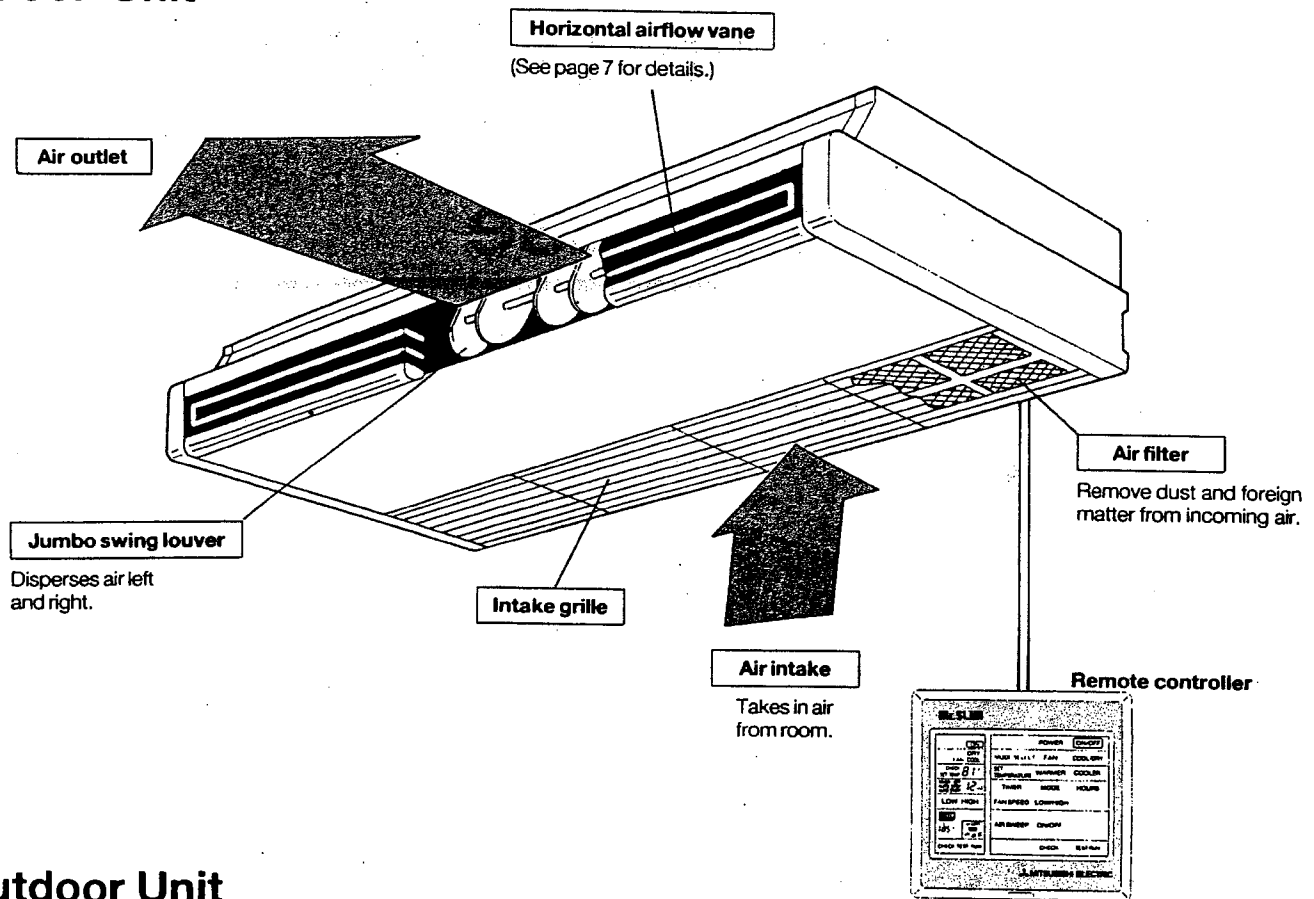
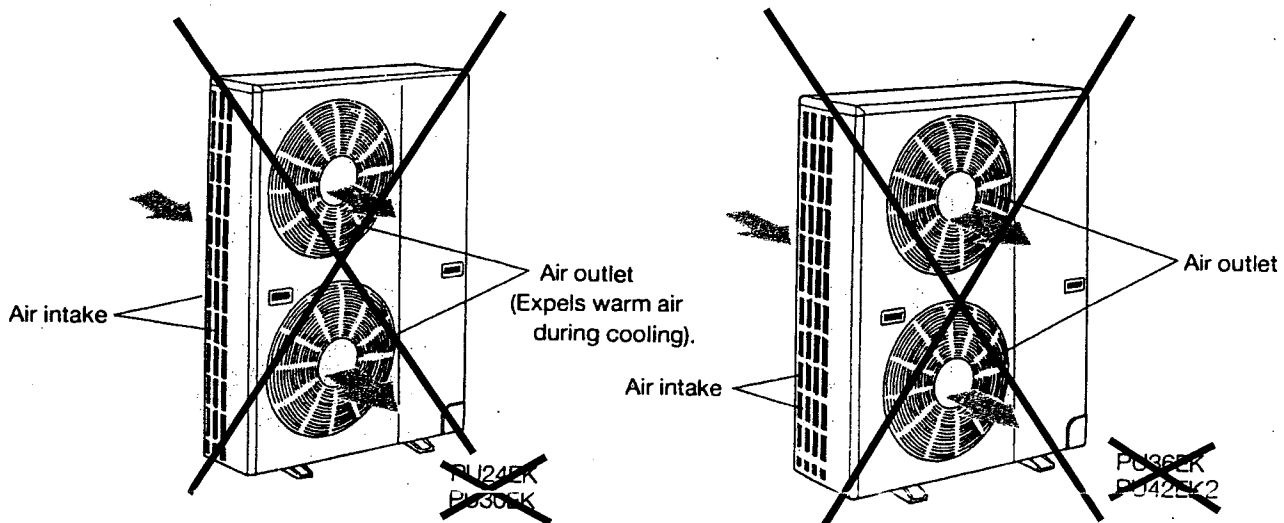


I. Names and Functions of Parts

● Indoor Unit

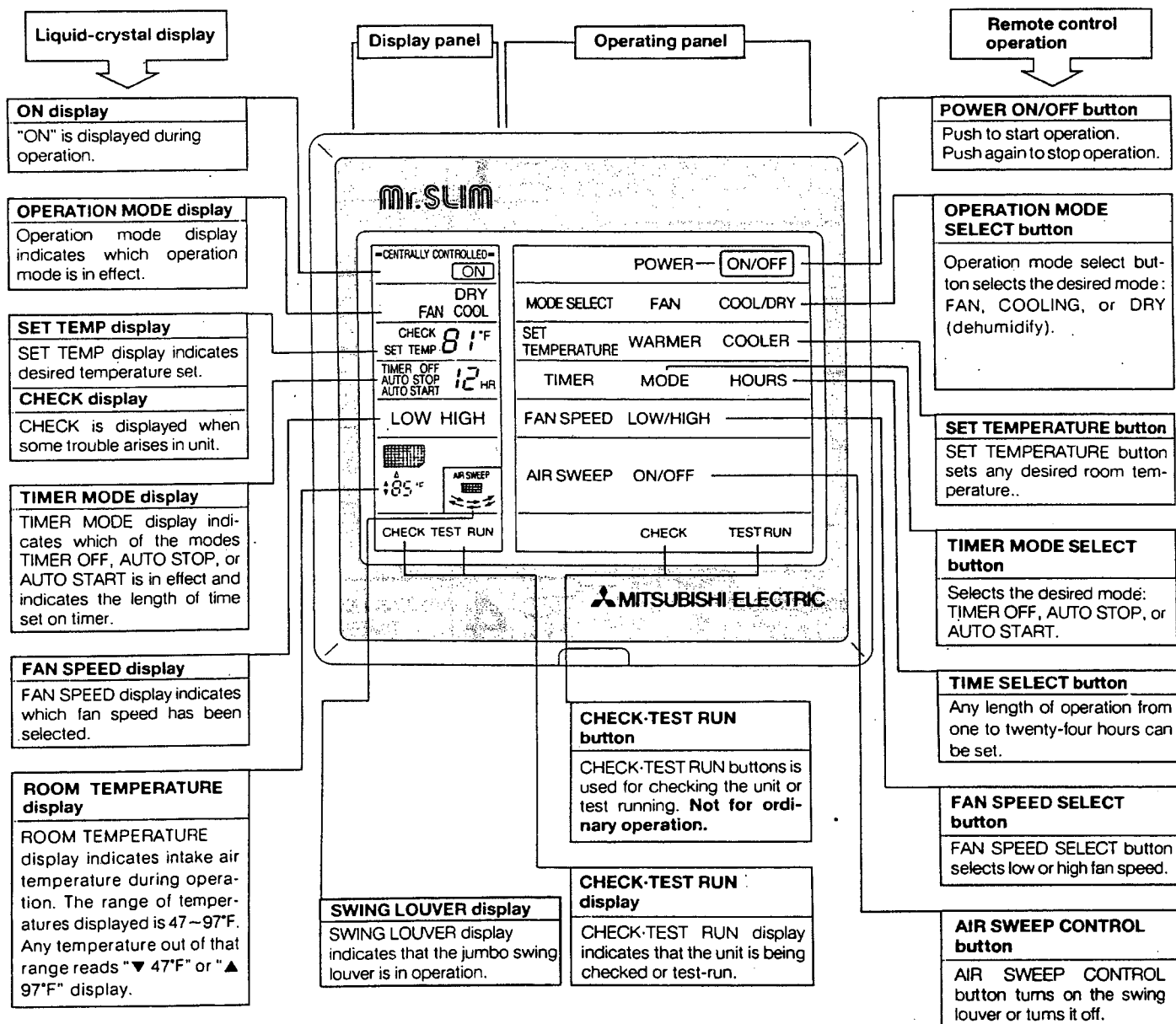


● Outdoor Unit



● Remote controller

Settings remain in effect until changed. Air conditioner can be operated by simply pushing POWER ON/OFF button once settings have been made.



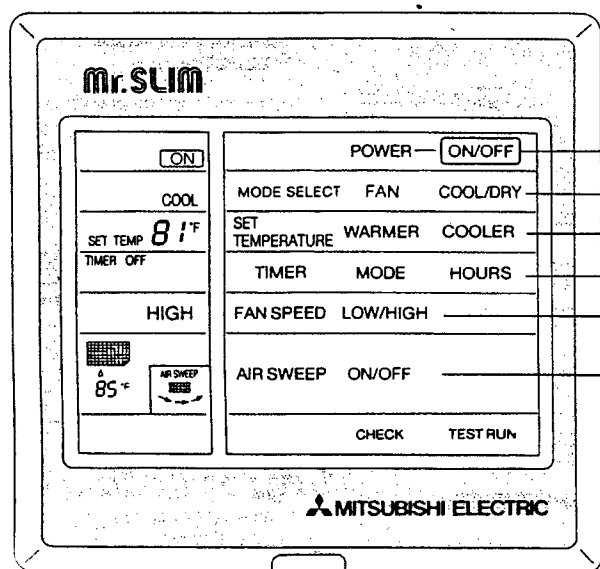
Attention :

- All liquid-crystal panel readings disappear when air conditioner is not in operation.
- When any button on control panel is pushed, it beeps to indicate that it has functioned.
- Avoid button operation with fingernails or other sharp objects. They may damage the control panel.
- They may be the case that "—CENTRALLY CONTROLLED—" is displayed a moment and goes off. This is not malfunction.

2. Method of Use and Description of Operation

Cooling

- Cooling can be controlled by simply pushing POWER ON/OFF button once settings have been made. Check that power is on before starting. Avoid turning off main power while cooling is operating. As it will turn off crankcase heater.
- Mode of COOL or DRY is transferred alternately at every pushing COOL/DRY button. The current operation shall be confirmed on the display.



Values and figures on the above control panel are an example of operation during cooling.

1 Push POWER ON/OFF button.

2 Push COOL/DRY button to select COOL mode.

3 Set desired temperature.
(See page 6 for temperature setting method.)

4 Push MODE (TIMER) button to select "TIMER OFF" mode.
(See page 6 for timer operation method.)

5 Set desired fan speed.

6 Set desired airflow direction.

- See page 7 for the procedure of adjusting the direction of airflow.

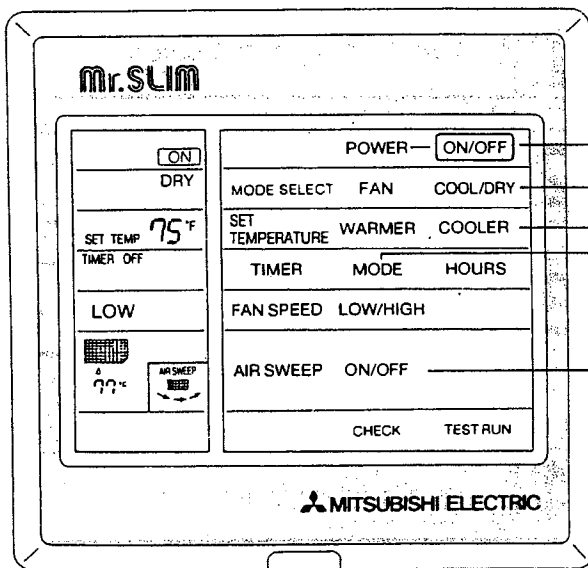
Stopping Push POWER ON/OFF button.

To protect unit, air conditioner will not restart for about three minutes after stopping. Air conditioner will restart automatically after three minutes have elapsed if POWER ON/OFF button is pushed during this time.

Dry (Dehumidify)

- Dry (dehumidify) can be controlled by simply pushing POWER ON/OFF button once settings have been made. Check that power is on before starting. Avoid turning off main power while dry (dehumidify) is operating. As it will turn off crankcase heater.

- When the room temperature is lower than 65 deg. F, do not become to dry (dehumidify) mode operation.
- Indoor fan operation will be kept at low speed which cannot be changed.
(It is changed only on the display of remote controller.)
- Mode of COOL or DRY is transferred alternately at every pushing COOL/DRY button. The current operation shall be confirmed on the display.



Values and figures on the above control panel are an example of operation during dry (dehumidify).

■ Dry (Dehumidify) Mode Operation

This mode is the dehumidifying operation under the control of microcomputer system, with holding overcooling in compliance with desired temperature.
(It doesn't function during heating mode operation.)

• Mechanism of Dry (Dehumidify) Mode

1. Until getting to the desired temperature.
According to the change of room temperature, compressor and indoor fan repeat ON/OFF in a linkage automatically.
2. After getting to desired temperature.
 - Both of compressor and indoor fan stop their operations.
 - After ten minutes stop, they operate for 3 minutes to keep the existing low humidity.

1 Push POWER ON/OFF button.

2 Push COOL/DRY button to select DRY mode.

3 Set desired temperature.
(See page 6 for temperature setting method.)

4 Push MODE (TIMER) button to select "TIMER OFF" mode.
(See page 6 for timer operation method.)

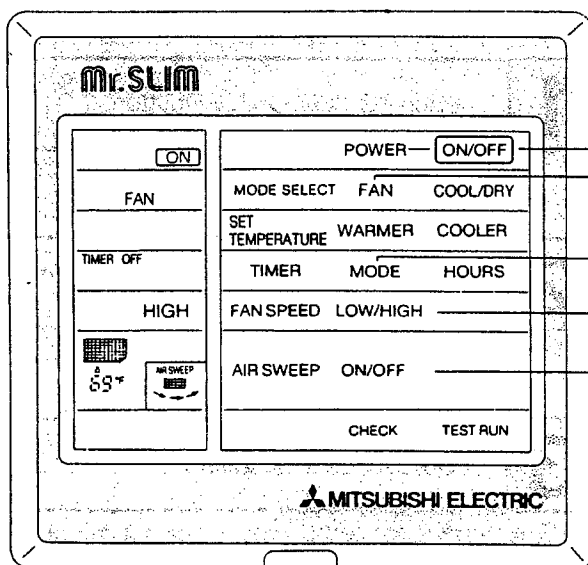
5 Set desired airflow direction.
(• See page 7 for the procedure of adjusting the direction of airflow.)

Stopping Push POWER ON/OFF button.

