

**FEDDERS  
LARGE SPLIT UNIT (R407C)  
SERVICE MANUAL**

**ISSUED ON 1 APRIL,2003**

**SECTION A: SPECIFICATIONS**

**SECTION B: PARTS LIST AND EXPLODED VIEWS**

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**SECTION E: WIRING DIAGRAM**

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## SECTION A: SPECIFICATIONS

<b>FEDDERS LARGE SPLIT (R407C) MODEL NUMBER</b>				
Indoor unit	E1FE418N6D	EHFE418N6D	E1FE424N6D	EHFE424N6D
Outdoor unit	E1FC418N6G	EHFC418N6G	E1FC424N6G	EHFC424N6G
<b>PERFORMANCE DATA</b>				
Volts / Hz / Phase	220-240 / 50 / 1	220-240 / 50 / 1	220-240 / 50 / 1	220-240 / 50 / 1
Cooling - BTU/h (kW)	17500 (5.13)	17500 (5.13)	21500 (6.30)	21000 (6.16)
Heating - BTU/h (kW)	--	18300 (5.36)	--	22000 (6.45)
Amps (Cooling / Heating)	9.8	9.8/9.8	11.0	11.2/11.4
Watts (Cooling / Heating)	2060	0.95636026	2400	2400/2550
EER (Cooling)	8.5	8.5/8.4	8.8	8.4/8.6
Indoor Sound Level (dBA)	47	47	47	47
Moisture Removal (Litres/h)	3.0	3.0	3.5	3.5
Air Circulation - CMH (CFM)	850	850/920	830	830/920
Interconnecting Tubing	3/8" & 5/8"	3/8" & 5/8"	3/8" & 5/8"	3/8" & 5/8"
Maximum Tibing Length - m (ft)	15 (49.2)	15 (49.2)	15 (49.2)	15 (49.2)
<b>UNIT DIMENSIONS - mm (inch)</b>				
Indoor Unit : Width	1020(40.16)	1020(40.16)	1020(40.16)	1020(40.16)
Depth	195(7.68)	195(7.68)	195(7.68)	195(7.68)
Height	320 (12.60)	320 (12.60)	320 (12.60)	320 (12.60)
Outdoor Unit : Width	895 (35.2)	895 (35.2)	895 (35.2)	895 (35.2)
Depth	331 (13.0)	331 (13.0)	331 (13.0)	331 (13.0)
Height	623 (24.6)	623 (24.6)	623 (24.6)	623 (24.6)
<b>CARTON DIMENSIONS mm (inch)</b>				
Indoor Unit : Width	1050(41.34)	1050(41.34)	1050(41.34)	1050(41.34)
Depth	290(11.42)	290(11.42)	290(11.42)	290(11.42)
Height	370(14.57)	370(14.57)	370(14.57)	370(14.57)
Outdoor Unit : Width	1070(42.13)	1070(42.13)	1070(42.13)	1070(42.13)
Depth	460(18.11)	460(18.11)	460(18.11)	460(18.11)
Height	735(28.94)	735(28.94)	735(28.94)	735(28.94)
<b>WEIGHTS - kg (lb)</b>				
Indoor Unit : Net Weight	14(30.8)	14(30.8)	14(30.8)	14(30.8)
Shipping Weight	18(39.6)	18(39.6)	18(39.6)	18(39.6)
Outdoor Unit : Net Weight	47(103.4)	47(103.4)	62(136.4)	62(136.4)
Shipping Weight	53(116.6)	53(116.6)	68(149.6)	68(149.6)
<b>CONTAINER LOADING</b>				
20 foot container	60	60	60	60
40 foot container	126	126	126	126
40 foot H.C. container	140	140	140	140

SECTION B: PARTS LIST AND EXPLODED VIEWS

**FEDDERS**  
**LARGE SPLIT AIR CONDITIONER(R407C)**  
**SERVICE PARTS LIST**

**SPECIFICATIONS :**

INDOOR UNIT DIMENSIONS : 1020(40.15")W x 195(7.68")D x 320(12.60")H

OUTDOOR UNIT DIMENSIONS : 895(35.2")W x 331(13.0")D x 623(24.6")H

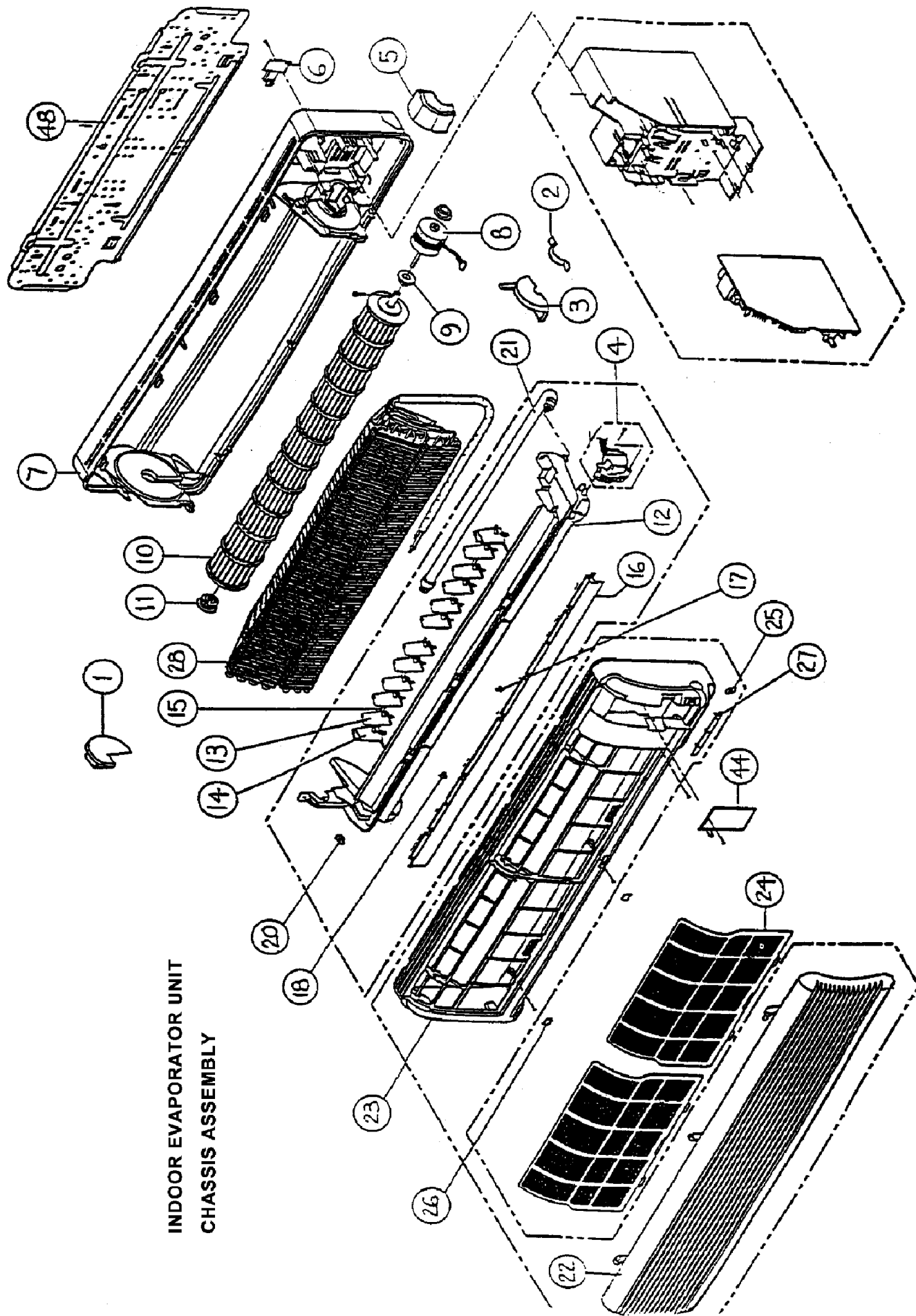
MODEL	R E V	BTU/h (kW)	MODE	Volt / Hz	AT STANDARD AHAM RATING CONDITIONS		EER COOL	REFRIGERANT CHARGE GRAMS OF R-407C
					Amps	Watts		
E1FE418N6D - E1FC418N6G		17500 (5.13)	COOL	220-240 / 50	9.8	2060	8.5	1.43 kg
EHFE418N6D - EHFC418N6G		17500 (5.13)	COOL	220-240 / 50	9.8	2060	8.5	1.50 kg
		18300 (5.36)	HEAT	220-240 / 50	9.8	2154	8.4	--
E1FE424N6D - E1FC424N6G		21500 (6.30)	COOL	220-240 / 50	11.0	2400	8.8	1.55 kg
EHFE424N6D - EHFC424N6G		21000 (6.16)	COOL	220-240 / 50	11.2	2400	8.4	1.70 kg
		22000 (6.45)	HEAT	220-240 / 50	11.4	2550	8.6	--

FEDDERS LARGE SPLIT INDOOR EVAPORATOR UNIT (R407C)			MODEL NUMBER			
			E 1 F E 4 1 8 N 6 D	E H F E 4 1 8 N 6 D	E 1 F E 4 2 4 N 6 D	E H F E 4 2 4 N 6 D
Item No.	Description	Service Part #				
-----CHASSIS ASSEMBLY-----						
1	Lock Plate, Blower Wheel Left	36-08-00010-001	1	1	1	1
2	Lock Plate, Fan Motor, Right	36-08-00020-001	1	1	1	1
3	Lock Plate, Fan Motor, Left	36-08-00030-001	1	1	1	1
4	Motor, Discharge Cover	36-08-00050-001	1	1	1	1
5	Plate protect, Coil Water	36-08-00060-001	1	1	1	1
6	Tube Bracket	36-08-00070-001	1	1	1	1
7	Base Asm. (include PS base, reinforce plate and insulation)	36-08-00080-001	1	1	1	1
8	Fan Motor	35-16-90010-001	1	1	1	1
9	Grommet, Fan Motor	36-08-00100-001	2	2	2	2
10	Blower Wheel, Dia102x763lg, Antimould	36-08-00110-002	1	1	1	1
11	Blower Wheel Grommet Asm (include grommet, bearing)	36-08-00120-001	1	1	1	1
12	Drip Tray (include PS and PE insulation complete)	36-08-00130-001	1	1	1	1
13	Air Deflector	36-08-00140-001	14	14	14	14
14	Handle Air Deflector	36-08-00150-001	2	2	2	2
15	Tie-bar, Air Deflector	36-08-00160-001	2	2	2	2
16	Discharge Cover	36-08-00170-001	1	1	1	1
17	Bearing, Discharge Cover, Mid	36-08-00180-001	2	2	2	2
18	Bearing, Discharge Cover, Left	36-08-00190-001	1	1	1	1
20	Plug, Drip Tray	36-08-00210-001	1	1	1	1
21	Drain Hose Asm. (include drain hose,insulation)	36-08-00220-001	1	1	1	1
22	Decorative Front Grille,Neuter	36-08-00230-N01	1	1	1	1
23	Decorative Front Top Cover	36-08-00240-N01	1	1	1	1

FEDDERS LARGE SPLIT INDOOR EVAPORATOR UNIT (R407C)			MODEL NUMBER			
			E 1 F E 4 1 8 N 6 D	E H F E 4 1 8 N 6 D	E 1 F E 4 2 4 N 6 D	E H F E 4 2 4 N 6 D
Item No.	Description	Service Part #				
<b>-----CHASSIS ASSEMBLY(Cont')-----</b>						
24	Filter	35-16-00010-001	2	2	2	2
NI	3M Purifying Filter	35-03-01460-001	1	1	1	1
NI	Charcoal Purifying Filter	35-03-00260-001	1	1	1	1
25	Lens, Sensor	36-08-00250-001	1	1	1	1
26	Cover, Screw	36-08-00260-001	3	3	3	3
27	Label, LED Lens	36-08-00270-001	1	1	1	1
<b>-----REFRIGERANT ASSEMBLY-----</b>						
28	Evaporator Coil Asm. (include flare fittings, top, bottom & back coil Asm., connecting tubes)	37-16-08540-001	1	1	1	1
<b>-----ELECTRICAL ASSEMBLY-----</b>						
29	Metal Cover, Electrical Box	36-08-00280-001	1	1	1	1
30	Metal Cover, Terminal Connection	36-08-00290-001	1	1	1	1
31	Base, Main PCB	36-08-00300-001	1	1	1	1
32	Electrical Box	36-08-00310-001	1	1	1	1
33	Cover, Electrical Box	36-08-00320-001	1	1	1	1
34	Cover, Terminal Connection	36-08-00330-001	1	1	1	1
35	Strain Relief, Interconnect	36-08-00340-001	1	1	1	1
36	Metal Electrical Box Asm	36-08-00350-001	1	1	1	1
37	Electrical Box, Front	36-08-00360-001	1	1	1	1
38	Holder, Receiver	36-08-00370-001	1	1	1	1
NI	Mount Plate, Terminal Block	35-16-00030-001	1	1	1	1
NI	Terminal Block ,9P	35-03-00540-031	1	1	1	1
39	Cover, LED	36-08-00380-001	1	1	1	1
40	Base, LED	36-08-00390-001	1	1	1	1

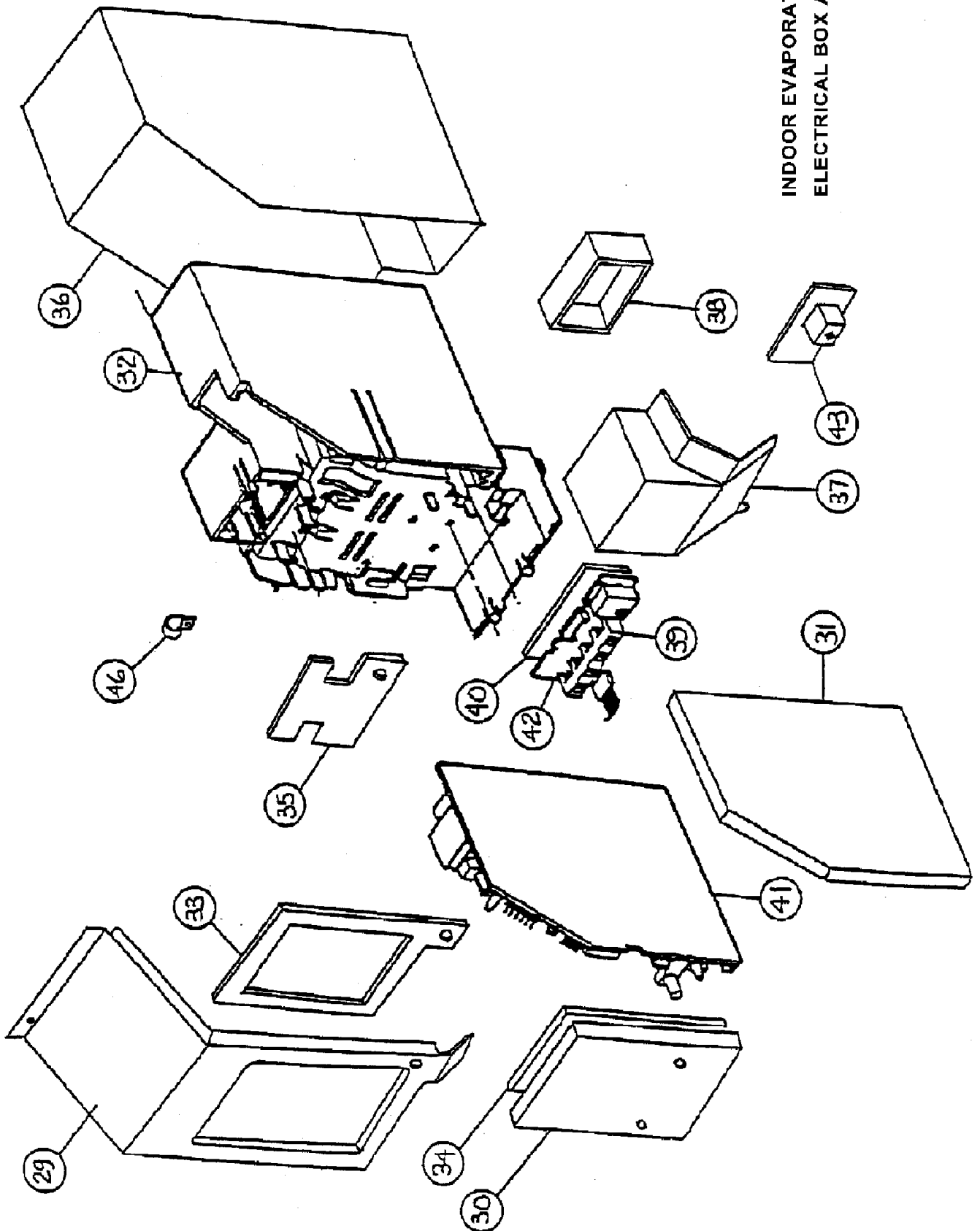


FEDDERS LARGE SPLIT INDOOR EVAPORATOR UNIT (R407C)			MODEL NUMBER			
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Item No.	Description	Service Part #				
-----ELECTRICAL ASSEMBLY(Cont')-----						
41	Main P.C. Board (C/O)	35-16-04160-012	1	--	1	--
41	Main P.C. Board Kit (H/P) (Includes LED, Receiver PCB, All Thermistors, Cables)	50-18-0015N-001	--	1	--	1
42	LED PC Board	35-16-04110-011	1	1	1	1
43	Receiver PC Board	35-16-04120-011	1	1	1	1
44	Wiring Diagram (C/O)	36-08-00420-001	1	--	1	--
44	Wiring Diagram (H/P)	36-08-00430-001	--	1	--	1
NI	Power Cord	36-08-00440-001	1	1	1	1
46	Strain Relief, Power Cord	36-08-00450-001	1	1	1	1
NI	Clip, Thermistor	35-03-01280-001	1	1	1	1
NI	Spring, Thermistor	35-05-00200-001	1	1	1	1
NI	Indoor Air Thermistor,10K	35-11-04140-03K	1	1	1	1
NI	Indoor Coil Thermistor,10K	35-11-04110-03K	1	1	1	1
NI	Outdoor Coil Thermistor, 10K	35-11-04120-03K	--	1	--	1
NI	Jumper, Outdoor Thermistor	35-16-04170-011	--	1	--	1
-----PACKAGING PARTS-----						
48	Mounting Bracket, Unit	36-08-00460-001	1	1	1	1
49	Remote Control (C/O),Neuter	11-23-03640-020	1	-	1	-
49	Remote Control (H/P),Neuter	11-23-03640-021	-	1	-	1
50	Remote Control Holder	35-02-00070-01V	1	1	1	1
51	Packaging Clam Shell	36-08-00400-001	2	2	2	2
52	Carton,Neuter	36-08-00410-001	1	1	1	1
54	Accessory Kit Carton	35-03-00320-001	1	1	1	1
NI	Unit Plastic Bag	35-08-01140-001	1	1	1	1
57	Signal/Thermistor Wire 15M,OD	35-02-01170-02K	-	1	-	1
NI	User Manual	35-03-01350-001	1	1	1	1
NI	Installation Manual	35-24-00130-001	1	1	1	1

