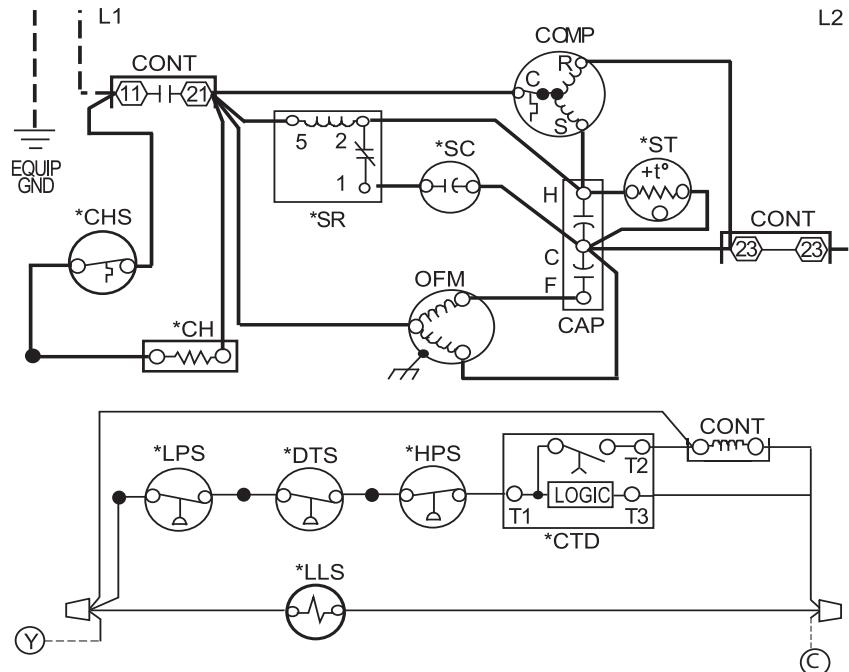


Fig. 10 – 24AHA4/124ANS 208/230 Single Phase Wiring Diagram

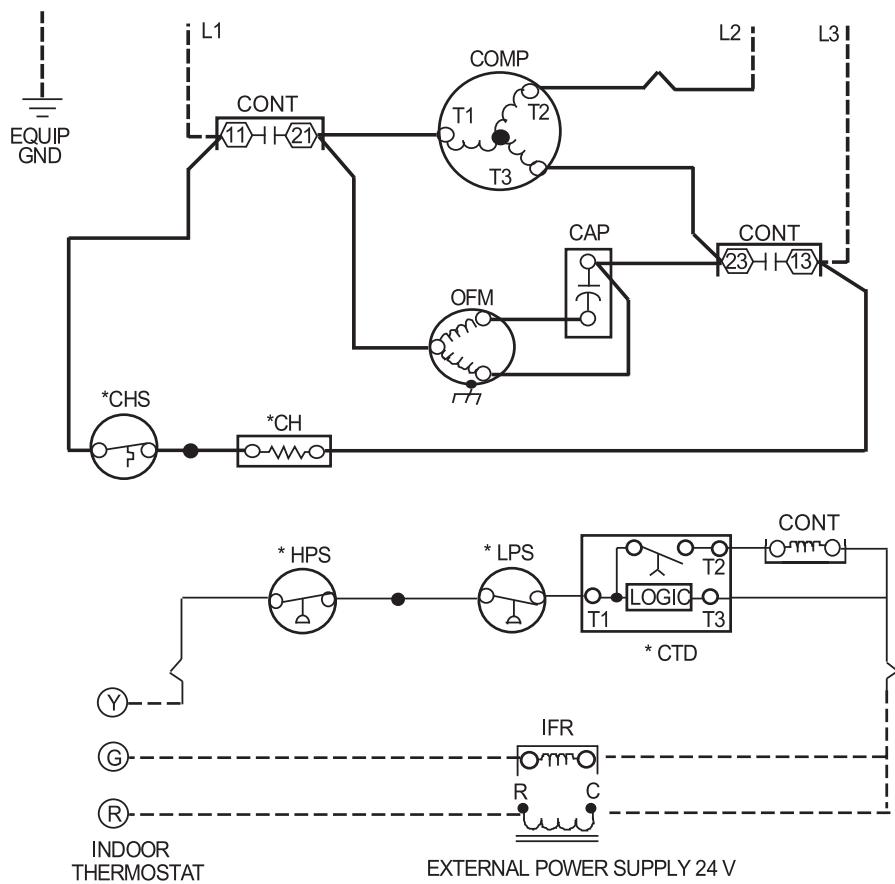


Fig. 11 – 24AHA4/124ANS 208/230/460 3 Phase Wiring Diagram

WIRING DIAGRAM (INDOOR UNIT)