To protect unit, air conditioner will not restart for about three minutes after stopping. Air conditioner will restart automatically after three minutes have elapsed if POWER ON/OFF button is pushed during this time.

Ventilation

Ventilation can be controlled by simply pushing POWER ON/OFF button once settings have been made. Check that power is on before starting.



Values and figures on the above display panel are an example of operation during ventilation.

1 Push POWER ON/OFF button.

2 Push FAN button.

3 Push MODE (TIMER) button to select "TIMER OFF" mode.
(See page 6 for timer operation method.)

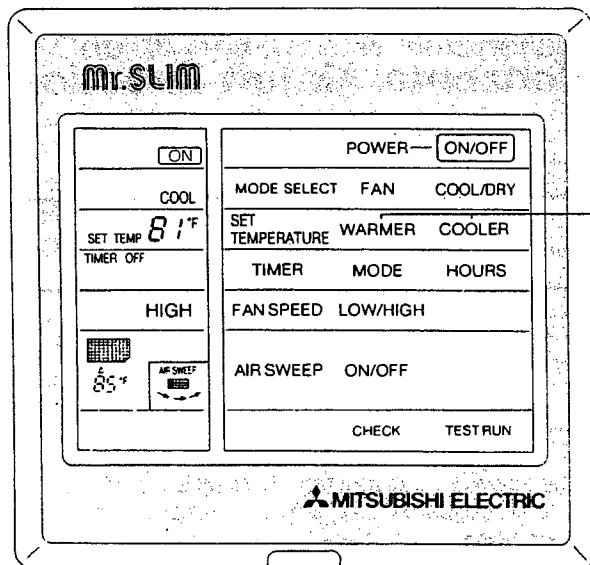
4 Set desired fan speed.

5 Set desired airflow direction.

(•See page 7 for the procedure of adjusting the direction of airflow.)

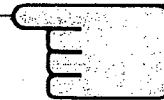
Stopping Push POWER ON/OFF button.

Regulating Room Temperature



Changing Room Temperature

To change room temperature, push WARMER or COOLER button while referring to display panel.



Push WARMER or COOLER button to set desired temperature.

Each time the WARMER button is pushed, the temperature setting is increased by 2°F.
Holding down the button increases the temperature setting 2°F every 0.5 seconds.
Each time the COOLER button is pushed, the temperature setting is decreased by 2°F.
Holding down the button decreases the temperature setting 2°F every 0.5 seconds.

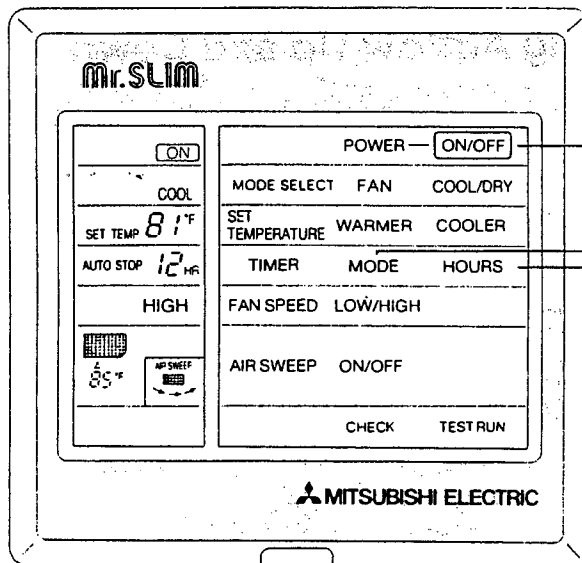
Temperature Setting Range

Example of Temperature Setting Display

Cooling : 65 ~ 87 °F
Dry : 65 ~ 87 °F

SET TEMP 81°F

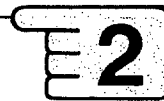
Using Timer



Setting Timer



Push POWER ON/OFF button



Push MODE (TIMER) button to select "AUTO STOP" or "AUTO START" mode.



Push HOURS (TIMER) button to set desired length of time set on timer.

- Each time the button is pushed, the time setting is increased by one hour. Holding down the button increases the time setting one hour every 0.5 seconds to a maximum of 24 hours.
- The unit can be either started or stopped while in AUTO STOP or AUTO START mode by pushing the POWER ON/OFF button regardless of any remaining time set on the timer.
- The last settings of AUTO START and AUTO STOP are each stored in memory whenever the timer mode is entered, the previous settings are restored.

Example Timer Setting

AUTO STOP 12 HR

The example shows the AUTO STOP mode by which the unit stops after 12 hours of operation. The time reading decreases by one hour after each hour elapses, indicating the remaining time.

Cancellation

Push POWER ON/OFF button

If timer mode has been set "AUTO START", Air conditioner will begin to operate.

If timer mode has been set "AUTO STOP", unit will stop its operation.

Function of Timer

AUTO STOP Mode:

- Air conditioner stops after operating for length of time set on timer

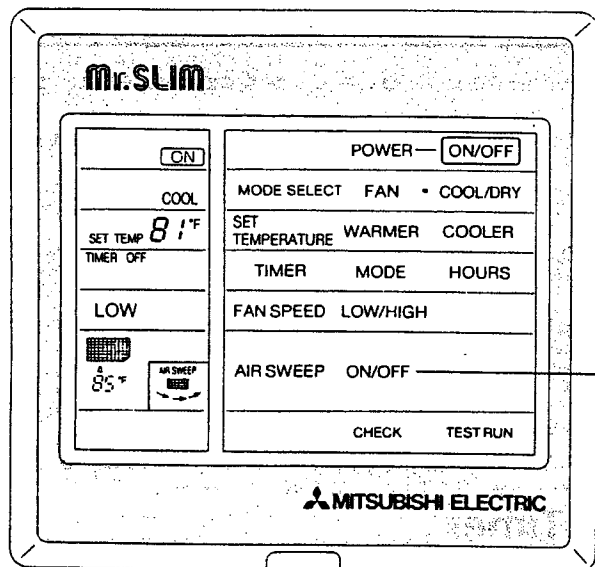
AUTO START Mode:

- Air conditioner starts after length of time set on timer elapses

Adjusting Airflow Direction

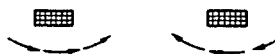
Adjusting Horizontal Airflow Direction

The airflow direction can be changed by moving the jumbo swing louver.



Push ON/OFF (AIR SWEEP) button to select turns the jumbo swing louver on or turns it off.

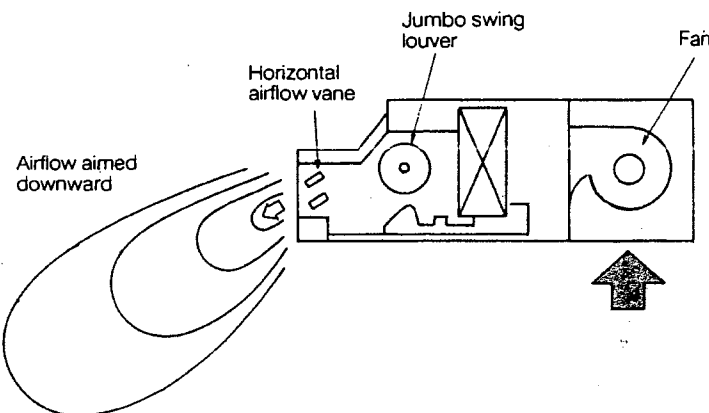
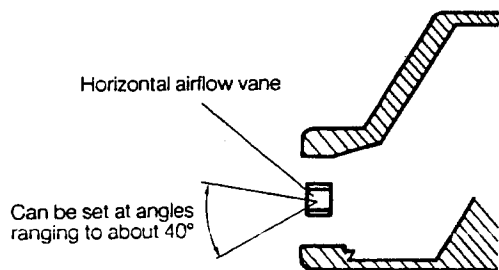
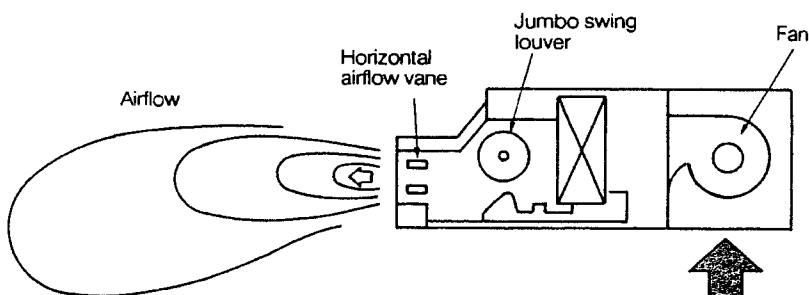
Remote control display reading when air sweep is in operation.



The arrow indicators alternate every second. No display indicates that the air sweep is not in operation.

Adjusting Airflow Up and Down

Height of airflow can be adjusted by manually turning horizontal airflow vane.

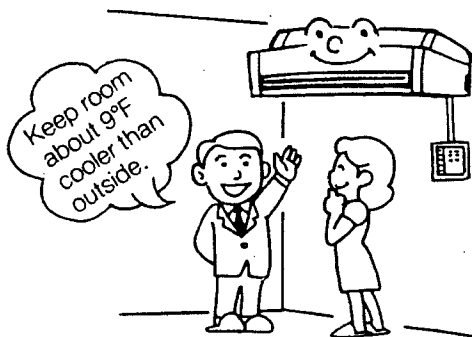


3. For Best Results ...

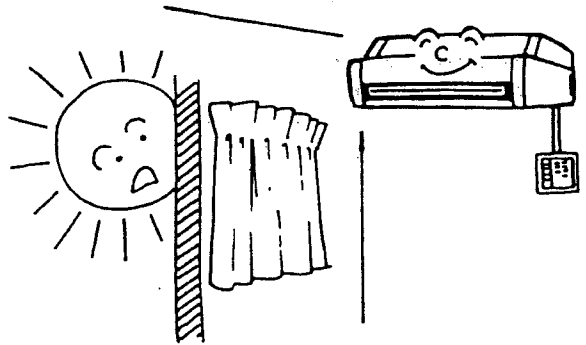
A few simple steps will permit the most effective and economical air conditioner operation.

Cool to Reasonable Temperatures

- Cooling is most efficient when the difference between room and outside temperatures is less than 9°F.
- Raising room temperature 2°F during cooling will result in electricity savings of about 10%.
- Overcooling is not good for health and wastes electricity.

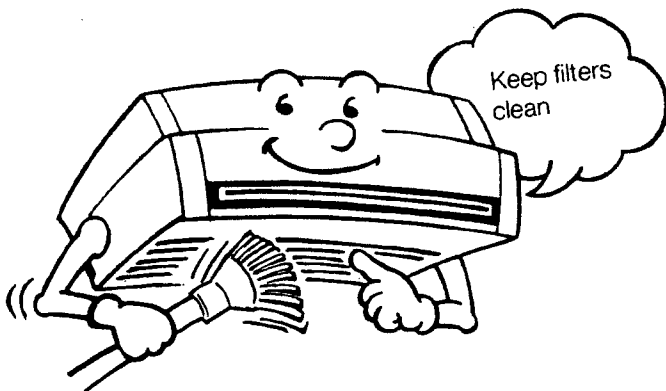


Block Sources of Outside Heat



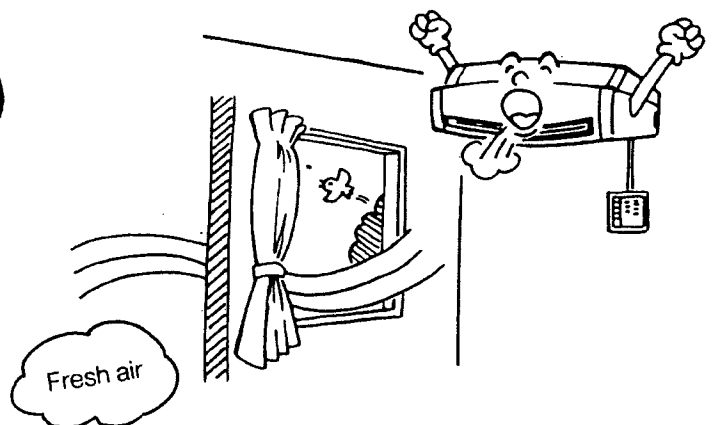
- Use curtains to cover windows subject to direct sunlight during cooling. Avoid opening doors more often than necessary.

Clean Filters Conscientiously



- Dirty or clogged filters block airflow and reduce cooling efficiency. Especially dirty filters can damage the air conditioner itself. Clean filters once a week, or more often in particularly dusty locations.

Allow Fresh Air into Room Occasionally



- Air in closed off rooms will grow musty over time. Ventilate the room periodically.

4. Care and Cleaning

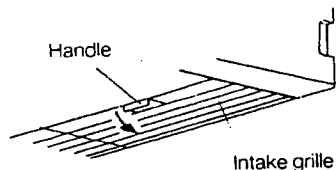
Always turn power off before cleaning or servicing air conditioner.

Filters

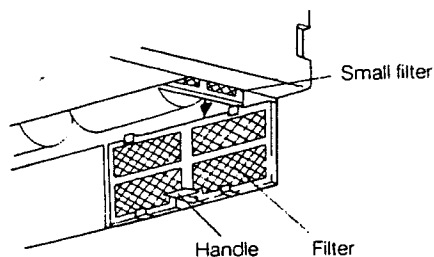
Clean filters weekly.

Removing the air filters

- Pull handle on intake grille in direction of arrow to open grille.



- Hold filter handle and release from catch on grille. Pull out small filter too.



Cleaning Filters

- Tap lightly or clean with vacuum cleaner. Rinse in water or neutral detergent dissolved in lukewarm water if filters are especially dirty. Be sure to thoroughly rinse off any detergent used. Dry before reinstalling into air conditioner.



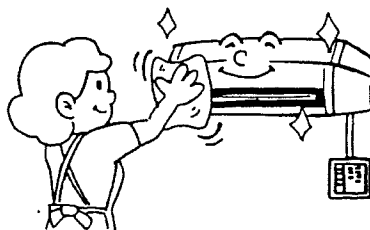
Attention

- Do not dry filters in direct sunlight or by other heat sources. Heat may disfigure filters.
- Washing in hot water (over 120°F) may disfigure filters.

Main Unit

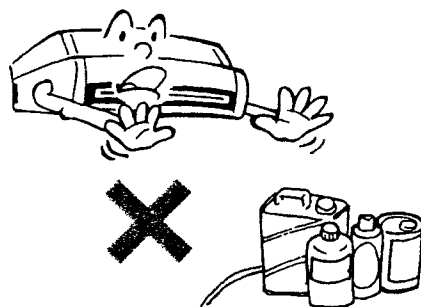
Cleaning

- Wipe with clean, dry, soft cloth.



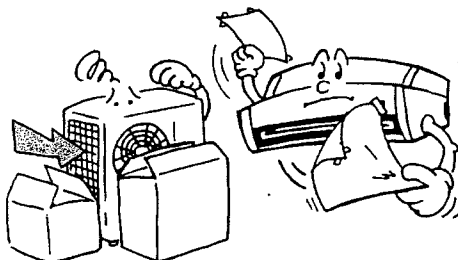
- Use neutral household detergent (for dishes or laundry) to clean oil or hand-prints.

- Never use gasoline, benzene, thinner, scouring powder or non-neutral detergents. These materials may damage air conditioner.

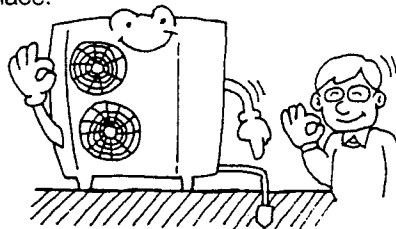


Before Season Starts

- Check that intakes and outlets on both indoor and outdoor units are free of obstruction.
- Be sure to remove protective cover from outdoor unit.



- Check that ground wire is properly in place.



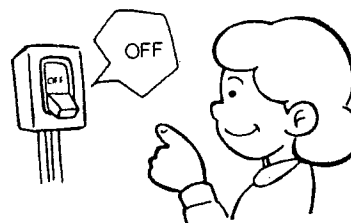
- Check drain hose for bends, kinks, clogging and improper positioning.

- Always replace filters before starting air conditioner. Running air conditioner without filters can damage unit.