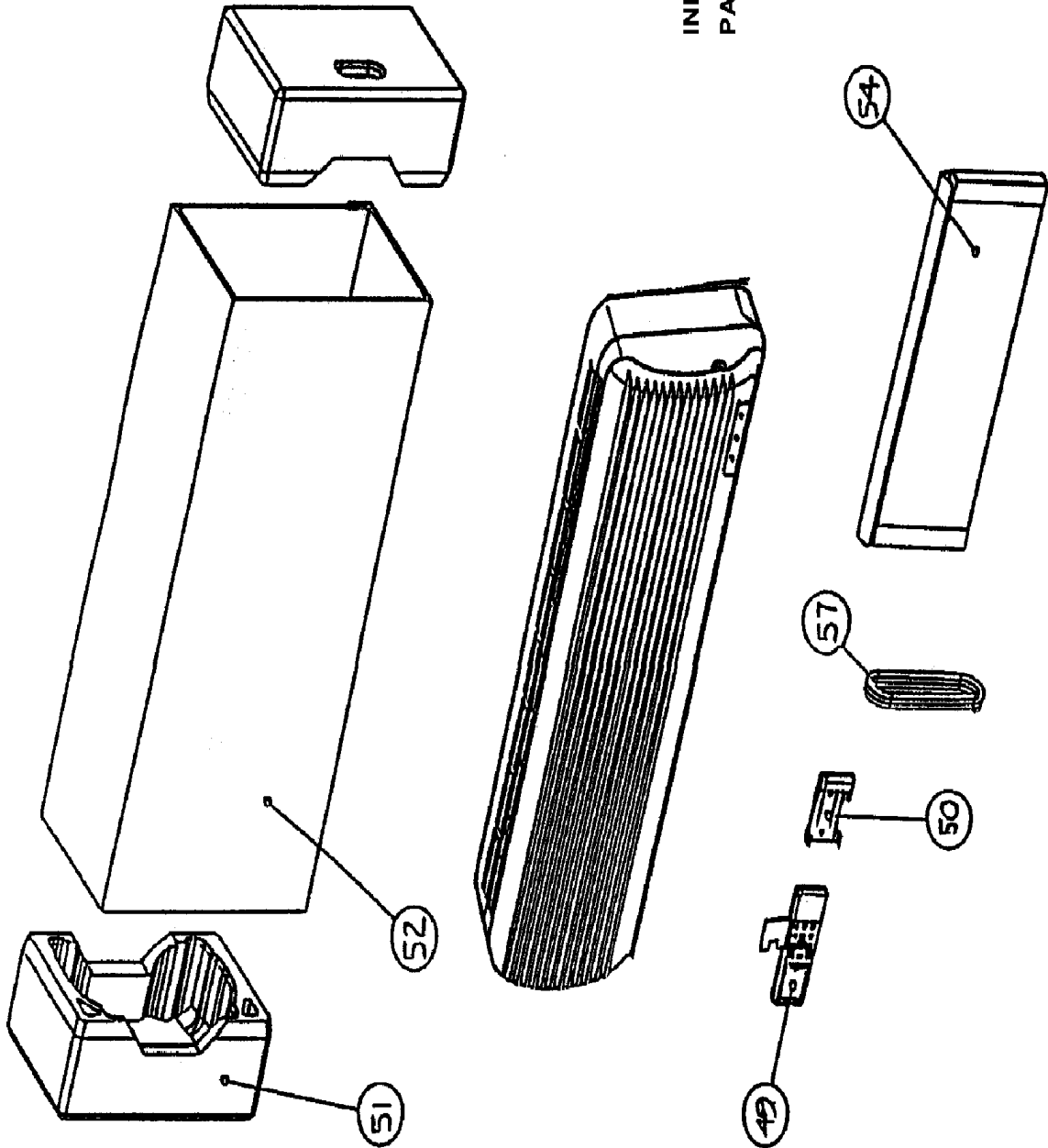


INDOOR EVAPORATOR UNIT  
CHASSIS ASSEMBLY

INDOOR EVAPORATOR UNIT  
ELECTRICAL BOX ASSEMBLY



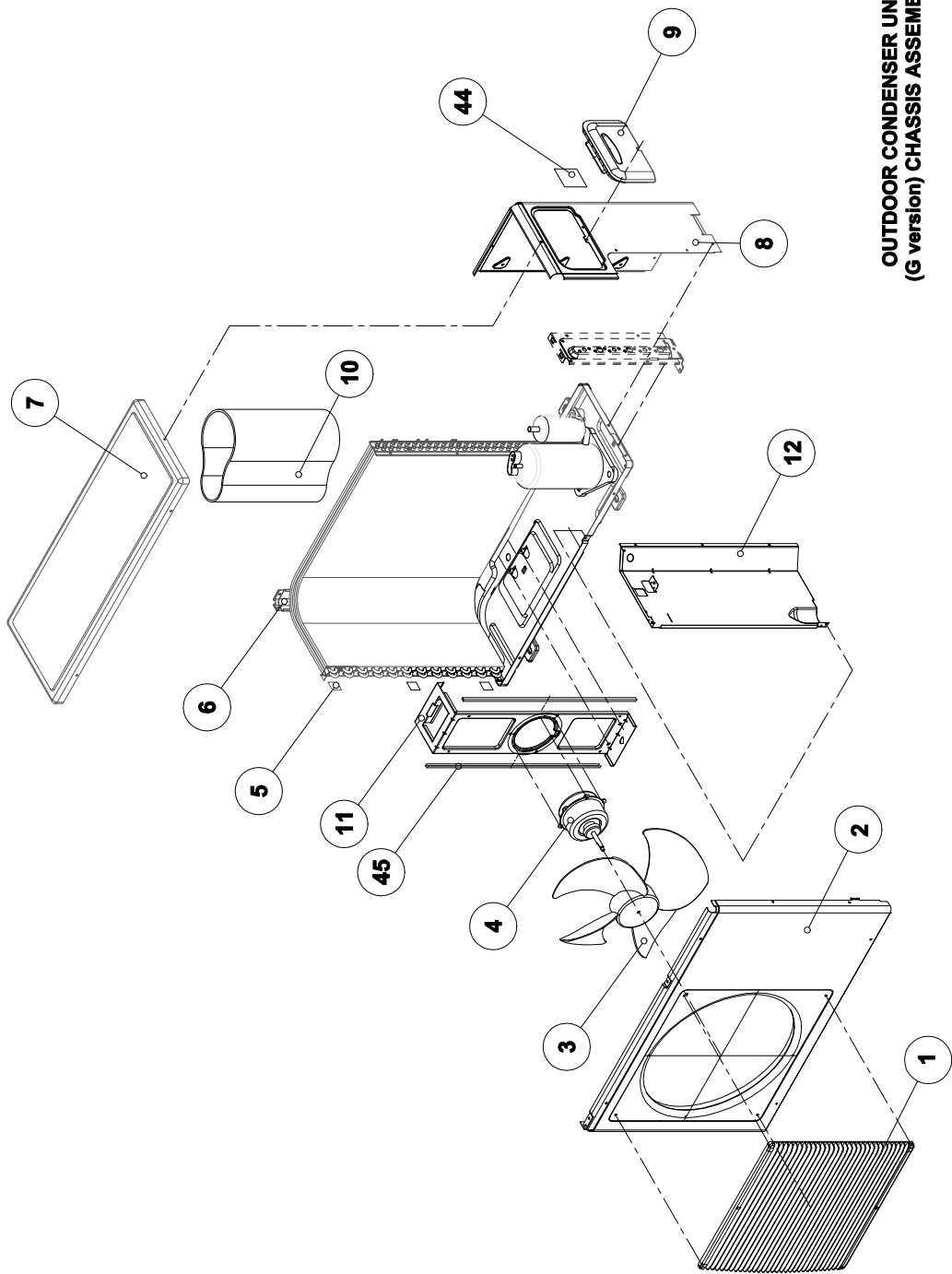
INDOOR EVAPORATOR UNIT  
PACKAGING PARTS



FEDDERS LARGE SPLIT UNIT OUTDOOR CONDENSER UNIT (R407C)			MODEL NUMBER			
			E 1 F C 4 1 8 N 6 G	E H F C 4 1 8 N 6 G	E 1 F C 4 2 4 N 6 G	E H F C 4 2 4 N 6 G
Item No.	Description	Service Part #				
<b>-----CHASSIS ASSEMBLY-----</b>						
1	Front Grille	35-24-05150-001	1	1	1	1
2	Front Panel (painted),Neuter	35-24-05010-083	1	1	1	1
3	Fan Blade	37-24-01010-001	1	1	1	1
4	Fan Motor	35-24-90000-001	1	1	1	1
5	Mesh-Panel (securing)	35-08-02000-001	3	3	3	3
6	Rear Post (painted)	35-24-05050-081	1	1	1	1
7	Top Cover (painted)	35-24-05080-083	1	1	1	1
8	Side Panel (painted)	35-24-05060-081	1	1	1	1
9	Service Cover	35-24-05140-001	1	1	1	1
10	Compressor Blanket	35-05-00190-001	1	1	1	1
11	Motor Mounting Bracket (Painted)	35-24-05090-081	1	1	1	1
12	Partition (Asm with foam seal)	37-24-08130-001	1	1	1	1
44	Wiring Diagram (C/O)	35-24-00100-003	1	--	1	--
44	Wiring Diagram (H/P)	35-24-00120-003	--	1	--	1
45	Mounting Bracket Reinforced	37-24-05010-081	2	2	2	2
<b>-----REFRIGERANT ASSEMBLY-----</b>						
13	Base Pan Asm. (1-48 Frame)	35-24-08010-084	1	1	--	--
	Base Pan Asm. (Bristol) (include base pan and mounting legs - painted)	35-24-08010-081	--	--	1	1
14	Service Valve Plate (painted)	35-24-05100-083	1	1	1	1
15a	3-Way Service Valve, 5/8"	37-24-06010-003	1	1	1	1
15b	2-Way Service Valve, 3/8"	37-24-06020-002	1	1	1	1

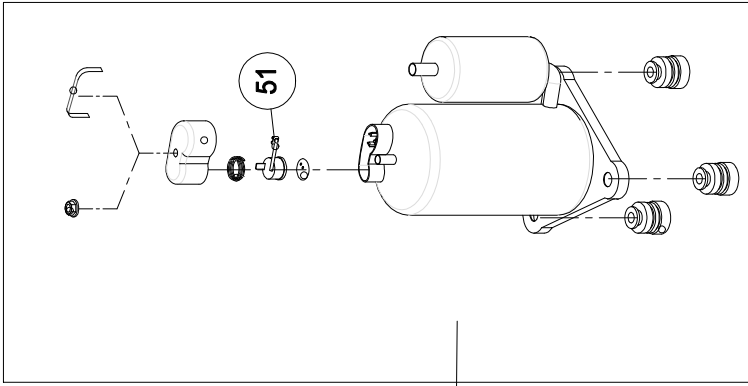
FEDDERS LARGE SPLIT UNIT OUTDOOR CONDENSER UNIT (R407C)			MODEL NUMBER			
			E 1 F C 4 1 8 N 6 G	E H F C 4 1 8 N 6 G	E 1 F C 4 2 4 N 6 G	E H F C 4 2 4 N 6 G
Item No.	Description	Service Part #				
-----REFRIGERANT ASSEMBLY(Cont')-----						
16	Capillary Tube, 0.064" ID x 13"	S0-02-C0002-N14	1	1	1	1
17	Condenser Assembly, Inner (14FPI)	35-24-08020-002	1	1	1	1
18	Condenser Assembly, Outer (14FPI)	35-24-08030-002	1	1	1	1
19	Plastic Coil Protection Mesh	37-24-01020-001	1	1	1	1
20	Compressor Kit '( with accessories)	50-16-0114N-001	1	1	--	--
	Compressor Kit '( with accessories)	50-16-0115N-001	--	--	1	1
24	Reversing Valve	37-03-08190-001	--	1	--	1
25	Crankcase Heater	35-11-00340-009	--	1	--	--
	Crankcase Heater	35-11-00340-010	--	--	--	1
47	Check Valve	36-08-00580-001	--	1	--	1
51	Overload Protect (DB35-00011C)	35-05-00620-001	1	1	-	-
70	Filter-Drier	37-01-05010-001	1	-	1	-
70	Filter-Drier	37-24-06110-001	-	1	-	1
NI	Strainer	88-60-00220-007	1	1	1	1
-----ELECTRICAL ASSEMBLY-----						
26	Terminal Block, 3 Pole	35-03-00570-001	1	--	1	--
	Terminal Block, 5 Pole	35-03-00580-001	--	1	--	1
27	Control Box	35-24-05040-001	1	1	1	1
28	Fan Motor Capacitor, 3uF	16-05-00750-002	1	1	1	1
29	Compressor Capacitor, 40uF/440V	16-05-00730-132	1	1	1	1
30	Strap, Capacitor	35-05-00240-001	1	1	1	1
31	Start Assist	16-06-03480-001	1	1	1	1
32	Strain Relief (Multi Usage Type)	35-03-25060-001	2	2	2	2
33	Thermostat-Bimetal	11-23-03950-001	--	1	--	1

FEDDERS LARGE SPLIT UNIT OUTDOOR CONDENSER UNIT (R407C)			MODEL NUMBER			
			E 1 F C 4 1 8 N 6 G	E H F C 4 1 8 N 6 G	E 1 F C 4 2 4 N 6 G	E H F C 4 2 4 N 6 G
Item No.	Description	Service Part #				
-----PACKAGING PARTS-----						
34	Carton,Neuter	35-24-00070-N01	1	1	1	1
35	EPS Pad, Top Left	35-24-00030-001	1	1	1	1
36	EPS Pad, Top Right	35-24-00040-001	1	1	1	1
37	EPS Tie-bar	35-08-02060-001	1	1	1	1
38	EPS Side Post	35-24-00020-001	2	2	2	2
39	EPS Side Pad	35-24-00050-001	1	1	1	1
40	EPS Bottom Pad	35-24-00060-002	1	1	1	1
41	Carton Box Base	35-24-00080-001	1	1	1	1
42	Drain Adapter Kit (include drain adapter, gasket)	35-08-00820-001	1	1	1	1
43	Rubber Damper Feet	35-24-00010-001	4	4	4	4
66	Plastic Bag	35-08-00540-001	1	1	1	1

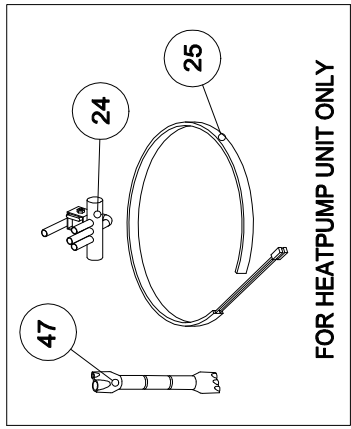
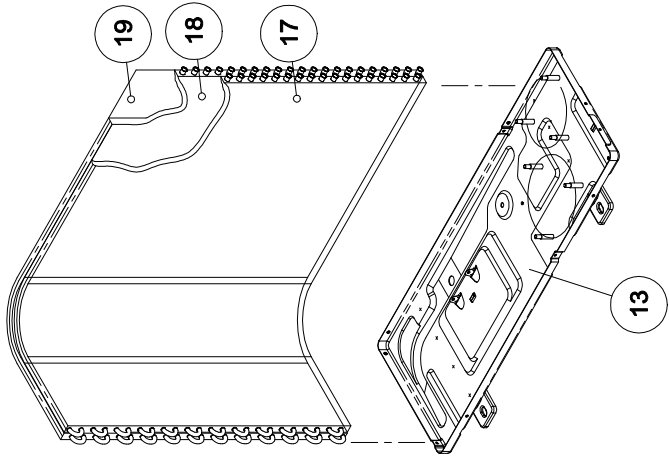
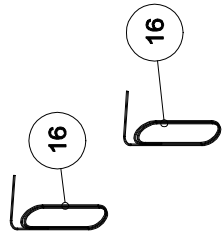


**OUTDOOR CONDENSER UNIT  
(G version) CHASSIS ASSEMBLY**

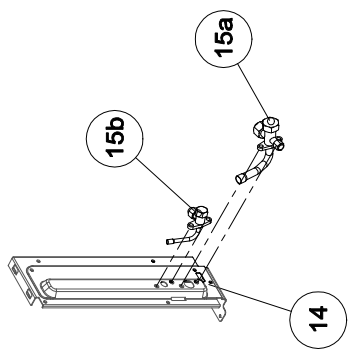




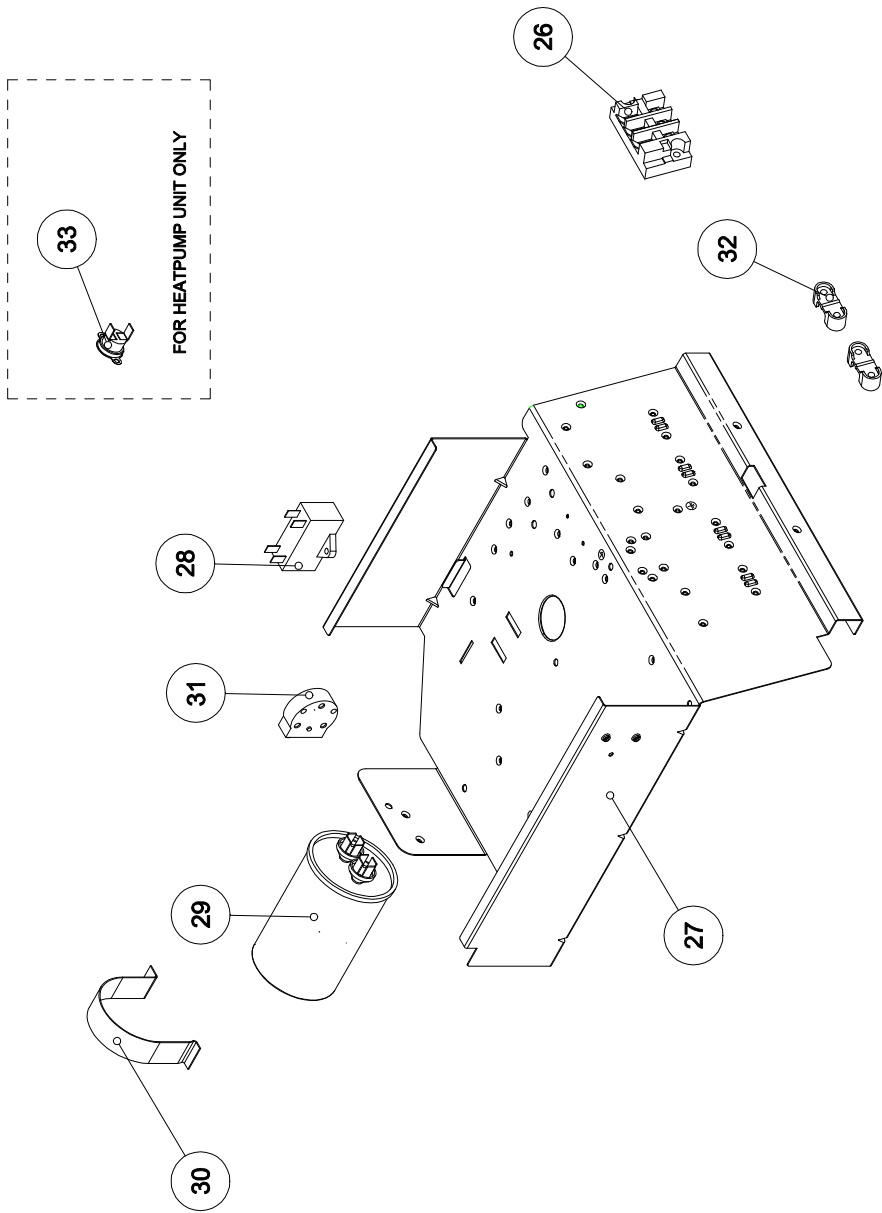
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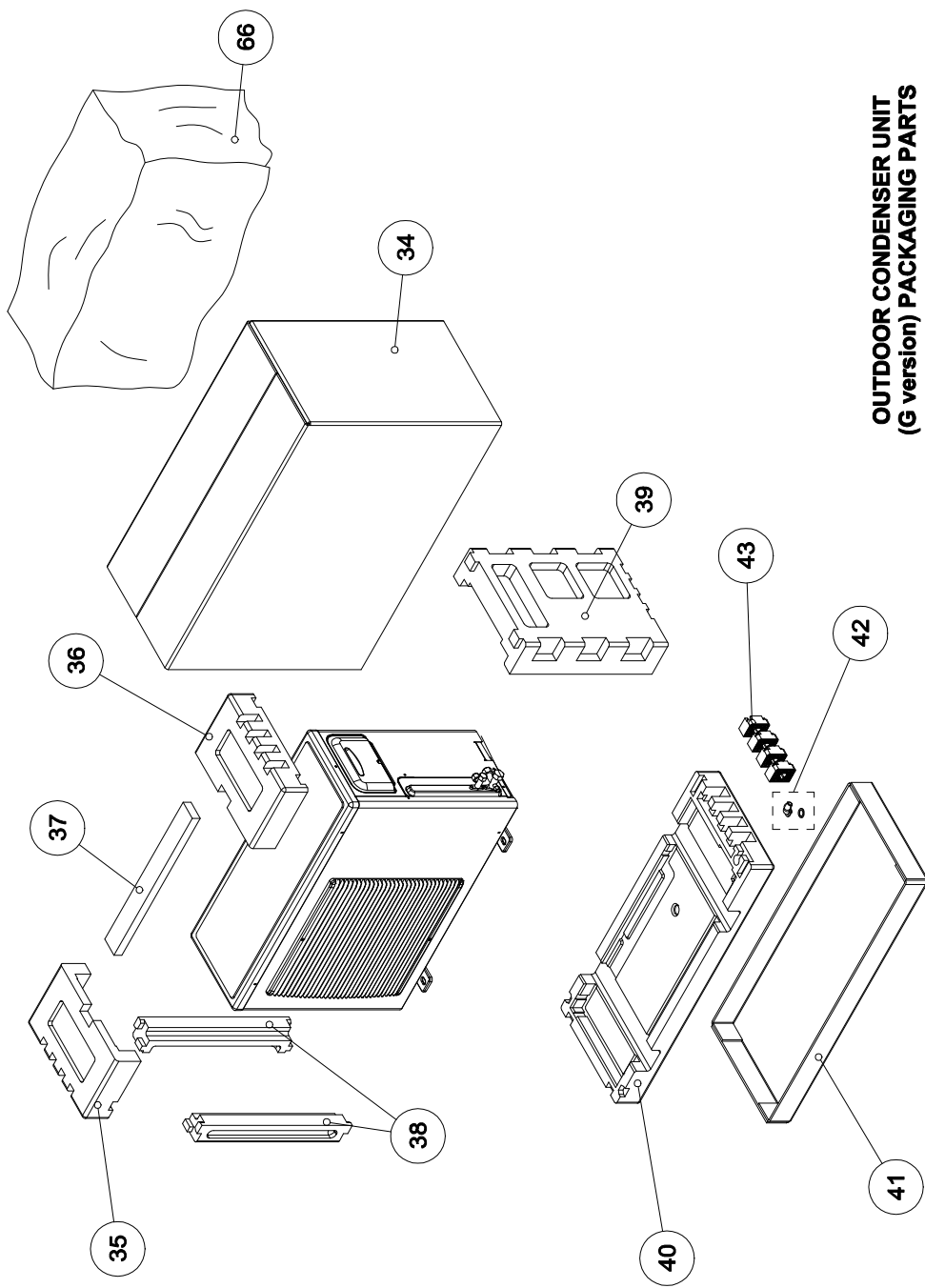
FOR HEATPUMP UNIT ONLY



**OUTDOOR CONDENSER UNIT  
(G version) REFRIGERANT ASSEMBLY**



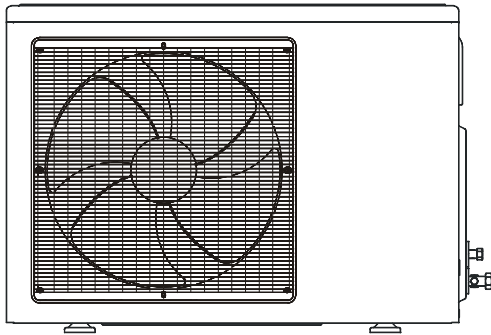
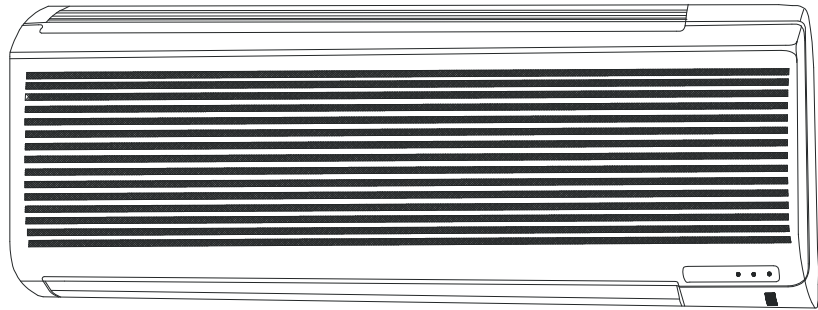
**OUTDOOR CONDENSER UNIT  
(G version) ELECTRICAL ASSEMBLY**



**OUTDOOR CONDENSER UNIT  
(G version) PACKAGING PARTS**

## SECTION C: INSTALLATION

# SPLIT TYPE AIR CONDITIONER INSTALLATION MANUAL



For 18,000 - 24,000 Btu

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## SAFETY PRECAUTION

- Please read the “Safety Precaution” carefully before installing the unit.
- Pay special attention to signs of “WARNING” and “CAUTION”. The “Warning” section contains matters which, if not observed strictly, may cause death or serious injury. The “Caution” section contains matters which may result in serious consequences if not observed properly. Please follow all instructions strictly to help ensure your safety.