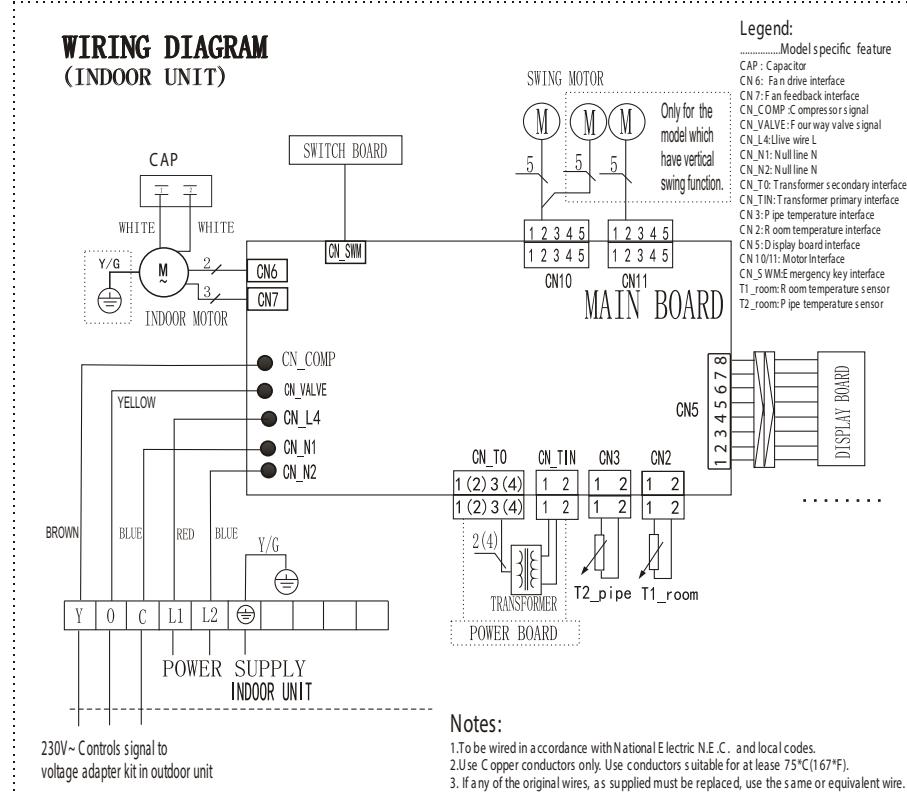


Fig. 12 – 40MKQ**B wiring diagram

OUTDOOR UNIT SCHEMATIC DIAGRAM

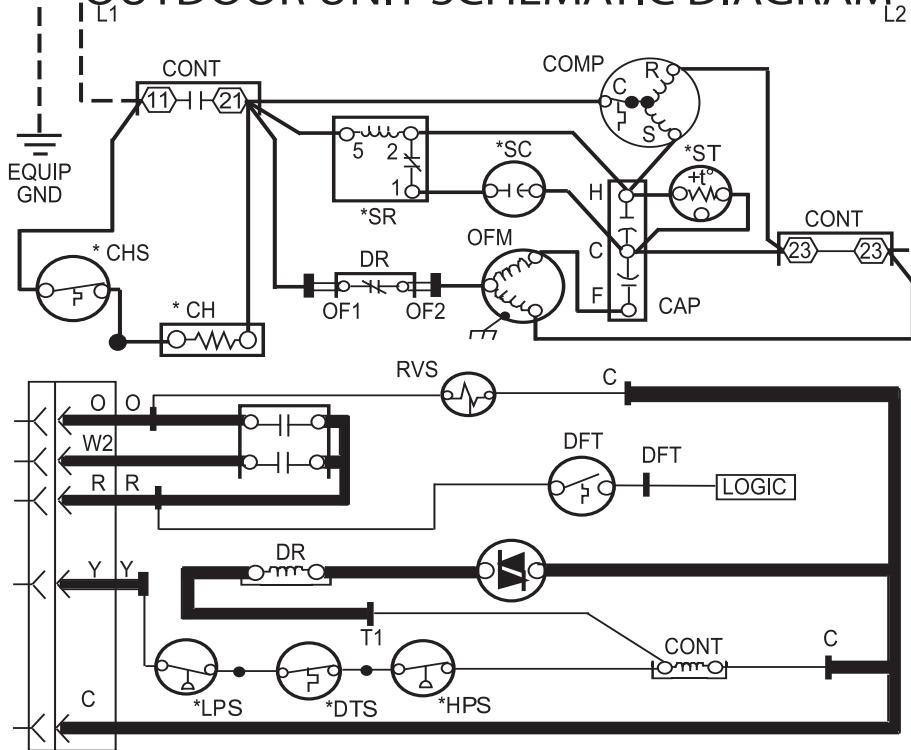


Fig. 13 – 25HHA4/224ANS Wiring Diagram

REFRIGERATION CYCLE DIAGRAMS

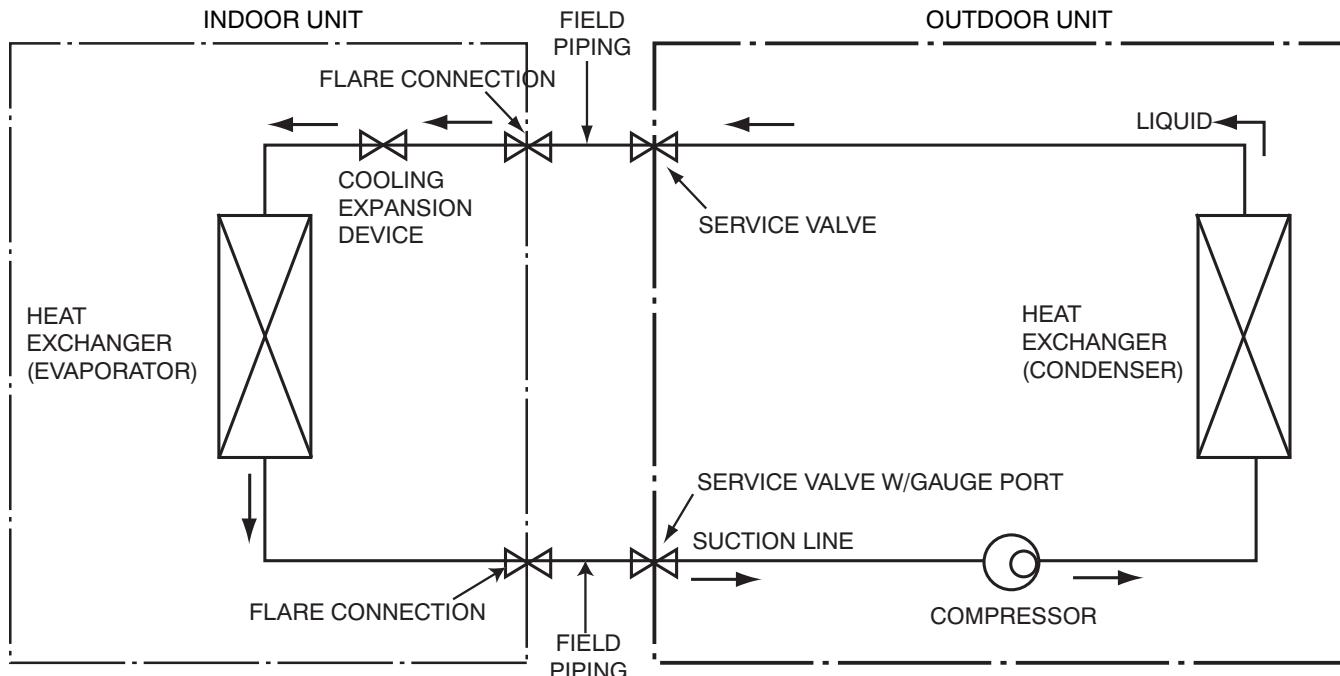


Fig. 14 – Cooling Only

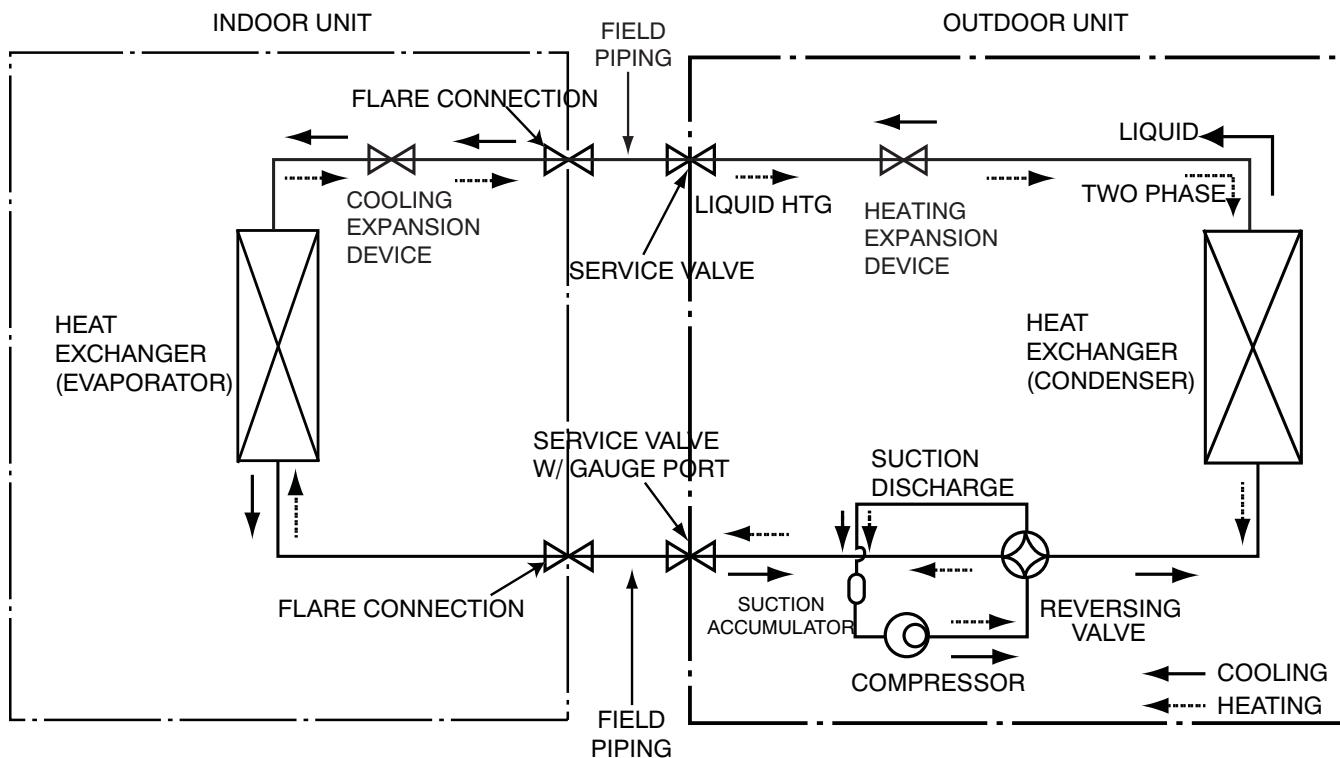


Fig. 15 – Heat Pumps

REFRIGERANT LINES

General refrigerant line sizing:

- The outdoor units are shipped with a full charge of R410A refrigerant. All charges, line sizing, and capacities are based on runs of 25 ft (7.6 m). For runs over 25 ft (7.6 m), refer to the *Residential Long Line Guide*.
- Minimum refrigerant line length between the indoor and outdoor units is 10 ft. (3 m).
- Refrigerant lines should not be buried in the ground. If it is necessary to bury the lines, not more than 36-in (914 mm) should be buried. Provide a minimum 6-in (152 mm) vertical rise to the service valves to prevent refrigerant migration.
- Both lines must be insulated. Use a minimum of 1/2-in. (12.7 mm) thick insulation. Closed-cell insulation is recommended in all long-line applications.
- Special consideration should be given to isolating interconnecting tubing from the building structure. Isolate the tubing so that vibration or noise does not transmit into the structure.

IMPORTANT: Both refrigerant lines must be insulated separately.

- The following maximum lengths are allowed:

Table 12 – Maximum Refrigerant Line Lengths

Unit Size	Max Line Length* ft(m)	Max Elevation (ID over OD) ft (m)	Max Elevation (OD over ID) ft (m)
18K	250 (76.2)	65 (19.8)	200 (61)
24K	250 (76.2)	65 (19.8)	200 (61)
30K	250 (76.2)	65 (19.8)	200 (61)
36K	250 (76.2)	65 (19.8)	200 (61)

Note: For lengths greater than 25 ft. (7.6 m), refer to the *Residential Long Line Guide*.

*Maximum actual length not to exceed 200 ft. (61 m). Total equivalent length accounts for losses due to elbows or fitting. See the *Long Line Guideline* for details.