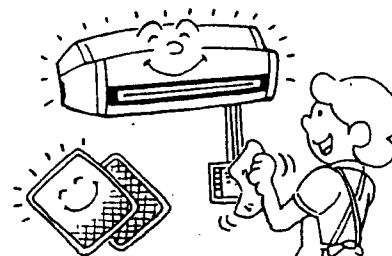
- Turn main power on at least 12 hours before starting actual operation. This will ensure smooth trouble-free starting.

After Season is Over

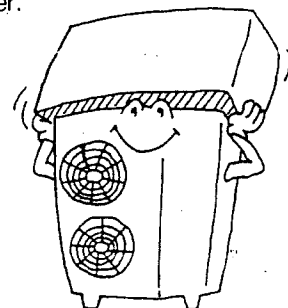
- Turn main power off.



- Clean filters and other parts.



- Cover outdoor unit with plastic or other cover to protect from dirt and foreign matter.



5. Troubleshooting

Check the following points before calling for service.

Problem	Display	Cause	Remedy
Unit does not operate at all.	When POWER ON/OFF button is pushed, there is no beep and nothing is displayed.	Power outage.	Push POWER ON/OFF button after power restored.
		Main power not on.	Turn main power on.
		Main power fuse blown.	Replace fuse.
		Ground fault breaker open.	Reset ground fault breaker.
Air is blown but is not cooled.	Liquid-crystal display indicates that the unit is on.	Improper temperature setting.	After checking the temperature setting and the intake air temperature reading on the liquid-crystal display and after referring to "Regulating Room Temperature" on page 6, make the necessary adjustment with the COOLER button.
		Clogged filter.	Clean filter. See page 9 "Cleaning Filter".
		Intake or outlet of indoor or outdoor unit obstructed.	Remove obstruction.
		Open window or door.	Shut window or door.
Neither cool air is blown out	Liquid-crystal display indicates that the unit operates.	3-Minute Restart Preventive Circuit is functioning.	As 3-Minute Restart Preventive Circuit is built in outdoor unit to protect compressor, compressor will not sometimes restart at once. In such case, please wait for a little while until the compressor restarts. It takes three minutes at longest.
Operation stops soon after starting.	Liquid-crystal display reads CHECK and "P6" or "P8".	Intake or outlet of indoor or outdoor unit obstructed.	Restart after removing obstruction.
		Clogged filter.	Restart after cleaning filter. See page 9 "Cleaning Filter".

If the above measures fail to solve the problems, turn off main switch and inform the dealer from which the air conditioner was purchased of the model name and the nature of the problem. If remote control liquid-crystal display panel displays "CHECK" and "P1~P8, U3, E0" also inform the dealer of that. Never attempt to repair the air conditioner yourself.

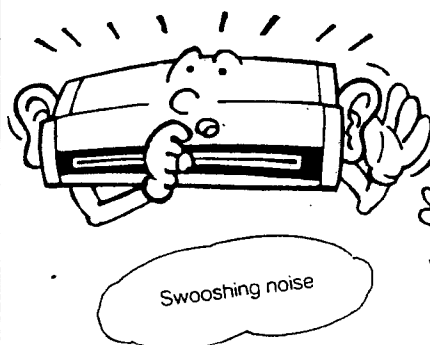
The following are not malfunctions

Odor

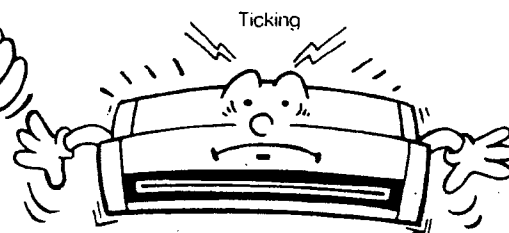


Air from air conditioner may sometimes carry odors. These odors are from tobacco smoke, cosmetics, furniture finish or other odors taken in during air conditioning and adhering to filters and other parts of air conditioner.

Noise



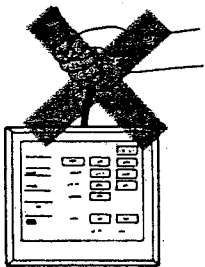
A swooshing noise may be heard during and upon stopping operation. This is merely refrigerant circulating inside air conditioner and does not represent a problem.



A ticking sound may occur just after stopping or starting cooling. This is caused by slight shrinking or expansion of front panel with temperature changes and does not represent a problem.

6. Special Precautions

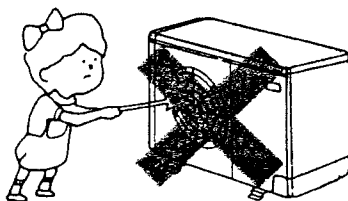
Avoid pulling remote controller cord strongly.



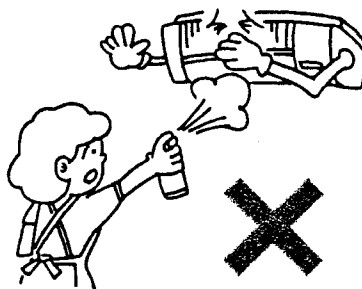
Yanking or tugging cord can damage unit or controller.

Never insert stick or foreign object in intakes or outlets.

Touching rotating or electrical parts can be hazardous.
Exercise special care around children.

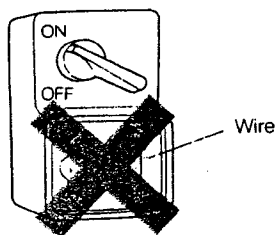


Do not spray with insecticide or other combustible gas.



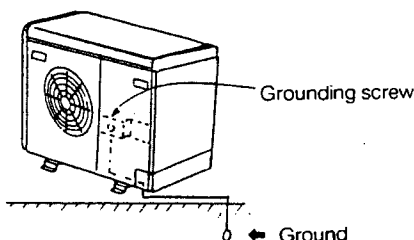
Always observe voltage rating and fuse and breaker capacities.

Never substitute piece of wire or higher capacity fuse for fuse of rated capacity. This can cause breakdowns or fires.



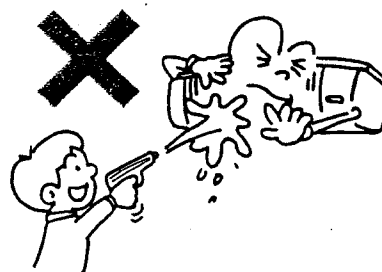
Always ground air conditioner.

Check that wire is properly connected between unit ground wire terminal and ground.



Do not apply water directly to air conditioner unit.

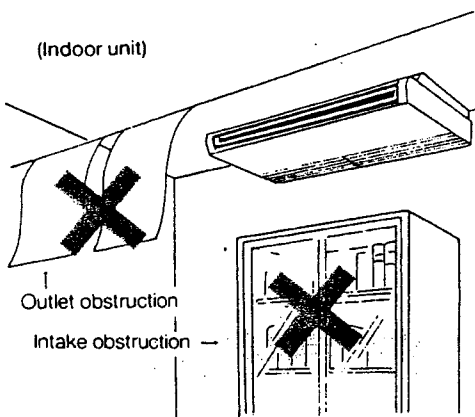
This can cause breakdowns or electrical shocks.



Do not obstruct indoor or outdoor unit intake or outlet

Obstruction will impeded performance and can cause breakdowns.

(Indoor unit)



Restarting after power outage

When operation has been stopped by power outage the "power outage restarting prevention circuit" keeps unit from restarting itself after power is restored. Push POWER ON/OFF button to restart.

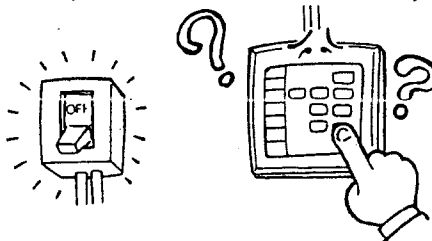
When stopping operation for long periods of time.

Turn main air conditioner power off before stopping air conditioner for extended periods of time or between operating seasons. Transformer and compressor-protection crankcase heater will consume electricity of approximately 33W~39W unless main power is turned off.

Stop operation and contact dealer in the following cases.

Breaker is tripped frequently.

Remote controller functions erratically.



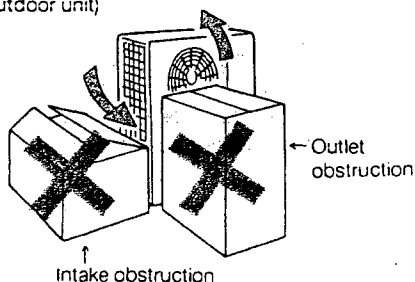
- Remote controller inspection display runs continuously.
- Any other operation or display differing from normal.

When restarting after long periods of no operation.

Turn main power on at least 12 hours before starting actual operation. This will ensure smooth trouble-free starting.



(Outdoor unit)



7. Specifications

Items		Models	PC24EK	PC30EK	PC36EK	PC42EK
Cooling capacity		• 1BTU/h	24000	31000	36500	42500
Power consumption		• 1kW	2.43	3.10	3.80	4.40
SEER			10.3	10.4	10.2	10.0
INDOOR UNIT MODELS			PC24EK	PC30EK	PC36EK	PC42EK
External finish			Munsell 2.5Y 8/0.3 & N2			
Power supply		V. Phase, Hz	115, 1, 60			
Max. fuse size (time delay)		A	15	15	15	15
Min. ampacity		A	3.0	3.0	3.0	3.0
Fan motor		F. L. A.	1.8	1.8	2.4	2.4
Airflow Lo-Hi	Dry	CFM	850-1050	850-1050	990-1270	990-1270
	Wet	CFM	730-900	730-900	860-1100	860-1100
Dimensions	W	in	50-7/16	50-7/16	62-1/4	62-1/4
	D	in	26-13/16	26-13/16	26-13/16	26-13/16
	H	in	10-1/8	10-1/8	10-1/8	10-1/8
Weight		lbs	93	93	115	115
OUTDOOR UNIT MODELS			PU24EK	PU30EK	PU36EK	PU42EK2
External finish			Munsell 5Y 7/1			
Power supply		V. Phase, Hz	208/230, 1, 60			
Max. fuse size (time delay)		A	20	30	30	40
Min. ampacity		A	16	20	22	27
Fan motor		F. L. A.	0.65 + 0.65	0.65 + 0.65	0.75 + 0.75	0.8 + 0.8
Compressor	Model (type)		NH33NBD	NH41NAD	NH47NAD	NH569NXA
	R. L. A.		11.5	14.0	17.5	20.0
	L. R. A.		54	73	87	105
Crankcase heater		A (W)	0.16/0.17 (33/39)	0.16/0.17 (33/39)	0.16/0.17 (33/39)	0.16/0.17 (33/39)
Refrigerant control			Capillary tube			
Dimensions	W	in	34-1/4		38-3/16	
	D	in	11-5/8		13-9/16	
	H	in	41-9/16		49-9/16	
Weight		lbs	207	208	220	260
REMOTE CONTROLLER			With indoor unit			
Control voltage (by built-in transformer)			Indoor unit-remote controller: DC 12V, Indoor unit-outdoor unit: DC 12V			

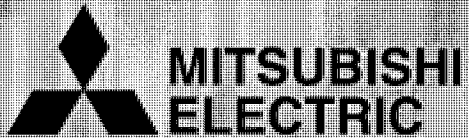
NOTES : *1 Rating conditions (cooling) – indoor :80°F DB, 67°F WB Outdoor: 95°F DB, 75°F WB

Operating range

		Indoor air intake temperature	Outdoor air intake temperature
Cooling	Maximum	95°FDB, 71°F WB	115°FDB
	Minimum	67°F DB, 57°F WB	23°F DB

Units should be installed by licensed electric contractor accordingly to local code requirement.

*Specifications subject to change without notice.



HVAC Advanced Products Division

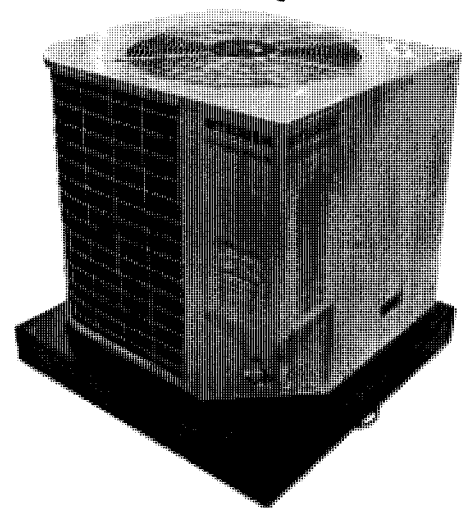
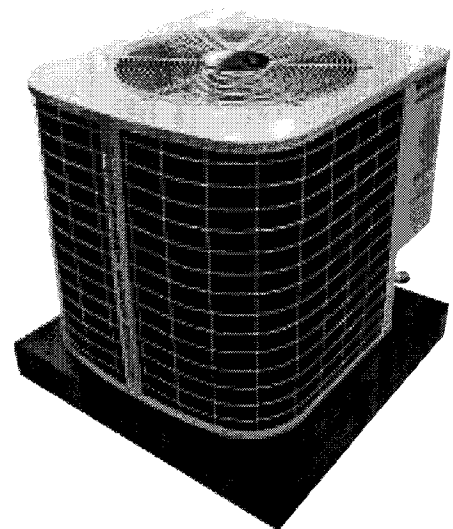
SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

NO. SP-007

TECHNICAL MANUAL

PUG & PUGH Condensing Units

	<Cooling>	<Heat Pumps>
Models	PUG18 ^{AK} _{BK}	PUGH18 ^{AK} _{BK}
	PUG24 ^{AK} _{BK}	PUGH24 ^{AK} _{BK}
	PUG30 ^{AK} _{BK}	PUGH30 ^{AK} _{BK}
	PUG36 ^{AK} _{BK}	PUGH36 ^{AK} _{BK}
	PUG42 ^{AK} _{BK}	PUGH42 ^{AK} _{BK}



Applies to: 208/230 VAC
Single and Three Phase Models



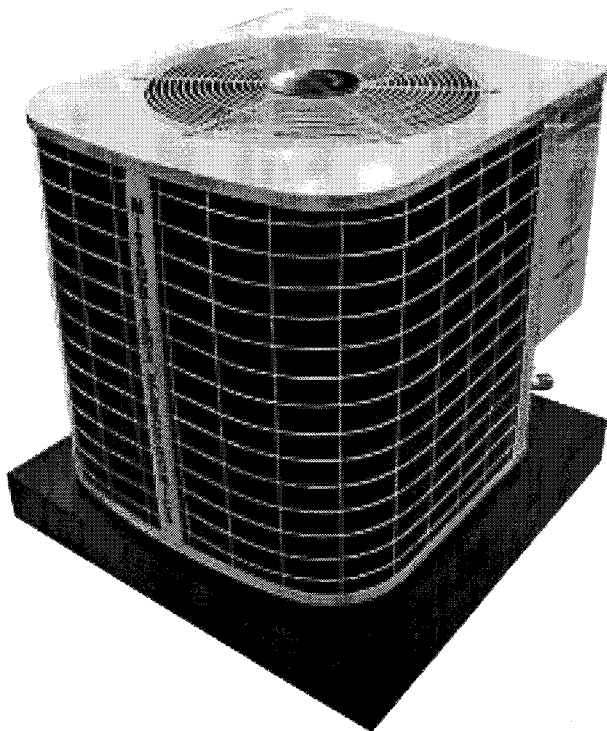
The Slim Line.
From Mitsubishi Electric.