### **WARNING**

- **We recommend that you ask a qualified technician to install your air conditioner in accordance with this Installation Manual.**
- **Read this manual carefully before using your air conditioner.**
- **All wiring must conform to local and national electrical codes.**
- **To avoid possible electrical shock, you must ground your air conditioner.**
- **This air conditioner requires a separate power supply on a separate fused circuit.**
- **If the supply cord is damaged, it must be replaced by a qualified technician.**
- **Do not disconnect or connect the power plug during operation.**
- **Do not insert your finger, a stick or any object into the air inlet and air outlet.**

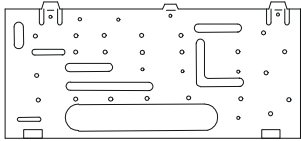
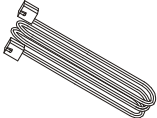
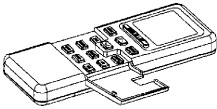


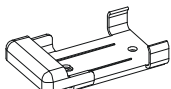

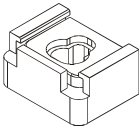
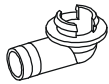



### **CAUTION**

- **Keep this manual for future reference as it contains important installation and safety instructions.**
- **Do not install the outdoor condensing unit near flammable gas. The condensing unit may catch fire if flammable gas leaks.**
- **Do not connect the power plug with wet hands.**
- **Do not expose your skin directly to the airflow for a long time.**

## PART LISTS

A number of small parts have been packed with the indoor unit. Please check the contents of the box with the list below.

Description		Quantity
<i>Wall Bracket</i>		1
<i>Indoor To Outdoor Signal Connecting Wire (For Heat-pump Model Only)</i>		1
<i>Remote Control</i>		1
<i>AAA batteries</i>		2
<i>Screws for Remote Control Holder</i>		2
<i>Remote Control Holder</i>		1
<i>Screws for Wall Mounting Bracket</i>		6
<i>Base Leg Damper</i>		4
<i>Drain Adapter</i>		1
<i>Drain Gasket</i>		1

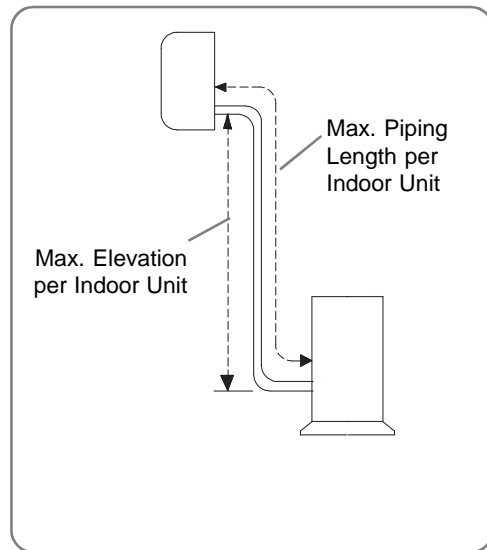


## PREPARATION OF PIPING

### Pipe Length, Elevation and refrigerant charge

- Each outdoor unit comes with a refrigerant charge that is sufficient for use with interconnecting tubing up to 7.5 metres.
- If the required interconnecting tube exceeds 5 metres, for each additional metre, add the amount of refrigerant according to the table as shown below.

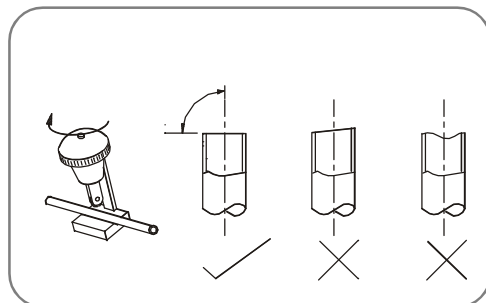
Liquid Pipe Size	Additional Refrigerant
1/4"	21 g/m
3/8"	57 g/m



- The recommended maximum allowable tubing length between indoor and outdoor is 15 metres.
- The recommended maximum allowable elevation between indoor and outdoor is 5 metres.

### Cutting The Pipe And The Cables.

- Measure the distance between the indoor and the outdoor units.
- Cut the pipe length about 10% more than the measured distance.
- Cut the electrical cable with about 2 metres more than the measured distance.



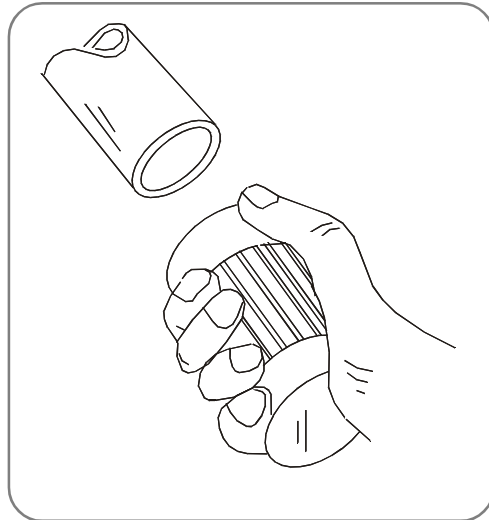
### Removing burrs

- Remove burrs from the cut edges of the pipes.
- Turn the pipe end down to avoid the metal powder entering the pipe.



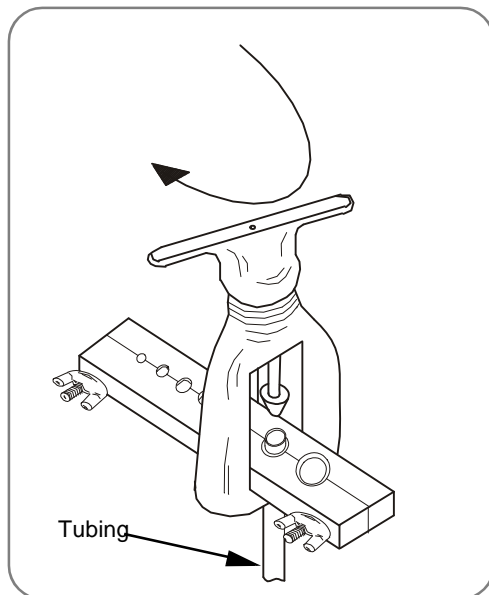
#### **CAUTION :**

**If burrs are not removed, they may cause a gas leakage when in operation.**



### Flaring of pipe

- Insert the flare nut or coupling nut over the tubing with the threaded end facing the end of the tubing.
- Clamp the tube in the flaring block, adjust the tube so that it is slightly above the block (about 1/3 of the total height of the flare).
- Place the yoke on the block with the taper cone over the end of the tube.
- Turn the handle until the flare is completed.
- Check for proper flaring of the tube. A properly flared tube should be of even thickness and evenly shine.



#### **CAUTION :**

**Any bend in the tubing must have a minimum radius of 100mm to prevent leakage.**

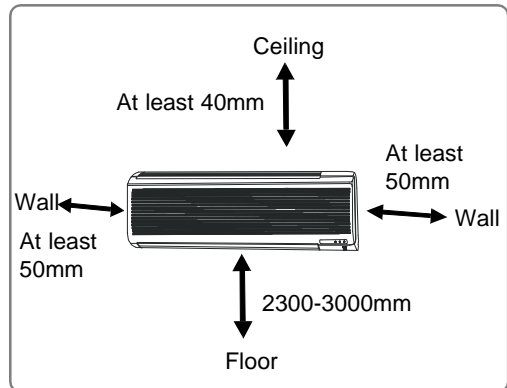
**Do not bend any section of the tube repeatedly.**

**Do not remove the flare nut from the tubing in the indoor unit until you are ready to connect it to the outdoor unit.**

## INDOOR UNIT INSTALLATION

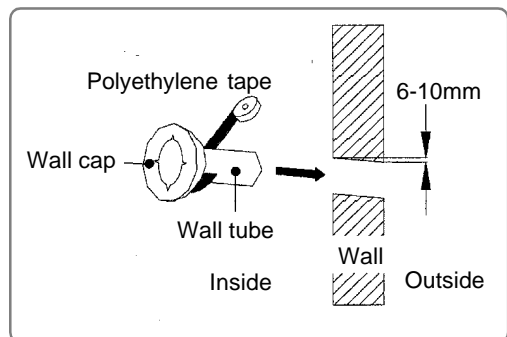
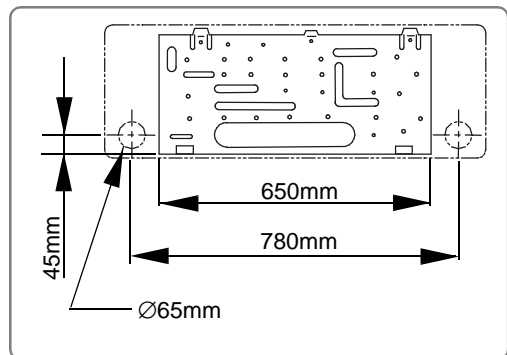
### Locating the indoor unit

- Do not install the unit near any heat source, steam source or flammable gas source.
- Locate the unit in a place where it will provide cool air throughout the room.
- Make sure the minimum distances from the walls and obstructions are maintained as shown on the right.
- Ensure that the unit's airflow is not obstructed.
- Place the unit so that the air filter can be removed easily and maintenance work can be carried out without obstructions.



### Installing the wall bracket & drilling the piping hole.

- Mount the wall bracket in a level angle.
- Secure the bracket directly on the wall.
- If you are mounting the bracket on plaster board, use the tapping screws provided to secure the bracket on to the wall.
- If you are mounting the bracket on a concrete wall, use anchor bolts to secure the bracket to the wall.
- If you are using the Right or Left back outlet, see page 8, drill a 65mm diameter piping hole at either on the right or the left, and the hole should be slightly slanted to the outdoor side.
- Cut the wall tube (not provided) to fit the wall thickness.
- Connect the wall cap (not provided) to the wall tube with polyethylene tape and insert the tube in the wall.

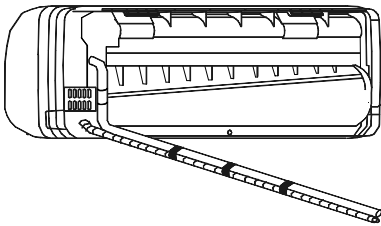


## Removing The Decorative Front

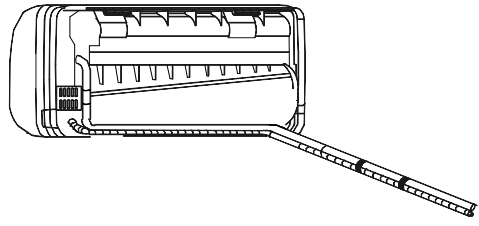
- Remove the Decorative Front by removing 3 screws.
- Remove it by lifting it up and then out.

## Routing the drain hose and tubing

- The following illustrate the different piping outlet option.

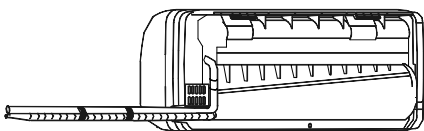


*Right Back Outlet*

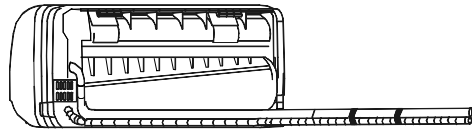


*Left Back Outlet*

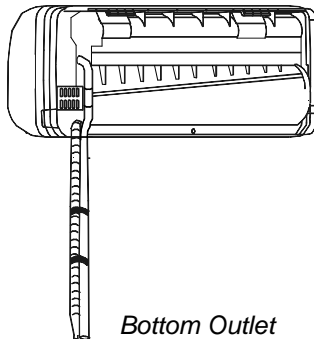
If you are using the following outlet option, you must wire the indoor unit before attaching it to the wall bracket.



*Right Outlet*



*Left Outlet*



*Bottom Outlet*



### **CAUTION :**

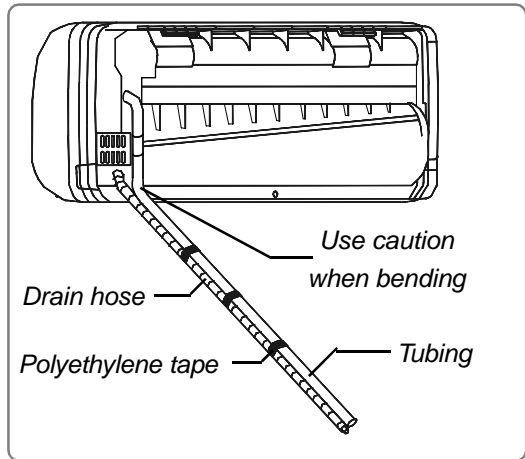
**Do not remove the flare nut from the tubing in the indoor unit until you are ready to connect it to the outdoor unit.**

**Bend tubes with caution.**

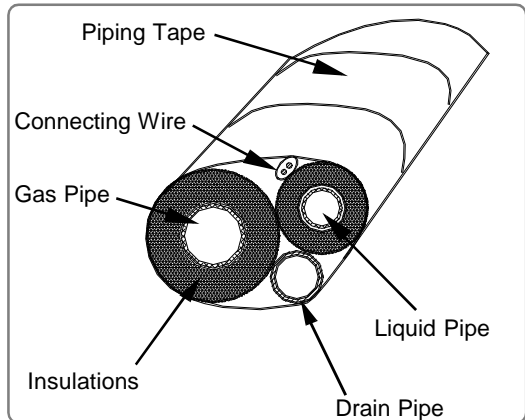
## INDOOR UNIT INSTALLATION

### Sealing The Drain Hose And Tubing

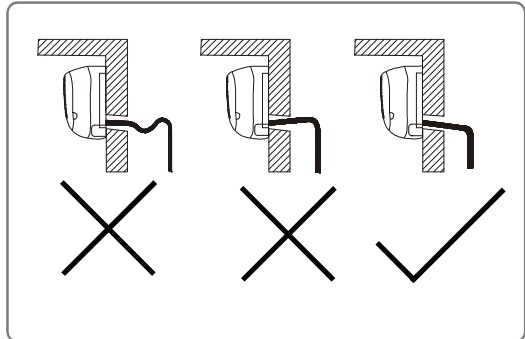
- Wrap the drain hose, tubing and electric wire together with polyethylene tape.
- Wrap all exposed tubing with tape except tubing, which will rest inside the unit.



- Insert the tubing, hose and wire through the wall tube with the drain hose in the lowest position.



- Make sure the tubing, hose and wire angle downwards as they pass through and exit the wall tube.

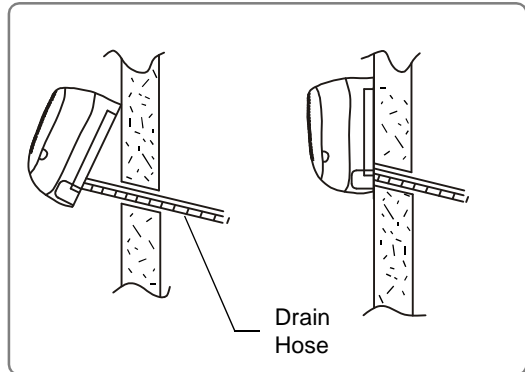


## INDOOR UNIT INSTALLATION

### Attaching The Unit To The Wall Bracket

If you are using right, left or bottom piping outlet (see page 8) you must wire the unit before you attach it to the wall bracket.

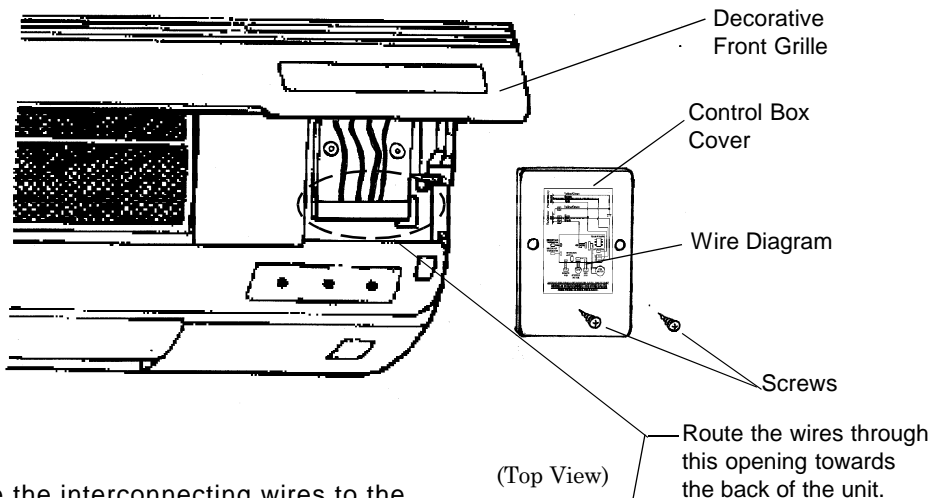
- Hook the unit to the hangers on top of the bracket first and then press the lower left and right side of the unit against the wall bracket until it is seated properly.
- Ensure that the unit is level.
- Ensure that the drain hose is in the proper position.



### Wiring The Indoor Unit

You may connect the wires to the indoor unit by opening the Decorative Front Grille.

- Remove 2 screws that secure the Control Box Cover.
- Connect the wire as shown on the wire diagram located on the control box cover or refer to the Wiring Diagram Section in this manual.



- Route the interconnecting wires to the back through the opening in the front as shown.
- Ensure all terminals are securely tightened.

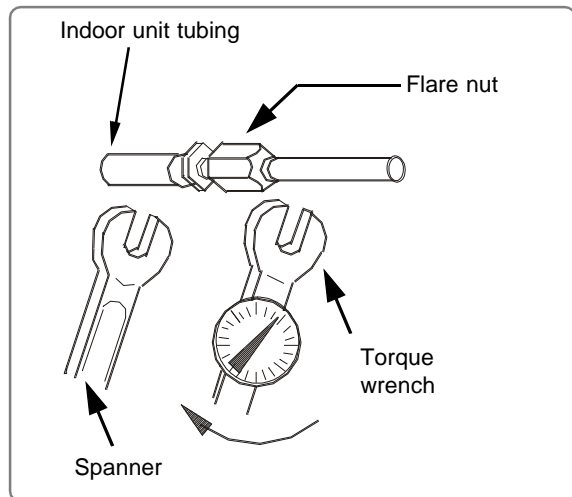


## Connecting The Piping To The Indoor Unit

- Align the center of the piping and then sufficiently tighten the flare nut with fingers, tighten the flare nut with torque wrench according to the table as shown below.