- The following are the piping sizes.

Table 13 – Pipe Sizes

Pipe Sizes (in)		
Unit Size	Mix Phase - in	Vapor - in
18K	3/8	5/8
24K	3/8	3/4
30K	3/8	3/4
36K	3/8	7/8

Note: Both lines need to be insulated using at least 1/2 inch closed foam insulation.

Refrigerant Charge

Table 14 – Charge Requirements

System Type	Nominal Capacity	Outdoor Unit	Indoor Unit	Charge to Sub-cooling Delta from Rating Plate Value
Cooling Only	018	24AHA418A003	124ANS018000	40MKCB18B--3
	022	24AHA424A003	124ANS024000	40MKCB22B--3
	028	24AHA430A003	124ANS030000	40MKCB28B--3
	032	24AHA436A003/5/6	124ANS036000	40MKCB32B--3
Heat Pump	024	25HHA424A003	224ANS024000	40MKQB24B--3
	028	25HHA430A003	224ANS030000	40MKQB28B--3

The above additional charge is required amount for line lengths up to 25 ft (7.6 m). For line lengths exceeding 25 ft. (7.6 m), additional charge will be required. Refer to the *Residential Long Line Guide*.

Metering Device

The metering device(s) for these systems is a type B accurator. The cooling accurator is installed with the indoor unit, while the heating accurator is installed with the outdoor unit. One Accurator is required for the cooling only system and two are required for the heat pump systems. Refer to Table 15 for the accurator size.

Table 15 – Accurator Sizes

System Size	Cooling Only	Heat Pumps	
	40MKC**B	40MKQ**B	25HHA4/224ANS
018	0.046"	-	-
022, 024	0.052"	0.052"	0.049"
028	0.059"	0.057"	0.055"
032	0.065"	-	-

SYSTEM EVACUATION AND CHARGING

CAUTION

UNIT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

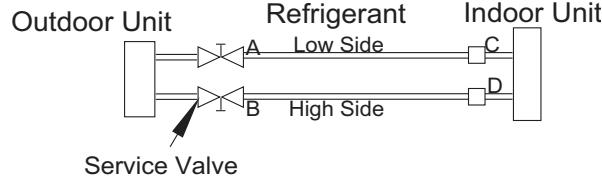
Never use the system compressor as a vacuum pump.

Refrigerant tubes and indoor coil should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the procedure outlined below is followed. Always break a vacuum with dry nitrogen.

