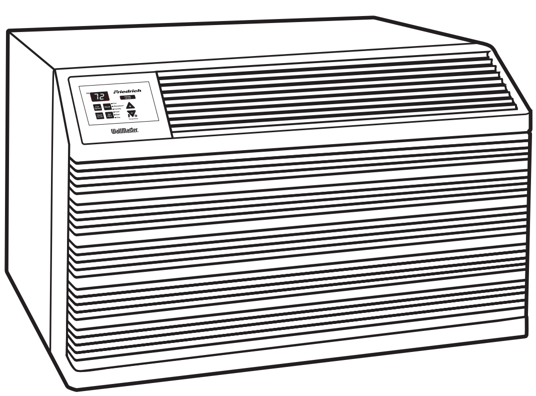
Friedrich®

Service & Parts Manual 2005

WallMaster® Thru-the-Wall



WS08B10A-A
WS10B10A-A
WS14B10A-A
WS10B30A-A
WS13B30A-A
WS16B30A-A
WE10B33A-A
WE13B33A-A
WE16B33A-A
WY10B33A-A
WY13B33A-A

WM-Svc-Prts-05 (3-05)

TABLE OF CONTENTS

FRIEDRICH ROOM MODEL NUMBER CODE

W S 08 B 1 0 B

1st DIGIT - FUNCTION
W = Thru-The-Wall, WallMaster Series

2nd DIGIT - TYPE
S = Straight Cool
E = Electric Heat
Y = Heat Pump

3rd & 4th DIGITS - APPROXIMATE BTU/HR (Cooling)
Heating BTU/HR capacity listed in Specifications/Performance Data Section

5th DIGIT - ALPHABETICAL MODIFIER

6th DIGIT - VOLTAGE
1 = 115 Volts
3 = 230-208 Volts

7th DIGIT
0 = Straight Cool & Heat Pump Models
ELECTRIC HEAT MODELS
3 = 3 KW Heat Strip, Nominal

8th DIGIT
Major Change

APPLICATION AND SIZING

In the application and sizing of room air conditioners for cooling, it is most important to give full consideration to all factors which may contribute to the heat loss or gain of the space to be conditioned. It is therefore necessary to make a survey of the space to be conditioned and calculate the load requirements before a selection of the size of the equipment needed can be made.

The load requirement may be determined very easily by simply using the standard "AHAM" Load Calculating Form, on Page 6. This form is very easy to use and is self explanatory. It is necessary only to insert the proper measurements on the lines provided and multiply by the given factors, then add the result for the total load requirements.

Cooling load requirements are generally based on the cooling load for comfortable air conditioning which does not require specific conditions of inside temperature and humidity. The load calculation form is based on outside design temperature of 95° FDB and 75° FWB. It can be used for areas in the Continental United States having other outside design temperatures by applying a correction factor for the particular locality as determined from the map shown on Page 5.

When sizing a TwinTemp unit for cooling and heating, we must remember that the heating capacity of any given unit varies directly with the outdoor ambient temperature. Also, we must keep in mind the average low temperatures which might be experienced in the locality where the unit is to be installed. Therefore, when sizing a TwinTemp unit, both cooling and heating requirements must be calculated. Do not oversize, or undersize, one phase of the unit's capacity at the expense of the other. In those cases where the unit will provide satisfactory cooling at all times but will be inadequate for those few times that the outdoor temperature is below the maximum low for the unit, additional auxiliary heating facilities must be provided to insure that adequate heat is available at all times.

INSTRUCTIONS FOR USING COOLING LOAD ESTIMATE FORM FOR ROOM AIR CONDITIONERS
(AHAM PUB. NO. RAC-1)

A. This cooling load estimate form is suitable for estimating the cooling load for comfort air conditioning installations which do not require specific conditions of inside temperature and humidity.

B. The form is based on an outside design temperature of 95°F dry bulb and 75°F wet bulb. It can be used for areas in the continental United States having other outside design temperatures by applying a correction factor for the particular locality as determined from the map.

C. The form includes "day" factors for calculating cooling loads in rooms where daytime comfort is desired (such as living rooms, offices, etc.)

D. The numbers of the following paragraphs refer to the corresponding numbered item on the form:

1. Multiply the square feet of window area for each exposure by the applicable factor. The window area is the area of the wall opening in which the window is installed. For windows shaded by inside shades or venetian blinds, use the factor for "Inside Shades." For windows shaded by outside awnings or by both outside awnings and inside shades (or venetian blinds), use the factor for "Outside Awnings." "Single Glass" includes all types of single thickness windows, and "Double Glass" includes sealed airspace types, storm windows, and glass block. Only one number should be entered in the right hand column for Item 1, and this number should represent **only the exposure with the largest load.**

2. Multiply the total square feet of **all** windows in the room by the applicable factor.

3a. Multiply the total length (linear feet) of all walls exposed to the outside by the applicable factor. Doors should be considered as being part of the wall. Outside walls facing due north should be calculated separately from outside walls facing other directions. Walls which are permanently shaded by adjacent structures should be considered "North Exposure." Do not consider trees and shrubbery as providing permanent shading. An uninsulated frame wall or a masonry wall 8 inches or less in thickness is considered "Light Construction." An insulated wall or masonry wall over 8 inches in thickness is considered "Heavy Construction."

3b. Multiply the total length (linear feet) of all inside walls between the space to be conditioned and any unconditioned spaces by the given factor. Do not include inside walls which separate other air conditioned rooms.

4. Multiply the total square feet of roof or ceiling area by the factor given for the type of construction most nearly describing the particular application (use one line only.)

5. Multiply the total square feet of floor area by the factor given. Disregard this item if the floor is directly on the ground or over a basement.

6. Multiply the number of people who normally occupy the space to be air conditioned by the factor given. Use a minimum of 2 people.

7. Determine the total number of watts for light and electrical equipment, except the air conditioner itself, that will be **in use** when the room air conditioning is operating. Multiply the total wattage by the factor given.

8. Multiply the total width (linear feet) of any doors or arches which are continually open to an unconditioned space by the applicable factor.

   NOTE: Where the width of the doors or arches is more than 5 feet, the actual load may exceed the calculated value. In such cases, both adjoining rooms should be considered as a single large room, and the room air conditioner unit or units should be selected according to a calculation made on this new basis.

9. Total the loads estimated for the foregoing 8 items.

10. Multiply the subtotal obtained in item 9 by the proper correction factor, selected from the map, for the particular locality. The result is the total estimated design cooling load in BTU per hour.

E. For best results, a room air conditioner unit or units having a cooling capacity rating (determined in accordance with the NEMA Standards Publication for Room Air Conditioners, CN 1-1960) as close as possible to the estimated load should be selected. In general, a greatly oversized unit which would operate intermittently will be much less satisfactory than one which is slightly undersized and which would operate more nearly continuously.