Pipe Size Diameter	Torque (N.m)
9.52mm (3/8")	35.6 - 44.4
15.87mm (5/8")	58.7 - 73.2

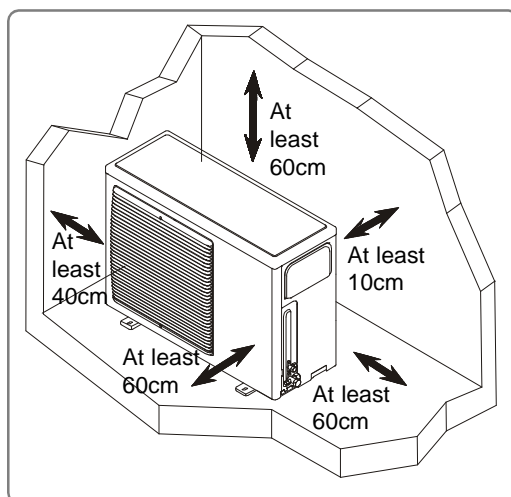
Torque Table



## OUTDOOR UNIT INSTALLATION

### Locating the outdoor unit

- Locate the outdoor unit where the air flow around it is not obstructed.
- Ensure that the base is level and does not exceed the maximum slope of 5 degrees.
- Secure the unit to a base with anchor bolts to reduce vibrations and noise.
- Place the unit with access space for servicing and maintenance.
- Do not install the unit near a heat source, steam source and flammable gas.
- Ensure that the minimum distances around the unit are maintained as shown on the right.
- For Heatpump unit, mount the unit above the snow line, if possible.

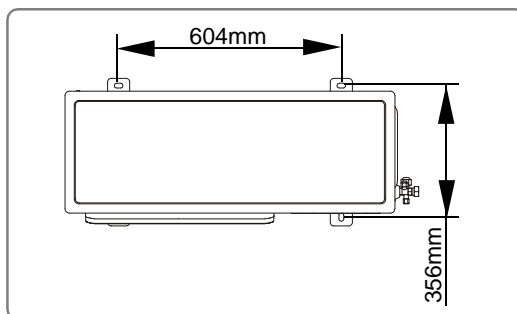
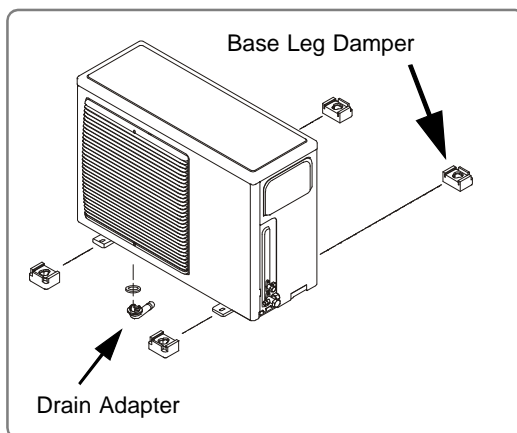




## OUTDOOR UNIT INSTALLATION

### Installing The Outdoor Unit

- Attach the Base Leg Damper by sliding the slot into the base of the outdoor unit.
- Attach the drain gasket and drain adapter to the base pan of the unit before you secure the unit.
- Fasten the unit down, referred to the mounting dimensions as shown here.

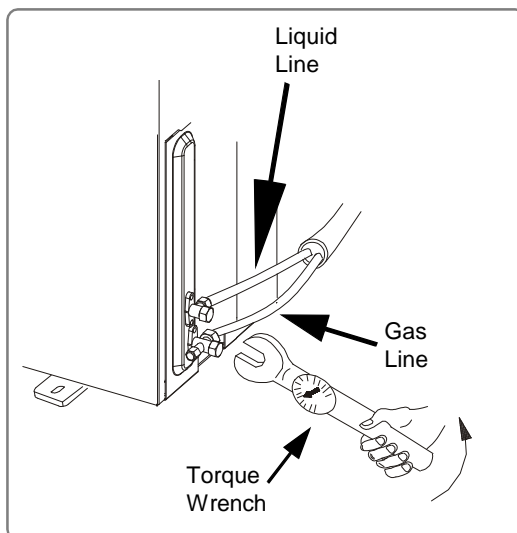


### Connecting The Pipe To The Outdoor Unit

- Align the center of the piping and sufficiently tighten the flare nut with fingers.
- Finally, tighten the flare nut with torque wrench according to the Table shown here.

Pipe Size Diameter	Torque (N.m)
9.52mm (3/8")	35.6 - 44.4
15.87mm (5/8")	58.7 - 73.2

Torque Table



## OUTDOOR UNIT INSTALLATION

### Connecting The Wires To The Outdoor Unit

- Remove the Service Cover from the unit.
- Connect the wires to the terminals according to the wiring diagram shown in the wiring diagram section or at the back of the Service Cover.
- Clamp the wire to the unit with the wire retainer.
- Form a drip loop in the wire to prevent water from entering the unit along the cord.

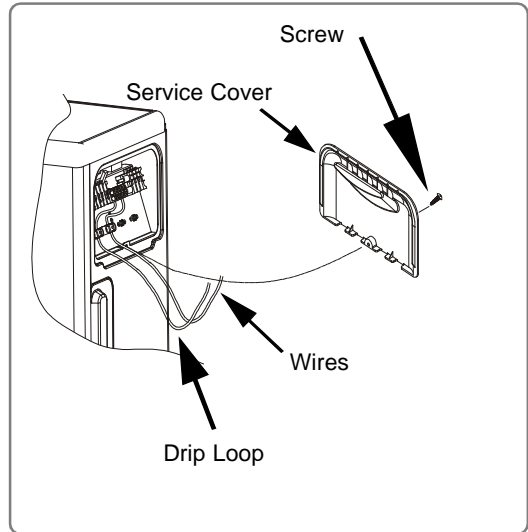
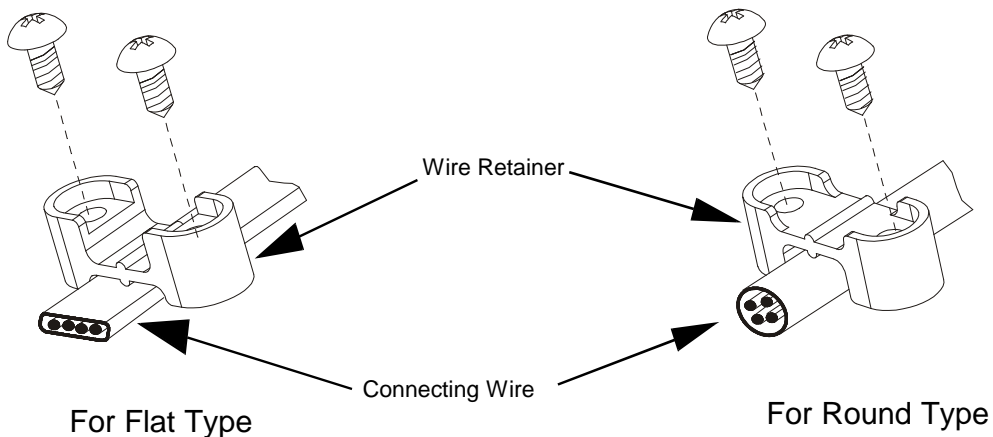


#### Caution

**This air conditioner must be disconnected from the supply by a switch having a 3mm contact separation in all poles.**

**For Heat-Pump model : Route the Outdoor Coil Thermister Wires separately from high voltage interconnecting cables.**

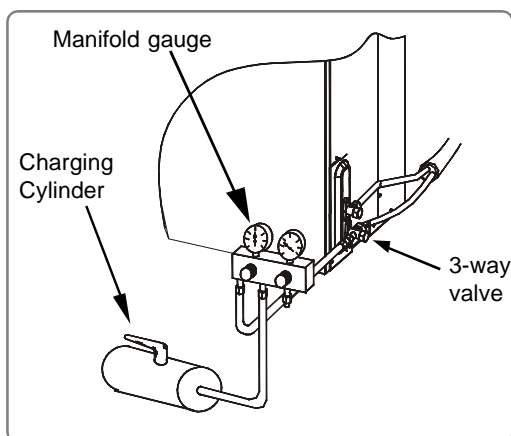
- The same Wire Retainer can be used on two types of wires by changing the orientation as shown below.



## VACUUMING THE PIPING & THE INDOOR UNIT

### Checking for gas leakage

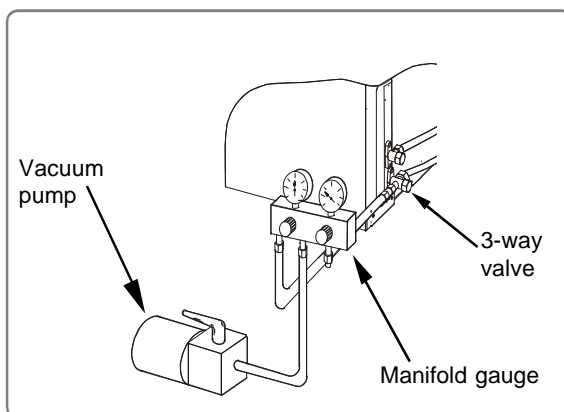
- Connect the Manifold gauge to the outdoor unit gas line port as shown on the right.
- Connect the charging cylinder to the Manifold gauge and open the valve of the Cylinder.
- Open the low pressure valve of the Manifold gauge until the meter reads steady at about 150-200 psig.
- Check for gas leakage especially around the tubing connectors with a gas-leak detector.
- If leakage was found, retighten the connector with Torque wrench and repeat the gas leakage check again.
- Upon completion of the leak test, close the valve of the charging cylinder and low side valve of the manifold gauge. Remove charging cylinder. Recover refrigerant from indoor unit and piping through the manifold gauge.



### Removing air from the tubing and indoor unit

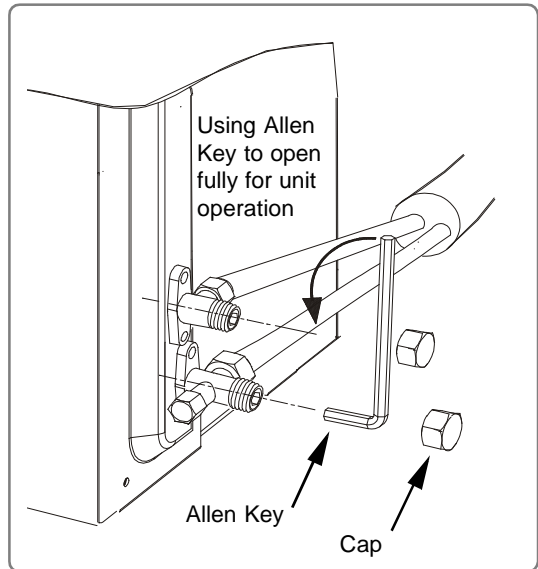
It is necessary to remove all air from the Refrigeration Cycle, as this air contains moisture, which may cause a malfunction or ineffectiveness of the compressor.

- Connect the center hose of the Manifold gauge to the vacuum pump.
- Connect the Manifold gauge to the outdoor unit gas line port as shown.
- Turn the vacuum pump on for about 10-15 minutes in order to evacuate the air.
- Close the manifold valve, then turn off the vacuum pump and disconnect the hose.



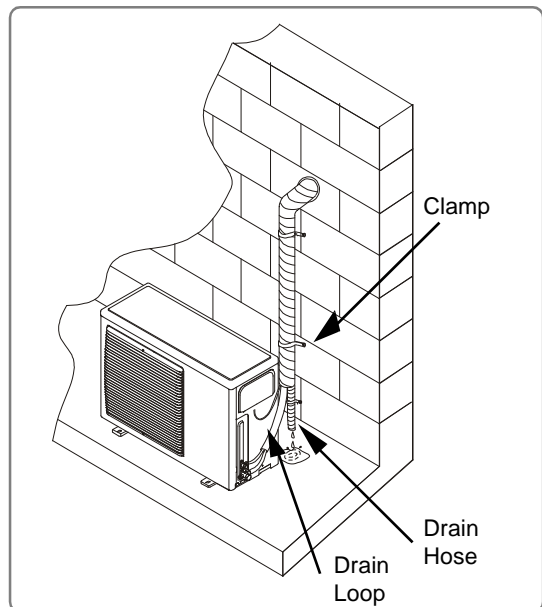
## VACUUMING THE PIPING & THE INDOOR UNIT

- Unscrew the cap on the 2-way and 3-way valve.
- After all lines are installed and leak tested, set both the liquid and gas line valves to fully open position with the Allen Key for the unit operation, as shown.
- Reinstall the cap and torque to the specified value under Torque Table on page 10.



### Restraining the piping

- Wrap the tubing connection to the unit with the insulation and seal it with polyethylene tape.
- You may connect an additional drain hose. The end of the drain outlet should keep a distance from the ground.
- Tape the connecting piping, drain hose and wires with polyethylene tape from bottom upwards to the top, and secure them to the wall.
- Fill any gap in the wall that has been core drilled.
- Form a drip loop on the electrical cable to prevent water entering the electrical compartment.



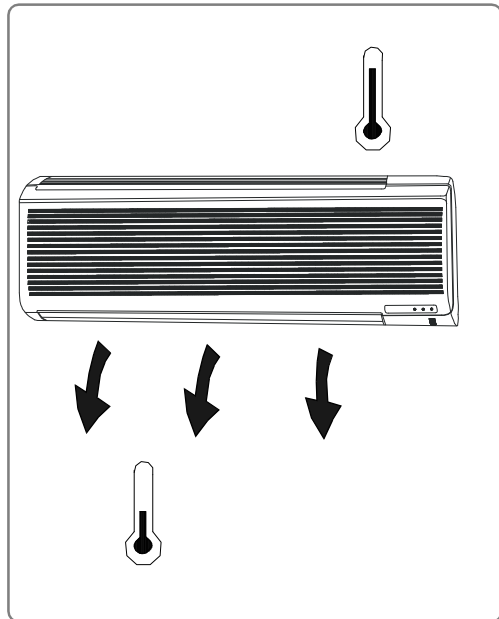
### Switch On The Power Supply



#### **CAUTION :**

**Ensure that all the piping and wiring are connected properly and securely, before turning the power On.**

- Turn the main switch of the unit to On.
- Operate the Indoor unit at Cooling/Heating mode for fifteen minutes or more.
- Measure the temperature of the intake and the discharge air, the temperature difference should be at least 9°C.



### **Checking The Unit**

- Check all the control functions.
- Check all the indicator lights.
- Check that the drain hose is draining properly.
- Ensure all the units are fastened properly and free from vibrations.

### **Upon completion of installing and checking the unit:**

- Supply the consumer with the Operating Manual.
- Demonstrate the functions of the remote control.
- Demonstrate how to remove and clean the air filters.
- Explain the 3 minute delay function.

## SECTION D: TROUBLE SHOOTING

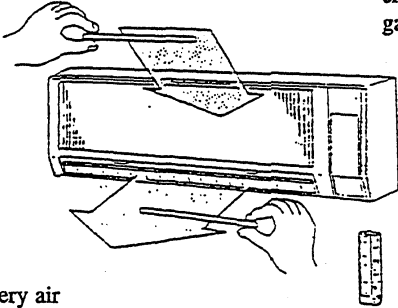
## BASIC TROUBLE SHOOTING (Refrigerant System)

Checking for refrigerant gas shortage during cooling.

Measuring methods

**1**

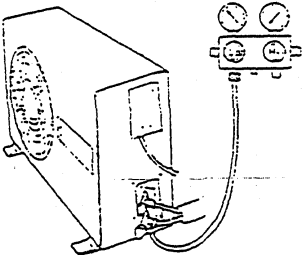
- o Measure entering air (intake) temperature.
- o Check conditions of the evaporator
- o Measure delivery air temperature.



- o Temperature difference shall be at least 10°C. (at high fan speed)
- o Frost forms on part of evaporator or the entire evaporator is not wet - Short gas condition.
- o Set fan speed at HIGH position

**2**

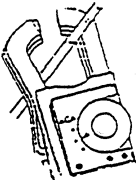
- o Check suction (low side) pressure.



- o Suction pressure decreases.

**3**

- o Check operating amperage of the unit with a clamp-on tester.



Live wire

- o Generally, operating amps decreases when gas is short.

- i) Check to see if the evaporator coil is wet or not during cooling. Generally, when the gas is short, the evaporator is dry and frost appears around the capillary tube (near evaporator inlet) and the evaporator outlet pipe becomes about the same as the ambient temperature.

If this is the case, add a small amount of gas several times and check for a change on the evaporator coil. If no change is seen, check for clogging of the capillary tube and/or strainers.

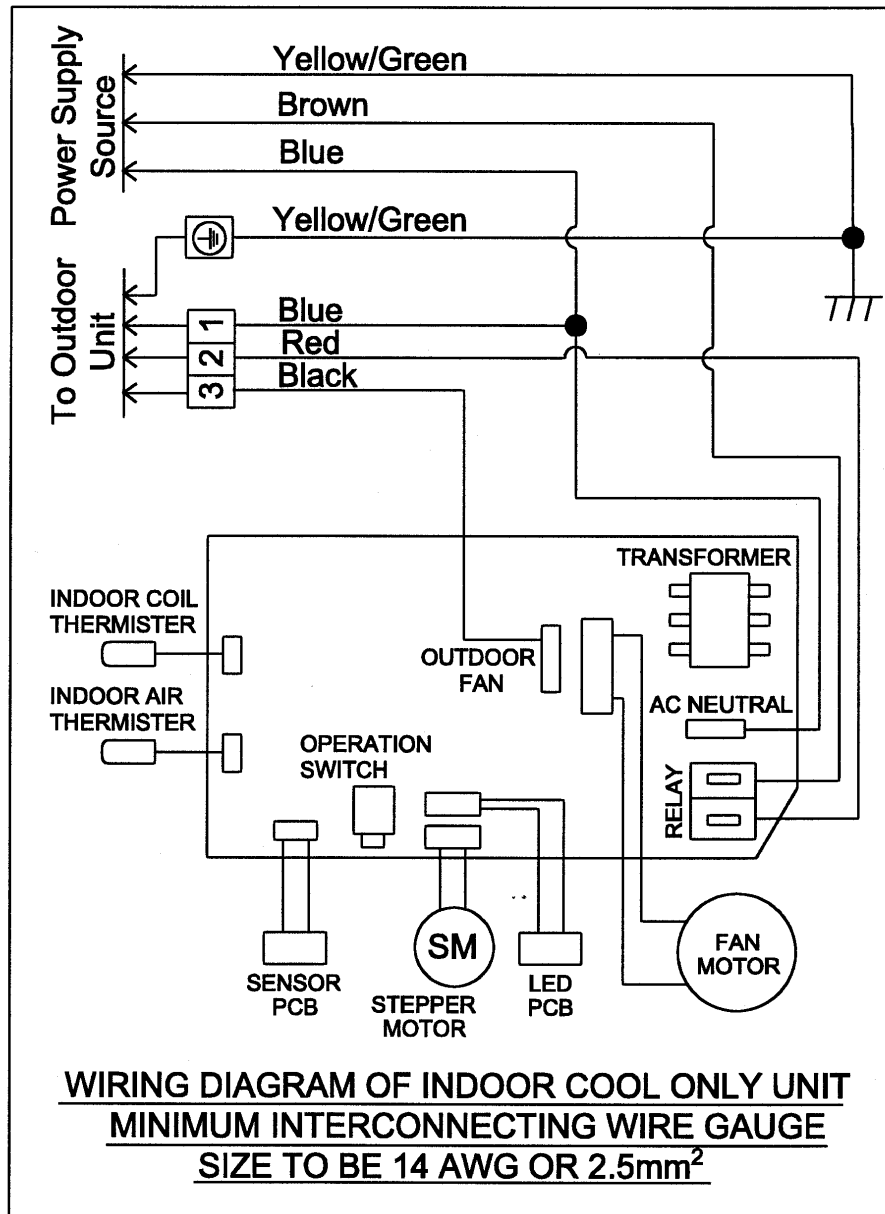
- o Repair or replace as necessary.