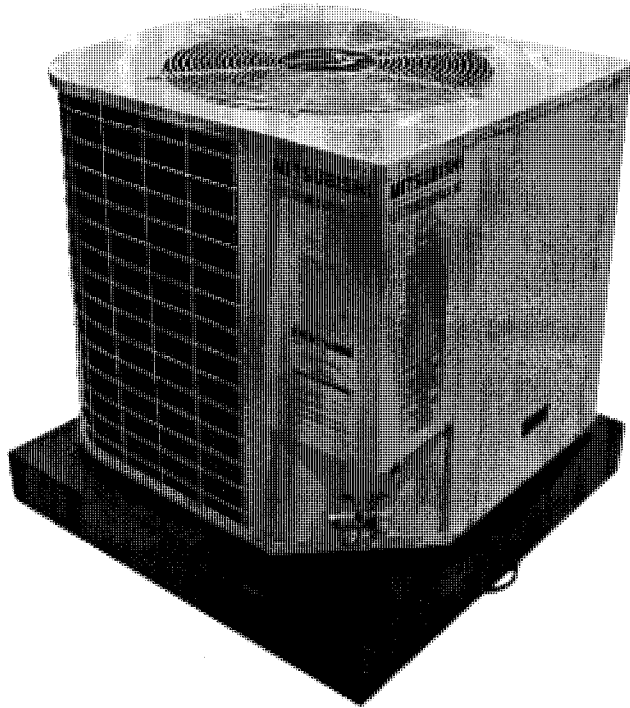
Mr. SLIM™

CONTENTS

1	FEATURES	2
2	SPECIFICATIONS.....	3
3	STANDARD OPERATING DATA	5
4	PERFORMANCE DATA - OPERATING PRESSURE.....	8
	COOLING MODE	8
	HEATING MODE	21
5	DIMENSIONS & CLEARANCES	24
6	OPERATING RANGE	25
7	REFRIGERANT CHARGE (R-22 (oz)) ADJUSTMENT FOR OPTIMUM PERFORMANCE	26
8	CAPACITY CORRECTION FACTORS FOR VARIOUS PIPE LENGTHS	27
9	MICROPROCESSOR CONTROL.....	28
10	ELECTRICAL	31
11	REFRIGERANT SYSTEM.....	37
→ 12	PARTS BREAKDOWN	40



PUG

~~PUGH~~

1. **THE PUG CONDENSING UNIT IS A COOLING ONLY MODEL WHILE THE PUGH IS A HEAT PUMP**
2. **PUG OUTDOOR CONDENSING UNITS ARE DESIGNED SPECIFICALLY FOR USE WITH MITSUBISHI ELECTRIC PK, PC AND PL MR. SLIM INDOOR UNITS OF MATCHING NOMINAL CAPACITY**
 These units are provided with an outdoor circuit board that is "standard to all models" and operates all functions of the condensing unit. The board also provides operational and diagnostic functions to the technician through the use of LEDs.
3. **PUGH OUTDOOR UNITS ARE DESIGNED SPECIFICALLY FOR USE WITH MITSUBISHI PKH, PCH AND PLH MR. SLIM INDOOR UNITS OF MATCHING NOMINAL CAPACITY**
 These units are also provided with the same "standard to all models" outdoor circuit board which operates all functions of the outdoor unit. Operational and diagnostic functions are easily accomplished by routine troubleshooting steps when using the LED diagnostic displays located on the circuit board.
4. **ALL PUG AND PUGH UNITS OF 18,000 BTU'S THROUGH 42,000 BTU'S ARE DRIVEN BY A HIGH EFFICIENCY COPELAND SCROLL COMPRESSOR**
5. **ALL UNITS ARE FACTORY PRECHARGED WITH REFRIGERANT FOR LINE SETS OF UP TO 100 FEET**

This greatly simplifies installation and saves time by eliminating the need to calculate additional refrigerant charges.

PK SERIES – AIR CONDITIONING SYSTEMS

System	Indoor	Outdoor	BTU/h	S.E.E.R.	E.E.R
PKG18FK1	PK18FK1	PUG18	18,000	12.0	11.0
PKG24FK1	PK24FK1	PUG24	24,000	12.0	11.2
PKG30FK1	PK30FK1	PUG30	29,600	12.0	11.2
PKG36FK1	PK36FK1	PUG36	34,200	12.0	11.1

PKH SERIES – HEAT PUMP SYSTEMS

System	Indoor	Outdoor	BTU/h COOL*	BTU/h HEAT (aux) [†]	S.E.E.R.	E.E.R	HSPF	COP
PKG18FK1	PKH18FK1	PUGH18	18,000	18,800(28,500)	12.0	11.0	7.0	3.2
PKG24FK1	PKH24FK1	PUGH24	24,000	24,000(30,500)	12.0	11.2	7.0	2.9
PKG30FK1	PKH30FK1	PUGH30	29,600	29,200(36,700)	12.0	11.2	7.0	3.4
PKG36FK1	PKH36FK1	PUGH36	34,200	34,600(42,100)	12.0	11.1	7.0	3.1

→ PC SERIES – AIR CONDITIONING SYSTEMS

System	Indoor	Outdoor	BTU/h	S.E.E.R.	E.E.R
PCG24EK1	PC24EK1	PUG24	24,000	12.0	10.4
PCG30EK1	PC30EK1	PUG30	28,800	12.0	10.5
PCG36EK1	PC36EK1	PUG36	35,600	12.0	11.4
PCG42EK1	PC42EK1	PUG42	42,000	12.0	11.4

PCH SERIES – HEAT PUMP SYSTEMS

System	Indoor	Outdoor	BTU/h COOL*	BTU/h HEAT (aux) [†]	S.E.E.R.	E.E.R	HSPF	COP
PCGH24EK1	PCH24EK1	PUGH24	24,000	23,200(28,700)	12.0	10.4	7.0	3.1
PCGH30EK1	PCH30EK1	PUGH30	28,800	26,000(34,500)	12.0	10.5	6.8	3.0
PCGH36EK1	PCH36EK1	PUGH36	35,600	33,000(42,500)	12.0	10.4	7.0	3.3
PCGH42EK1	PCH42EK1	PUGH42	42,000	41,000(50,500)	12.0	11.4	7.0	3.3

PL SERIES – AIR CONDITIONING SYSTEMS

System	Indoor	Outdoor	BTU/h	S.E.E.R.	E.E.R
PLG18FK1	PL18FK1	PUG18	18,000	12.0	10.5
PLG24FK1	PL24FK1	PUG24	22,200	11.5	10.2
PLG30FK1	PL30FK1	PUG30	30,000	12.0	10.9
PLG36FK1	PL36FK1	PUG36	34,200	12.0	10.9
PLG42FK1	PL42FK1	PUG42	41,000	12.0	10.8

2

SPECIFICATIONS

PLH SERIES – HEAT PUMP SYSTEMS

System	Indoor	Outdoor	BTU/h COOL*	BTU/h HEAT (aux) ¹	S.E.E.R.	E.E.R.	HSPF	COP
PLGH18FK1	PLH18FK1	PUGH18	18,000	17,400(23,900)	12.0	10.5	7.0	3.0
PLGH24FK1	PLH24FK1	PUGH24	22,200	23,200(29,700)	11.5	10.2	6.8	3.0
PLGH30FK1	PLH30FK1	PUGH30	30,000	26,600(36,800)	12.0	10.9	7.0	3.3
PLGH36FK1	PLH36FK1	PUGH36	34,200	33,000(42,500)	12.0	10.9	7.0	3.1
PLGH42FK1	PLH42FK1	PUGH42	41,000	39,000(48,500)	12.0	10.8	7.0	3.1

¹ Based on ETL operating condition. Data applies to 230V. Unit operates at 208/230V. 460V units available on special order.

Specifications subject to change without notice. *cooling tested at 95DB/75WB O/D and 80 DB/67 WB I/D. (Deg.F)

¹heating tested at 47-53/70-60 (deg.F)

ELECTRICAL SPECIFICATIONS - AIR CONDITIONING CONDENSING UNITS

Model			PUG18AK	PUG24AK	PUG30AK	PUG36AK	PUG42AK
Compressor	Locked Rotor Amps ¹	1 PH	45.0	63.0	72.5	93.0	103.0
		3 PH	n/a	55.0	63.0	77.0	88.0
	Rated Load Amps ¹	1 PH	9.6	10.6	13.5	14.6	18.0
		3 PH	n/a	7.7	9.0	10.3	12.4
Outdoor Fan	Full Load Amps ¹	1 PH	1.0	1.0	1.0	1.9	1.9
		3 PH	n/a	1.0	1.0	1.9	1.9
Unit Total	Full Load Amps ¹	1 PH	10.6	11.6	14.5	16.5	19.9
		3 PH	n/a	8.7	10.0	12.2	14.3
Max Fuse Size (Amps)		1 PH	20	20	30	30	40
		3 PH	n/a	15	20	25	25
Min. Circuit Ampacity		1 PH	13	16.3	18.6	19.5	24.4
		3 PH	n/a	10.6	12.3	14.8	17.4

ELECTRICAL SPECIFICATIONS - HEAT PUMP OUTDOOR UNITS

Model			PUGH18AK	PUGH24AK	PUGH30AK	PUGH36AK	PUGH42AK
Compressor	Locked Rotor Amps ¹	1 PH	45.0	63.0	72.5	93.0	103.0
		3 PH	n/a	55.0	63.0	77.0	88.0
	Rated Load Amps ¹	1 PH	9.6	12.2	13.5	16.0	18.0
		3 PH	n/a	7.7	9.0	10.3	12.4
Outdoor Fan	Full Load Amps ¹	1 PH	1.0	1.0	1.0	1.9	1.9
		3 PH	n/a	1.0	1.0	1.9	1.9
Unit Total	Full Load Amps ¹	1 PH	10.6	13.2	14.5	17.9	19.9
		3 PH	n/a	8.7	10.0	12.2	14.3
Max Fuse Size (Amps)		1 PH	20	25	30	35	40
		3 PH	n/a	15	20	25	25
Min. Circuit Ampacity		1 PH	13	15.8	18.6	19.5	24.3
		3 PH	n/a	10.6	12.3	14.8	17.4

PC AND PCH INDOOR UNITS WITH PUG AND PUGH OUTDOOR UNITS

Models			PC/H24EK		PC/H30EK		PC/H36EK		PC/H42EK	
Item	Unit		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
			208/230	208/230	208/230	208/230	208/230	208/230	208/230	208/230
Voltage	V		60		60		60		60	
Frequency	Hz		60		60		60		60	
Total input	kW		2.31	2.19	2.75	2.52	3.14	2.89	3.81	3.50
Indoor fan current	A		0.7	0.7	0.7	0.7	1.3	1.3	1.3	1.3
Booster heater current	A		—	7.6/8.4	—	9.8/10.8	—	10.8/12.0	—	10.8/12.0
Outdoor fan current	A		1.00	1.00	1.00	1.00	1.90	1.90	1.90	1.90
Compressor current (230v)	A		9.3	9.1	10.2	9.4	11.4	10.5	14.7	13.6
Condensing pressure	psi.G		234	218	253	226	235	209	254	234
Suction pressure	psi.G		76	59	78	56	77	58	78	55
Discharge temperature	°F		186	158	172	155	165	146	174	175
Condensing temperature	°F		112	107	118	110	113	104	118	112
Suction temperature	°F		67	48	56	31	68	45	61	45
Comp.shell bottom temperature	°F		132	109	126	40	127	98	126	115
Refrigerant pipe length	ft		25		25		25		25	
Refrigerant charge	—		6 lbs 2 oz		7 lbs 9 oz		7 lbs 3 oz		7 lbs 15 oz	
Indoor side	Intake air temperature	DB	80	70	80	70	80	70	80	70
		WB	67	60	67	60	67	60	67	60
	Discharge air temperature	DB	60	96	57	101	59	98	56	103
		WB	57	—	56	—	57	—	55	—
Fan speed	r.p.m.		1485	1470	1485	1470	1505	1480	1505	1480
Airflow (High)	CFM		830	920	830	920	1100	1270	1100	1270
Outdoor side	Intake air temperature	DB	95	47	95	47	95	47	95	47
		WB	—	43	—	43	—	43	—	43
Fan speed	r.p.m.		825		825		825		825	
Airflow	CFM		2,850		2,850		3,300		3,300	
Capacity	Btu/h		24,000	23,200	28,800	26,000	35,600	33,000	42,000	41,000
SHF	—		0.68	—	0.67	—	0.70	—	0.68	—

PC/H24EK with PUG/H24 (Indoor Air = 830 CFM)

COOLING MODE

75°F Outdoor Air Temperature										
Indoor Wet Bulb (°F)	Cooling Capacity (Btu/Hr)	EER	Total Power (Watts)	Net Sensible Cooling Capacity (Btu/Hr)					Pressures (psig)	
				Indoor Dry Bulb (°F)						
				70	75	80	85	90	Suction	Disch.
63	24,384	13.67	1,784	13,383	16,557	19,731	22,905	24,384	68	173
65	25,152	13.85	1,816	12,004	15,178	18,352	21,526	24,700	71	175
67	26,592	14.42	1,844	10,856	14,030	17,204	20,378	23,552	74	180
69	26,952	14.29	1,886	9,283	12,457	15,631	18,805	21,979	77	185
71	27,984	14.59	1,918	7,934	11,109	14,283	17,457	20,631	80	192

85°F Outdoor Air Temperature										
Indoor Wet Bulb (°F)	Cooling Capacity (Btu/Hr)	EER	Total Power (Watts)	Net Sensible Cooling Capacity (Btu/Hr)					Pressures (psig)	
				Indoor Dry Bulb (°F)						
				70	75	80	85	90	Suction	Disch.
63	23,472	11.51	2,039	13,019	16,193	19,368	22,542	23,472	69	196
65	24,216	11.71	2,069	11,644	14,818	17,993	21,167	24,216	72	200
67	24,960	11.89	2,099	10,250	13,424	16,598	19,773	22,947	75	205
69	25,968	12.13	2,140	8,931	12,106	15,280	18,454	21,628	78	211
71	26,952	12.34	2,184	7,579	10,754	13,928	17,102	20,276	81	217

95°F Outdoor Air Temperature										
Indoor Wet Bulb (°F)	Cooling Capacity (Btu/Hr)	EER	Total Power (Watts)	Net Sensible Cooling Capacity (Btu/Hr)					Pressures (psig)	
				Indoor Dry Bulb (°F)						
				70	75	80	85	90	Suction	Disch.
63	22,560	10.03	2,249	12,658	15,833	19,007	22,181	22,560	71	223
65	23,280	10.20	2,282	11,287	14,461	17,635	20,809	23,280	73	228
67	24,000	10.37	2,314	9,897	13,071	16,245	19,420	22,594	76	234
69	24,960	10.59	2,358	8,574	11,748	14,922	18,096	21,271	79	240
71	25,920	10.78	2,404	7,227	10,401	13,575	16,749	19,924	83	247

105°F Outdoor Air Temperature										
Indoor Wet Bulb (°F)	Cooling Capacity (Btu/Hr)	EER	Total Power (Watts)	Net Sensible Cooling Capacity (Btu/Hr)					Pressures (psig)	
				Indoor Dry Bulb (°F)						
				70	75	80	85	90	Suction	Disch.
63	19,968	8.10	2,464	11,646	14,820	17,995	19,968	19,968	72	256
65	20,664	8.26	2,501	10,302	13,476	16,650	19,824	20,664	74	262
67	21,360	8.41	2,538	8,939	12,113	15,287	18,461	21,360	77	267
69	22,224	8.60	2,585	7,616	10,791	13,965	17,139	20,313	80	274
71	23,064	8.77	2,631	6,265	9,439	12,613	15,787	18,961	84	281

115°F Outdoor Air Temperature										
Indoor Wet Bulb (°F)	Cooling Capacity (Btu/Hr)	EER	Total Power (Watts)	Net Sensible Cooling Capacity (Btu/Hr)					Pressures (psig)	
				Indoor Dry Bulb (°F)						
				70	75	80	85	90	Suction	Disch.
63	18,552	6.98	2,659	11,101	14,276	17,450	18,552	18,552	74	290
65	19,200	7.11	2,700	9,758	12,932	16,106	19,200	19,200	76	295
67	19,872	7.25	2,740	8,406	11,581	14,755	17,929	19,872	79	301
69	20,664	7.43	2,781	7,079	10,253	13,427	16,601	19,775	83	307
71	21,456	7.61	2,821	5,731	8,905	12,079	15,253	18,427	86	314

HEATING MODE

PCH24EK/PUGH24

INDOOR AIR 70°

Outdoor Air (deg °F)	Heating Capacity (BTUH)	Air Flow (CFM)	Compressor		
			Current (Amps)	Pressure (psig)	
				Disch.	Suction
65	29,045	920	10.3	275	73
60	27,400		9.7	260	69
55	25,756		9.1	244	65
50	24,111		8.5	229	61
47	23,200		8.1	218	59
45	22,467		8.0	213	57
40	20,633		7.6	202	51
35	18,800		7.3	191	46
30	17,633		7.0	185	42
25	16,467		6.7	179	38
20	15,300		6.4	174	34
17	14,600		6.2	171	32