F. Intermittent loads such as kitchen and laundry equipment are not included in this form.

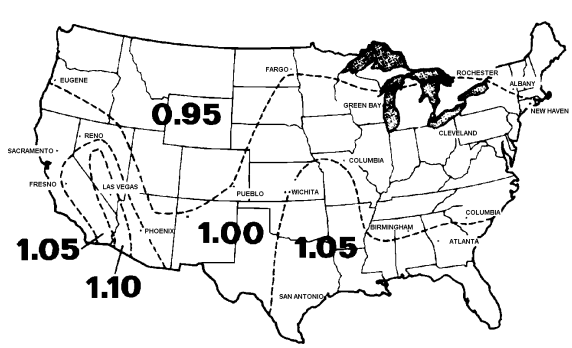
COOLING LOAD ESTIMATE FORM

HEAT GAIN FROM	QUANTITY	FACTORS DAY				BTU/Hr. (Quantity x Factor)
1. WINDOWS: Heat gain from the sun.		**No Shades***	**Inside Shades***	**Outside Awnings***	**(Area X Factor)**	
Northeast	____sq. ft.	60	25	20 ____	Use	____
East	____sq. ft.	80	40	25 ____	only	____
Southeast	____sq. ft.	75	30	20 ____	the	____
South	____sq. ft.	75	35	20 ____	largest	____
Southwest	____sq. ft.	110	45	30 ____	load.	____
West	____sq. ft.	150	65	45 ____	Use	____
Northwest	____sq. ft.	120	50	35 ____	only	____
North	____sq. ft.	0	0	0 ____	one.	____
2. WINDOWS: Heat by conduction (Total of all windows.)						
Single glass	____sq. ft.		14			_____
Double glass or glass block	____sq. ft.		7			_____
3. WALLS: (Based on linear feet of wall)		Light Construction		Heavy Construction		
a. Outside walls						
North Exposure	____ ft.	30		20		_____
Other than North exposure	____ ft.	60		30		_____
b. Inside Walls (between conditioned and unconditioned spaces only.)	____sq. ft.		30			_____
4. ROOF OR CEILING: (Use one only)						
a. Roof, uninsulated	____sq. ft.		19			_____
b. Roof, 1 inch or more insulation	____sq. ft.		8			_____
c. Ceiling, occupied space above	____sq. ft.		3			_____
d. Ceiling, insulated, with attic space above	____sq. ft.		5			_____
e. Ceiling, uninsulated, with attic space above	____sq. ft.		12			_____
5. Floor: (Disregard if floor is directly on ground or over a basement.	____sq. ft.		3			_____
6. NUMBER OF PEOPLE	____		600			_____
7. LIGHTS AND ELECTRICAL EQUIPMENT IN USE	____watts		3			_____
8. DOORS AND ARCHES CONTINUOUSLY OPENED TO UNCONDITIONED SPACE: (TOTAL LINEAR FEET OF WIDTH.)	____ft.		300			_____
9. SUBTOTAL	*****		*****			_____

* **These factors are for single glass only. For glass block, multiply the above factors by 0.5; for double glass or storm windows, multiply the above factors by 0.8.**

10. TOTAL COOLING LOAD (BTU per hour to be used for selection of room air conditioner(s).)

____ Total in Item 9 X ____ (Factor from Map) = ____



HEAT LOAD FORM

The heat load form on page 7 may be used by servicing personnel to determine the heat loss of a conditioned space and the ambient winter design temperatures in which the unit will heat the calculated space.

The upper half of the form is for computing the heat loss of the space to be conditioned. It is necessary only to insert the proper measurements on the lines provided and multiply by the given factors, then add this result for the total heat loss in BTU/Hr./°F.

The BTU/Hr. per °F temperature difference is the 70°F inside winter designed temperature minus the lowest outdoor ambient winter temperature of the area where the unit is installed. This temperature difference is used as the multiplier when calculating the heat loss.

The graph shows the following:

Left Hand Scale	Unit capacity BTU/Hr. or heat loss BTU/Hr.
Bottom Scale	Outdoor ambient temperature, base point.
Heat Pump Model	BTU/Hr. capacity heat pump will deliver at outdoor temperatures.
Balance Point	Maximum BTU/Hr. heat pump will deliver at indicated ambient temperature.

Below is an example using the heat load form:

A space to be conditioned is part of a house geographically located in an area where the lowest outdoor ambient winter temperature is 40°F. The calculated heat loss is 184 BTU/Hr./°F.

Subtract 40°F (lowest outdoor ambient temperature for the geographical location) from 70°F (inside design temperature of the unit) for a difference of 30°F. Multiply 184 by 30 for a 5500 BTU/Hr. total heat loss for the calculated space.

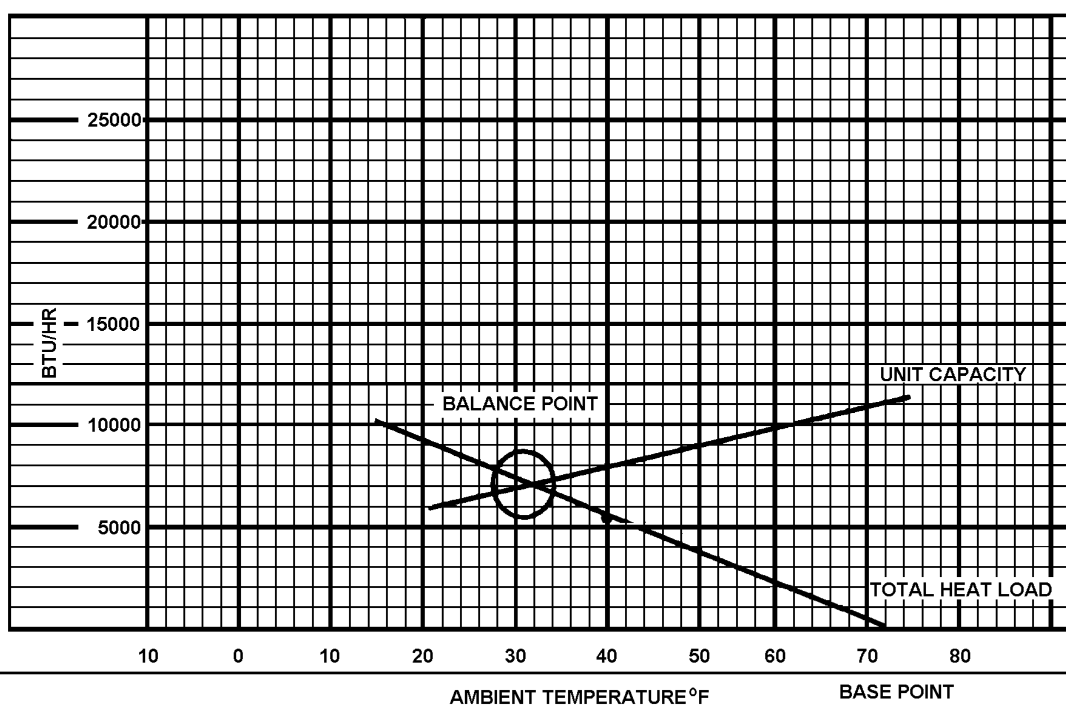
On the graph, plot the base point (70°) and a point on the 40°F line where it intersects with the 5500 BTU/Hr. line on the left scale. Draw a straight line from the base point 70 through the point plotted at 40°F. This is the total heat loss line.

Knowing that we have a 5500 BTU/Hr. heat loss, and we expect that our heat pump will maintain a 70°F inside temperature at 40°F outdoor ambient, we plot the selected unit capacity BTU/Hr. of the unit between 35° and 60° on the graph and draw a straight line between these points. Where the total heat loss line and the unit capacity line intersect, read down to the outdoor ambient temperature scale and find that this unit will deliver the required BTU/Hr. capacity to approximately 30°F.

HEATING LOAD FORM
FRIEDRICH ROOM UNIT HEAT PUMPS

	BTU/HR PER °F TEMP. DIFFERENCE
WALLS: (Linear Feet)	
2" Insulation	Lin. Ft. x 1.6
Average	Lin. Ft. x 2.6
WINDOWS & DOORS (Area, sq. ft.)	
Single Glass:	Sq. Ft. x 1.13
Double Glass:	Sq. Ft. x 0.61
INFILTRATION - WINDOWS & DOORS: AVG.	Lin. Ft. x 1.0
Loose	Lin. Ft. x 2.0
CEILING: (Area, Sq. Ft.)	
Insulated (6")	Sq. Ft. x 0.07
Insulated (2")	Sq. Ft. x 0.10
Built-up Roof (2" insulated	Sq. Ft. x 0.10
Built-up Roof (1/2" insulated)	Sq. Ft. x 0.20
No Insulation	Sq. Ft. x 0.33
FLOOR: (Area, Sq. Ft.)	
Above Vented Crawl space	
Insulated (1:)	Sq. Ft. x 0.20
Uninsulated	Sq. Ft. x 0.50
* Slab on Ground	Lin. Ft. x 1.70
1" Perimeter insulation	Lin. Ft. x 1.00
* Based on Linear Feet of outside wall	TOTAL HEAT LOSS PER °F BTU/HR/°F

Multiply total BTU/HR/°F X 30 and plot on the graph below at 40°F. Draw a straight line from the 70 base point thru the point plotted at 40°F. The intersection of this heat loss line with the unit capacity line represents the winter design heating load.