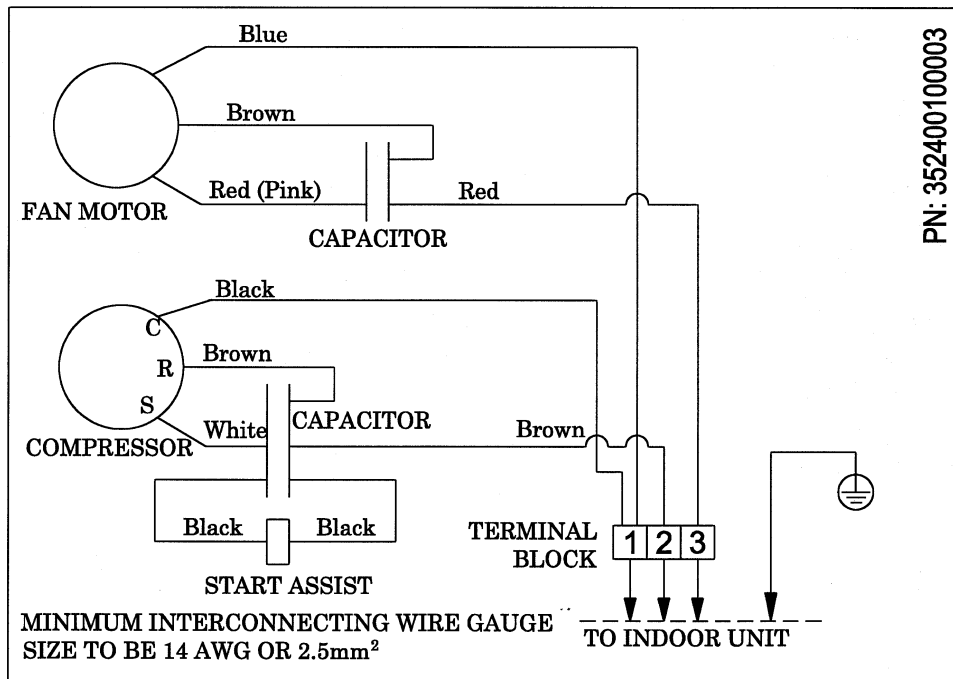
<b>SYMPTOM</b>	<b>DIAGNOSIS</b>	<b>REMEDY</b>
Both fan & compressor not running.	Fuse open or breaker tripped.	Inspect and repair.
	Poor power plug connection.	Inspect.
	Power failure.	Inspect.
	Control circuit malfunction.	Replace parts.
Compressor does not run.	Compressor motor windings open.	Replace compressor.
	Compressor locked.	Replace compressor.
	Defective overload.	Replace part.
	Defective capacitor.	Replace part.
	Control circuit malfunction.	Replace part.
	Voltage drop at start.	Check supply wiring.
	Pressure unequal at start.	Restart in 10 minutes. Inspect Control Circuit.
Fan does not run.	Fan motor windings open.	Replace part.
	Defective capacitor.	Replace part.
	Control circuit malfunction.	Replace part.
	Defective bearing.	Replace part.
	Fan blade interference.	Inspect.
Unit operates but does not cool.	Refrigerant circuit oil leak.	Leak repair and replenish gas.
	Small or no sound of refrigerant flow.	leak repair and replenish gas, or
	Low system temperature / pressure.	defective compressor. Replace part.
	Small or no sound of refrigerant flow.	System restriction; replace capillary tube
	High rise in temperature / pressure of condenser (frost forms on evaporator).	and strainer.
Poor cooling.	Incorrect thermostat setting.	Adjust.
	Open door or window.	Correct.
	Air inlet or outlet obstructed.	Correct.
	Unit exposed to sun.	Draw curtains.
	Additional heat sources or occupants.	Recalculate cooling load.
	Poor installation location.	Consider relocation.
	Incorrect cooling load calculation.	Recalculate cooling load, resize.
	Dirty filter.	Clean filter.
Overcooling.	Incorrect cooling load calculation.	Adjust fan speed and thermostat setting.
		Recalculate cooling load, resize.
High level of noise and vibration.	Compressor noise or vibration.	Check compressor mounting & isolation.
	Tubing noise and vibration.	Redress tubing.
	Fan motor noise or vibration.	Check fan motor mounting.
		Check for broken fan blade.
Radio noise and interference.	Defective electrical contact.	Repair.
Water leaks.	Drain pipe blocked.	Inspect and repair.
	Drain pipe blocked.	Inspect and repair.
	Improper installation.	Inspect and repair.

## SECTION E: WIRING DIAGRAM

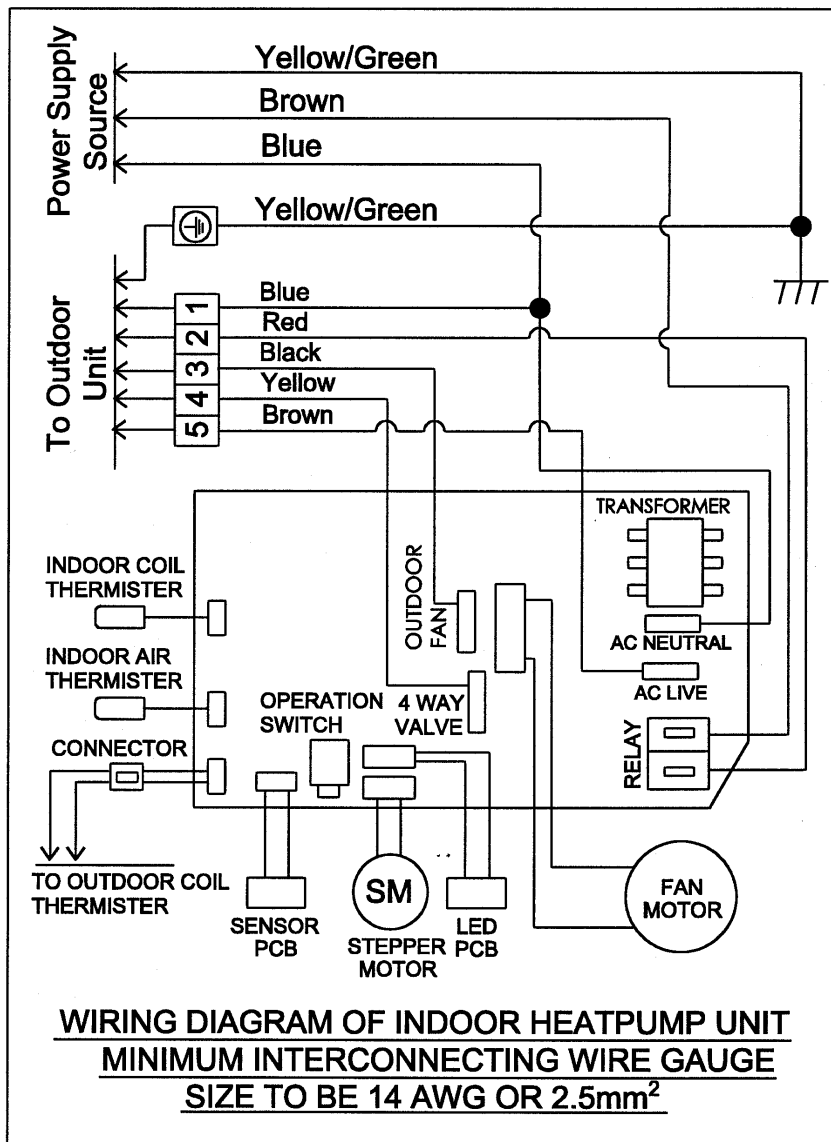
# WIRING DIAGRAM (LARGE SPLIT INDOOR COOL ONLY)



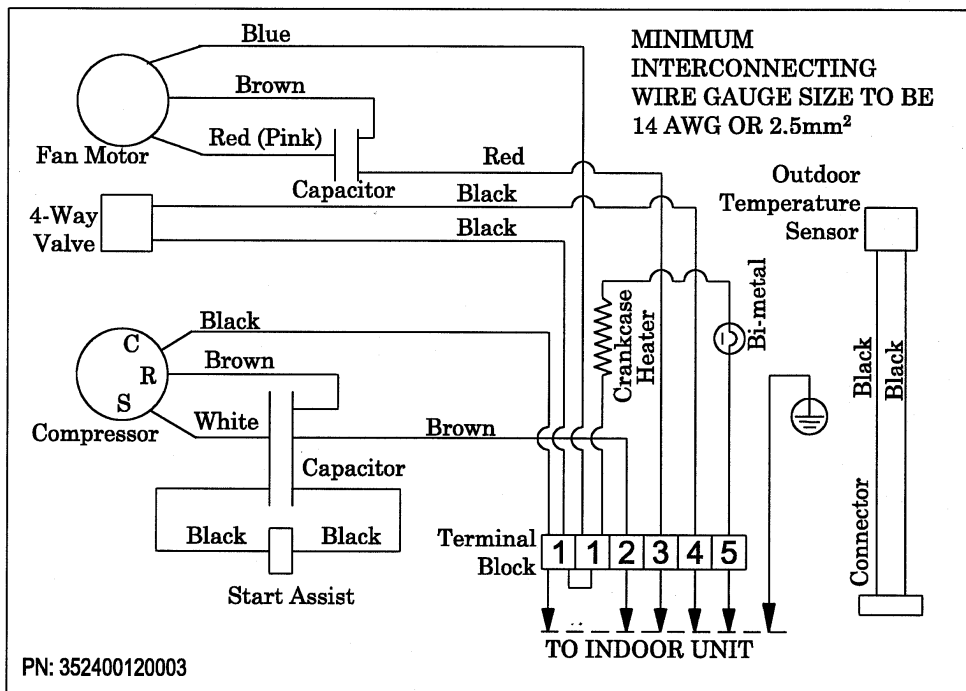
# WIRING DIAGRAM (LARGE SPLIT OUTDOOR COOL ONLY)



# WIRING DIAGRAM (LARGE SPLIT INDOOR HEATPUMP)



**WIRING DIAGRAM**  
**(LARGE SPLIT OUTDOOR HEATPUMP)**  
**With External Heater**



SECTION F: TECHNICAL DATA

## **REMOTE CONTROL AND PC BOARD FUNCTIONAL SPECIFICATIONS**

### ***LARGE SPLIT UNIT (18 / 24K)***

The electronic air-con control system consists of :

#### **I. CONTROL SYSTEM**

- 1) Hand-held Infra-Red transmitter with Liquid Crystal Display panel (hand held unit)
- 2) Receiver module consisting of:
  - a) Main receiver Board
  - b) LED Board
  - c) Sensor Board
- 3) The devices that are controlled by this electronic control system are :
  - a) Outdoor Compressor
  - b) Outdoor Fan
  - c) Outdoor 4 way Valve (***applicable for Heat Pump Unit only***)
  - d) Indoor Fan, single phase induction, tri- speed
  - e) Stepper motor
- 4) Features of this electronic controller include:
  - a) Operating voltage of 220/240Vac  $\pm 10\%$ , 50/60Hz.
  - b) Step-down transformer that complies with IEC standard specifying High-Pot. test at 1500V.
  - c) 50 mm x 43 mm Liquid Crystal Display on the hand-held transmitter.
  - d) Computer Operating Properly (COP) watchdog timer feature for graceful software reset after any un-recoverable fault.
  - e) Room temperature control range of 16°C to 31°C.
  - f) 3-minute compressor switch on delay except on power-up or system reset for compressor protection.
  - g) 60-second four-way valve switch over (meaning switch from ON to OFF and vice-versa) delay after turning off the compressor except on power-up or system reset (***applicable on Heat Pump Unit only***).
  - h) Cool fan prevention measure in heat mode to reduce discomfort to user caused by circulation of cold air by the indoor fan (***applicable on Heat Pump Unit only***).
  - i) Indoor coil overheat protection in heat mode (***applicable on Heat Pump Unit only***).
  - j) Indoor coil protection against icing in cool mode (***applicable on Heat Pump Unit only***).
  - k) Outdoor coil protection against icing in heat mode (***applicable on Heat Pump Unit only***).
  - l) Filter dirty LED indication after every 500 hours of operation.
  - m) On/Off switching hysteresis to prevent frequent switching and to extend live of the relays.
  - n) Self-test function for quick production test, system diagnosis and system integrity checks.
  - o) Thermistor fault indication.
  - p) Gas Leaks Protection.
  - r) Outdoor Coil Overheat Protection in Cool Mode (***applicable on Heat Pump Unit only***).



## II. Hand-held Transmitter

Operating Voltage	: 3.0 Vdc.
Power Source	: 2 "AAA" size batteries
Battery Life Expectancy	: more than 1 year
Range of Transmission	: at least 8m from the infrared sensor of the receiver module
Angle of Transmission	: 45° about normal
Medium of Transmission	: infrared transmission

The hand-held transmitter has an iconic LCD panel that displays the following information:

- i) Iconic representation of current mode of operation
- ii) Value of set/desired room temperature
- iii) Iconic representation of current indoor fan speed
- iv) Iconic representation of current vane position
- v) Vane swing icon, appears if vane swing function has been activated.
- vi) 12-hour format display of time of the day
- vii) On/off timer settings, if timer function has been activated
- viii) Sleep function icon, if sleep function has been activated
- ix) Arrow icon to indicate the sequence of ON/OFF timer actions
- x) "Signal transmitted" icon to indicate that transmission of command code to receiver is being done.

The hand-held transmitter has one button for each of the following functions in manual operation:

- a) POWER ON/OFF button      Toggles the air-con ON and OFF
- b)  $\hat{U}$ , the "Temperature Increment" button      Increases the set temperature
- c)  $\hat{U}$ , the "Temperature Decrement" button      Decreases the set temperature
- d) MODE button      Toggles the mode of operation between AUTO, COOL, DRY, FAN and HEAT (*Heat Mode only applicable on Heat Pump Unit*).
- e) FAN button      Toggles the fan speed between LOW, MEDIUM, HIGH and AUTO.
- f) SWING button      Causes the vane to be moved up and down continuously.
- g) VANE button      Toggles vane position between ANGLE, DOWN, MIDDLE and AUTO.

- |                 |                                                                                                                                                                                                     |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| h) CLOCK button | Starts and stops the setting of time of the day. Deactivates timer function.<br>The accuracy of the time setting must be + / - 15 second per day.                                                   |
| i) SLEEP button | Activates / deactivates sleep function                                                                                                                                                              |
| j) START button | Activate / deactivate ON timer                                                                                                                                                                      |
| k) STOP button  | Activates / deactivates OFF timer                                                                                                                                                                   |
| l) HR. button   | Adjusts the hour setting of the time of the day if the CLOCK button has been pressed prior to this step. Adjust the hour setting of the ON/OFF timer if the Start/Stop button has been pressed.     |
| m) MIN. button  | Adjusts the minute setting of the time of the day if the CLOCK button has been pressed prior to this step. Adjust the minute setting of the ON/OFF timer if the Start/Stop button has been pressed. |

(a) to (d) and (i) are exposed buttons. The remaining buttons are concealed behind a hinged door.

A "beep" sound, acknowledging the reception of a valid infrared signal will be generated by the main receiver board if a valid button is pressed.

### **III. Receiver Module**

Input Voltage:	220/240 Vac $\pm$ 10%, 50/60Hz.
Power Relay Contact Ratings:	240Vac/30A, for compressor. 240Vac/5A, for indoor fan motor, outdoor fan motor and 4-way valve.

#### **1. Main Receiver Board**

Main board, where the dual in-line package (SDIP) microcontroller is mounted. It also holds a push button switch called Operation/Filter Reset Button. Main receiver board material must be PR4 Grade.

## 1.1. Operation / Filter Reset Button.

### Operation

By pushing this button, one of the following two air-con operations are selected.

- a) AUTOMATIC operation    Selecting this operation is equivalent to selecting Auto mode, auto fan speed control and auto vane function in manual operation. The set temperature is internally fixed at 22°C and cannot be changed.

This operation is useful when the hand held transmitter is lost or faulty.

- b) OFF operation            The air-con will be switched off. The hand-held transmitter will not be able to control the operation of the Air-con.

Note that the ac. power supply is still connected to the receiver module of the electronic controller although the air-con is switched off.

This reset button selection is cyclic between AUTOMATIC – OFF.

### Filter Reset

Whenever the Air-con is switched on, the air filter usage time will be monitored by the microcontroller. When the period of usage reaches 500 hours, the red LED on the LED board will light up to indicate that the air filter is dirty. The filter should then be removed and cleansed.

To extinguish the red LED after cleansing and replacing the filter, press and hold the Operation / Filter reset switch for 3 seconds. A beep sound will be heard after 3 seconds to indicate that the red LED has been extinguish.

## 1.2. RFI Filter

This is built into the main receiver board to remove RFI from the AC power supply. RFI filter could be removed provided that the EMC test result was satisfactory.

## 2. LED Board

Three LEDs on the board provide the following indications :

- a) Power on/Defrost (green) LED    Lights up when power on.  
It blinks at approximately 60 times per minute during de-icing.
- b) Timer activated (yellow) LED    Lights up upon activation of either one or both of the START/STOP timers.

c) Filter dirty/System Fault (red)  
LED

Lights up after 500 hours of operation, to indicate that the filter requires cleansing. The Operation/Filter reset switch should be pressed by the user to switch this LED indication off after cleansing and replacing the filter.

When Indoor air thermistor (TH1) fault. It blinks at approximately 30 times per minute, only indoor fan is operating and reset by turning off main power supply.

When Indoor Coil thermistor (TH2) fault. It blinks at approximately 60 times per minute. The indoor fan is operating according to the cold air prevention in heat mode and normal in cool mode and reset by turning off main power supply.

When outdoor coil thermistor (TH3) fault. It blinks at approximately 150 times per minute. The indoor fan is operating according to the cold air prevention in heat mode and normal in cool mode and reset by turning off main power supply. In case the thermistor is fault, the transmitter will not be able to function (*applicable on Heat Pump Unit only*).

Check thermistor open or short circuit.

### 3. Infra Red Sensor Board

An Infra-Red sensor on this board detects infra-red signal transmission from the remote hand held transmitter.

## IV. Operations of the electronic controller

1. ON

In manual operation, the air-con is switched on when ON/OFF button of the hand held transmitter is pressed while the air-con is off.

For automatic operation, the air-con is switched on if the push button is pressed once. The microprocessor will regulate room temperature automatically.

2. OFF

In manual operation, the air-con is switched off once the ON/OFF button is pressed again or when the operation push button is pressed two times.

When the air-con is turned off, it does not regulate the indoor temperature.

The vane motor will execute a final sequence of movement to the HOME position, causing the air flow outlet to be fully closed.

3. 3-min. compressor switch on delay  
The compressor is not switched on again immediately after being switched off. The air-con controller waits for 3 minutes before turning it on again to protect it. This protective measure applies throughout the operation of the air-con except on power-up.
4. 60-second 4-way valve delay (*applicable on Heat Pump Unit only*)  
This refers to the 60-second delay after turning off compressor before the 4-way valve is switched over from off to on or vice-versa. This delay allows the safe, gradual transition of the air-con operation from a cooling function to heating function or vice versa.
5. Cool fan prevention in heat mode (*applicable on Heat Pump Unit only*)  
When compressor starts in heating operation or after defrosting, the indoor fan changes the speed due to the indoor coil thermistor temperature and operation time to blow out warm air. The indoor fan runs according to the following table during heat mode:

STEP 1:

ID Coil Temp., T	$T \leq 28^{\circ}\text{C}$	$28^{\circ}\text{C} < T < 30^{\circ}\text{C}$	$T \geq 30^{\circ}\text{C}$
ID Fan	STOP	*	LOW

STEP 2:

ID Coil Temp., T	$T \leq 33^{\circ}\text{C}$	$33^{\circ}\text{C} < T < 36^{\circ}\text{C}$	$T \geq 36^{\circ}\text{C}$
ID Fan	LOW	*	SET

STEP 3:

ID Coil Temp., T	$T \leq 46^{\circ}\text{C}$	$46^{\circ}\text{C} < T < 50^{\circ}\text{C}$	$T \geq 50^{\circ}\text{C}$
ID Fan	SET	*	HIGH

\* Maintain current state

- The start-up warm airflow control program is regardless room temperature. The indoor fan is also not switched on while the outdoor coil is being de-iced for the same reason.
6. Indoor coil icing prevention in cool mode  
Should the indoor coil temperature dip to  $2^{\circ}\text{C}$  or lower in cool mode for at least 2 mins, de-icing will be executed to remove the ice formed at the indoor coil. De-icing will be stopped when the indoor coil temperature rises to  $10^{\circ}\text{C}$  or higher or 10 mins lapse.
  7. Outdoor coil icing prevention in heat mode (*applicable on Heat Pump Unit only*)  
If the outdoor coil temperature dips to below  $-4^{\circ}\text{C}$  in heat mode. It will perform De-ice according to a specified algorithm, and de-ice the outdoor coil if necessary.

## V. Modes of Operation

### 1. Cool Mode

The air-con controller lowers the room temperature in this mode.

In cool mode, the indoor fan is always turned on, allowing it to run at the set speed.

To stop the cool mode cycle, the compressor, outdoor fan are turned off, the 4-way valve which serves no function in this mode is still kept at off. The indoor fan is however allowed to continue running at set speed.

The controller monitors room temperature and compares it against set/desired temperature. It starts and stops the cool mode cycle according to the following rules:

<b>Room Temperature</b>	< Set pt-1°C	= Set pt-1°C	= Set pt.	= Set pt+1°C	> Set pt+1°C
<b>Cool Mode Cycle</b>	Stop	Stop	*	Start	Start

\* Maintain current state

If room temperature  $\leq 16^{\circ}\text{C}$ , compressor, outdoor fan and 4-way valve turn off. The indoor fan runs according to following table:

ID Room Temp., Tr	Tr $\leq 15^{\circ}\text{C}$	15°C<Tr<16°C	Tr $\geq 16^{\circ}\text{C}$
ID Fan	LOW	*	SET

\* Maintain current state

### 2. Dry Mode

Dry mode operation extracts moisture from the indoor air and tries to maintain room temperature to the default set temperature of 22°C.