SYSTEM VACUUM AND CHARGE

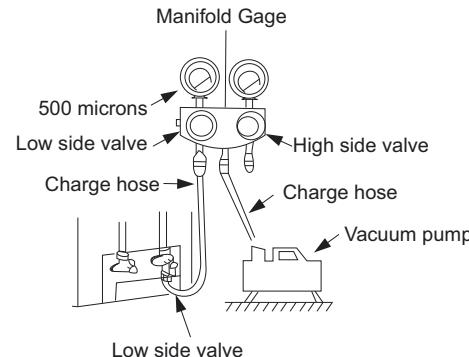
Using Vacuum Pump

- Completely tighten flare nuts A, B, C, D, connect manifold gage charge hose to a charge port of the low side service valve (see Fig. 16).
- Connect charge hose to vacuum pump.
- Fully open the low side of manifold gage (see Fig. 17).
- Start the vacuum pump.
- Evacuate using either deep vacuum or triple evacuation method.
- After evacuation is complete, fully close the low side of manifold gage and stop operation of vacuum pump.
- The factory charge contained in the outdoor unit is good for up to 25 ft. (8 m) of line length. For refrigerant lines longer than 25 ft. (8 m), add charge, up to the maximum allowable length, as specified in the residential *Long Line Application Guide*.
- Disconnect charge hose from charge connection of the low side service valve.
- Fully open service valves B and A.
- Securely tighten caps of service valves.



A07360

Fig. 16 – Service Valve

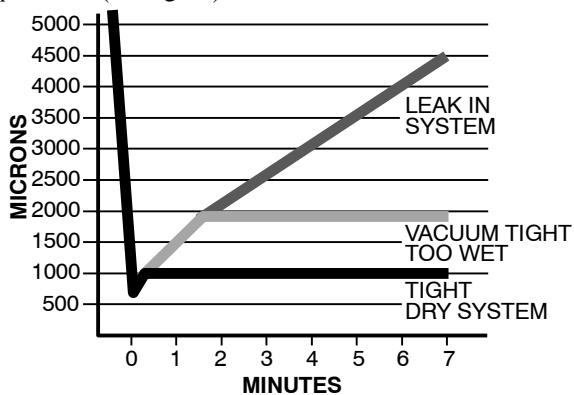


A07361

Fig. 17 – Manifold

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water (see Fig. 18).



A95424

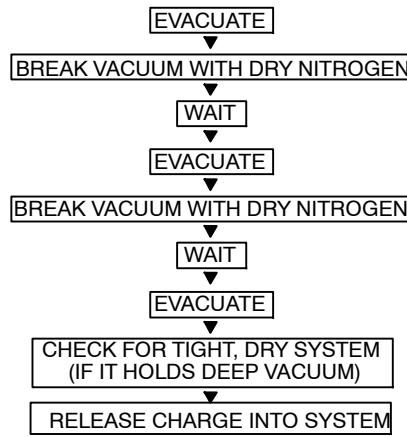
Fig. 18 – Deep Vacuum Graph

Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is only capable of pumping down to 28 in. of mercury vacuum and system does not contain any liquid water.

Refer to Fig. 19 and proceed as follows:

- 1 Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.
- 2 Close service valves and shut off vacuum pump.
- 3 Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
- 4 Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
- 5 Repeat this procedure as indicated in Fig. 19. System will then be free of any contaminants and water vapor.



A95425

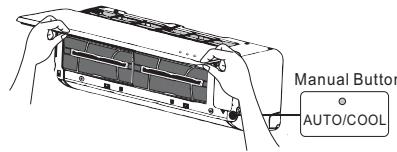
Fig. 19 – Triple Evacuation Method

SEQUENCE OF OPERATION

Interface

A wireless remote control, supplied with the unit, is the interface between the fan coil and the user. The wireless remote control has the following characteristics:

- Capable of displaying °C and °F with °F being the default setting. To change the default setting, refer to the Owner's Manual.
- The remote control setpoint range is from 62°F (17°C) to 86°F (30°C) in increments of 1°F (1°C).
- The wireless remote control has an operating range of 25 ft. (7.62 m).
- The same remote control can be used to control more than one unit.
- If the remote control is lost, damaged, or the batteries are exhausted, the system can be operated by using the manual button (forced Auto) located under the front panel.



A14359

Fig. 20 – Manual Button Location on Unit

TROUBLESHOOTING

This section provides the required flow charts to troubleshoot problems that may arise.

NOTE: Information required in the diagnoses can be found either on the wiring diagrams or in the appendix.

Required Tools:

The following tools are needed when diagnosing the units:

- Digital multimeter
- Screw drivers (Phillips and straight head)
- Needle-nose pliers

Recommended Steps

- 1 Refer to the diagnostic hierarchy charts below and determine the problem at hand.
- 2 Go to the chart listed in the diagnostic hierarchy and follow the steps in the chart for the selected problem.

For ease of service, the indoor unit is equipped with diagnostic code display LEDs in the indoor units. This diagnostic display is a combination of flashing LEDs on the display panel or the front of the unit. If possible, always check the diagnostic codes displayed on the indoor unit.

Once a failure occurs with the indoor unit in operation, the green LED on the indoor unit flashes at intervals of 0.5 seconds. The fault code is deduced from the number of times the green LED flashes, blocking unit operation. Between one flash cycle and the next one, a pause of 3 to 4 seconds elapses.

The diagnostic codes for the indoor units are listed in the appendix. Problems may occur that are not covered by a diagnostic code, but are covered by the diagnostic flow charts. These problems are typical air conditioning mechanical or electrical issues that can be corrected using standard air conditioning repair techniques.

For problems requiring measurements at the control boards please note the following:

For Heat Pump Units Only:

- 1 Always disconnect the main power.
- 2 When possible check the outdoor board first.
- 3 Start by removing the outdoor unit top cover.
- 4 Reconnect the main power
- 5 Probe the outdoor board inputs and outputs with a digital multi-meter referring to the wiring diagrams.
- 6 Connect the red probe to hot signal and the black probe to the ground or negative.
- 7 Note that some of the DC voltage signals are pulse and gives continuously variable readings.

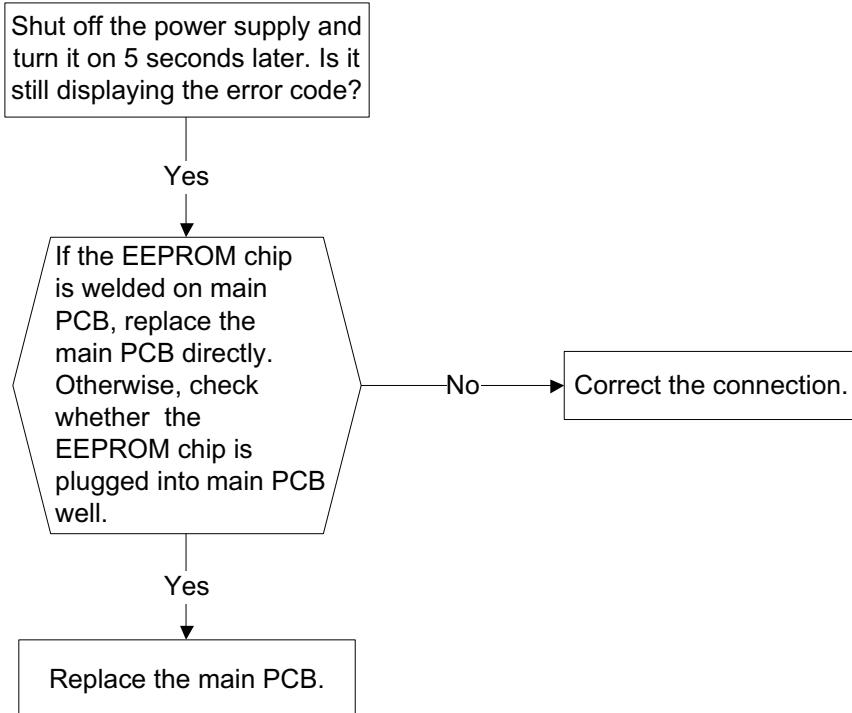
For Cooling only and Heat Pumps

- 1 If it is necessary to check the indoor unit board you must start by disconnecting the main power.
- 2 Next remove the front cover of the unit and then control box cover.
- 3 Carefully remove the indoor board from the control box, place it face up on a plastic surface (not metal).
- 4 Reconnect the main power and repeat steps 5, 6, and 7.
- 5 Disconnect main power before reinstalling board to avoid shock hazard and board damage.