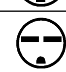
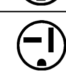


PERFORMANCE DATA

	EVAPORATOR AIR TEMP. DEG. F		EVAPORATOR TEMP. DEG. F								OPERATING PRESSURES		ELECTRICAL RATINGS			R-22 REF.			BREAKER FUSE
	Discharge Air	Temp. Drop F.	E(in)	E (out)	CONDENSER TEMP. DEG. F	Discharge Temp	Suction Temp	Liquid Temp	Super Heat	Sub-Cooling	Suction	Discharge	Amps Cool	Amps Heat	Locked Rotor Amps	Charge in OZ.	Evap CFM	Motor RPM	60 Hertz Amps
WS08B10A-A	55	25	55	55	127	165	61	102	18	25	87	281	7.1		36.2	20.5	257	1100	15
WS10B10A-A	52	28	53	51	128	176	68	105	16	24	79	293	9.0		45.0	22.0	248	1100	15
WS14B10A-A	52	28	52	52	128	179	63	99	14	28	82	297	12.4		58.0	44.9	293	1300	15
WS10B30A-A	55	25	53	57	131	179	68	106	16	23	77	289	4.6		26.0	22.5	235	1100	15
WS13B30A-A	51	29	52	50	128	174	57	100	13	30	78	295	6.5		27.4	35.2	281	1300	15
WS16B30A-A	52	28	51	53	121	154	54	99	18	32	74	315	7.7		35.0	47.6	292	1421	15
WE10B33A-A	53	27	54	52	126	180	82	99	16	31	82	289	4.6	15.2	45.0	38.0	225	1074	20
WE13B33A-A	52	29	52	51	127	180	64	103	13	29	80	295	6.5	15.7	27.4	35.0	274	1318	20
WE16B33A-A	52	28	51	53	121	174	57	100	18	30	74	315	6.5	16.1	35.0	35.2	281	1305	20
WY10B33A-A	53	27	54	52	126	180	66	99	16	31	82	225	4.6	4 / 15.2	26.0	38.0	225	1074	20
WY13B33A-A	52	29	52	51	127	180	64	103	16	29	80	300	6.5	5.6 / 15.7	27.4	35.0	260	1200	20

	Electrical Characteristics (60 Hertz)										
	Cooling Capacity BTU/h	Heating Capacity BTU/h	Volts Rated	Cooling Amps	Cooling Watts	Heating Amps	Heating Watts	Energy Efficiency Ratio EER	Moisture Removal Pints/Hr.	Room Side Air Circulation CFM	Net Weight Lbs.
WS08B10A	8000	—	115	6.8	762	—	—	**10.5**	1.3	245	93
WS10B10A	10000	—	115	8.7	954	—	—	**10.5**	2.4	245	103
WS14B10A	13500	—	115	12.0	1415	—	—	**9.5**	3.3	295	112
WS10B30A	10000/10000	—	230/208	4.6/5.0	1005/996	—	—	**10.0/10.0**	2.1	260	101
WS13B30A	13200/12800	—	230/208	6.3/6.7	1389/1347	—	—	**9.5/9.5**	3.3	280	109
WS16B30A	15800/15000	—	230/208	7.8/8.5	1756/1705	—	—	**9.0/8.8**	4.2	290	119
WE10B33A	10000/10000	11000/9100	230/208	4.6/5.0	1005/996	16.0/14.7	3550/2950	**10.0/10.0**	2.1	260	103
WE13B33A	13200/12800	11000/9100	230/208	6.3/6.7	1389/1347	16.0/14.7	3550/2950	**9.5/9.5**	3.3	280	111
WE16B33A	15800/15000	11000/9100	230/208	7.8/8.5	1756/1705	16.0/14.7	3550/2950	**9.0/8.8**	4.2	290	121
WY10B33A	10100/9800	8100/7800	230/208	4.6/4.8	1013/976	3.9/4.0	857/821	**10.0/10.0**	2.5	230	107
WY13B33A	12500/12100	10400/10000	230/208	6.4/6.8	1389/1352	5.4/5.7	1182/1136	**9.0/9.0**	3.2	280	116

Installation Information

	Circuit Rating Breaker or T-D Fuse	Plug Face (NEMA#)	Appearance (Facing Blades)
WS08B10A, WS10B10A, WS14B10A	125V - 15A	5 - 15P	
WS10B30A, WS13B30A, WS16B30A	250V - 15A	6 - 15P	
WE10, WE13, WE16 WY10, WY13	250V - 20A	6 - 20P	

Sleeve Dimensions

	Height	Width	Depth with Front	Minimum Extension Into Room	Minimum Extension Outside	Thru-the-wall Finished Hole Height	Thru-the-wall Finished Hole Width
WSC	16 3/4"	27"	23"	7 1/2"	9/16"	17 1/4"	27 1/4"

* Rating Conditions: 80 degrees F, room air temp. & 50% relative humidity, with 95 degree F, outside air temp & 40% relative humidity

Calculate the heat loss of the space to be heated. As long as the heat loss does not exceed the resistance heating capacity rating of the unit, the heating performance will be satisfactory. Change-over from heat pump operation to resistance operation on models indicated is automatic at a preset outside ambient temperature of approximately 35°F. If condensate disposal is desired, an optional drain kit is available. DEFROST CONTROL: Initiated at 20°F (outdoor coil temperature) and terminated at 43°F (outdoor coil temperature). During defrost, the compressor stops and the electric heat starts, then operates with the fan to maintain indoor comfort. Below 43°F, the unit remains in electric heat mode. During electric heat mode, the unit will achieve the following ratings: 11000/9100 BTU/h, 16.0/14.7 amps, and 3550/2950 watts. DEFROST DRAIN: Drain automatically opens at approximately 50°F in outdoor base pan for defrost condensate disposal.

COMPONENTS OPERATION & TESTING

WARNING

DISCONNECT ELECTRICAL POWER TO UNIT BEFORE SERVICING OR TESTING

COMPRESSORS

Compressors are single phase, 115 or 230/208 volt, depending on the model unit. All compressor motors are permanent split capacitor type using only a running capacitor across the start and run terminal.

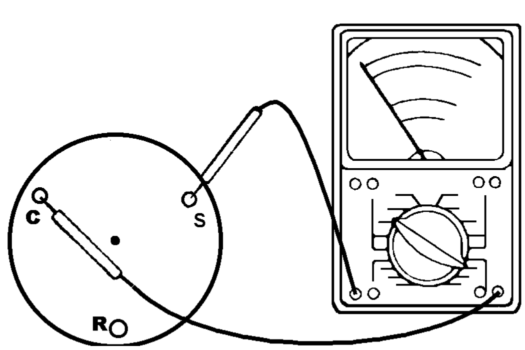
All compressors are internally spring mounted and externally mounted on rubber isolators.

COMPRESSOR WINDING TEST (See Figure 1)

Remove compressor terminal box cover and disconnect wires from terminals. Using an ohmmeter, check continuity across the following:

1. Terminal "C" and "S" - no continuity - open winding - replace compressor.
2. Terminal "C" and "R" - no continuity - open winding - replace compressor.
3. Terminal "R" and "S" - no continuity - open winding - replace compressor.

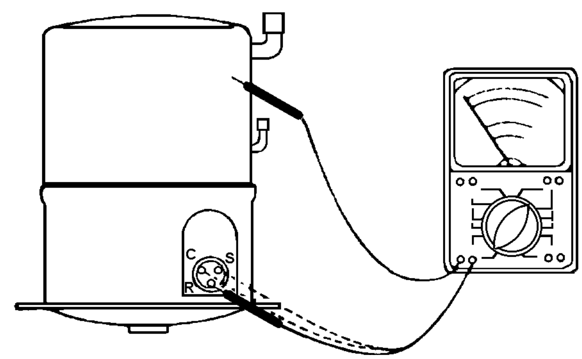
Figure 1: Compressor Winding Test



GROUND TEST

Use an ohmmeter set on its highest scale. Touch one lead to the compressor body (clean point of contact as a good connection is a must) and the other probe in turn to each compressor terminal (see Figure 2.) If a reading is obtained, the compressor is grounded and must be replaced.

Figure 2: Typical Ground Test



CHECKING COMPRESSOR EFFICIENCY

The reason for compressor inefficiency is normally due to broken or damaged suction and/or discharge valves, reducing the ability of the compressor to pump refriger-ant gas.