To dry the air, the controller executes the dry mode cycle, which toggles the compressor and outdoor fan on for 10 minutes and off for 5 minutes repetitively.

The temperature setting, which is not changeable by user, is internally set at 22°C.

In this mode, the indoor fan constantly runs at the low speed. The 4-way valve that serves no function in this mode is always kept OFF.

<b>Room Temperature</b>	<Set pt-1°C	Set pt-1 °C	Set pt.	Set pt+1°C	>Set pt+1°C
<b>Dry Mode Cycle</b>	Start	Start	*	Pre-dry	Pre-dry

Pre-dry : compressor on, outdoor fan on and 4-way valve kept off.

\* Maintain current state

### 3. Heat Mode (*applicable on Heat Pump Unit only*)

Heat mode operation can be chosen if it is desired to raise the room temperature. In this mode, the air-con controller turns on the compressor, outdoor fan, 4-way valve and indoor fan to provide the heating effect. The above operation, when executed in accordance to the device protection criteria and cool fan prevention requirement is termed the heat mode cycle. To stop heat mode cycle, the compressor and outdoor fan are turned off.

If the room temperature  $\geq 31^{\circ}\text{C}$ , compressor off, outdoor fan off and 4-way valve remains on, indoor fan runs according to following table:

ID Room Temp., Tr	$\text{Tr} \leq 31^{\circ}\text{C}$	$31^{\circ}\text{C} < \text{Tr} < 32^{\circ}\text{C}$	$\text{Tr} \geq 32^{\circ}\text{C}$
ID Fan	SET	*	LOW

\* Maintain current state

The heating cycle starts and stops according to the result of set temperature - room temperature comparison:

<b>ID Room Temp.</b>	$< \text{Set pt} - 1^{\circ}\text{C}$	$= \text{Set pt} - 1^{\circ}\text{C}$	$= \text{Set pt.}$	$= \text{Set pt} + 1^{\circ}\text{C}$	$> \text{Set pt} + 1^{\circ}\text{C}$
<b>Heat Mode Cycle</b>	Start	Start	*	Stop	Stop

\* Maintain current state

The 4-way valve will always be on in this mode except during de-icing, while the indoor fan will be turned on or off in accordance to cool air prevention requirement.

#### 4. Auto Mode

Depending on the room temperature, the air-con controller will automatically select cool, dry or heat mode when this mode is first selected. The selected mode of operation will not be exited until Auto mode is de-selected. If automatic operation is chosen, auto mode will be automatically selected.

Room Temperature Range	Mode of Operation That Will Be Entered if Auto Mode Is Selected
Room Temp. $> 24^{\circ}\text{C}$	Cool Mode
$19^{\circ}\text{C} < \text{Room Temp.} \leq 24^{\circ}\text{C}$	Dry Mode
Room Temp. $\leq 19^{\circ}\text{C}$	Heat Mode ( <i>Heat Pump Unit only</i> )

#### Mode selection rule in Auto mode

The set temperature is internally set at  $22^{\circ}\text{C}$ . In manual operation, the user can change it in steps of  $2^{\circ}\text{C}$  to  $20^{\circ}\text{C}$  or  $24^{\circ}\text{C}$  by pressing "Ú" or "Û" button on the hand-held transmitter. Conversely, this is not possible in automatic operation.

#### 5. Fan Mode

Only indoor fan and the vane operate in this mode.

The user can select the desired indoor fan speed and vane position, but auto fan speed selection is not available.

## VI. Temperature Control and Measurement

### 1. Temperature Measurement Accuracy

The temperature measurement range of the air-con controller is from -10°C to 60°C. Measurement accuracy is given in the following Table:

°C	+	-	°C	+	-	°C	+	-	°C	+	-	°C	+	-
-10	1	1	5	1	1	20	1	1	35	1	1	50	1	1
-9	1	1	6	1	1	21	1	1	36	1	1	51	1	1
-8	1	1	7	1	1	22	1	1	37	1	1	52	1	1
-7	1	1	8	1	1	23	1	1	38	1	1	53	1	1
-6	1	1	9	1	1	24	1	1	39	1	1	54	1	1
-5	1	1	10	1	1	25	1	1	40	1	1	55	1	1
-4	1	1	11	1	1	26	1	1	41	1	1	56	1	1
-3	1	1	12	1	1	27	1	1	42	1	1	57	1	1
-2	1	1	13	1	1	28	1	1	43	1	1	58	1	1
-1	1	1	14	1	1	29	1	1	44	1	1	59	1	1
0	1	1	15	1	1	30	1	1	45	1	1	60	1	1
1	1	1	16	1	1	31	1	1	46	1	1			
2	1	1	17	1	1	32	1	1	47	1	1			
3	1	1	18	1	1	33	1	1	48	1	1			
4	1	1	19	1	1	34	1	1	49	1	1			

Temperature measurement error

### 2. Room Temperature Control Range

The room temperature control range of the air-con controller is from 16°C to 31°C, both inclusive. In manual operation, set temperature is adjusted using the temperature setting buttons "Ū" and "Ū" on the hand-held transmitter.

At each press of one of the buttons, the set temperature is changed by 1°C if it is currently in cool or heat mode until the upper limit of 31°C or the lower limit of 16°C is reached. In Auto mode, pressing the temperature setting buttons will cause the set temperature to change in steps of 2°C until the upper limit of 24°C or the lower limit of 20°C is hit, but the temperature setting will not be displayed on the hand-held transmitter.

## VII. Auto Fan Function

Auto fan function is not available in dry and fan modes.

This function will be disabled if the sleep function is later selected. On the other hand, if sleep function is activated first, it is not possible to select the Auto fan function.

In automatic operation, the Auto fan function will be chosen if the air-con operates in cool or heat mode.



When the indoor fan control is set to Auto, the fan speed is automatically selected according to the mode of operation, set temperature and room temperature.

In **cool mode**, choosing Auto Fan will result in the following automatic fan speed selection:

<b>Room Temperature</b>	< Set pt-3°C	= Set pt-3°C	= Set pt.	= Set pt+3°C	> Set pt+3°C
<b>Indoor Fan Speed</b>	LOW	LOW	*	HIGH	HIGH

\* Maintain current fan speed

Therefore, if the temperature set point is 20°C when cool mode is first entered in a room at 23°C, the indoor fan speed will be automatically HIGH.

The Indoor Fan Speed still remains at HIGH when the room temperature later lowers to 20°C.

When the room temperature falls further to 17°C, indoor fan speed changes to LOW.

If the room temperature rises to 20°C again, the indoor fan will still run at LOW speed. Indoor fan speed will not be changed to HIGH unless the room temperature rises further to 23°C.

In **dry mode**, the indoor fan constantly runs at low speed. The Auto Fan function is not available:

<b>Room Temperature</b>	< Set pt-1°C	= Set pt-1°C	= Set pt.	= Set pt+1°C	> Set pt+1°C
<b>Indoor Fan Speed</b>	LOW	LOW	LOW	LOW	LOW

In **heat mode (Heat Pump Unit only)**, indoor fan speed is controlled as follows:

<b>Room Temperature</b>	< Set pt-3°C	= Set pt-3°C	= Set pt.	= Set pt+3°C	> Set pt+3°C
<b>Indoor Fan Speed</b>	HIGH	HIGH	*	LOW	LOW

\* Maintain current fan speed

For example, if the set temperature is 20°C when heat mode is entered in a room at 17°C, the indoor fan speed will be automatically HIGH.

The indoor fan speed still remains at HIGH when room temperature later rises to 20°C.

When the room temperature rises further to 23°C, the indoor fan speed is changed to LOW.

If the room temperature subsequently falls to 20°C again, the indoor fan will still run at LOW speed. The indoor fan speed will not be changed to HIGH unless the room temperature dips further to 17°C.

*When Sleep function is selected in manual operation, indoor fan speed will be fixed at LOW until the air-con is eventually turned off by sleep function.*

## **VIII. Vane Function**

### 1. Vane Position

- HOME**            The vane will be at this position whenever the air-con is off. Its exact angle is 115° counter-clockwise from position 3.
- POSITION 1**    The vane plane is positioned 70° counter-clockwise from position 3. cool, dry and fan modes default vane position.
- POSITION 2**    The vane plane is 50° counter-clockwise from position 3.
- POSITION 3**    The vane plane is vertical (Heat mode default vane position).

*NB. For the vane position discussion, view the vane from the left side of the air-con indoor unit.*

### 2. Vane Control

When the Air-con is first switched ON in manual operation, the vane will move to the position indicated on the hand-held transmitter.

When the Air-con is first powered up, or when the air-con is switched OFF either by toggling the POWER ON/OFF button in manual operation or by pushing the operation/ filter reset button to OFF position, the vane will be moved to HOME position so that the air flow outlet is completely closed.

In manual operation, the vane can be set to position 1, position 2 and position 3, or made to swing using the hand-held transmitter. If the user does not wish to control the vane position, the Auto Vane function can be chosen.

In automatic operation, the auto vane function is always chosen. The vane will thus move to the default vane position according to the mode of operation selected.

### 3. Auto Vane function.

Auto vane function automatically moves the vane to an optimum position according to current mode of operation.

If Auto Vane function is selected in cool, dry or fan mode, the vane is moved to position 1. Whereas in heat mode, the vane is moved to position 3.

### 4.. Vane Swing Function

The Vane Swing function can only be selected in manual operation. When selected, the vane moves to and fro between position 1 and position 3 continuously.

This function will be de-selected if the "SWING" button is pressed again, if the mode of operation is changed, if the Air-con is switched OFF, if the fan is OFF or if the ON timer is activated. The vane will then return to the last position before the selection of swing function unless the air-con is switch OFF.

## IX. Sleep Function

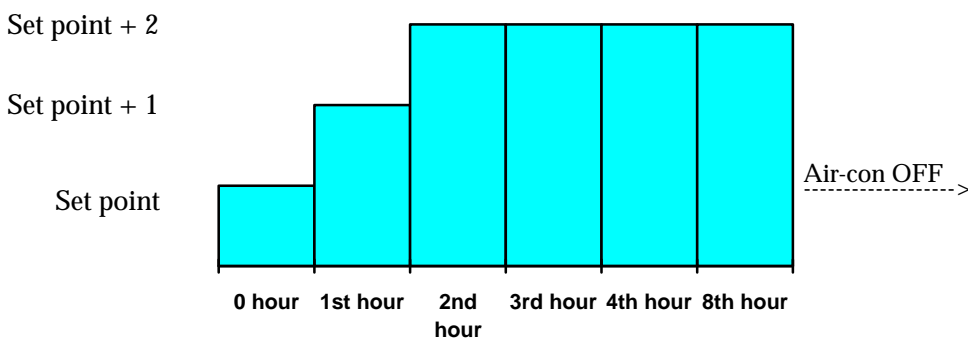
Sleep function is only selectable in manual operation, but it is not available in dry and fan modes. When this function is selected, the Indoor Fan immediately runs at low speed, all timer functions will be overridden and disabled at the same time.

### **In cool or auto-cool mode,**

One hour after Sleep function is selected, the temperature set point will be raised by 1°C.

Two hours later, the set temperature will be raised by another 1°C.

Eight hours after selection of Sleep function, the air-con will be switched OFF.

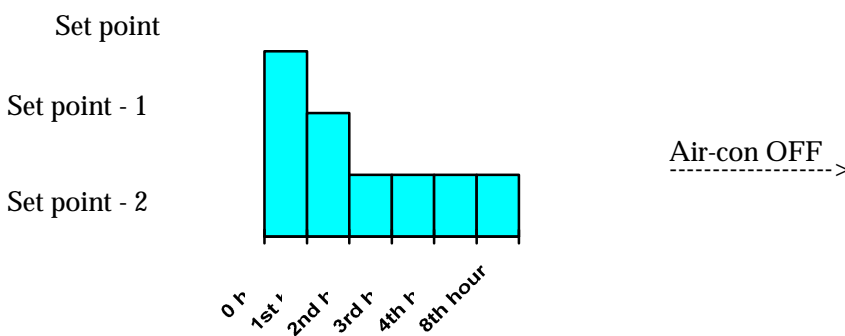


Actions of Sleep function in cool mode

**In heat or auto-heat mode (applicable on Heat Pump Unit only),** one hour after Sleep function is selected, the temperature set point will be lowered by 1°C.

Two hours later, the set temperature will be lowered by another 1°C.

Eight hours after selection of Sleep function, the air-con will be turned OFF.



Actions of Sleep function in heat mode

### **In auto-dry mode,**

Eight hours after the selection of Sleep function, the air-con will be turned OFF.

When the air-con is switched OFF by the sleep function, it will not be turned on again unless explicitly switched on by the user.

This function can be de-selected if the "SLEEP" button is pressed again. It will also be de-selected if the mode of operation is changed or when the air-con is switched OFF.

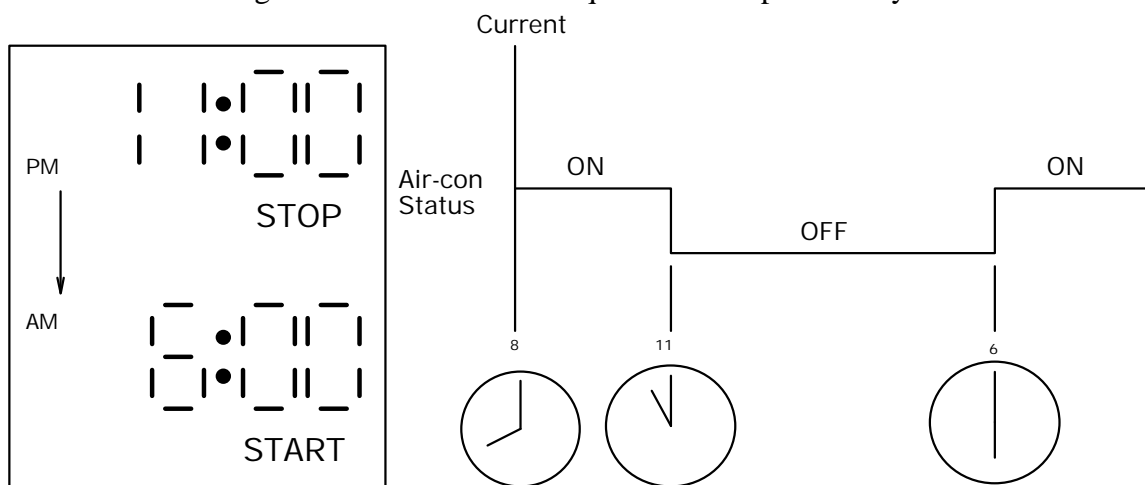
## X. Timer Function

The start timer will switch the air conditioner ON at the start time set in the hand-held transmitter, while the stop timer will switch the air-con OFF at the specified stop time.

Both timers can be activated together to perform "ON-OFF-ON" or "OFF-ON-OFF" operation. The setting of the timers is done using the HR. and MIN. buttons of the hand-held transmitter in steps of 10 minutes. The LCD panel on the hand-held transmitter will show the start and/or stop times of timer operation. In addition, the yellow LED on the LED board will be lighted to indicate that at least one timer is in operation.

### ON-OFF-ON Operation

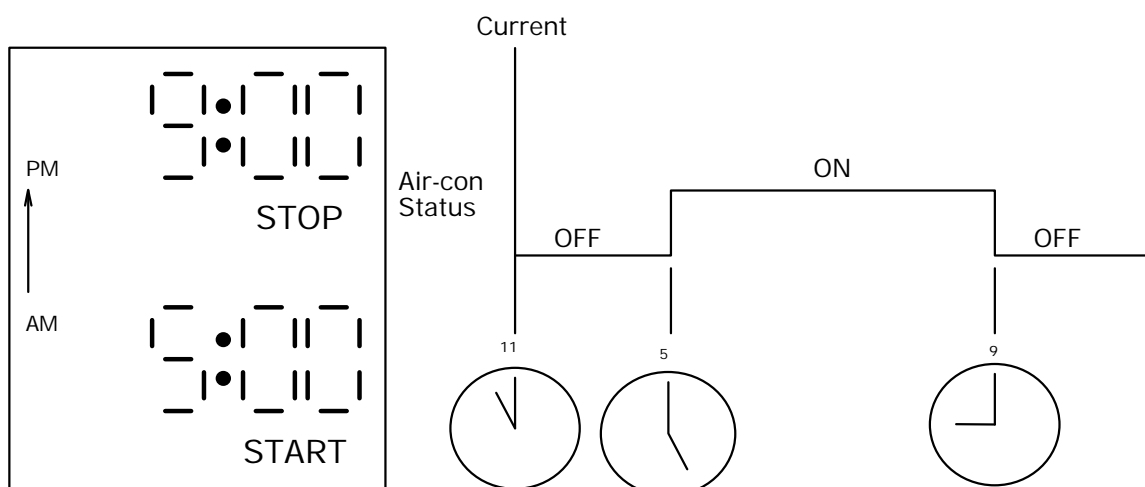
If the current time is 8:00 PM, the following timer setting will turn off the air-con at 11:00 PM and turn it on again at 6:00 AM. This sequence will repeat in a cyclic manner.



ON-OFF-ON timer operation

### OFF-ON-OFF Operation

If the current time is 11:00 AM, the following timer setting will turn on the air-con at 5:00 PM and turn it off again at 9:00 PM. This sequence will repeat in a cyclic manner.



OFF-ON-OFF timer operation

## **XI. Device Protection Measures**

### 1. 3-minutes compressor switch on delay

The compressor is not switched on again for 3-minutes every time after it is switched off to protect it. This restriction applies throughout the operation of the Air-con except on power-up.

### 2. Cool mode protection (Low-pressure indicator)

If the indoor coil thermistor temperature is 25°C and above after the compressor has been turned on for more than 30 minutes in cool mode only, the compressor stop, outdoor fan stop, 4-way valve off and indoor fan run at low speed and the RED LED will blink at 95 times per minute.

When compressor is stopping, the microprocessor will not monitoring the indoor coil thermistor temperature

#### **(applicable on Heat Pump Unit only)**

If the outdoor coil thermistor temperature is more than 60°C in cool mode, the compressor stops, the outdoor fan remains on, 4-way valve remains off, indoor fan run at set speed.

If the outdoor coil thermistor temperature later dips to 50°C or below in cool mode, the compressor on, outdoor fan remain on, 4-way valve remain off, indoor fan run at set speed.

### 3. Heat mode protection (***applicable on Heat Pump Unit only***)

If the indoor coil thermistor temperature is 28°C and below after the compressor has been turned on for more than 30 minutes in heat mode only, then the compressor will stop and the outdoor fan will stop, the 4-way valve will remain on and the indoor fan stop, the RED LED will blink at 95 times per minute.

The thermistor accuracy and responses time both are very critical for heat mode indoor coil overload protection, The software must be able to detect the system rate of change, this would allow the unit to operate at very extrem condition without stopping or tripping the compressor during the heat mode operation. Details refer to Heat Mode Protection Control Sequences attached.

### 4. On/off Hysteresis

In order to avoid switching the relays and the associated devices too frequently, some hysteresis is incorporated into the starting and stopping of the operation cycles.

In the **cool, heat and dry modes**, the respective cycles start and stop as shown in the diagram below:

<b>Room temperature</b>	< Set pt-1°C	= Set pt-1°C	= Set pt.	= Set pt+1°C	> Set pt+1°C
<b>Cycle</b>	Stop	Stop	*	Start	Start

\* Maintain current state

For example, if the temperature set point is 20°C when cool mode is entered at a room temperature of 21°C, the controller will start the cool mode cycle to cool the room.

The cycle still continues when the room temperature later lowers to 20°C. It finally stops when the room temperature lowers further to 19°C.

If the room temperature subsequently rises to 20°C again, the cool mode cycle will still not start. The cool mode cycle will only start when the room temperature rises further to 21°C.

In **heat mode** (*applicable on Heat Pump Unit only*), the heat mode cycle starts and stops according to the following rules:

<b>Room temperature</b>	< Set pt-1°C	= Set pt-1°C	= Set pt.	= Set pt+1°C	> Set pt+1°C
<b>Heat Mode Cycle</b>	Start	Start	*	Stop	Stop

\* Maintain current state

For example, if the temperature set point is 20°C when heat mode is entered at a room temperature of 19°C, the heat mode cycle will start to raise the room temperature.

The cycle still continues when the room temperature later rises to 20°C, and eventually stops when the room temperature raises further to 21°C.

If the room temperature subsequently falls to 20°C again, the cycle will still not start. The heat mode cycle will only start when the room temperature descends further to 19°C.