1 – EEPROM parameter error – diagnosis and solution(E1)

Error Code	E1
Malfunction conditions	Indoor PCB main chip does not receive feedback from EEPROM chip.
Possible Causes	<ul style="list-style-type: none">• Installation mistake• Defective PCB

Trouble shooting:

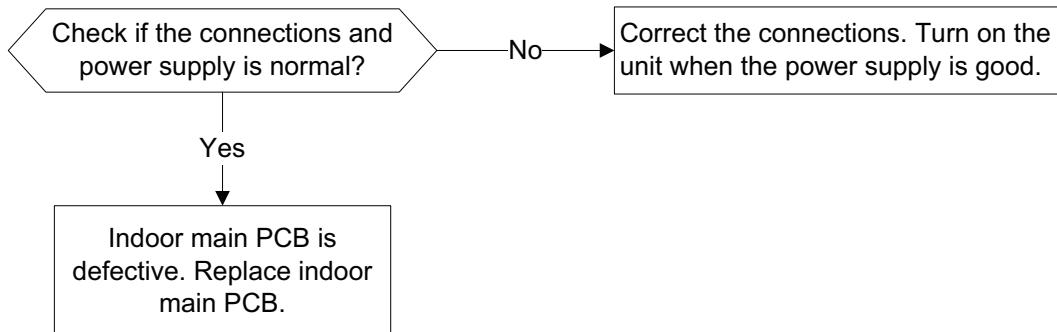


A14480

2 – Zero crossing signal detection error – diagnosis and solution (E2)

Error Code	E2
Malfunction conditions	When PCB does not receive zero crossing signal feedback for 4 minutes or the zero crossing signal time interval is abnormal.
Possible Causes	<ul style="list-style-type: none">• Connection mistake• Defective PCB

Trouble shooting:

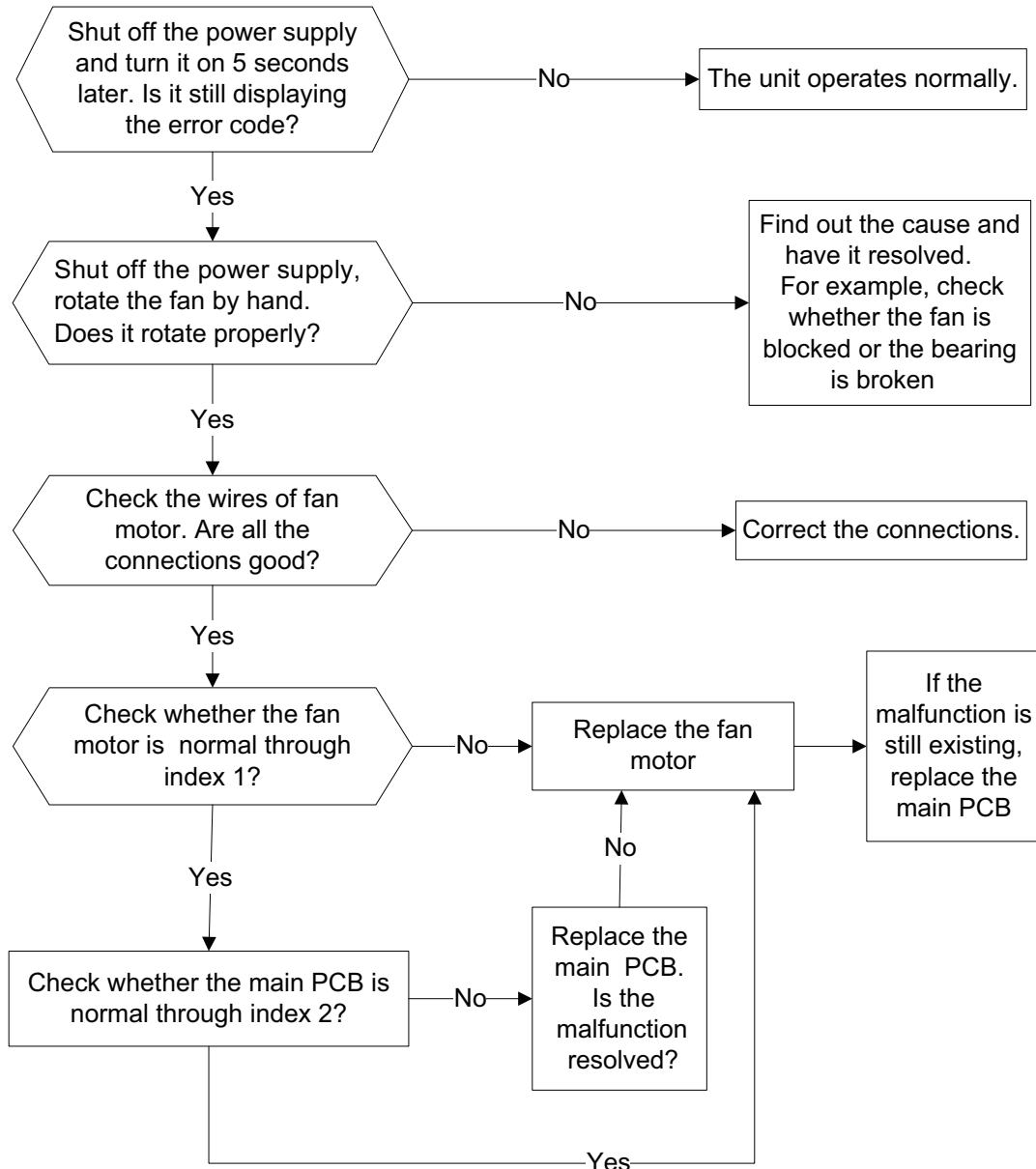


A14482

3 – Fan speed out of control – diagnosis and solution (E3)

Error Code	E3
Malfunction conditions	When the indoor fan speed has been too low (300RPM) for certain time, the unit stops and the LED displays the failure.
Possible Causes	<ul style="list-style-type: none"> • Wiring mistake • Defective fan assembly • Defective fan motor • Defective PCB

Trouble shooting:



Index 1:

Indoor fan motor

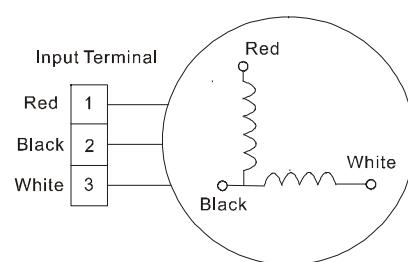
Measure the resistance value of each winding by using the tester.
For the definite value of the resistance, refer to Appendix A2 and A3.