This condition can be checked as follows:

1. Install a piercing valve on the suction and discharge or liquid process tube.
2. Attach gauges to the high and low sides of the system.
3. Start the system and run a "cooling or heating per-formance test."

   If test shows:

   A. **Below** normal high side pressure

   B. **Above** normal low side pressure.

   C. **Low** temperature difference across coil.

   The compressor valves are faulty - replace the compressor.

TERMINAL OVERLOAD (External)

Some compressors are equipped with an external overload which is located in the compressor terminal box adjacent to the compressor body (see Figure 3.)
The overload is wired in series with the common motor terminal. The overload senses both major amperage and compressor temperature. High motor temperature or amperage heats the disc causing it to open and break the circuit to the common motor terminal.

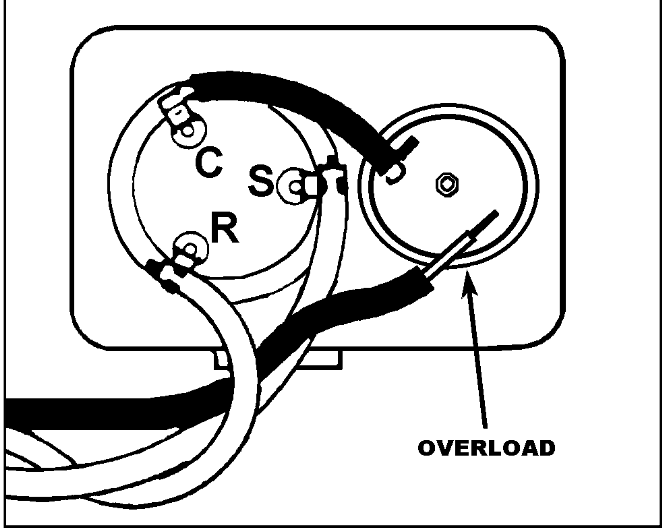
Heat generated within the compressor shell is usually due to:

1. High amperage.
2. Low refrigerant charge.
3. Frequent recycling.
4. Dirty condenser.

TERMINAL OVERLOAD - TEST
(Compressor - External Type)

1. Remove overload.
2. Allow time for overload to reset before attempting to test.
3. Apply ohmmeter probes to terminals on overload wires. There should be continuity through the overload.

Figure 3: External Overload



TERMINAL OVERLOAD (Internal)

Some model compressors are equipped with an internal overload. The overload is embedded in the motor windings to sense the winding temperature and/or current draw. The overload is connected in series with the common motor terminal.

Should the internal temperature and/or current draw become excessive, the contacts in the overload will open, turning off the compressor. The overload will automatically reset, but may require several hours before the heat is dissipated.

CHECKING THE INTERNAL OVERLOAD
(See Figure 4.)

1. With no power to unit, remove the leads from the compressor terminals.
2. Using an ohmmeter, test continuity between terminals C-S and C-R. If not continuous, the compressor overload is open and the compressor must be replaced.

FAN MOTOR

A single phase permanent split capacitor motor is used to drive the evaporator blower and condenser fan. A self-resetting overload is located inside the motor to protect against high temperature and high amperage conditions.

Figure 4

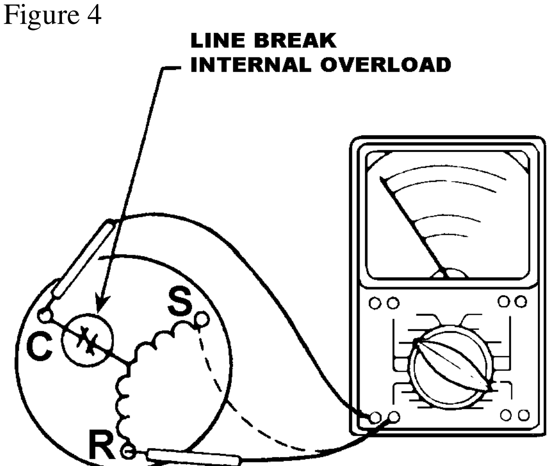
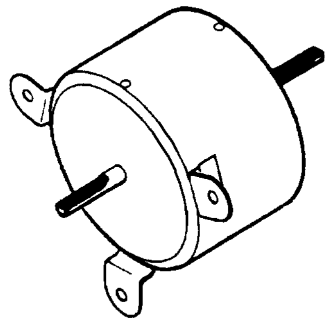


Figure 5: Fan Motor

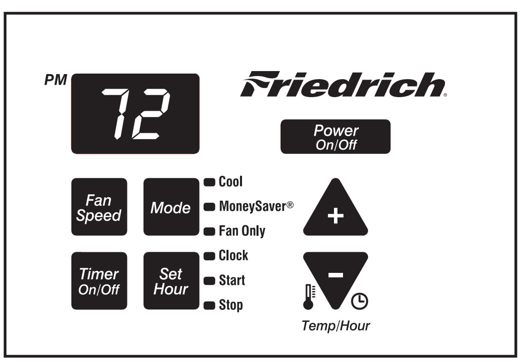


FAN MOTOR - TEST

1. Determine that capacitor is serviceable.
2. Disconnect fan motor wires from fan speed switch or system switch.
3. Apply "live" test cord probes on black wire and common terminal of capacitor. Motor should run at high speed.
4. Apply "live" test cord probes on red wire and common terminal of capacitor. Motor should run at low speed.
5. Apply "live" test cord probes on each of the remaining wires from the speed switch or system switch to test intermediate speeds.

SYSTEM CONTROL PANEL
("WS" Models)

Figure 6: System Control Panel



TESTING THE ELECTRONIC CONTROL

CHECKING ROOM TEMPERATURE

1. Check the room temperature at the electronic control pad by pressing at the same time the **"FAN SPEED"** button and the temperature **"UP"** button on **XQ** & **WS models**.
2. The indoor temperature will display for 10 seconds. Indoor temperature can be viewed in all modes, including the TEST mode. The display can be changed back to SET temperature by pressing any key, except the ON/OFF button, or after 10seconds has elapsed.

ACTIVATING TEST MODE

Activate test mode by pressing at the same time the **"MODE"** button and the temperature **"DOWN"** button on **XQ** & **WS models**. LEDs for Hour, Start, and Stop will blink 1bps while Test Mode is active.

Test Mode has duration of 90 minutes. Test Mode can be activated under any conditions, including Off. Test Mode is cancelled by pressing the On/Off button, unplugging the unit, or when the 90 minutes is timed out. All settings revert to the factory default settings of Cool, 75 degrees F, Timer and Set Hour features are nonfunctional.

Test Mode overrides the three-minute lockout, all delays for compressor and fan motor start / speed change, and no delay when switching modes.

Test Mode default settings are ON, Money Saver, 60 degrees F, and High fan speed.

Activating Error Code Mode (Submode of Test Mode)

Unit must be in Test Mode to enter Error Code Mode

1. Activate Error Code Mode by pressing the **"TIMER ON/OFF"** button on **XQ** & **WS models**. LED for the **"TIMER ON/OFF"** will flash 1bps while Error Code Mode is active. Pressing the **"TEMP/HR + "** button will display 00. Consecutive presses will scroll through all error codes logged. Press the **"TEMP/HR - "** button to see the reverse order of all error codes logged. When the end of logged error codes is reached the temperature set point will appear.

IMPORTANT

Error Codes are cleared from the log by exiting from Error Code Mode. To exit on XQ & WS models, press Timer On/Off button. Or unplug unit to exit Error Code Mode. Plug unit in after 5 seconds to resume normal operation of unit.

ERROR CODE LISTINGS

E1 SHORT CYCLE SITUATION: Defined as compressor powered on before the three minute time delay ten times in one hour. Investigate and correct short cycling problem.

E2 KEYBOARD STUCK ERROR: If key button(s) are pressed continuously for twenty seconds or more. If **MODE** key is stuck, unit will default to cool. Exit Error Code Mode to see if error "E2" is no longer displayed and unit is functioning. Replace board if "E2" still displays after exiting Error Code Mode.

E3 FROST PROBE OPEN: Normal operation is allowed. Ohm frost probe. Replace probe if ohm value not read. If ohm value present replace board.

E4 FROST PROBE SHORT: Normal operation allowed. Replace probe.