#### 5. Indoor Coil Protection Against Icing in Cool Mode

After switching on the compressor for 10 minutes in cool mode, the electronic air-con controller will detect the indoor coil temperature. If indoor coil temperature <6°C, the indoor fan will operate in accordance with the following table:

ID Coil Temp. Tr	Tr ≤ 4 °C	4°C < Tr < 6°C	Tr ≥ 6°C
ID Fan	High	*	Set

\*Maintain current State

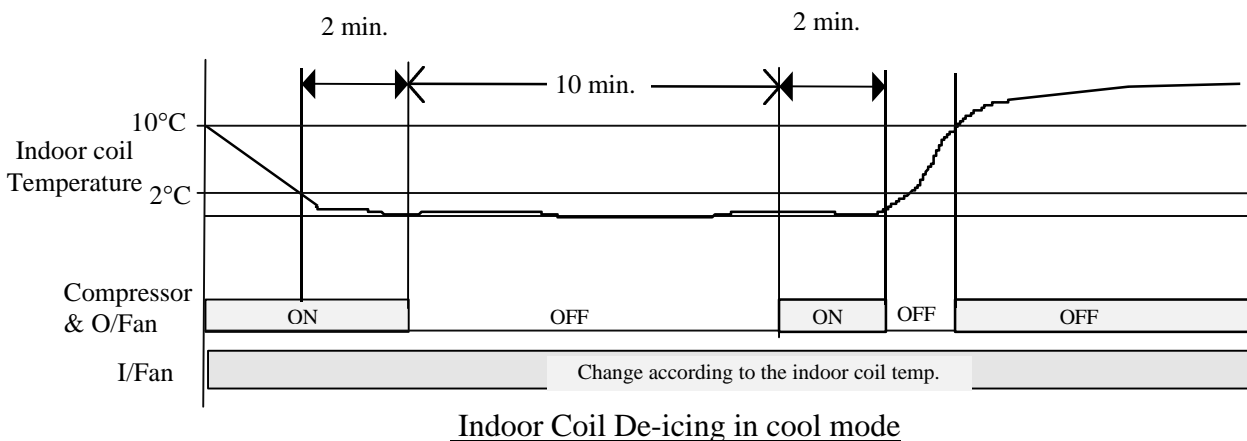
Indoor coil de-icing will be executed if indoor coil temperature is found to be less than 2°C for 2 minutes. De-icing operation will stop if the indoor coil temperature reaches 10°C or higher for 2 minutes. If not, it will be end de-icing operation after 10 minutes. While the indoor coil is being de-iced, the green LED on the LED board will blink at approximately 95 times per minute.

To de-ice the indoor coil, the air-con controller discontinue cooling it by turning off the compressor and outdoor fan. At the mean time, the indoor fan is left running at its set speed to speed up the ice-melting process via convection.

Normal cool mode operation will be maintained at its current state for the initial 3 minutes of de-icing operation. After this, the compressor and outdoor fan will be switched off.

When the indoor coil temperature reaches 10°C or higher for 2 minutes de-icing will be terminated and normal cool mode operation resumes. However, if the coil temperature is still below 10°C after 10 minutes, de-icing operation will still be terminated to resume normal cool mode operation.

40 minutes after the completion of one de-icing cycle, another detection of the indoor coil temperature is made. If the indoor coil temperature detected is less than 2°C, then another de-icing cycle is executed. Similarly, if it is found that the indoor coil does not require de-icing after sensing its temperature, another indoor coil temperature detection is carried out 40 minutes later to see if de-icing is required by then. The de-icing temperature checking repeats in this fashion as long as the system resides in cool mode operation.



5. **Outdoor Coil Protection Against Icing in Heat Mode (*applicable on Heat Pump Unit only*)**

After switching on the compressor in heat mode, the electronic air-con controller will monitor the outdoor coil temperature, after 30 minutes later the unit will perform outdoor coil de-icing if necessary. While the outdoor coil is being de-iced, the green LED on the LED board will blink at approximately 95 times per minute.

Outdoor coil temperature checking algorithm for protection against icing progresses as follows:

The controller will monitor and read the outdoor coil temperature as soon as the compressor is turned on in heat mode for 30 mins. If the temperature is found to be lower than -4°C, for 2 mins and meet the defrost starting condition. It will perform De-ice according to the algorithm, if not, the controller will continue monitoring the outdoor coil temperature.

6. Defrosting in HEAT mode (*applicable on Heat Pump Unit only*)

a) Defrost starting conditions

When all conditions of i) ~ iii) are satisfied, defrosting operation starts.

i) The indoor coil thermistor read  $\leq 42^{\circ}\text{C}$

ii) The outdoor coil thermistor reads  $-4^{\circ}\text{C}$  or below.

iii) The difference between the Indoor-coil Thermistor and Indoor air thermistor  $\leq 22^{\circ}\text{C}$ .

Further information on defrost interval is described in (3).

b) Defrost termination conditions

When the condition of i) or iv) is satisfied, the defrosting operation stops.

iv) The defrost thermistor reads above  $5^{\circ}\text{C}$ .

v) The defrost time exceeds 8 minutes.

c) Defrost interval

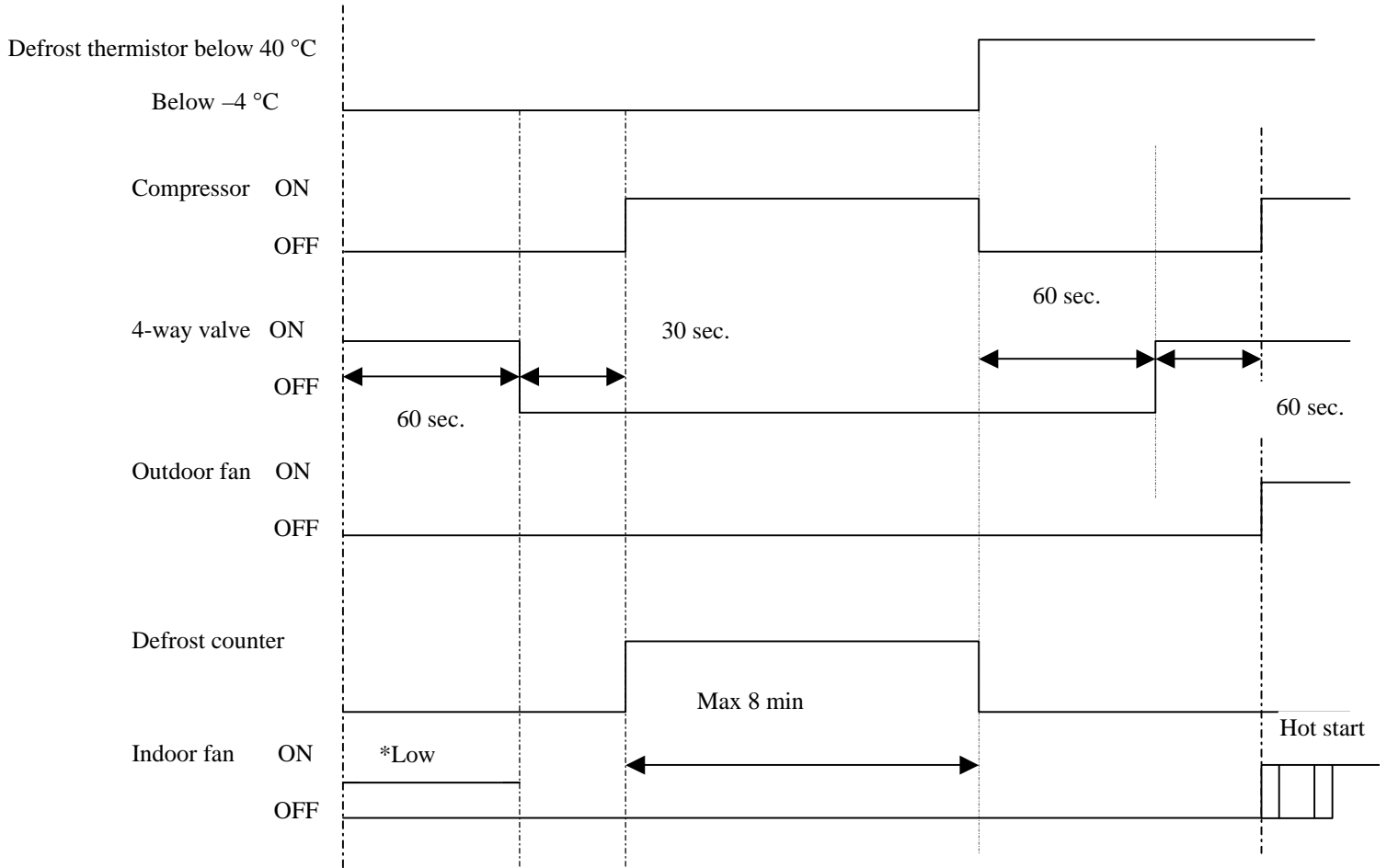
The defrost interval time is determined as follows.

There should be a 30 minutes intervals between defrost cycle. During this intervals, No detection of defrost is required. Detection of defrost will resume after the 30 minutes intervals , upon condition meet, enter defrost cycle, otherwise continue detection for defrost.



7. Outdoor Coil De-icing in Heat Mode (*applicable on Heat Pump Unit only*)

The air-con controller heats up the outdoor coil to melt the ice formed at outdoor coil. To achieve this, the compressor must be turned on, while the 4-way valve must be turned off. During this period, the indoor fan must be switched off with exception condition as stated in Note 1. otherwise it will fill the room with cool air and cause discomfort to the users.



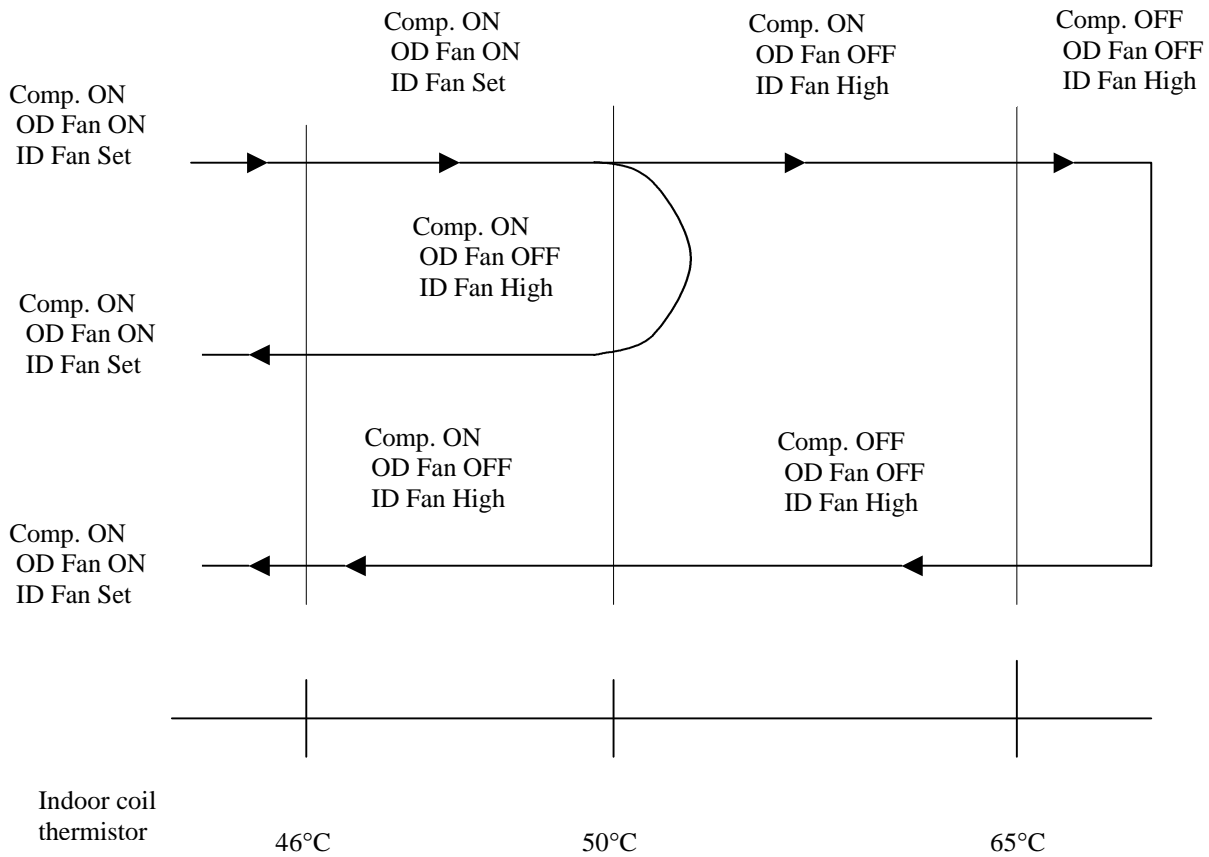
Defrost Time Chart

## XII. Thermistor fault indication

The electronic controller flashes the filter LED when a thermistor fault is detected. The filter LED blinking according to the time specified until the thermistor fault is rectified.

### 1. Heat Overload Protection Algorithm

#### Large-Split Heatpump



#### Large Split Heat Mode Protection Control Sequence \*

Legend:

Comp. - Compressor  
 OD - Outdoor

\* Indoor fan runs according to section IV cool fan prevention in heat mode.

### **XIII. Self Test**

#### **Main PCB Self-test**

To initiate the self-test sequence, execute the following:

- a) Turn on the ac. supply to the air-con.
- b) Press and hold the Operation / Filter reset button for 6 seconds after which you can hear 2 beep sound to indicate activation of self-test sequence.  
(Note : When press and hold for 3 seconds, a single beep will be heard. Keep on holding for another 3 seconds to achieve the total 6 seconds requirement to activate the self-test sequence.)

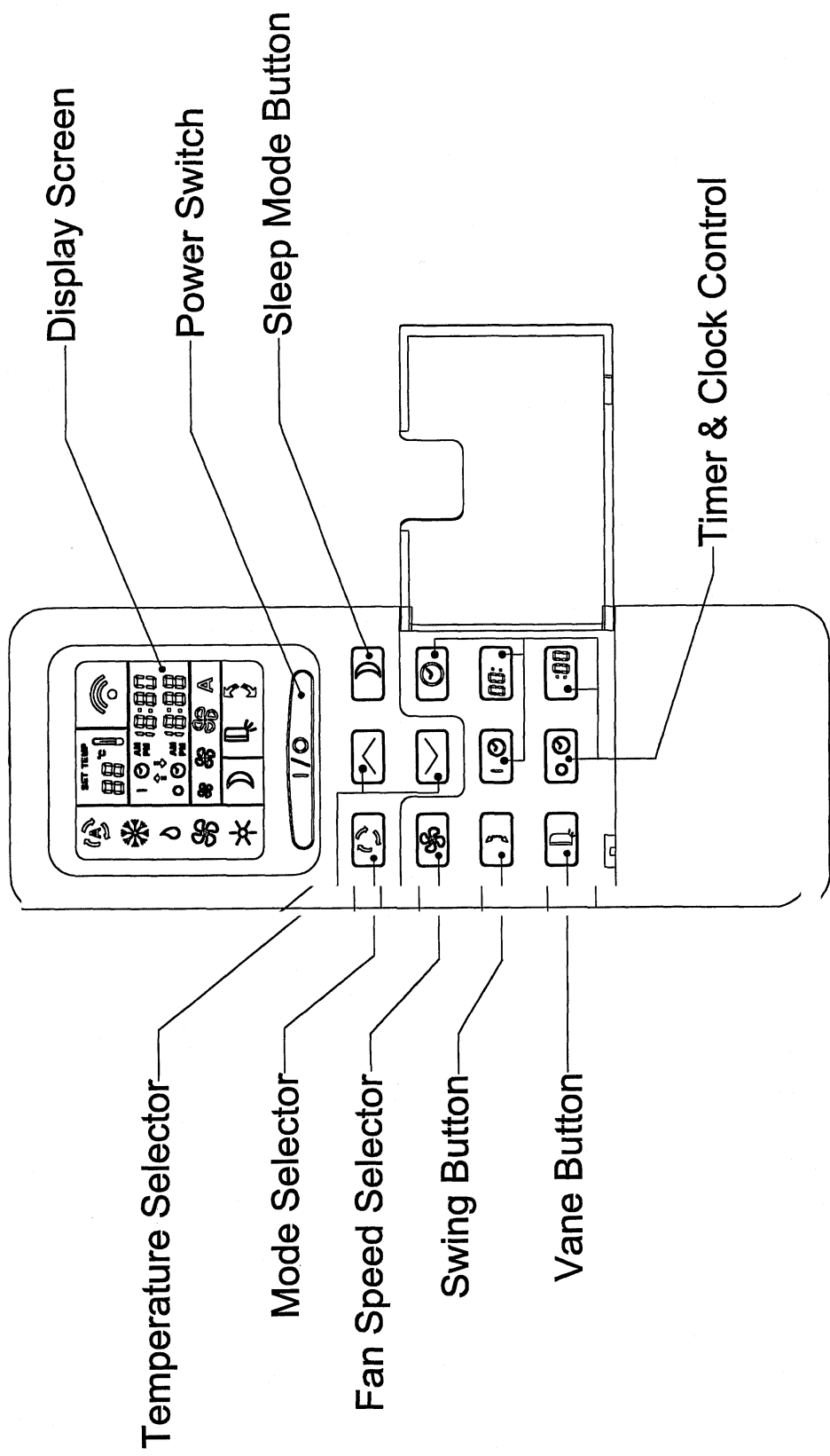
Observe the following events.

- i all output devices are turned off
- ii EEPROM is tested. If EEPROM is faulty, buzzer will sound for 3s
- iii green, yellow & red LEDs are turned on.
  
- iv 1s later, the 4-way valve is turned on (*applicable on Heat Pump Unit only*)
- v 1s later, compressor is turned on
- vi 1s later, outdoor fan is turned on
  
- vii 1s later, indoor fan runs at low speed for 3s
- viii Following, the indoor fan runs at medium speed for 3s
- ix Following, the indoor fan runs at high speed
  
- x 3s later, the vane moves to down position, taking 3.42s & stays for 2s
- xi The vane moves to home position, taking 1.47s and stays for 2s
- xii The vane moves to middle position, taking 1.39s and stays for 2s
  
- xiii The vane moves to angle position, taking 0.565s & stays for 2s.
- xiv The vane moves to home position again, takes 1.96s & stays for 2s.
- xv All output devices are turned OFF.

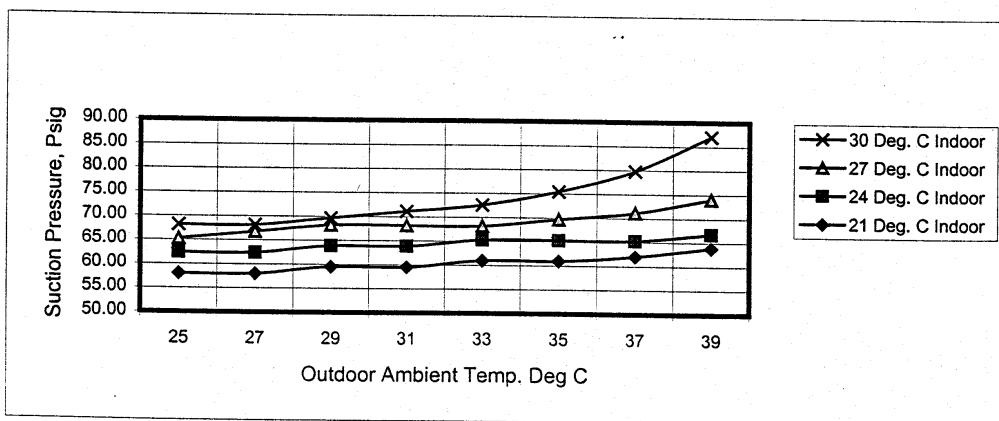
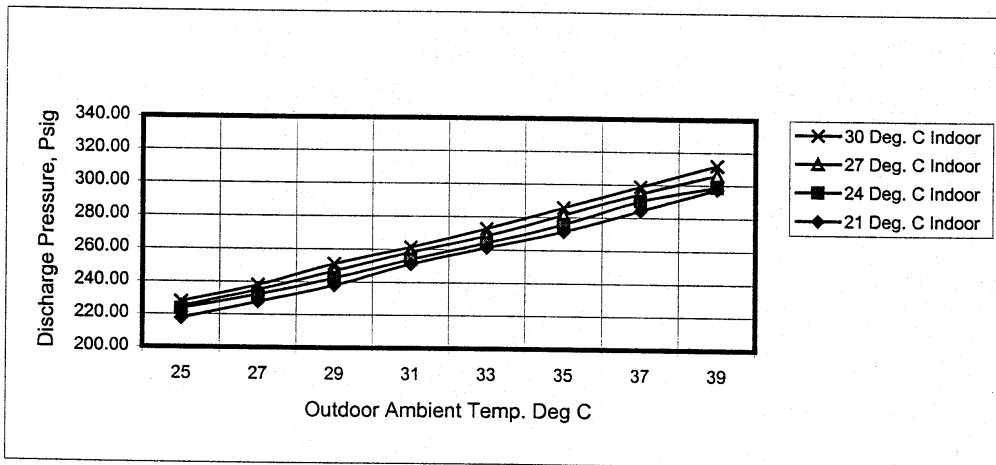
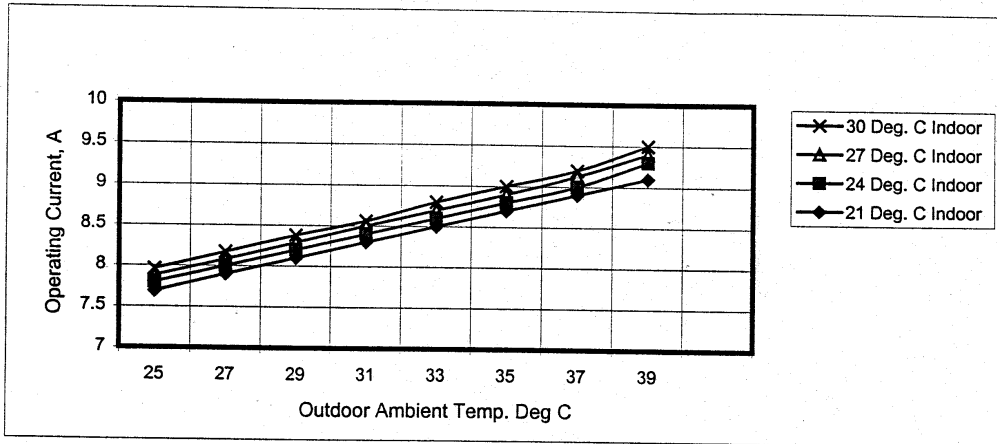
For normal operation, power off the system and turn on the system again to cause a power on reset.