PCH30EK/PUGH30

INDOOR AIR 70°

Outdoor Air (deg °F)	Heating Capacity (BTUH)	Air Flow (CFM)	Compressor		
			Current (Amps)	Pressure (psig)	
				Disch.	Suction
65	32,579	920	12.1	287	70
60	30,734		11.4	271	66
55	28,889		10.7	254	62
50	27,045		10.0	238	58
47	26,000		9.4	226	56
45	25,200		9.3	222	54
40	23,200		9.2	211	50
35	21,200		9.0	201	45
30	19,756		8.8	194	41
25	18,311		8.7	187	37
20	16,867		8.5	180	33
17	16,000		8.4	176	31

PCH36EK/PUGH36

INDOOR AIR 70°

Outdoor Air (deg °F)	Heating Capacity (BTUH)	Air Flow (CFM)	Compressor		
			Current (Amps)	Pressure (psig)	
				Disch.	Suction
65	41,801	1,270	13.5	267	73
60	39,434		12.7	252	69
55	37,067		12.0	237	64
50	34,700		11.2	221	60
47	33,000		10.5	209	58
45	32,333		10.4	206	56
40	30,667		10.3	201	52
35	29,000		10.1	196	49
30	27,056		9.9	189	44
25	25,111		9.8	182	40
20	23,167		9.6	176	36
17	22,000		9.5	172	33

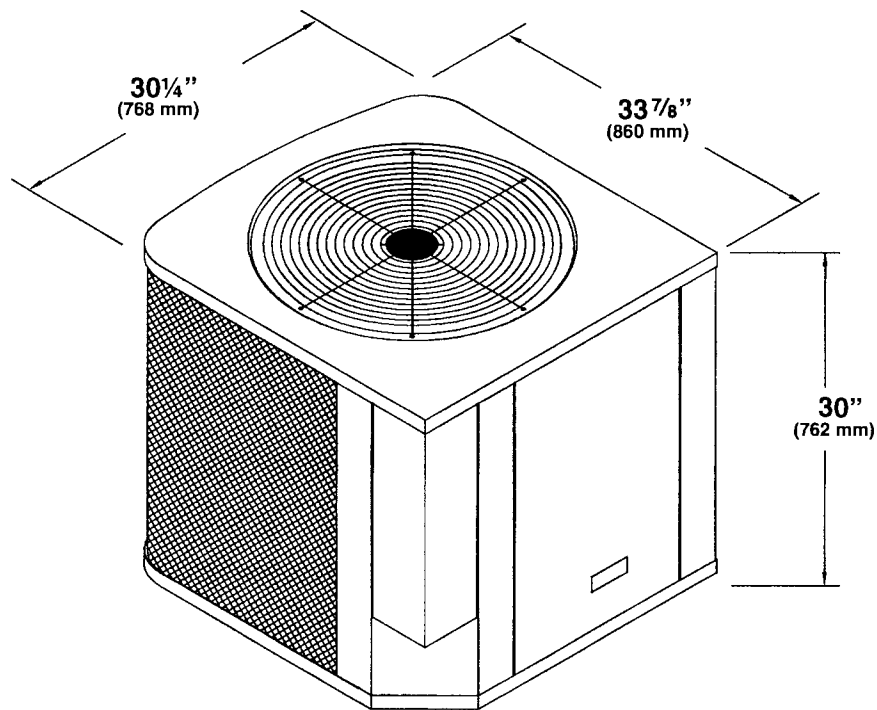
PCH42EK/PUGH42

INDOOR AIR 70°

Outdoor Air (deg °F)	Heating Capacity (BTUH)	Air Flow (CFM)	Compressor		
			Current (Amps)	Pressure (psig)	
				Disch.	Suction
65	51,712	1,270	17.5	299	69
60	48,784		16.5	282	65
55	45,856		15.5	265	61
50	42,928		14.5	248	57
47	41,000		13.6	234	55
45	40,000		13.5	231	53
40	37,500		13.4	225	50
35	35,000		13.2	218	46
30	32,722		13.0	210	42
25	30,444		12.7	202	38
20	28,167		12.5	194	34
17	26,800		12.3	190	32

5

DIMENSIONS & CLEARANCES



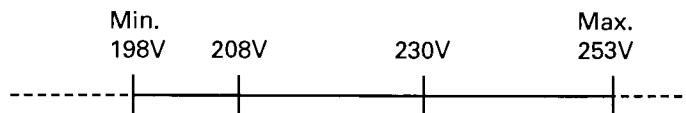
Required clearances of 18 inches on all sides and above the unit. Comply with all local codes as necessary.

6

OPERATING RANGE

1) POWER SUPPLY

1 Phase 60Hz 208/230V
Guaranteed voltage range



2) OPERATING TEMPERATURE RANGE

Function	Air intake temperature Condition	Indoor		Outdoor	
		DB(°F)	WB(°F)	DB(°F)	WB(°F)
Cooling	Standard temperature	80	67	95	75
	Maximum temperature	95	71	115	—
	Minimum temperature	67	57	25	—
	Maximum humidity	80	75	80	75
Heating	Standard temperature	70	60	47	43
	Maximum temperature	70	60	17	15
	Minimum temperature	80	67	75	65

REFRIGERANT CHARGE (R-22 (oz)) ADJUSTMENT FOR OPTIMUM PERFORMANCE

1) Copeland Scroll "KC" Compressors

Model	ARI rating pt.	Subtract Charge			Factory Charge	Add Charge	
	25 ft	25 ft	50 ft	75 ft	100 ft	125 ft	150 ft
PUG/H18	101	-10	-7	-4	111	3	7
PUG/H24	98	-10	-7	-4	108	3	7
PUG/H30	100	-25	-17	-9	125	8	8
PUG/H36	105	-25	-17	-9	130	8	8
PUG/H42	100	-25	-17	-9	125	8	8

2) Copeland Scroll "K4/K3" Compressors

Model	ARI rating pt.	Subtract Charge			Factory Charge	Add Charge	
	25 ft	25 ft	50 ft	75 ft	100 ft	125 ft	150 ft
PUG/H18	80	-10	-7	-4	90	3	7
PUG/H24	88	-10	-7	-4	98	3	7
PUG/H30	96	-25	-17	-9	121	8	8
PUG/H36	90	-25	-17	-9	115	8	8
PUG/H42	102	-25	-17	-9	127	8	8

Note: See Performance Data for Pressure/Temperature Charging.

Note: It is not necessary to remove refrigerant for linesets less than 100 feet; however, doing so will provide some improvement of system efficiency.

8

CAPACITY CORRECTION FACTORS FOR VARIOUS PIPE LENGTHS

1) COOLING CAPACITY

MODEL	Refrigerant piping length (one way)								
	25ft	40ft	55ft	70ft	85ft	100ft	115ft	130ft	150ft
PUG/H18	1.0	0.992	0.983	0.978	0.966	0.959	0.950	0.945	—
PUG/H24	1.0	0.981	0.968	0.952	0.940	0.925	0.913	0.900	0.886
PUG/H30	1.0	0.981	0.968	0.952	0.940	0.925	0.913	0.900	0.886
PUG/H36	1.0	0.981	0.968	0.952	0.940	0.925	0.913	0.900	0.886
PUG/H42	1.0	0.975	0.955	0.935	0.918	0.900	0.884	0.869	0.855

2) HEATING CAPACITY

Models	Refrigerant piping length (one way)		
	Less than 100ft	100~130ft	130~150ft
PUG/H18	1.00	0.995	0.990
PUG/H24	1.00	0.995	0.990
PUG/H30	1.00	0.995	0.990
PUG/H36	1.00	0.995	0.990
PUG/H42	1.00	0.995	0.990

COOLING/HEATING OPERATION

Outdoor unit operation is activated by delivery of a 12VDC signal from the indoor unit. Cooling only units have 2 low voltage control wires from the indoor unit to the outdoor unit. Heat pump units have 3 low voltage control wires from the indoor to the outdoor unit. The function of these wires are:

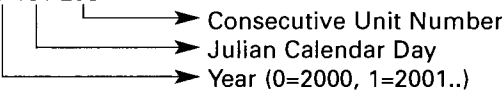
- **Wire #1:** Common
- **Wire #2:** Initiates operation of the compressor and outdoor fan when 12VDC is supplied from the indoor unit.
- **Wire #3:** Initiates operation of the reversing valve for heating operation. 12VDC is present constantly when the indoor unit mode is set to heat.

2. OUTDOOR ABNORMALITY DETECTION BY INDOOR UNIT (P8 FAULT CODE)

- A. The indoor unit constantly monitors the difference between return air temperature and indoor coil temperature. During a call for cooling, if after several minutes of operation (approx 10 minutes) the indoor coil does not become at least 9 degrees colder than the return air temperature, the indoor circuit board will cause the system to shut down. At this point the problem code "P8" will be displayed at the indoor unit remote controller and the 12VDC signal to the outdoor unit will be stopped.
 - B. The "P8" code does not necessarily mean that the failure is caused by the outdoor unit. It simply means that the indoor coil did not become colder than the return air during a call for cooling.
 - C. During the heat mode the indoor coil temperature must get at least 9 degrees warmer than the return air temperature. If this temperature difference is not achieved the unit will shut down as indicated above.
 - D. **If a "P8" code is displayed:**
 - i. Turn the indoor remote controller off and back on to reset it.
 - ii. Set the remote controller to a "call" for cooling.
 - iii. At the indoor unit 12VDC control terminals check to see if 12VDC is present on the #1 and #2 wires.
 1. You may encounter a 3 minute delay in cooling or a 6 minute delay in heating before the 12VDC signal is generated.
 - iv. If 12VDC is present and the outdoor unit is not running the problem is not caused by the indoor unit and the following should be checked:
 1. Check the 12VDC terminals at the outdoor unit for 12VDC. The polarity must be the same as that of the indoor meaning wire one at the indoor must be on the same terminal at the outdoor. If they are reversed no harm will be done but the unit will not operate.
 - a. If no 12VDC signal is present when 12VDC is available at the indoor unit check for a break/open in the control wire.
 - b. If 12VDC is present insure polarity is correct. If polarity is correct and a 12VDC signal is present check the LED indicators on the outdoor board.
 - i. Is the "Status" LED lite constantly? If so the outdoor board is in time delay, wait for it to expire (make sure the 12VDC signal is still available from the indoor unit).
 - ii. Is the "#2" LED lit? This indicates that the board is receiving 12VDC from the indoor unit.
- NO LED:** Recheck for 12VDC on the control wires, check for correct polarity and check the wires from the terminal block to the board.
- LIT:** The board should be outputting 24 VAC to the compressor contactor and line voltage to the fan (unless in low ambient control). Is the compressor/fan operating?
- YES:** System is OK
- NO:** Is the "Status LED" flashing?
- NO:** Bad outdoor board
- YES:** 2 Flash sequence indicates that the High Pressure Switch is open. 4 Flash sequence indicates that the Low Pressure Safety Switch is open

3. OUTDOOR BOARD FUNCTIONALITY

- A. **High Pressure Safety Switch (HPSS).** Opens at approx 420 PSIG and closes at approx 320 PSIG. There is no bypass on this switch. When the switch opens it immediately stops the compressor and outdoor fan. When it closes the system can restart providing the indoor unit has not entered a P8 fault code. If the switch opens 3 times within a one hour period the outdoor unit operation is "locked out" and must be serviced. The lockout is reset by turning line voltage off and back on to the outdoor unit. The indoor unit must also be reset to clear the fault code by turning the remote controller off and back on.
- B. **Low Pressure Safety Switch (LPS).** Depending upon the generation of circuit board this switch will open at 7 PSI or 15 PSI and close at 21 PSI or 30 PSI respectively. The switch is bypassed during the first 3 minutes of cooling operation and first 10 minutes of heating operation. It is bypassed constantly throughout the defrost cycle plus 10 minutes after completion of defrost. If the switch opens after the specified time the compressor is then stopped. Once pressure rises to the "cut in" point the compressor may restart providing the delay has expired and the indoor unit is not in a P8 fault. If the switch opens 3 times within a one hour period the outdoor unit will be "locked out" and must be serviced. The circuit can be reset by turning off and then resetting line voltage to the outdoor unit.
- C. **Low Ambient Temperature Switch (LATS).** The purpose of this switch is to allow cooling operation in low outdoor temperatures. It functions only during the cooling mode and is ignored in the heat mode. Depending upon the production period one of two methods have been utilized.
 1. The first method uses an outdoor temperature thermostat to cycle the outdoor fan on or off to maintain head pressure. The switch is located in the electrical compartment of the unit. When outdoor temperature drops to approx 31 (+/-2) degrees the switch opens and the fan operation is stopped. When the temperature rises to approx 37 degrees the switch closes and the fan operation is restored.
 2. The second and newer method uses a high side pressure switch to cycle the fan. When pressure drops to 150 PSI (+/-15) the switch opens and the fan stops. When pressure rises to 225 the switch closes and the fan restarts. This method provides a more reliable method of low ambient cooling than that of the temperature switch. To convert a "temperature switch" unit to a "pressure switch" unit, order Part Number GPN490001.
 3. During low ambient cooling operation the indoor unit may initiate an "air defrost" of the indoor coil once during every 16 minutes of continuous cooling operation. This insures that the coil has adequate airflow and should not be considered as a fault.
- D. **Defrost Sensor Switch (DFT).** The defrost switch is set to close at 35 degrees (+/-7) and opens at 65 degrees (+/-5). The board is factory set with a 60 minute minimum defrost interval and can be reset to 30 or 90 minutes by moving a jumper. When the defrost sensor closes, the defrost timer begins timing out the compressor run time. Once the timer "times out" (30/60/90 minutes) and the switch is closed the reversing valve is shifted and defrost is accomplished. If the room temperature is satisfied during a defrost cycle, the defrosting will continue until the termination temperature is achieved or 10 minutes has elapsed.
- E. **Crankcase Heater (CCH).** A 40 watt crankcase heater is installed into all PUG and PUGH condensing units to provide additional protection to the compressor when operating under low ambient conditions. When line voltage is first turned onto the outdoor unit the crankcase heater will be energized. The CCH will continue to be energized until the first call for compressor operation. The CCH never runs during compressor operation. Thirty minutes after the compressor turns off the CCH will again be energized. It will then cycle on for 30 minutes and off for 30 minutes repeatedly until the compressor is again turned on.
- F. **Reversing Valve (RXV).** Fails to cooling and energizes when the system is set to the heat mode. Heat mode operation is initiated when the indoor unit provides a 12VDC signal on the #3 low voltage control wire. The reversing valve is then energized with 24VAC and remains energized continuously throughout the heating mode (not just during compressor operation), with the exception of defrost cycles. When the outdoor unit enters defrost the RXV will shift on the fly.
- G. **Compressor Contactor (CC).** The compressor contactor is energized with 24VAC when a 12 VDC is input to the outdoor unit on control wires 1 and 2 from the indoor unit. This 12 VDC signal is generated and sent from the indoor unit on all calls for compressor operation regardless of heating or cooling.
- H. **Outdoor Fan Motor (ODF).** The outdoor fan motor typically operates at the same time as the compressor. There are however some exceptions to this. The fan may be off while the compressor is operating during low ambient cooling conditions. This is controlled by the LATS as identified above. The fan is also cycled off during defrosting operations to speed elimination of frost from the outdoor coil.
- I. **Transformer Input (24VAC).** The secondary side of the transformer inputs 24 volts AC to the circuit board on the "24VAC" terminals. This voltage operates the internal circuits of the board and also provides voltage to the reversing valve and compressor contactor when appropriate. The primary side of the transformer picks up line voltage from terminals marked "L1" and "L2" on the board.