E5 INDOOR PROBE OPEN: Control assumes indoor ambient temperature is 90 degree F and unit will operate. Ohm indoor probe. Replace probe if ohm value not read.

E6 INDOOR PROBE SHORT: Control assumes ambient temperature is 90 degree F and unit will operate. Replace probe.

NOTE: All Error Code displays for Frost & Indoor Probe will allow unit to operate. Unit may or will ice up if faulty components not replaced.

Frost Probe Sensor: Disables compressor at 35 degrees F +/- 3 degrees F

Indoor Probe Sensor: Control range is 60 degrees F to 90 degrees F +/- 2 degrees F

Indoor temperature will be displayed by pressing:

(XQ / WS Units) The **Fan Speed** button and the **Temp Up button**.

The indoor temperature will be displayed for 10 seconds. The display will change back to the Set Point temperature by pressing any key button except for the On/Off button. The indoor temperature can be viewed in all modes, including test mode.

Keep Alive: The electronic control has a memory to retain all functions and status as set up by the user in the event of a power failure. Once power is restored to the unit there is a two second delay before the fan comes on and approximately three minutes delay before the compressor is activated, providing that the mode was set for cooling and the set point temperature has not been met in the room.

SYSTEM CONTROL SWITCH

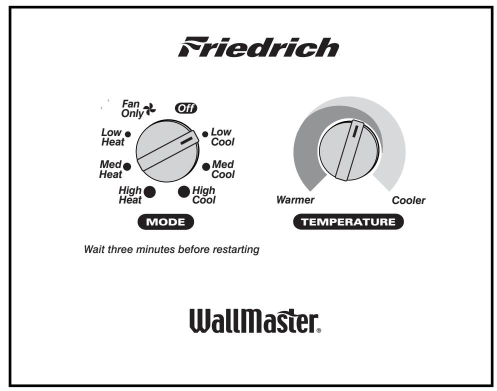
("WE" & "WY" Models)

An eight position switch is used to regulate the operation of the fan motor, compressor and electric heater.

The unit can be operated in cooling or heating mode with the compressor or electric heater on and the fan motor operating on low, medium or high speed.

The fan motor can also be operated independently on medium speed. See switch section as indicated on decorative control panel, in Figure 7.

Figure 7: System Control Panel

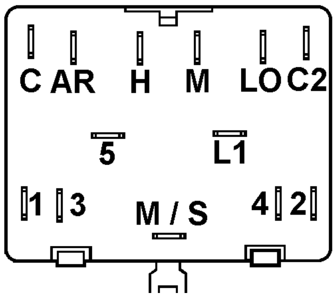


SYSTEM CONTROL SWITCH - TEST

Disconnect leads from control switch. Turn control to position being tested (see Figure 8). There must be continuity as follows:

1. "Off" Position-no continuity between terminals.
2. "Lo Cool" Position-between terminals "C" and "3", "C2" and "2", "LO" and "M/S", "AR" and "5".
3. "Med Cool" Position-between terminals "C" and "3", "C2" and "2", "M" and "M/S", "AR" and "5".
4. "Hi Cool" Position-between terminals "C" and "3", "C2" and "2", "H" and "M/S", "AR" and "5".
5. "Hi Heat" Position-between terminals "C" and "1", "C2" and "4", "H" and "M/S", "AR" and "5".
6. "Med Heat" Position-between terminals "C" and "1", "C2" and "4", "M" and "M/S", "AR" and "5".
7. "Lo Cool" Position-between terminals "C" and "1", "C2" and "4", "LO" and "M/S", "AR" and "5".
8. "Fan Only" Position-between terminals "L1", "M" and "2".

Figure 8: System Control Switch
(Heat Pump & Electric Heat Models)

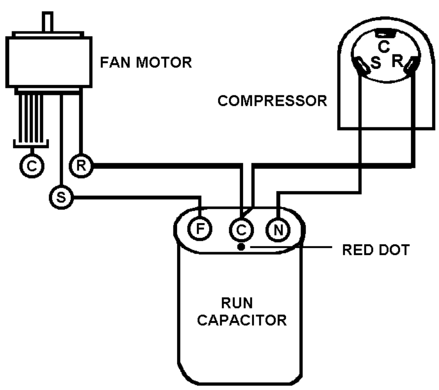


NOTE:
Units will operate in constant fan in the cooling mode and auto fan in the heating mode.

RUN CAPACITOR

A run capacitor is wired across the auxiliary and main winding of a single phase permanent split capacitor motor such as the compressor and fan motor. A single capacitor can be used for each motor or a dual rated capacitor can be used for both.

Figure 9: Run Capacitor Hook-Up



The capacitor's primary function is to reduce the line current while greatly improving the torque characteristics of a motor. The capacitor also reduces the line current to the motor by improving the power factor of the load. The line side of the capacitor is marked with a red dot and is wired to the line side of the circuit (see Figure 9).

CAPACITOR - TEST

1. Remove capacitor from unit.
2. Check for visual damage such as bulges, cracks, or leaks.
3. For dual rated, apply an ohmmeter lead to common (C) terminal and the other probe to the compressor (HERM) terminal. A satisfactory capacitor will cause a deflection on the pointer, then gradually move back to infinity.
4. Reverse the leads of the probe and momentarily touch the capacitor terminals. The deflection of the pointer should be two times that of the first check if the capacitor is good.
5. Repeat steps 3 and 4 to check fan motor capacitor.

NOTE: A shorted capacitor will indicate a low resistance and the pointer will move to the "0" end of the scale and remain there as long as the probes are connected.

An open capacitor will show no movement of the pointer when placed across the terminals of the capacitor.

THERMOSTAT

("WE" & "WY" Models)

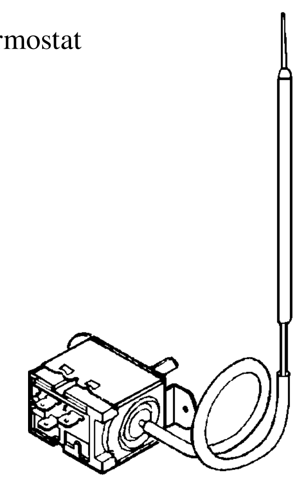
A cross ambient thermostat is used on all electric heat and heat pump WallMaster models (see Figure 12).

Range from 60° F (±2° F) to 92° F (±2° F).

TEST:

Remove wires from thermostat and check continuity between terminal "2" (common) and "1" for heating. Also check that contacts in thermostat open after placing in either position. NOTE: Temperature must be within range listed to check thermostat.

Figure 10: Thermostat



THERMOSTAT ADJUSTMENT

No attempt should be made to adjust thermostat. Due to the sensitivity of the internal mechanism and the sophisticated equipment required to check the calibration, it is suggested that the thermostat be replaced rather than calibrated.

HEATING ELEMENT

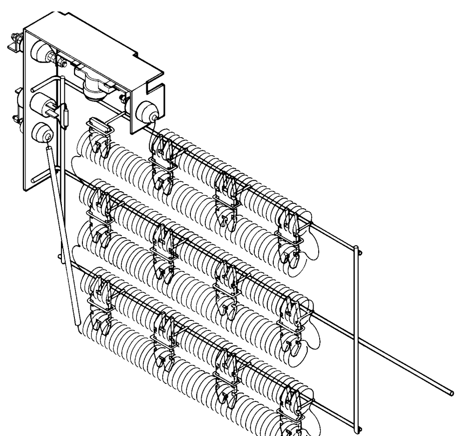
("WE" &"WY" Models)

All "WE" and "WY" models are equipped with a 3.3 KW heating element.

The heating element contains a fuse link and heater limit switch. The fuse link is in series with the power supply and will open and interrupt the power when the temperature reaches 183° F, or a short circuit occurs in the heating element. Once the fuse link separates, a new fuse link must be installed. NOTE: Always replace with the exact replacement.

The heater element has a high limit control. This control is a bi-metal thermostat mounted in the top of the heating element.

Figure 11: Heating Element



Should the fan motor fail or filter become clogged, the high limit control will open and interrupt power to the heater before reaching an unsafe temperature condition.

The control is designed to open at 120° F ± 5° F. Test continuity below 120° F and for open above 120° F.