Index 2:

Indoor fan motor

Power on and set the unit running in fan mode (at high fan speed). After it has been running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V (208~240V power supply) the PCB must have problems and needs to be replaced.

A14483

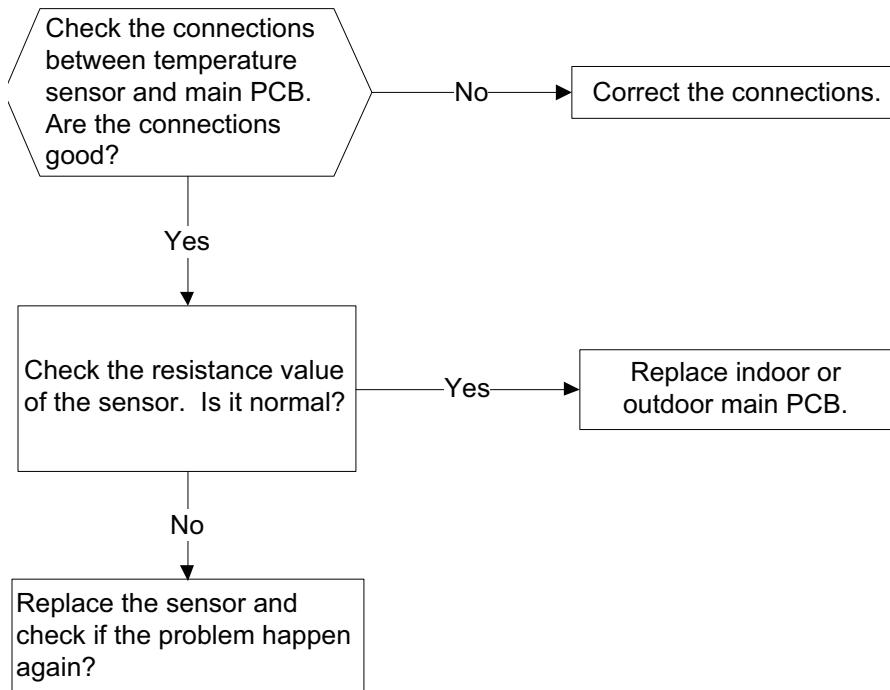


A14484

6 – Indoor room temperature sensor Open or short circuited – diagnosis and solution (E5)

Error Code	E5
Malfunction conditions	If the reading voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure.
Possible Causes	<ul style="list-style-type: none"> • Wiring mistake • Defective sensor • Defective PCB

Trouble shooting:

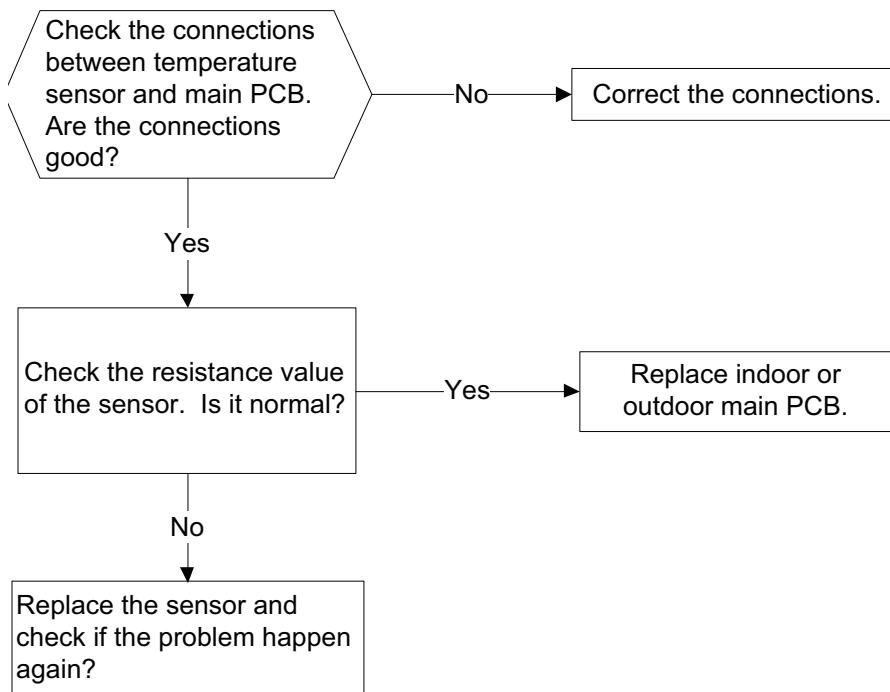


A14485

4 – Evaporator coil temperature sensor Open or short circuited – diagnosis and solution (E6)

Error Code	E6
Malfunction conditions	If the reading voltage is lower than 0.06V or higher than 4.94V, the LED displays the failure.
Possible Causes	<ul style="list-style-type: none">• Wiring mistake• Defective sensor• Defective PCB

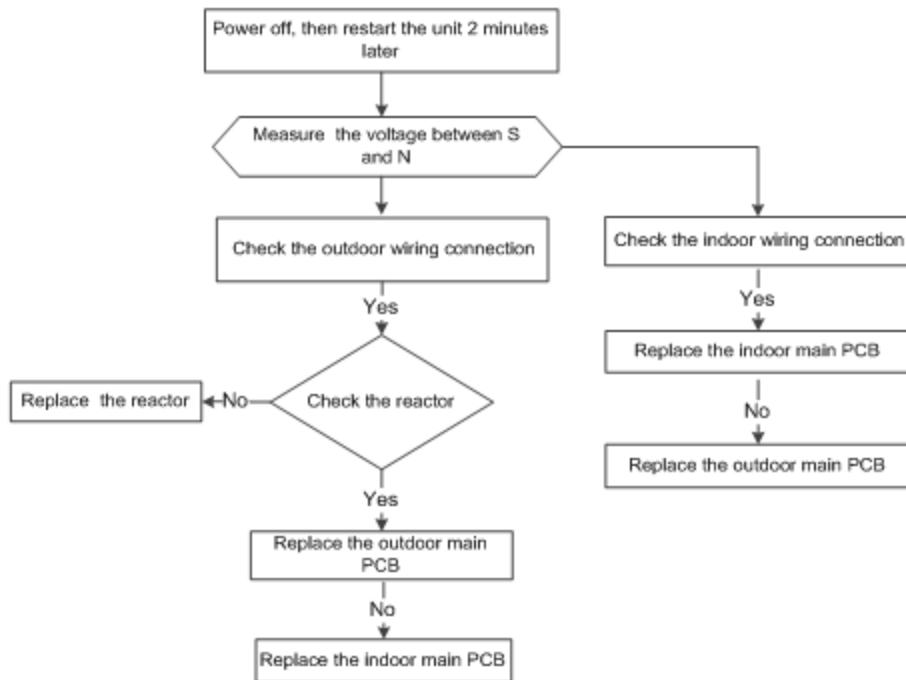
Trouble shooting:



5 – Refrigerant Leakage Detection – diagnosis and solution (EC)

Error Code	EC
------------	----

Trouble shooting:



ADDITIONAL INFORMATION FOR CRITICAL PARTS:

Temperature sensor troubleshooting

Disconnect the temperature sensor from the PCB, and measure the resistance value with a multimeter.