- J. **Line Voltage.** Line voltage is input and output from the circuit board on the terminals marked "L1" and "L2". There are four terminals marked "L1", the purpose of each is as follows. One is "L1" input to the board while the remaining three are outputs to one side of the Transformer, Crankcase Heater and the Outdoor Fan Motor. There are two terminals marked "L2". One is "L2" line voltage input to the board while the other is output to the Transformer.
- K. **Anti-Recycle Delay Timer.** The outdoor board provides an "anti-recycle delay" which is 3 minutes in the cooling mode and 6 minutes in the heating mode.
- L. **Time Shortening.** By moving the defrost jumper to the "test" position time shortening of "timing sequences" can be accomplished. Timeouts are reduced as follows when the jumper is in the test position:
1. Anti-recycle 36 seconds
 2. CCH Cycles 24 seconds
 3. Defrost Interval 24 seconds
 4. Compressor Run 1 second
 5. Low Pressure bypass 12 seconds
- M. **Last Fault Memory Recall.** The outdoor board (TDICM3315) maintains a memory of the "last fault" which can be recalled by moving the defrost jumper to the "test" position and viewing the "status" LED display. Only one fault can be memorized. The fault can be cleared by turning off and resetting line voltage to the outdoor unit.
- N. **LED Function.** The board has four LED's which provide the following function:
1. **"STATUS" LED** indicates normal operation or faults as follows:
- | LED FLASHES | INDICATION OF CONDITION |
|------------------|--|
| Off | Normal Operation, no fault, no "call" |
| Constant On LED | Anti-recycle delay active. If the HPSS or LPS opens the anti-recycle will activate for 3 to 6 minutes before the fault can be displayed. |
| 1 Flash Sequence | Defrost Sensor Closed |
| 2 Flash Sequence | High Pressure Safety Switch Open |
| 3 Flash Sequence | LATS Open |
| 4 Flash Sequence | Low Pressure Safety Switch Open |
2. **"CCH" LED** indicates that the Crankcase heater is energized.
 3. **"2" LED** indicates that the indoor unit is calling for compressor operation, 12VDC is present on control wire #2.
 4. **"3" LED** indicates that the indoor unit is set to the Heating Mode. The reversing valve will be energized (except during defrost). 12VDC is present on control wire #3.
- O. **Serial Number.** Consists of 7 digits which have the following meaning:
- Serial Number: 0 161 253
- 
- Consecutive Unit Number
→ Julian Calendar Day
→ Year (0=2000, 1=2001..)
- P. **Production Code.** Identifies the exact day of manufacturing. Read from left to right using BLACKHORSE acronym.
- Q. **Circuit Board Manufacture Numbers.** To date two versions of outdoor circuit boards have been manufactured.
1. T7I CM2 315: Original board. Does not memorize last fault code.
 2. T7I CM3 315: Memorizes last fault. Provides improved protection for 12VDC circuit from EMC.

PUG

208/230V - 1ph - 60Hz

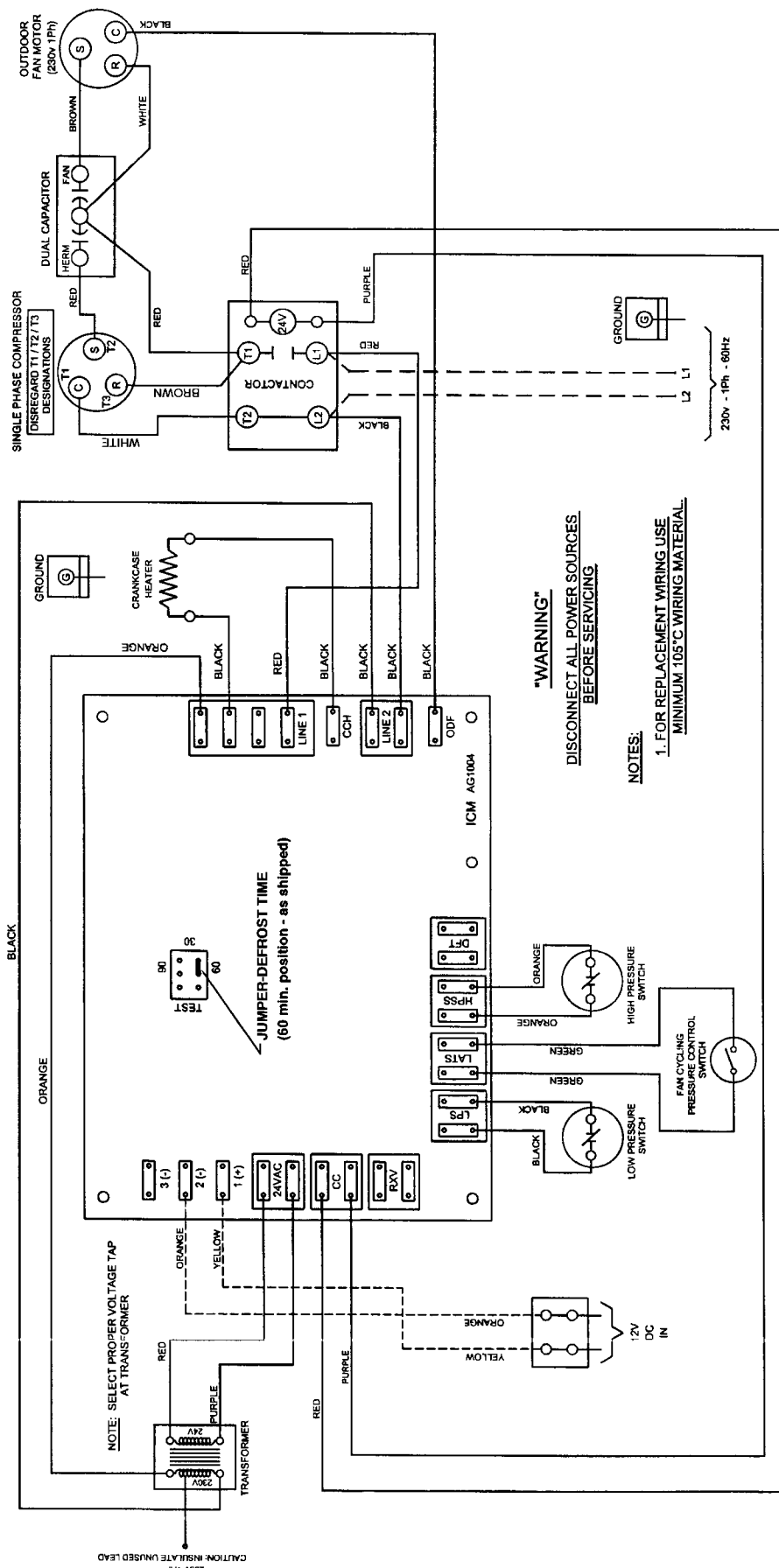
LEGEND

ODF - Outdoor Fan
CCH - Crank Case Heater
DFT - Defrost Sensor
HPSS - High Pressure Safety Switch
LATS - Low Ambient Temperature Switch (Outdoor Fan Control)
LPS - Low Pressure Switch
RXV - Reversing Valve (24 Volt Coil Hookup)
CC - Contactor Coil
24VAC - 24 VAC (from Transformer)
1(+) - Positive DC Voltage (from Indoor Unit)
2(-) - Negative 12VDC (from Indoor Unit, Compressor/Fan Call)

Note: To view the "last fault", move the defrost jumper to the "test" position. The status indicator will flash the last fault that occurred. Turning off the power supply clears this fault.

LEGEND:

---	=	FACTORY WIRING (12V DC)
---	=	FIELD WIRING LINE VOLTAGE
---	=	FACTORY WIRING LOW VOLTAGE
---	=	FACTORY WIRING LINE VOLTAGE



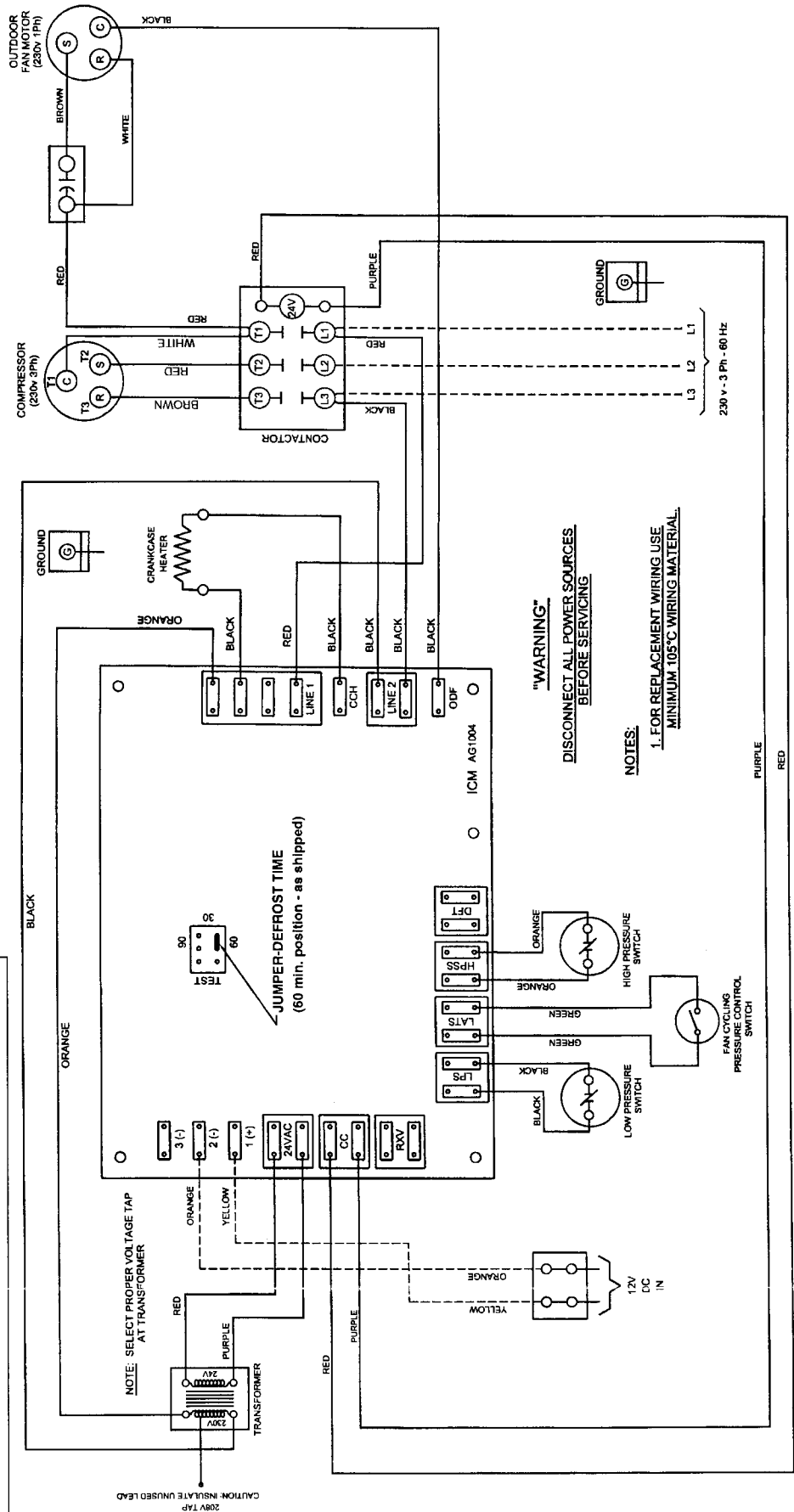
PUU 208/230V - 3ph - 60Hz

LEGEND	
ODF - Outdoor Fan	
CCH - Crank Case Heater	
DFT - Defrost Sensor	
HPSS - High Pressure Safety Switch	
LATS - Low Ambient Temperature Switch (Outdoor Fan Control)	
LPS - Low Pressure Switch	
RXV - Reversing Valve (24 Volt Coil Hookup)	
CC - Contactor Coil	
24VAC - 24 VAC (from Transformer)	
1(+) - Positive DC Voltage (from Indoor Unit)	
2(-) - Negative 12VDC (from Indoor Unit, Compressor/Fan Call)	

Note: To view the "last fault", move the defrost jumper to the "test" position. The status indicator will flash the last fault that occurred. Turning off the power supply clears this fault.

LEGEND:

---	=	FACTORY WIRING (12V DC)
---	=	FIELD WIRING LINE VOLTAGE
---	=	FACTORY WIRING LOW VOLTAGE
---	=	FACTORY WIRING LINE VOLTAGE



PUG
460v - 3ph - 60Hz

ODF - Outdoor Fan
 CCH - Crank Case Heater
 DFT - Defrost Sensor
 HPSS - High Pressure Safety Switch
 LATS - Low Ambient Temperature Switch (Outdoor Fan Control)
 LPS - Low Pressure Switch
 RXV - Reversing Valve (24 Volt Coil Hookup)
 CC - Contactor Coil
 24VAC - 24 VAC (from Transformer)
 1(+)- Positive DC Voltage (from Indoor Unit)
 2(-) - Negative 12VDC (from Indoor Unit, Compressor/Fan Call)

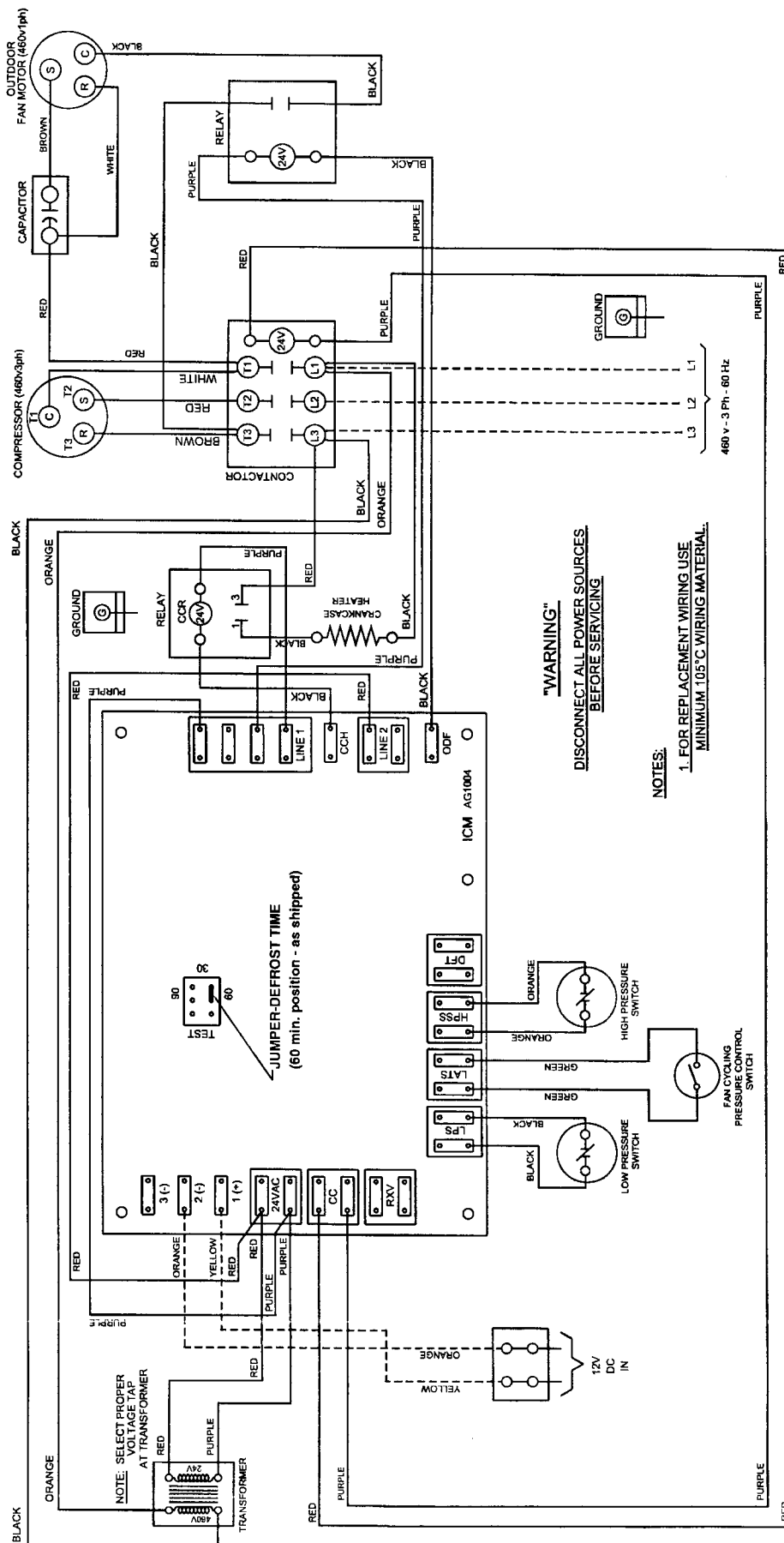
Note: To view the “last fault”, move the defrost jumper to the “test” position. The status indicator will flash the last fault that occurred. Turning off the power supply clears this fault.