DEFROST THERMOSTAT

("WY" Models Only)

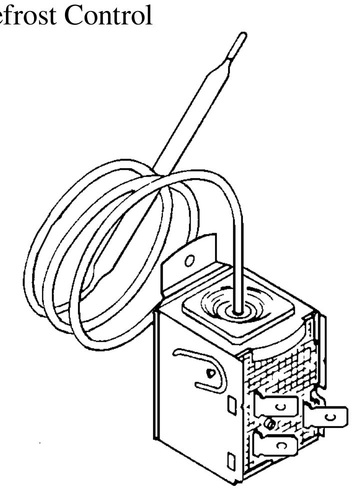
This thermostat is a single pole - double throw with contacts between terminal "2" and "3" closing on temperature rise and contacts between terminals "2" and "1" closing on temperature fall. When the contacts between terminals "2" and "3" open, power to the compressor is interrupted. When contacts between terminals "2" and "1" make, power is suppled to the heater element.

This control is a dual purpose control that acts as an outdoor thermostat and defrost control.

When the sensing bulb, attached to the condenser coil, senses enough icing on the outdoor coil it will interrupt power to the compressor and supply power to the heating element until the coil temperature reaches above 43°. Then the heater will shut off and the unit will resume operating in the reverse cycle mode.

When the outdoor coil temperature drops below 20 degrees, the unit will operate in electric heat mode continuously until the outdoor coil temperature rises above 43°.

Figure 12: Defrost Control

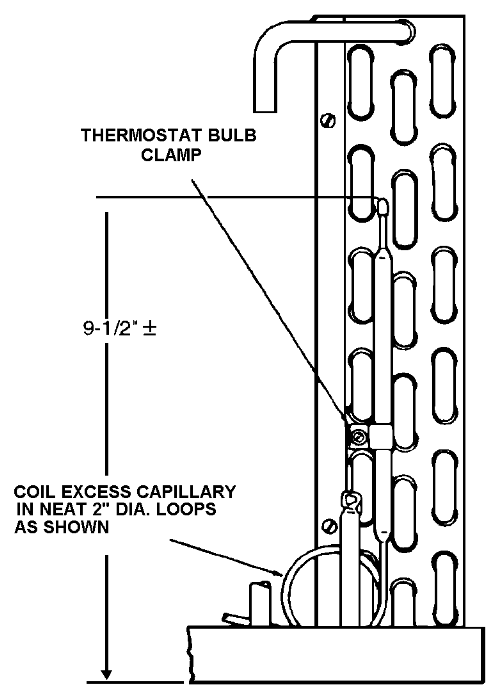


DEFROST BULB LOCATION

(All "WY" Models)

The defrost control bulb must be mounted securely and in the correct location to operate properly (see Figure 13).

Figure 13: Defrost Bulb Location
(All "WY" Models)



SOLENOID COIL

("WY" Models Only)

The solenoid coil is an electromagnetic type coil mounted on the reversing valve and is energized during the operation of the compressor in the heating cycle.

Should the reversing valve fail to shift during the heating cycle, test the solenoid coil. Also, refer to Touch Test Chart on Page 18.

TO TEST:

1. Disconnect power to unit.
2. Disconnect coil leads.
3. Attach probes of an ohmmeter to each coil lead and check for continuity.

WARNING: Do not start unit with solenoid coil removed from valve, or do not remove cord after unit is in operation. This will cause the coil to burn out.

CHECK VALVE: LIQUID DRYER OPERATION HEAT PUMP

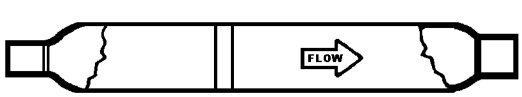
COOLING MODE (See Figure 14)

In the cooling mode of operation, liquid refrigerant from condenser (liquid line) enters the cooling check valve forcing the heating check valve shut. The liquid refrigerant is directed into the liquid dryer after which the refrigerant is metered through cooling capillary tubes to evaporator. (Note: liquid refrigerant will also be directed through the heating capillary tubes in a continuous loop during the cooling mode).

HEATING MODE (see Figure 14)

In the heating mode of operation, liquid refrigerant from the indoor coil enters the heating check valve forcing the cooling check valve shut. The liquid refrigerant is directed into the liquid dryer after which the refrigerant is metered through the heating capillary tubes to outdoor coils. (Note: liquid refrigerant will also be directed through the cooling capillary tubes in a continuous loop during the heating mode).

Figure 14
One-way Check Valve
(Heat Pump Models)



DRAIN PAN VALVE

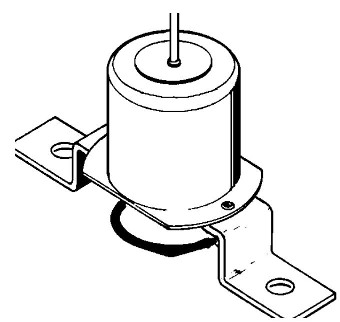
(See Figure 15)

During the cooling mode of operation, condensate which collects in the drain pan is picked up by the condenser fan blade and sprayed onto the condenser coil. This assists in cooling the refrigerant plus evaporating the water.

During the heating mode of operation, it is necessary that water be removed to prevent it from freezing during cold outside temperatures. This could cause the condenser fan blade to freeze in the accumulated water and prevent it from turning.

To provide a means of draining this water, a bellows type drain valve is installed over a drain opening in the base pan. This valve is temperature sensitive and will open when the outside temperature reaches 40° F. The valve will close gradually as the temperature rises above 40° F to fully close at 60° F.

Figure 15: Drain Pan Valve



REVERSING VALVE

("WY" Models Only)

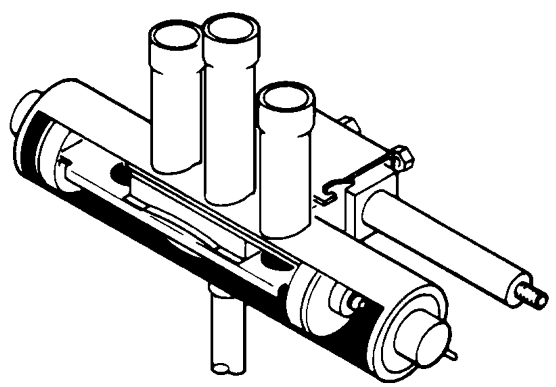
A reversing valve is used to change the refrigerant flow within the system to permit heating or cooling (see Figure 16).

The reversing valve consists of a main valve body which houses the slide and piston, plus a pivot valve which is activated by a solenoid.

There are three tubes connected to one side of the main valve body and one tube on the opposite side. The single tube is connected to the compressor discharge line. The center tube on the opposite side is the common suction line to the compressor. The outside tubes are connected to the indoor and outdoor coils.

The pivot valve is responsible for directing the refrigerant flow to the indoor or outdoor coil. There are three small tubes connected to the pivot valve body. The center pilot tube is the common pilot tube and is connected to the center suction line. The outside tubes are connected to each end of the main valve body. The pilot valve consists of a needle valve and spring. When the solenoid is deenergized, the spring tension closes one pilot port while the other remains open. When the solenoid is energized, the opposite end is closed. The piston in the main valve is pressure operated and will always travel in the direction of the open pilot tube port which provides a path to the center tube. Pressure which will increase in the opposite side of the valve will escape through a bleed port located in each piston. When deenergized, the valve will be in the cooling position.

Figure 16: Reversing Valve



TESTING REVERSING VALVE

Occasionally, the reversing valve may stick in the heating or cooling position or in the mid-position.

When stuck in the mid-position, part of the discharge gas from the compressor is directed back to the suction side, resulting in excessively high suction pressure.

Check the operation of the valve by starting the system and switching the operation from “Cooling” to “Heating” and then back to “Cooling”. Do not hammer on valve.

If valve fails to change its position, test the voltage to the valve coil while the system is in the heating cycle. If voltage to the coil is satisfactory, replace reversing valve.

Should the valve fail to shift from cooling to heating, block the air flow through the outdoor coil and allow the discharge pressure to build in the system. Then switch the system from cooling to heating.

If the valve is stuck in the heating position, block the air flow through the indoor coil and allow discharge pressure to build in the system. Then switch the system from heating to cooling.