Temperature sensors:

1. Room temperature (T1) sensor,
2. Indoor coil temperature (T2) sensor,
3. Outdoor coil temperature (T3) sensor,
4. Outdoor ambient temperature (T4) sensor,
5. Compressor discharge temperature (T5) sensor

Indoor Fan Motor

Measure the resistance value of each winding by using the multimeter.

APPENDIX

APPENDIX TABLE OF CONTENTS

DESCRIPTION	NUMBER
Control Board Input/Output Values	A1
Temperature Sensor Values (Temperature vs. Resistance) for T1, T2, T3, T4	A2
Temperature Sensor Values (Temperature vs. Resistance) for T5	A3
Indoor Unit Diagnostic Codes	A4

A1

Table 16 – Control Board Input/Output Value

Table 17 – Control Board Input/Output Value - 40MFC(Q)009---1 / 40MFC(Q)012---1

CONNECTOR	CONTROL BOARD INPUT or OUTPUT VALUE
CAP	Capacitor Voltage :AC 230V
CN 6	Fan drive interface Voltage :AC 230V
CN 7	Fan feedback interface Output DC 12V
CN_COMP	Compressor signal Voltage :AC 230V
CN_VALVE	Four way valve signal Voltage :AC 230V
CN_L4	Live wire L Voltage :AC 230V
CN_N1	Null line N Voltage :AC 230V
CN_N2	Null line N Voltage :AC 230V
CN_T0	Transformer secondary interface Output AC 12V
CN_TIN	Transformer primary interface Input AC 230V
CN 3	Pipe temperature interface Output DC 5V
CN 2	Room temperature interface Output DC 5V
CN 5	Display board interface Output DC 5V
CN 10/11	Motor Interface Output DC 12V
CN_SWM	Emergency key interface DC 5V

Table 18 – Temperature Sensor Resistance Value Table for T1, T2, T3, T4

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	115.266	20	68	12.6431	60	140	2.35774	100	212	0.62973
-19	-2	108.146	21	70	12.0561	61	142	2.27249	101	214	0.61148
-18	0	101.517	22	72	11.5	62	144	2.19073	102	216	0.59386
-17	1	96.3423	23	73	10.9731	63	145	2.11241	103	217	0.57683
-16	3	89.5865	24	75	10.4736	64	147	2.03732	104	219	0.56038
-15	5	84.219	25	77	10	65	149	1.96532	105	221	0.54448
-14	7	79.311	26	79	9.55074	66	151	1.89627	106	223	0.52912
-13	9	74.536	27	81	9.12445	67	153	1.83003	107	225	0.51426
-12	10	70.1698	28	82	8.71983	68	154	1.76647	108	226	0.49989
-11	12	66.0898	29	84	8.33566	69	156	1.70547	109	228	0.486
-10	14	62.2756	30	86	7.97078	70	158	1.64691	110	230	0.47256
-9	16	58.7079	31	88	7.62411	71	160	1.59068	111	232	0.45957
-8	18	56.3694	32	90	7.29464	72	162	1.53668	112	234	0.44699
-7	19	52.2438	33	91	6.98142	73	163	1.48481	113	235	0.43482
-6	21	49.3161	34	93	6.68355	74	165	1.43498	114	237	0.42304
-5	23	46.5725	35	95	6.40021	75	167	1.38703	115	239	0.41164
-4	25	44	36	97	6.13059	76	169	1.34105	116	241	0.4006
-3	27	41.5878	37	99	5.87359	77	171	1.29078	117	243	0.38991
-2	28	39.8239	38	100	5.62961	78	172	1.25423	118	244	0.37956
-1	30	37.1988	39	102	5.39689	79	174	1.2133	119	246	0.36954
0	32	35.2024	40	104	5.17519	80	176	1.17393	120	248	0.35982
1	34	33.3269	41	106	4.96392	81	178	1.13604	121	250	0.35042
2	36	31.5635	42	108	4.76253	82	180	1.09958	122	252	0.3413
3	37	29.9058	43	109	4.5705	83	181	1.06448	123	253	0.33246
4	39	28.3459	44	111	4.38736	84	183	1.03069	124	255	0.3239
5	41	26.8778	45	113	4.21263	85	185	0.99815	125	257	0.31559
6	43	25.4954	46	115	4.04589	86	187	0.96681	126	259	0.30754
7	45	24.1932	47	117	3.88673	87	189	0.93662	127	261	0.29974
8	46	22.5662	48	118	3.73476	88	190	0.90753	128	262	0.29216
9	48	21.8094	49	120	3.58962	89	192	0.8795	129	264	0.28482
10	50	20.7184	50	122	3.45097	90	194	0.85248	130	266	0.2777
11	52	19.6891	51	124	3.31847	91	196	0.82643	131	268	0.27078
12	54	18.7177	52	126	3.19183	92	198	0.80132	132	270	0.26408
13	55	17.8005	53	127	3.07075	93	199	0.77709	133	271	0.25757
14	57	16.9341	54	129	2.95896	94	201	0.75373	134	273	0.25125
15	59	16.1156	55	131	2.84421	95	203	0.73119	135	275	0.24512
16	61	15.3418	56	133	2.73823	96	205	0.70944	136	277	0.23916
17	63	14.6181	57	135	2.63682	97	207	0.68844	137	279	0.23338
18	64	13.918	58	136	2.53973	98	208	0.66818	138	280	0.22776
19	66	13.2631	59	138	2.44677	99	210	0.64862	139	282	0.22231