LEGEND:

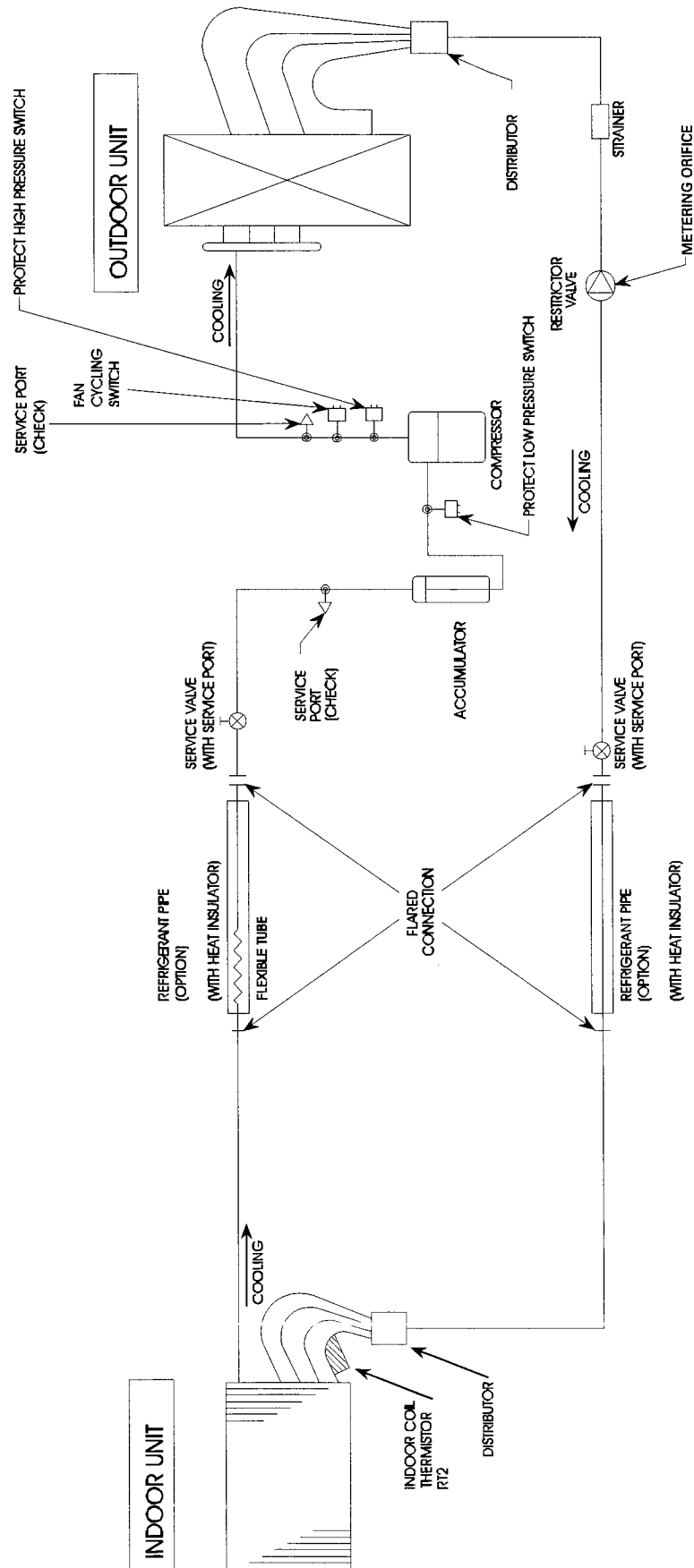
- - - - - FACTORY WIRING (12v DC)
 - - - - - FIELD WIRING LINE VOLTAGE
 _____ FACTORY WIRING LOW VOLTAGE
 _____ FACTORY WIRING LINE VOLTAGE

OUTDOOR FAN MOTOR
460v 1ph

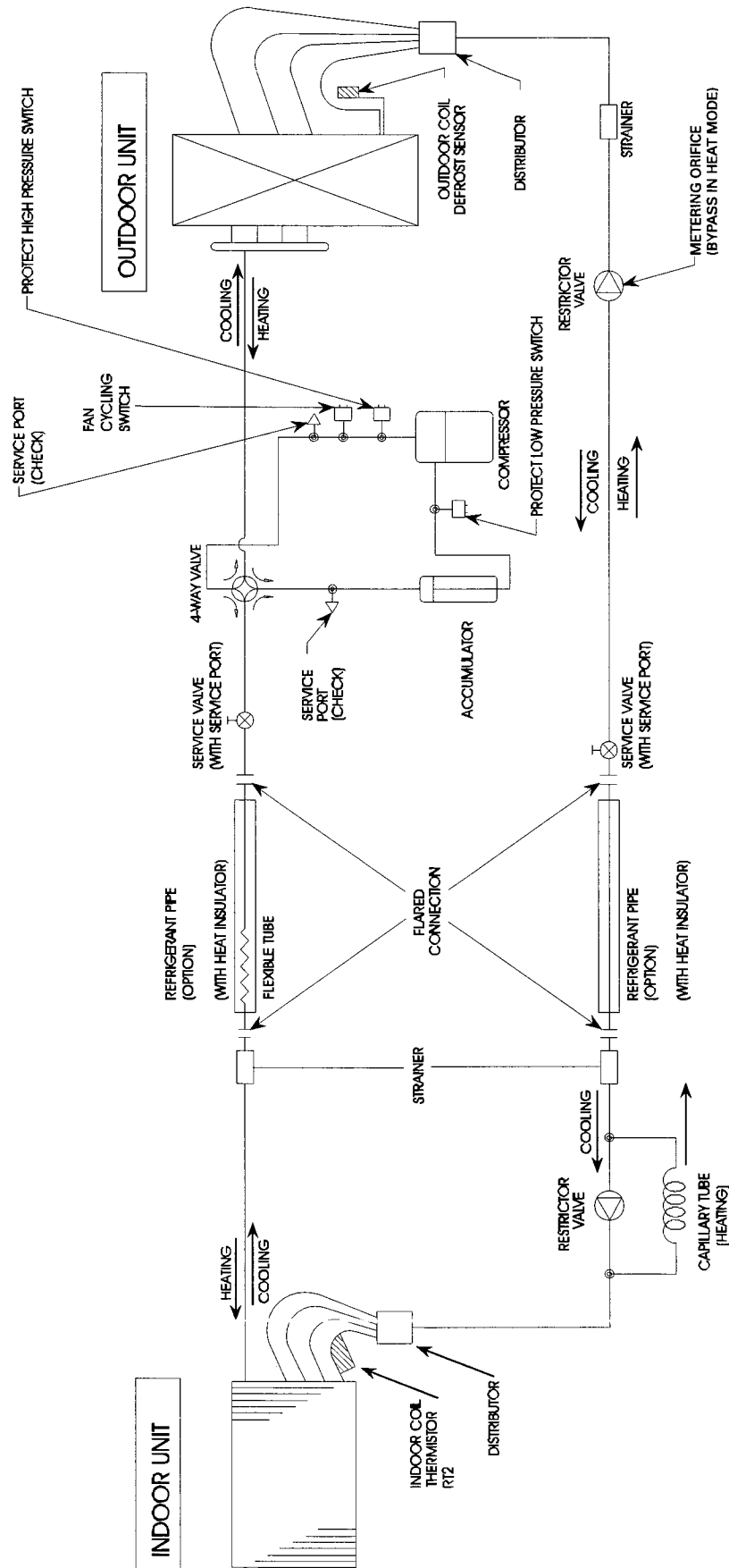
Note: Yellow and purple motor leads are unused and capped.



A. PUG PIPING DIAGRAM



B. PUGH HEAT PUMP MODELS

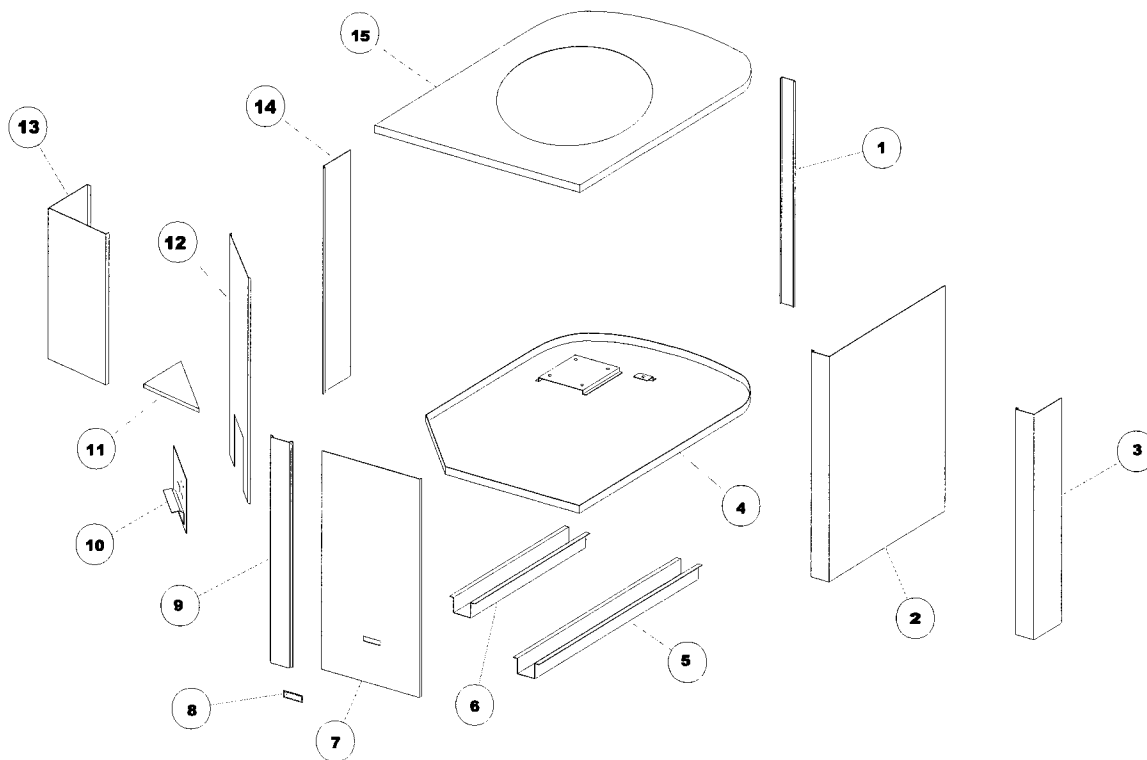


SERVICE PORTS

There are 4 service ports available to service technicians. One port is located at each of the two "ball valves" and two additional ports are located directly above the ball valves. The purpose of each is:

- A. **Liquid Line Ball Valve Service Port.** This port is used to evacuate the refrigerant line set when the ball valve is in the closed position. It may also be used to measure the liquid line pressure or more accurately the "saturated line" pressure during normal operation.
 - 1) During cooling operation this service port is downstream of the metering orifice which is installed inside of the condensing unit. While in the cooling mode this pressure is typically 25 to 40 PSI above that of the suction ball valve pressure (usually 85 to 110 PSI).
 - 2) During heating operation this pressure continues to be downstream of the capillary tube which is now metering refrigerant at the outlet of the indoor unit.
- B) **Suction Ball Valve Service Port.** This port is also used to evacuate the indoor unit and line set during installation (the ball valve must be closed to evacuate the line set and indoor unit). During normal cooling mode operation this pressure port indicates evaporator pressure (minus line set pressure drop). Typical cooling mode pressure readings here are in the range of 55 to 80 PSI during summer operation.
- C) **Two additional service ports are located directly above the ball valves.** These ports are connected to the compressor discharge line and the suction line just above the accumulator. These ports always read "true" high and low side pressures regardless of cooling or heating operating modes.
- D. **Both refrigerant lines must be insulated as a result of the "cooling side" metering device location (in outdoor unit).** Failure to insulate the liquid line, or more accurately the "saturation line", will result in condensate dripping from the line and poor cooling performance.
- E. **Metering Devices.** Metering of refrigerant in the cooling mode is accomplished by a "fixed orifice" that is located in the condensing unit. If a restriction or a compressor failure occurs this orifice can be easily accessed and cleaned after refrigerant is recovered.

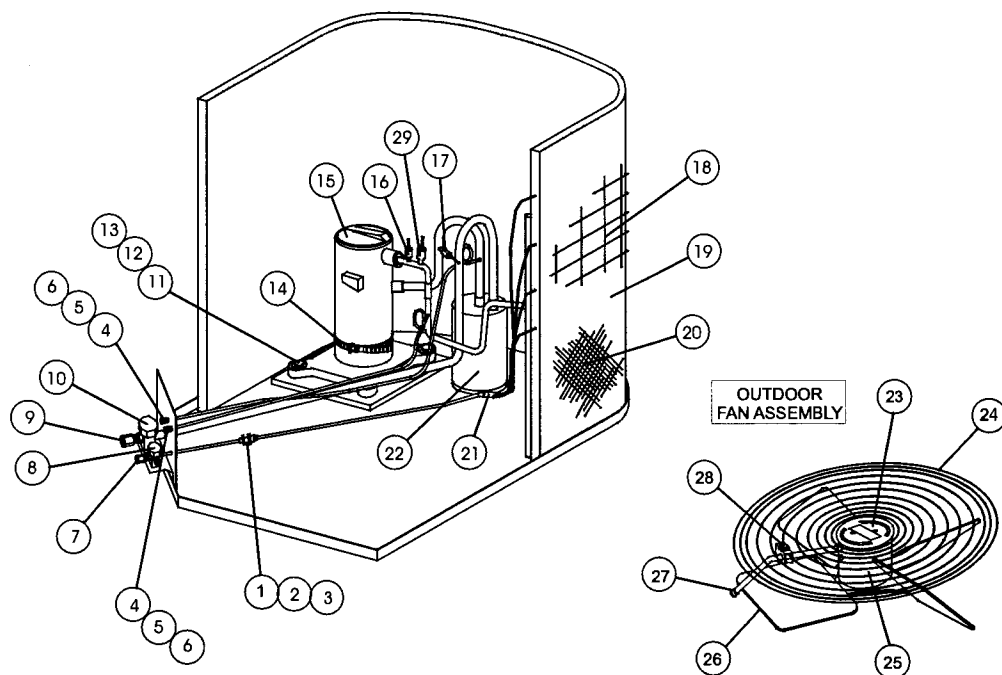
A. STRUCTURAL PARTS – ALL PUG AND PUG/H MODELS



PUG/PUGH - ALL

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUG/H18	PUG/H24	PUG/H30	PUG/H36	PUG/H42
1	501371FRP	FRONT HOLD-DOWN/DECAL STRIP	PAINTED	1	1	1	1	1
2	501367FRP	COIL SEAL/CORNER PANEL	PAINTED	1	—	—	—	—
3	501368FRP	COIL SEAL/CORNER PANEL	PAINTED	—	1	1	1	1
4	501361FRP	BASE PANEL	PAINTED	1	1	1	1	1
5	537724FRP	RAIL – LONG	GALVANIZED	1	1	1	1	1
6	537725FRP	RAIL – SHORT	GALVANIZED	1	1	1	1	1
7	501366FRP	ACCESS DOOR	PAINTED	1	1	1	1	1
8	818014FRP	HANDLE	ABS PLASTIC – BLACK	1	1	1	1	1
9	501361FRP	VERTICAL PANEL	PAINTED	1	1	1	1	1
10	501372FRP	REFRIGERATION LINE CLOSURE/ MOUNTING PLATE	PAINTED	1	1	1	1	1
11	537987FRP	BARRIER PLATE – LOWER W/BUSHINGS	PAINTED	1	1	1	1	1
12	501363FRP	CONTROL PANEL	PAINTED	1	1	1	1	1
13	501028FRP	CONTROL PANEL ACCESS COVER	PAINTED	1	1	1	1	1
14	501362FRP	COIL SEAL – LEFT	PAINTED	1	1	1	1	1
15	537990FRP	TOP	PAINTED	1	1	1	1	1

C. FUNCTIONAL PARTS – PUG BKB MODELS



PUGxxBKB (w/KC Comp.)