Should the valve fail to shift in either position after increasing the discharge pressure, replace the valve.

NOTE: When brazing a reversing valve into the system, it is of extreme importance that the temperature of the valve does not exceed 250° F at any time.

Wrap the reversing valve with a large rag saturated with water. “Rewet” the rag and thoroughly cool the valve after each brazing operation of the four joints involved.

The wet rag around the reversing valve will eliminate conduction of heat to the valve body when brazing the line connection.

SEALED REFRIGERATION SYSTEM REPAIRS

EQUIPMENT REQUIRED:

1. Voltmeter
2. Ammeter
3. Ohmmeter
4. Vacuum Pump (capable of 200 microns or less vacuum.)
5. Acetylene Welder
6. Electronic Halogen Leak Detector (G.E. Type H-6 or equivalent.)
7. Accurate refrigerant charge measuring device such as:
    a. Balance Scales - 1/2 oz. accuracy
    b. Charging Board - 1/2 oz. accuracy
8. High Pressure Gauge - (0 - 400 lbs.)
9. Low Pressure Gauge - (30 - 150 lbs.)
10. Vacuum Gauge - (0 - 1000 microns)

EQUIPMENT MUST BE CAPABLE OF:

1. Evacuation from both the high side and low side of the system simultaneously.
2. Introducing refrigerant charge into high side of the system.
3. Accurately weighing the refrigerant charge actually introduced into the system.
4. Facilities for flowing nitrogen through refrigeration tubing during all brazing processes.

HERMETIC COMPONENT REPLACEMENT

The following procedure applies when replacing components in the sealed refrigeration circuit or repairing refrigerant leaks. (Compressor, condenser, evaporator, capillary tube, refrigerant leaks, etc.)

1. Recover the refrigerant from the system at the process tube located on the high side of the system by installing a line tap on the process tube. Apply gauge from process tube to EPA approved gauges from process tube to EPA approved recovery system. Recover CFCs in system to at least 5%.
2. Cut the process tube below pinch off on the suction side of the compressor.
3. Connect the line from the nitrogen tank to the suction process tube.
4. Drift dry nitrogen through the system and unsolder the more distant connection first. (Filter drier, high side process tube, etc.)
5. Replace inoperative component, and always install a new filter drier. Drift dry nitrogen through the system when making these connections.
6. Pressurize system to 30 PSIG with proper refrigerant and boost refrigerant pressure to 150 PSIG with dry nitrogen.
7. Leak test complete system with electric halogen leak detector, correcting any leaks found.
8. Reduce the system to zero gauge pressure.
9. Connect vacuum pump to high side and low side of system with deep vacuum hoses, or copper tubing. (Do not use regular hoses.)
10. Evacuate system to maximum absolute holding pressure of 200 microns or less. NOTE: This process can be speeded up by use of heat lamps, or by breaking the vacuum with refrigerant or dry nitrogen at 5,000 microns. Pressure system to 5 PSIG and leave in system a minimum of 10 minutes. Release refrigerant, and proceed with evacuation of a pressure of 200 microns or less.
11. Break vacuum by charging system from the high side with the correct amount of refrigerant specified. This will prevent boiling the oil out of the crankcase.

    NOTE: If the entire charge will not enter the high side, allow the remainder to enter the low side in small increments while operating the unit.
12. Restart unit several times after allowing pressures to stabilize. Pinch off process tubes, cut and solder the ends. Remove pinch off tool, and leak check the process tube ends.

SPECIAL PROCEDURE IN THE CASE OF MOTOR COMPRESSOR BURNOUT

1. Recover all refrigerant and oil from the system.
2. Remove compressor, capillary tube and filter drier from the system.
3. Flush evaporator condenser and all connecting tubing with dry nitrogen or equivalent, to remove all contamination from system. Inspect suction and discharge line for carbon deposits. Remove and clean if necessary.
4. Reassemble the system, including new drier strainer and capillary tube.
5. Proceed with processing as outlined under hermetic component replacement.

ROTARY COMPRESSOR SPECIAL TROUBLESHOOTING AND SERVICE

Basically, troubleshooting and servicing rotary compressors is the same as on the reciprocating compressor with only a few exceptions.

1. Because of the spinning motion of the rotary, the mounts are critical. If vibration is present, check the mounts carefully.
2. The electrical terminals on the rotary are in a different order than the reciprocating compressors. The terminal markings are on the cover gasket. Use your wiring diagram to insure correct connections.

REFRIGERANT CHARGE

1. The refrigerant charge is extremely critical. Measure charge carefully - as exact as possible to the nameplate charge.
2. The correct method for charging the rotary is to introduce liquid refrigerant into the high side of the system with the unit off. Then start compressor and enter the balance of the charge, gas only, into the low side.

   The introduction of liquid into the low side, without the use of a capillary tube, will cause damage to the discharge valve of the rotary compressor.

   NOTE: All inoperative compressors returned to Friedrich must have all lines properly plugged with the plugs from the replacement compressor.

TROUBLESHOOTING TOUCH TEST CHART: TO SERVICE REVERSING VALVES

NORMAL FUNCTION OF VALVE								
VALVE OPERATING CONDITION	DISCHARGE TUBE from Compressor	SUCTION TUBE to Compressor	Tube to INSIDE COIL	Tube to OUTSIDE COIL	LEFT Pilot Capillary Tube	RIGHT Pilot Capillary Tube	NOTES: * TEMPERATURE OF VALVE BODY ** WARMER THAN VALVE BODY	
	1	2	3	4	5	6	**POSSIBLE CAUSES**	**CORRECTIONS**
Normal Cooling	Hot	Cool	Cool as (2)	Hot as (1)	*TVB	TVB		
Normal Heating	Hot	Cool	Hot as (1)	Cool as (2)	*TVB	TVB		
MALFUNCTION OF VALVE								
Valve will not shift from cool to heat.	Check Electrical circuit and coil						No voltage to coil.	Repair electrical circuit.
							Defective coil.	Replace coil.
	Check refrigeration charge						Low charge.	Repair leak, recharge system.
							Pressure differential too high.	Recheck system.
	Hot	Cool	Cool, as (2)	Hot, as (1)	*TVB	Hot	Pilot valve okay. Dirt in one bleeder hole.	Deenergize solenoid, raise head pressure, reenergize solenoid to break dirt loose. If unsuccessful, remove valve, wash out. Check on air before installing. If no movement, replace valve, add strainer to discharge tube, mount valve horizontally.
							Piston cup leak	Stop unit. After pressures equalize, restart with solenoid energized. If valve shifts, reattempt with compressor running. If still no shift, replace valve.
Valve will not shift from cool to heat.	Hot	Cool	Cool, as (2)	Hot, as (1)	*TVB	*TVB	Clogged pilot tubes.	Raise head pressure, operate solenoid to free. If still no shift, replace valve.
	Hot	Cool	Cool, as (2)	Hot, as (1)	Hot	Hot	Both ports of pilot open. (Back seat port did not close).	Raise head pressure, operate solenoid to free partially clogged port. If still no shift, replace valve.
	Warm	Cool	Cool, as (2)	Hot, as (1)	*TVB	Warm	Defective Compressor.	Replace compressor
Starts to shift but does not complete reversal.	Hot	Warm	Warm	Hot	*TVB	Hot	Not enough pressure differential at start of stroke or not enough flow to maintain pressure differential.	Check unit for correct operating pressures and charge. Raise head pressure. If no shift, use valve with smaller port.
							Body damage.	Replace valve
	Hot	Warm	Warm	Hot	Hot	Hot	Both ports of pilot open.	Raise head pressure, operate solenoid. If no shift, use valve with smaller ports.
	Hot	Hot	Hot	Hot	*TVB	Hot	Body damage.	Replace valve
							Valve hung up at mid-stroke. Pumping volume of compressor not sufficient to maintain reversal.	Raise head pressure, operate solenoid. If no shift, use valve with smaller ports.
	Hot	Hot	Hot	Hot	Hot	Hot	Both ports of pilot open.	Raise head pressure, operate solenoid. If no shift, replace valve.
Apparent leap in heating.	Hot	Cool	Hot, as (1)	Cool, as (2)	*TVB	*TVB	Piston needle on end of slide leaking.	Operate valve several times, then recheck. If excessive leak, replace valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	** WVB	** WVB	Pilot needle and piston needle leaking.	Operate valve several times, then recheck. If excessive leak, replace valve.
Will not shift from heat to cool.	Hot	Cool	Hot, as (1)	Cool, as (2)	*TVB	*TVB	Pressure differential too high.	Stop unit. Will reverse during equalization period. Recheck system
							Clogged pilot tube.	Raise head pressure, operate solenoid to free dirt. If still no shift, replace valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	*TVB	Dirt in bleeder hole.	Raise head pressure, operate solenoid. Remove valve and wash out. Check on air before reinstalling, if no movement, replace valve. Add strainer to discharge tube. Mount valve horizontally.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	*TVB	Piston cup leak.	Stop unit. After pressures equalize, restart with solenoid deenergized. If valve shifts, reattempt with compressor running. If it still will not reverse while running, replace the valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	Hot	Defective pilot.	Replace valve.
	Warm	Cool	Warm, as (1)	Cool, as (2)	Warm	*TVB	Defective compressor.	Replace compressor