A3

Table 19 – Temperature Sensor Resistance Value Table for T5

°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm	°C	°F	K Ohm
-20	-4	542.7	20	68	68.66	60	140	13.59	100	212	3.702
-19	-2	511.9	21	70	65.62	61	142	13.11	101	214	3.595
-18	0	483	22	72	62.73	62	144	12.65	102	216	3.492
-17	1	455.9	23	73	59.98	63	145	12.21	103	217	3.392
-16	3	430.5	24	75	57.37	64	147	11.79	104	219	3.296
-15	5	406.7	25	77	54.89	65	149	11.38	105	221	3.203
-14	7	384.3	26	79	52.53	66	151	10.99	106	223	3.113
-13	9	363.3	27	81	50.28	67	153	10.61	107	225	3.025
-12	10	343.6	28	82	48.14	68	154	10.25	108	226	2.941
-11	12	325.1	29	84	46.11	69	156	9.902	109	228	2.86
-10	14	307.7	30	86	44.17	70	158	9.569	110	230	2.781
-9	16	291.3	31	88	42.33	71	160	9.248	111	232	2.704
-8	18	275.9	32	90	40.57	72	162	8.94	112	234	2.63
-7	19	261.4	33	91	38.89	73	163	8.643	113	235	2.559
-6	21	247.8	34	93	37.3	74	165	8.358	114	237	2.489
-5	23	234.9	35	95	35.78	75	167	8.084	115	239	2.422
-4	25	222.8	36	97	34.32	76	169	7.82	116	241	2.357
-3	27	211.4	37	99	32.94	77	171	7.566	117	243	2.294
-2	28	200.7	38	100	31.62	78	172	7.321	118	244	2.233
-1	30	190.5	39	102	30.36	79	174	7.086	119	246	2.174
0	32	180.9	40	104	29.15	80	176	6.859	120	248	2.117
1	34	171.9	41	106	28	81	178	6.641	121	250	2.061
2	36	163.3	42	108	26.9	82	180	6.43	122	252	2.007
3	37	155.2	43	109	25.86	83	181	6.228	123	253	1.955
4	39	147.6	44	111	24.85	84	183	6.033	124	255	1.905
5	41	140.4	45	113	23.89	85	185	5.844	125	257	1.856
6	43	133.5	46	115	22.89	86	187	5.663	126	259	1.808
7	45	127.1	47	117	22.1	87	189	5.488	127	261	1.762
8	46	121	48	118	21.26	88	190	5.32	128	262	1.717
9	48	115.2	49	120	20.46	89	192	5.157	129	264	1.674
10	50	109.8	50	122	19.69	90	194	5	130	266	1.632
11	52	104.6	51	124	18.96	91	196	4.849			
12	54	99.69	52	126	18.26	92	198	4.703			
13	55	95.05	53	127	17.58	93	199	4.562			
14	57	90.66	54	129	16.94	94	201	4.426			
15	59	86.49	55	131	16.32	95	203	4.294			
16	61	82.54	56	133	15.73	96	205	4.167			
17	63	78.79	57	135	15.16	97	207	4.045			
18	64	75.24	58	136	14.62	98	208	3.927			
19	66	71.86	59	138	14.09	99	210	3.812			

A4

Table 20 – Indoor Unit Diagnostic Guides

Operation lamp	Timer lamp	Display	LED STATUS
☆1 time	X	E1	Indoor Unit EEPROM parameter error
☆2 times	X	E2	Zero-crossing signal detection error
☆3 times	X	E3	Indoor fan speed has been out of control
☆5 times	X	E5	Open circuit or short circuit of indoor room temperature sensor
☆6 times	X	E6	Open circuit or short circuit of evaporator coil temperature sensor
☆2 times	O	EC	Refrigerant Leakage Detection

O (light) X (off) ☆ (flash)

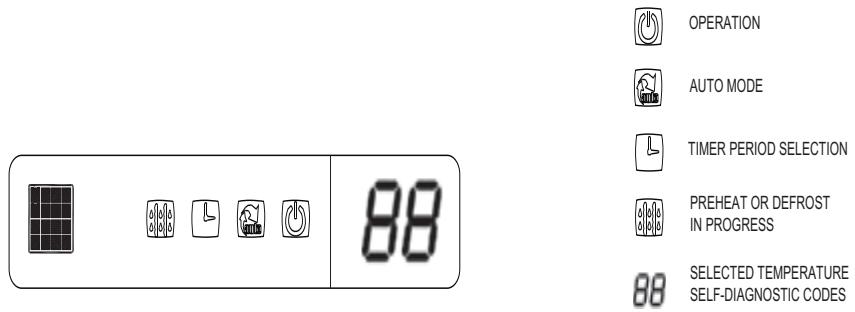


Fig. 21 – Unit Display

Table 21 – Signal Receiver Functions

	ION indication lamp(optional function): This lamp illuminates when Clean Air feature is activated.
	DEFROST indication lamp(For cooling & heating models only): Lights up when the air conditioner starts defrosting automatically or when the warm air control feature is activated in heating operation.
	OPERATION indication lamp: This lamp illuminates when the air conditioner is in operation.
	TIMER indication lamp: Lights up during Timer operation.
	Temperature indicator: Displays the temperature settings when the air conditioner is operational. Displays the malfunction code.

APPENDIX 1

°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-5	23	21	69.8	51	123.8	82	179.6	113	235.4
-4	24.8	22	71.6	52	125.6	83	181.4	114	237.2
-3	26.6	23	73.4	53	127.4	84	183.2	115	239
-2	28.4	24	75.2	54	129.2	85	185	116	240.8
-1	30.2	25	77	55	131	86	186.8	117	242.6
0	32	25.5	77.9	56	132.8	87	188.6	118	244.4
0.5	32.9	26	78.8	57	134.6	88	190.4	119	246.2
1	33.8	27	80.6	58	136.4	89	192.2	120	248
1.5	34.7	28	82.4	59	138.2	90	194	121	249.8
2	35.6	29	84.2	60	140	91	195.8	122	251.6
2.5	36.5	30	86	61	141.8	92	197.6	123	253.4
3	37.4	31	87.8	62	143.6	93	199.4	124	255.2
3.5	38.3	32	89.6	63	145.4	94	201.2	125	257
4	39.2	33	91.4	64	147.2	95	203	126	258.8
4.5	40.1	34	93.2	65	149	96	204.8	127	260.6
5	41	35	95	66	150.8	97	206.6	128	262.4
6	42.8	36	96.8	67	152.6	98	208.4	129	264.2
7	44.6	37	98.6	68	154.4	99	210.2	130	266
8	46.4	38	100.4	69	156.2	100	212	131	267.8
9	48.2	39	102.2	70	158	101	213.8	132	269.6
10	50	40	104	71	159.8	102	215.6	133	271.4
11	51.8	41	105.8	72	161.6	103	217.4	134	273.2
12	53.6	42	107.6	73	163.4	104	219.2	135	275
13	55.4	43	109.4	74	165.2	105	221	136	276.8
14	57.2	44	111.2	75	167	106	222.8	137	278.6
15	59	45	113	76	168.8	107	224.6	138	280.4
16	60.8	46	114.8	77	170.6	108	226.4	139	282.2
17	62.6	47	116.6	78	172.4	109	228.2	140	284
18	64.4	48	118.4	79	174.2	110	230	141	285.8
19	66.2	49	120.2	80	176	111	231.8	142	287.6
20	68	50	122	81	177.8	112	233.6	143	289.4