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUG18BKB	PUG24BKB	PUG30BKB	PUG36BKB	PUG42BKB
1	416053FRP	FLOW CONTROL (3/8" I.D.)		1	1	1	1	1
2	416057FRP	FIELD CONNECTOR w/SWIVEL (3/8" I.D.)		1	1	1	1	1
3	416076FRP	RESTRICTOR	.056" dia.	1	—	—	—	—
	416077FRP	RESTRICTOR	.058" dia.	—	1	1	—	—
	416083FRP	RESTRICTOR	.070" dia.	—	—	—	1	—
	416086FRP	RESTRICTOR	.076" dia.	—	—	—	—	1
4	255029FRP	SERVICE VALVE – BODY		2	2	2	2	2
5	255031FRP	SERVICE VALVE – CORE		2	2	2	2	2
6	255027FRP	SERVICE VALVE – CAP		2	2	2	2	2
7	416145FRP	FLARE NUT (SMALL)		1	1	—	—	—
	416146FRP	FLARE NUT (SMALL)		—	—	1	1	1
8	416140FRP	BASE VALVE – LIQUID	3/8"	1	1	—	—	—
	416141FRP	BASE VALVE – LIQUID	1/2"	—	—	1	1	1
9	416147FRP	FLARE NUT (LARGE)		1	1	—	—	—
	416148FRP	FLARE NUT (LARGE)		—	—	1	1	1
10	416142FRP	BASE VALVE – SUCTION		1	1	—	—	—
	416143FRP	BASE VALVE – SUCTION		—	—	1	1	1
11	507004FRP	COMPRESSOR GROMMET		4	4	4	4	4
12	507014FRP	COMPRESSOR SLEEVE		4	4	4	4	4

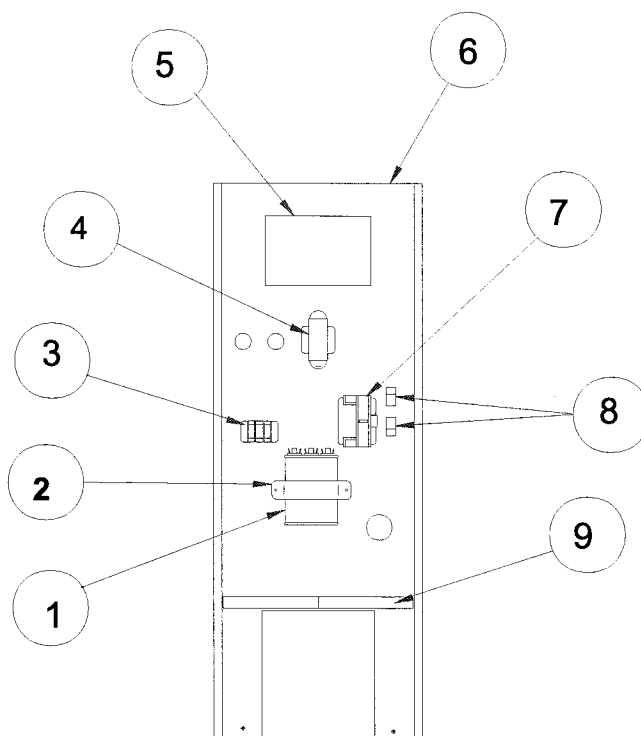
12

PARTS BREAKDOWN

PUGxxBKB (w/KC Comp.)

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUG18BKB	PUG24BKB	PUG30BKB	PUG36BKB	PUG42BKB
13	702086FRP	BOLT (5/16 - 18 x 1-5/8) w/WASHER		4	4	4	4	4
14	537960FRP	CRANKCASE HEATER ASSEMBLY		1	1	—	—	—
	537961FRP	CRANKCASE HEATER ASSEMBLY		—	—	1	1	1
15	200312FRP	COMPRESSOR	ZR18KC-PFV	1	—	—	—	—
	200313FRP	COMPRESSOR	ZR24KC-PFV	—	1	—	—	—
	200314FRP	COMPRESSOR	ZR28KC-PFV	—	—	1	—	—
	200315FRP	COMPRESSOR	ZR34KC-PFV	—	—	—	1	—
	200316FRP	COMPRESSOR	ZR40KC-PFV	—	—	—	—	1
16	309056FRP	HIGH PRESSURE SWITCH	450 C.O. 350 C.I.	1	1	1	1	1
17	309064FRP	LOW PRESSURE SWITCH	7 C.O. 21 C.I.	1	1	1	1	1
18	537727FRP	COIL GUARD (METAL)		1	—	—	—	—
	537728FRP	COIL GUARD (METAL)		—	1	1	1	1
19	210282FRP	OUTDOOR COIL		1	—	—	—	—
	210300FRP	OUTDOOR COIL		—	1	1	—	—
	210301FRP	OUTDOOR COIL		—	—	—	1	1
20	537729FRP	COIL GUARD (PLASTIC)		1	—	—	—	—
	537730FRP	COIL GUARD (PLASTIC)		—	1	1	1	1
21	537817FRP	FEEDER TUBE ASSEMBLY w/DISTRIBUTOR		1	—	—	—	—
	537898FRP	FEEDER TUBE ASSEMBLY w/DISTRIBUTOR		—	1	—	—	—
	537899FRP	FEEDER TUBE ASSEMBLY w/DISTRIBUTOR		—	—	1	1	1
22	250079FRP	ACCUMULATOR		1	1	—	—	—
	250017FRP	ACCUMULATOR		—	—	1	1	1
23	643036FRP	"DECAL" ON ALUMINUM DISC (6-1/2" DIA)		1	1	1	1	1
24	406053FRP	FAN GUARD / MOTOR MOUNT		1	1	1	1	1
25	220111FRP	OUTDOOR FAN MOTOR		1	1	1	—	—
	220110FRP	OUTDOOR FAN MOTOR		—	—	—	1	1
26	601056FRP	FAN BLADE		1	1	1	1	1
27	538010FRP	"OUTDOOR FAN MOTOR WIRE" TUBING ASSEMBLY		1	1	1	1	1
28	402075FRP	THRUST COLLAR w/BOLT & NUT		1	1	1	1	1
29	309066FRP	FAN CYCLING PRESSURE SWITCH	150 C.O. 225 C.I.	1	1	1	1	1

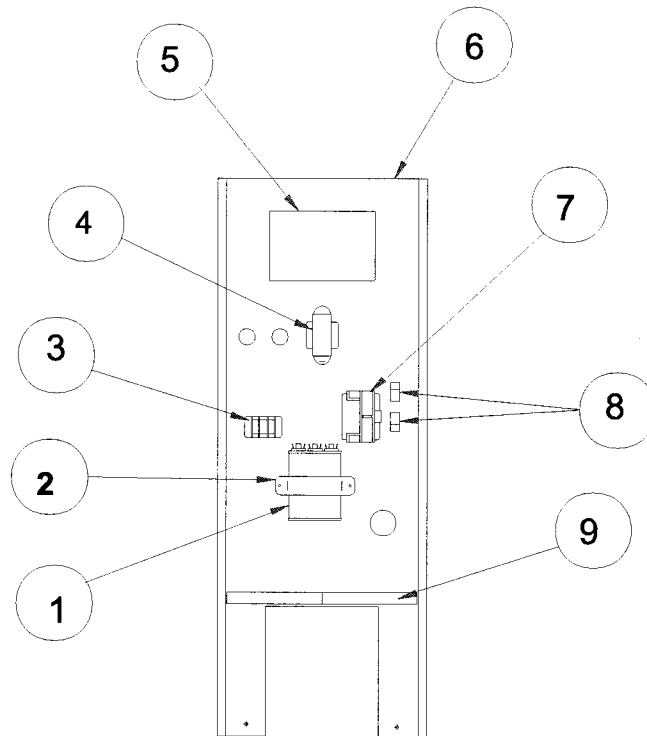
F. ELECTRICAL PANEL – PUG AKB MODELS



PUGxxAKB (w/K3 & 4 Comp.)

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUG18AKB	PUG24AKB	PUG30AKB	PUG36AKB	PUG42AKB
1	300184FRP	DUAL CAPACITOR	35+5@370VAC	1	1	—	—	—
	300177FRP	DUAL CAPACITOR	45+5@370VAC	—	—	1	—	—
	300176FRP	DUAL CAPACITOR	50+5@370VAC	—	—	—	1	—
	300210FRP	DUAL CAPACITOR	55+5@370VAC	—	—	—	—	1
2	522402FRP	CAPACITOR STRAP		1	1	1	1	1
3	313041FRP	TERMINAL BLOCK		1	1	1	1	1
4	315067FRP	TRANSFORMER		1	1	1	1	1
5	305023FRP	CONTROL BOARD (ICM)		1	1	1	1	1
6	501363FRP	CONTROL PANEL		1	1	1	1	1
7	301051FRP	CONTACTOR		1	1	1	—	—
	301052FRP	CONTACTOR		—	—	—	1	1
8	704060FRP	GROUND LUG		2	2	2	2	2
9	537987FRP	BARRIER PLATE – LOWER W/BUSHINGS		1	1	1	1	1

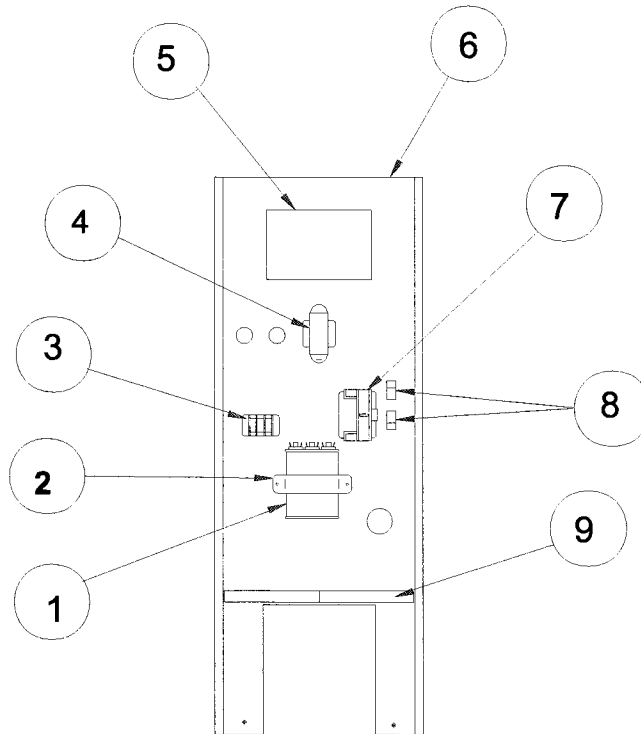
G. ELECTRICAL PANEL – PUG BKB MODELS



PUGxxBKB (w/KC Comp.)

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUG18BKB	PUG24BKB	PUG30BKB	PUG36BKB	PUG42BKB
1	300196FRP	DUAL CAPACITOR	30+5@370VAC	1	—	—	—	—
	300184FRP	DUAL CAPACITOR	35+5@370VAC	—	1	—	—	—
	300165FRP	DUAL CAPACITOR	35+5@440VAC	—	—	1	—	—
	300183FRP	DUAL CAPACITOR	40+5@370VAC	—	—	—	1	—
	300205FRP	DUAL CAPACITOR	40+5@440VAC	—	—	—	—	1
2	522402FRP	CAPACITOR STRAP		1	1	1	1	1
3	313041FRP	TERMINAL BLOCK		1	1	1	1	1
4	315067FRP	TRANSFORMER		1	1	1	1	1
5	305023FRP	CONTROL BOARD (ICM)		1	1	1	1	1
6	501363FRP	CONTROL PANEL		1	1	1	1	1
7	301051FRP	CONTACTOR		1	1	1	—	—
	301052FRP	CONTACTOR		—	—	—	1	1
8	704060FRP	GROUND LUG		2	2	2	2	2
9	537987FRP	BARRIER PLATE – LOWER W/BUSHINGS		1	1	1	1	1

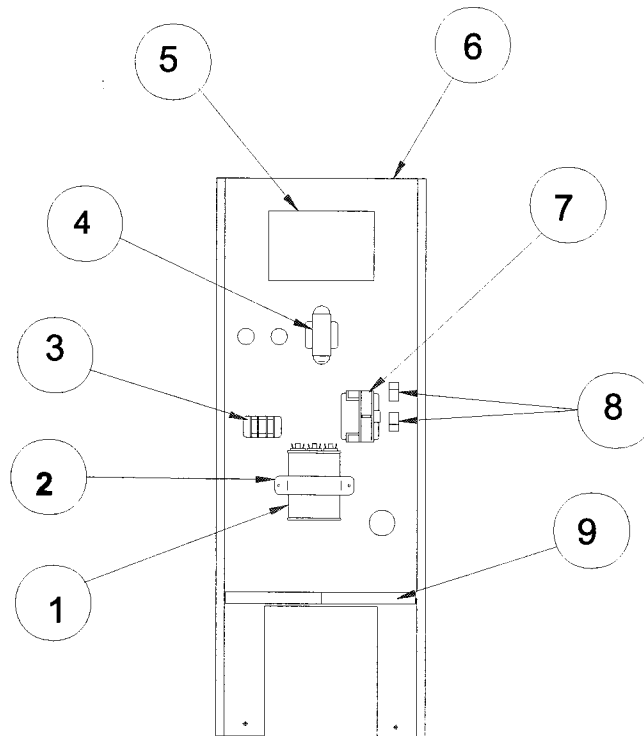
H. ELECTRICAL PANEL – PUGH AKB MODELS



PUGHxxAKB (w/K3 & 4 Comp.)

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUGH18AKB	PUGH24AKB	PUGH30AKB	PUGH36AKB	PUGH42AKB
1	300184FRP	DUAL CAPACITOR	35+5@370VAC	1	1	—	—	—
	300177FRP	DUAL CAPACITOR	45+5@370VAC	—	—	1	—	—
	300176FRP	DUAL CAPACITOR	50+5@370VAC	—	—	—	1	—
	300210FRP	DUAL CAPACITOR	55+5@370VAC	—	—	—	—	1
2	522402FRP	CAPACITOR STRAP		1	1	1	1	1
3	313040FRP	TERMINAL BLOCK		1	1	1	1	1
4	315067FRP	TRANSFORMER		1	1	1	1	1
5	305023FRP	CONTROL BOARD (ICM)		1	1	1	1	1
6	501363FRP	CONTROL PANEL		1	1	1	1	1
7	301051FRP	CONTACTOR		1	1	1	—	—
	301052FRP	CONTACTOR		—	—	—	1	1
8	704060FRP	GROUND LUG		2	2	2	2	2
9	537987FRP	BARRIER PLATE – LOWER W/BUSHINGS		1	1	1	1	1

I. ELECTRICAL PANEL – PUGH BKB MODELS

**PUGHxxBKB (w/KC Comp.) Exception: PUGH42BKB**

No.	Parts No.	Parts Name	Specifications	Q'ty/set				
				PUGH18BKB	PUGH24BKB	PUGH30BKB	PUGH36BKB	PUGH42BKB
1	300196FRP	DUAL CAPACITOR	30+5@370VAC	1	—	—	—	—
	300184FRP	DUAL CAPACITOR	35+5@370VAC	—	1	—	—	—
	300165FRP	DUAL CAPACITOR	35+5@440VAC	—	—	1	—	—
	300183FRP	DUAL CAPACITOR	40+5@370VAC	—	—	—	1	—
	300210FRP	DUAL CAPACITOR	55+5@370VAC	—	—	—	—	1
2	522402FRP	CAPACITOR STRAP		1	1	1	1	1
3	313040FRP	TERMINAL BLOCK		1	1	1	1	1
4	315067FRP	TRANSFORMER		1	1	1	1	1
5	305023FRP	CONTROL BOARD (ICM)		1	1	1	1	1
6	501363FRP	CONTROL PANEL		1	1	1	1	1
7	301051FRP	CONTACTOR		1	1	1	—	—
	301052FRP	CONTACTOR		—	—	—	1	1
8	704060FRP	GROUND LUG		2	2	2	2	2
9	537987FRP	BARRIER PLATE – LOWER W/BUSHINGS		1	1	1	1	1

Mr. SLIM™



MITSUBISHI ELECTRIC

Mitsubishi Electric & Electronics USA, Inc.

HVAC Advanced Products Division

4505A Newpoint Place, Lawrenceville, GA 30043