### **XIV. Memory Backup of Settings**

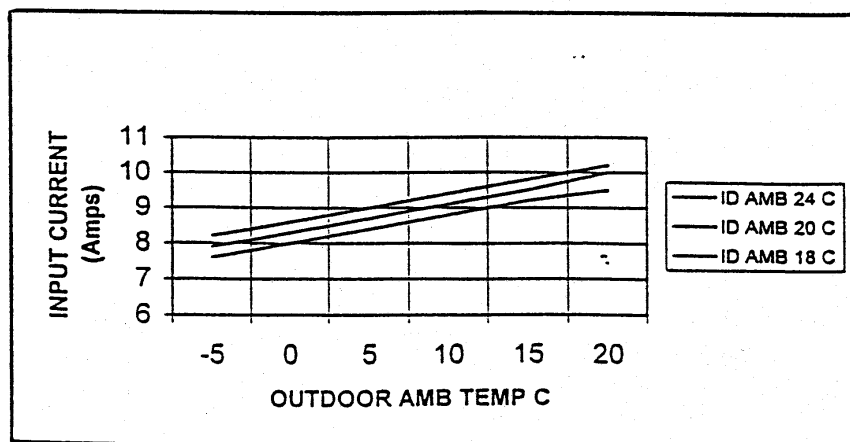
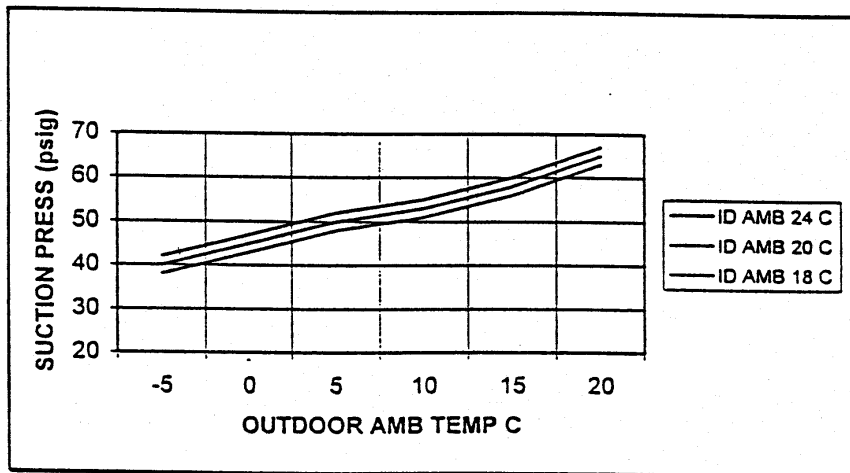
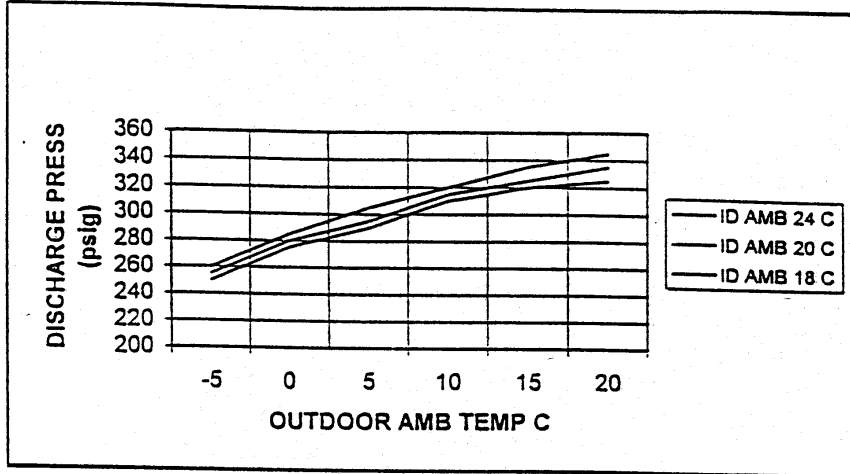
Once the setting of the unit changed, it will be stored into the EEPROM immediately. After current restoration due to power source supply breakdown, the unit commences operation using all the settings at the time of the breakdown. However, all timing related function will be invalid. The unit will be randomly start with 3 minutes delay for compressor protection.

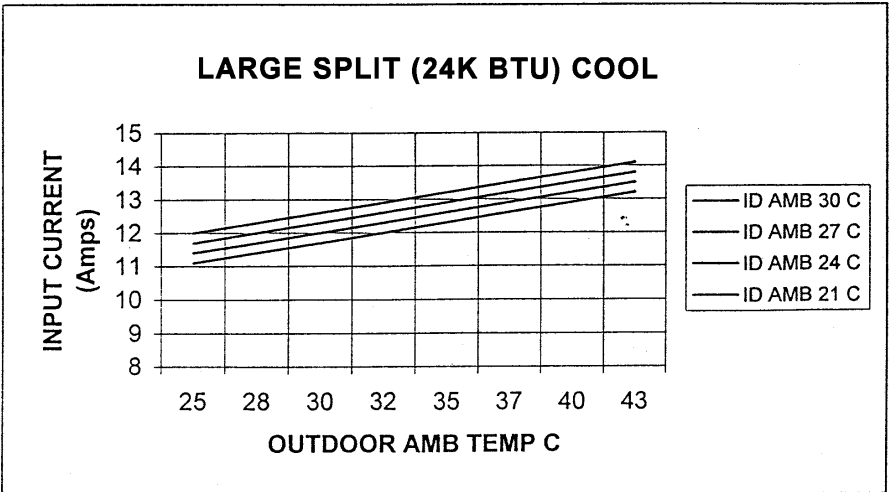
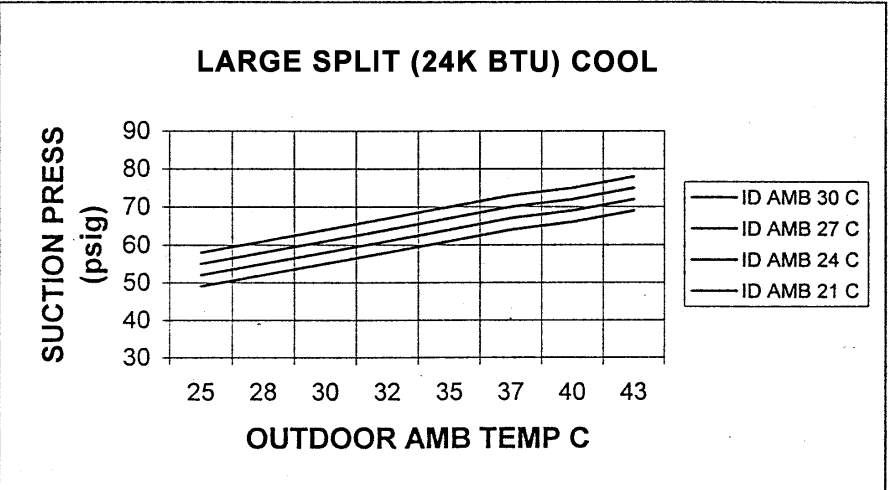
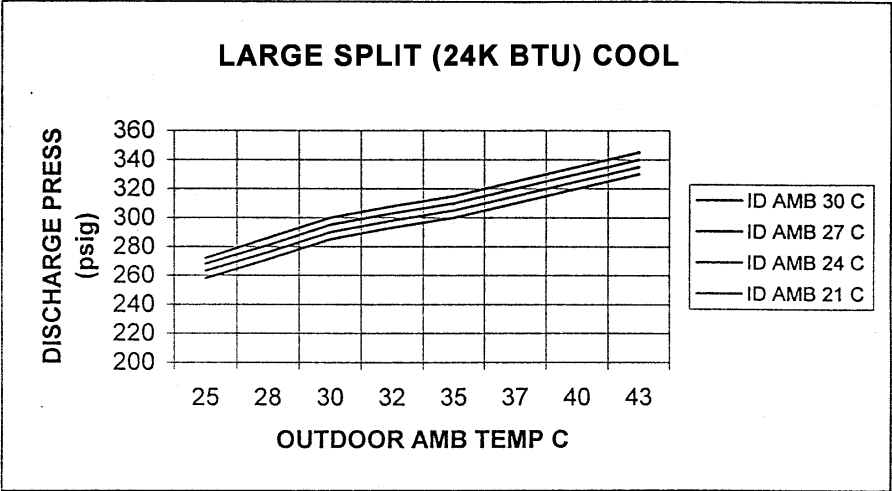


### LARGE SPLIT (18 BTU) COOLING MODE

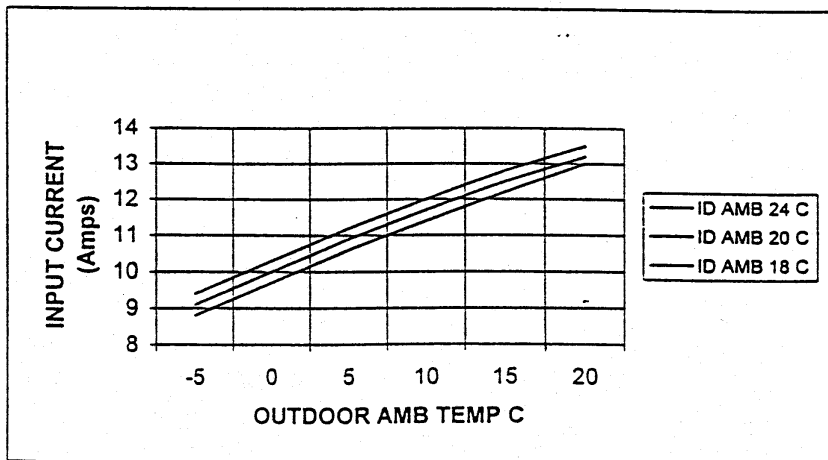
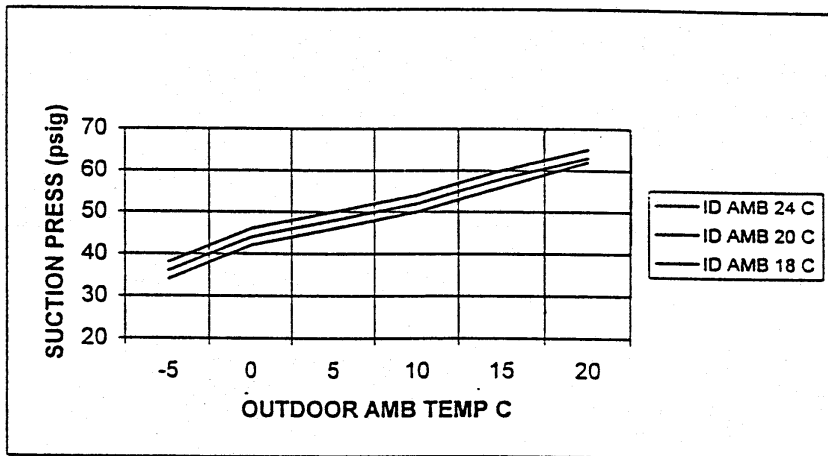
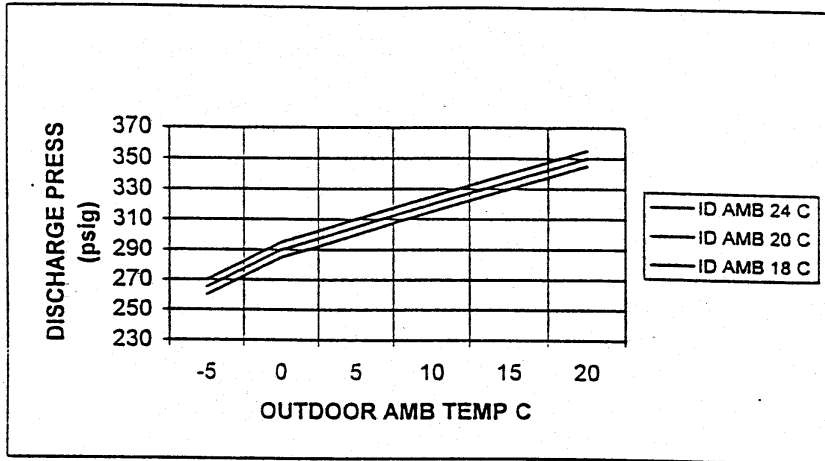


### LARGE SPLIT (18K BTU) HEATING MODE





### LARGE SPLIT (24K BTU) HEATING MODE

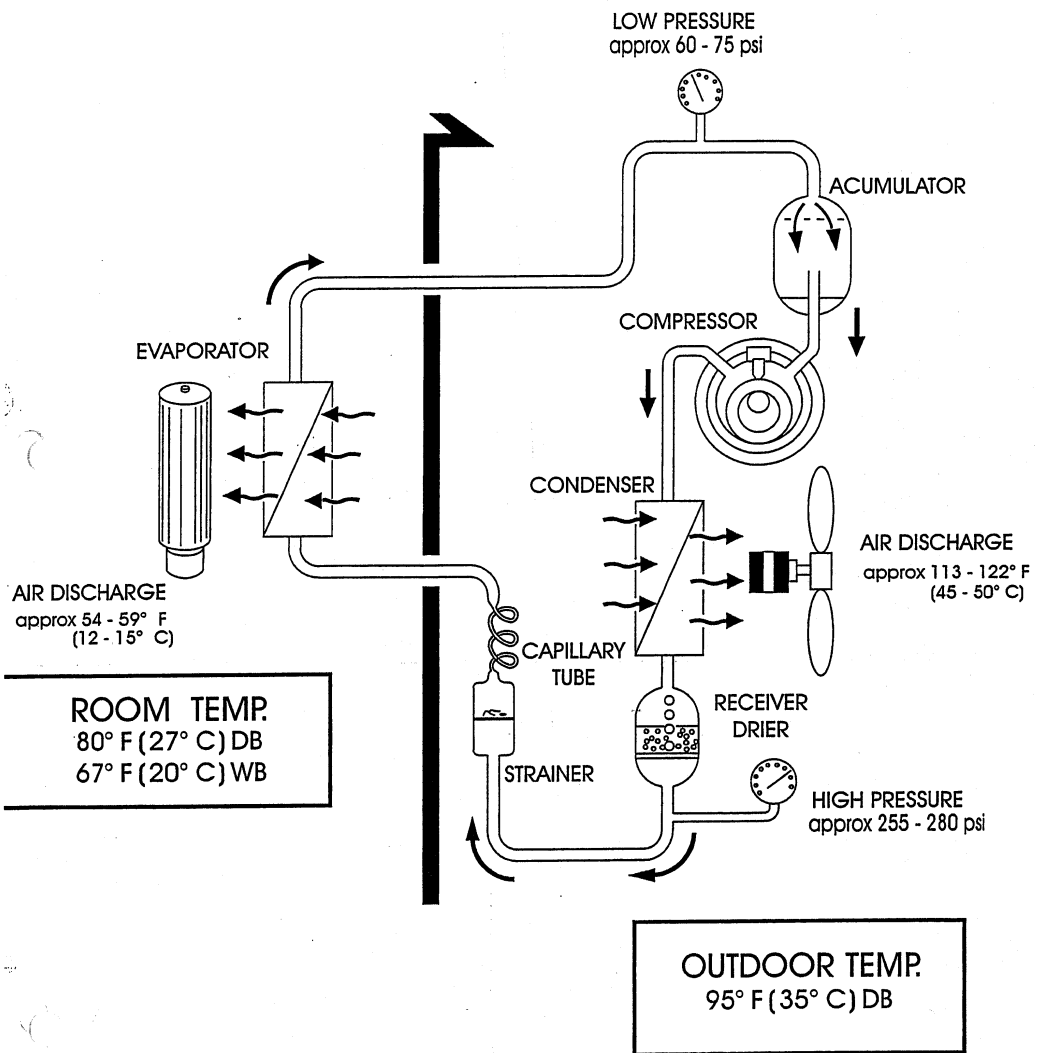




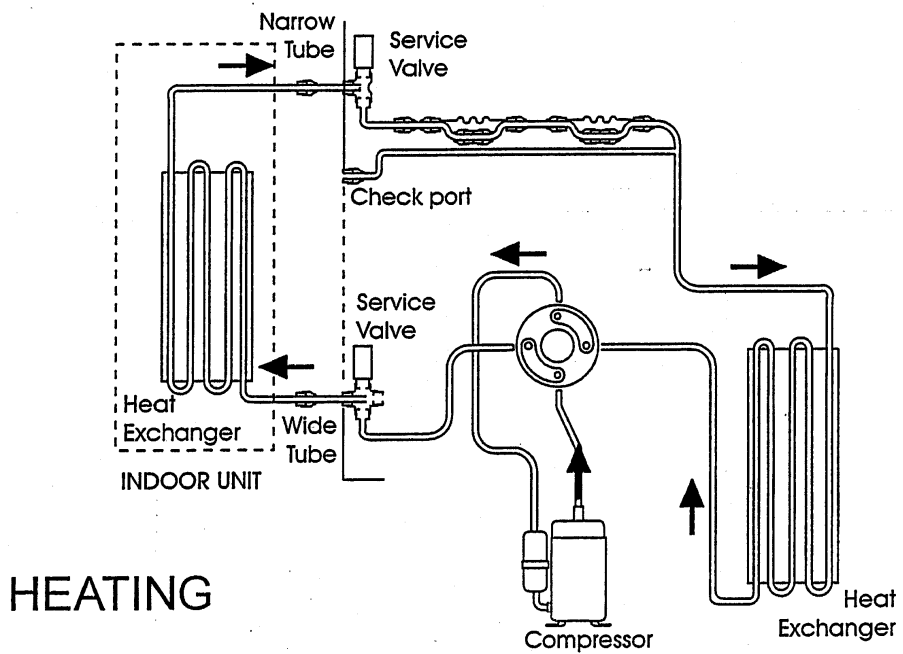
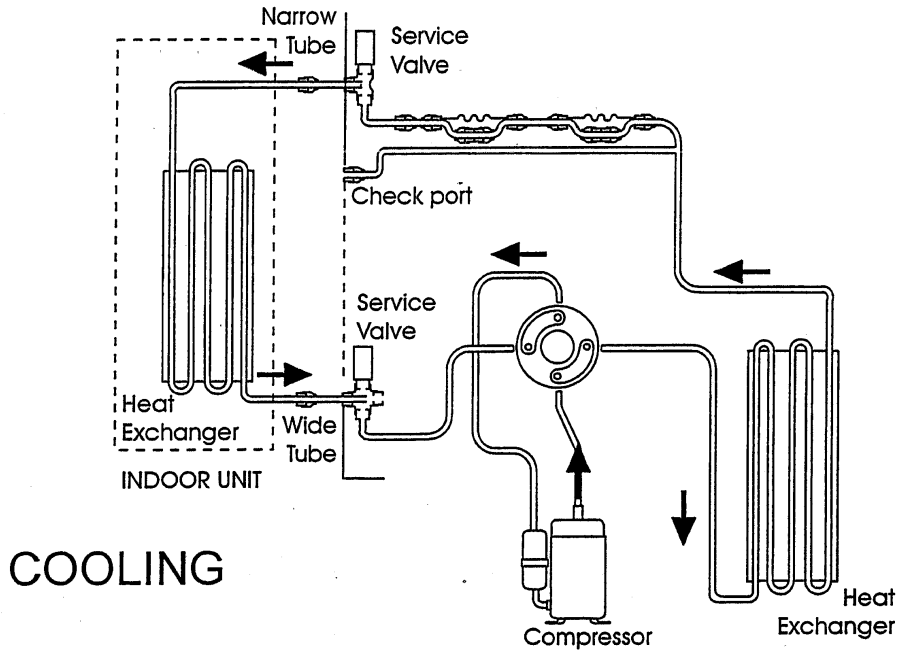
# Normal Temperature & Pressure (At High Fan Speed)

INDOOR

OUTDOOR



# 4-WAY VALVE OPERATION



# PSYCHROMETRIC CHART