COOLING ONLY ROOM AIR CONDITIONERS: TROUBLESHOOTING TIPS

Problem	Possible Cause	Action
Compressor does not run	Low voltage	Check voltage at compressor. 115V & 230V units will operate at 10% voltage variance
	T-stat not set cold enough or inoperative	Set t-stat to coldest position. Test t-stat & re-place if inoperative
	Compressor hums but cuts off on B10 overload	Hard start compressor. Direct test compressor. If compressor starts, add starting components
	Open or shorted compressor windings	Check for continuity & resistance
	Open overload	Test overload protector & replace if inoperative
	Open capacitor	Test capacitor & replace if inoperative
	Inoperative system switch	Test for continuity in all positions. Replace if inoperative
	Broken, loose or incorrect wiring	Refer to appropriate wiring diagrams to check wiring

Problem	Possible Cause	Action
Fan motor does not run	Inoperative system switch	Test switch & replace if inoperative
	Broken, loose or incorrect wiring	Refer to applicable wiring diagram
	Open capacitor	Test capacitor & replace if inoperative
	Fan speed switch open	Test switch & replace if inoperative
	Inoperative fan motor	Test fan motor & replace if inoperative (be sure internal overload has had time to reset)

Problem	Possible Cause	Action
Does not cool or only cools slightly	Undersized unit	Refer to industry standard sizing chart
	T-stat open or inoperative	Set to coldest position. Test t-stat & replace if necessary
	Dirty filter	Clean as recommended in Owner's Manual
	Dirty or restricted condenser or evaporator coil	Use pressure wash or biodegradable cleaning agent to clean
	Poor air circulation	Adjust discharge louvers. Use high fan speed
	Fresh air or exhaust air door open on applicable models	Close doors. Instruct customer on use of this feature
	Low capacity - undercharge	Check for leak & make repair
	Compressor not pumping properly	Check amperage draw against nameplate. If not conclusive, make pressure test

Problem	Possible Cause	Action
Unit does not run	Fuse blown or circuit tripped	Replace fuse, reset breaker. If repeats, check fuse or breaker size. Check for shorts in unit wiring & components
	Power cord not plugged in	Plug it in
	System switch in "OFF" position	Set switch correctly
	Inoperative system switch	Test for continuity in each switch position
	Loose or disconnected wiring at switch or other components	Check wiring & connections. Reconnect per wiring diagram

Problem	Possible Cause	Action
Evaporator coil freezes up	Dirty filter	Clean as recommended in Owner's Manual
	Restricted airflow	Check for dirty or obstructed coil. Use pressure wash or biodegradable cleaning agent to clean
	Inoperative t-stat	Test for shorted t-stat or stuck contacts
	Short of refrigerant	De-ice coil & check for leak
	Inoperative fan motor	Test fan motor & replace if inoperative
	Partially restricted capillary tube	De-ice coil. Check temp. differential (delta T) across coil. Touch test coil return bends for same temp. Test for low running current

Problem	Possible Cause	Action
Compressor runs continually & does not cycle off	Excessive heat load	Unit undersized. Test cooling performance & replace with larger unit if needed
	Restriction in line	Check for partially iced coil & check temperature split across coil
	Refrigerant leak	Check for oil at silver soldered connections. Check for partially iced coil. Check split across coil. Check for low running amperage
	T-stat contacts stuck	Check operation of t-stat. Replace if contacts remain closed.
	T-stat incorrectly wired	Refer to appropriate wiring diagram

Problem	Possible Cause	Action
T-stat does not turn unit off	T-stat contacts stuck	Disconnect power to unit. Remove cover of t-stat & check if contacts are stuck. If so, replace t-stat
	T-stat set at coldest point	Turn to higher temp. setting to see if unit cycles off
	Incorrect wiring	Refer to appropriate wiring diagrams
	Unit undersized for area to be cooled	Refer to industry standard sizing chart

Problem	Possible Cause	Action
Compressor runs for short periods only. Cycles on overload	Overload inoperative. Opens too soon	Check operation of unit. Replace overload if system operation is satisfactory
	Compressor restarted before system pressures equalized	Allow a minimum of 2 minutes to allow pressures to equalize before attempting to restart. Instruct customer of waiting period
	Low or fluctuating voltage	Check voltage with unit operating. Check for other appliances on circuit. Air conditioner should be in separate circuit for proper voltage & fused separately
	Incorrect wiring	Refer to appropriate wiring diagram
	Shorted or incorrect capacitor	Check by substituting a known good capacitor of correct rating
	Restricted or low air flow through condenser coil	Check for proper fan speed or blocked condenser
	Compressor running abnormally hot	Check for kinked discharge line or restricted condenser. Check amperage

Problem	Possible Cause	Action
T-stat does not turn unit on	Loss of charge in t-stat bulb	Place jumper across t-stat terminals to check if unit operates. If unit operates, replace t-stat.
	Loose or broken parts in t-stat	Check as above
	Incorrect wiring	Refer to appropriate wiring diagram

Problem	Possible Cause	Action
Noisy operation	Poorly installed	Refer to Installation Manual for proper installation
	Fan blade striking chassis	Reposition - adjust motor mount
	Compressor vibrating	Check that compressor grommets have not deteriorated. Check that compressor mounting parts are not missing
	Improperly mounted or loose cabinet parts	Check assembly & parts for looseness, rubbing & rattling

Problem	Possible Cause	Action
Water leaks into the room	Evaporator drain pan overflowing	Clean obstructed drain trough
	Condensation forming on base pan	Evaporator drain pan broken or cracked. Reseal or replace
	Poor installation resulting in rain entering the room	Check installation instructions. Reseal as required
	Condensation on discharge grille louvers	Clean the dirty evaporator coil. Use pressure wash or biodegradable cleaning agent to clean
	Chassis gasket not installed	Install gasket, per Installation manual
	Downward slope of unit is too steep	Refer to installation manual for proper installation

Problem	Possible Cause	Action
Water "spitting" into room	Sublimation: When unconditioned saturated, outside air mixes with conditioned air, condensation forms on the cooler surfaces	Ensure that foam gaskets are installed in between window panes & in between the unit & the sleeve. Also, ensure that fresh air/exhaust vents (on applicable models) are in the closed position & are in tact
	Downward pitch of installation is too steep	Follow installation instructions to ensure that downward pitch of installed unit is no less than 1/4" & no more than 3/8"
	Restricted coil or dirty filter	Clean & advise customer of periodic cleaning & maintenance needs of entire unit

Problem	Possible Cause	Action
Excessive moisture	Insufficient air circulation thru area to be air conditioned	Adjust louvers for best possible air circulation
	Oversized unit	Operate in "MoneySaver" position
	Inadequate vapor barrier in building structure, particularly floors	Advise customer

Problem	Possible Cause	Action
T-stat short cycles	T-stat differential too narrow	Replace t-stat
	Plenum gasket not sealing, allowing discharge air to short cycle t-stat	Check gasket. Reposition or replace as needed
	Restricted coil or dirty filter	Clean & advise customer of periodic cleaning & maintenance needs of entire unit

Problem	Possible Cause	Action
Prolonged off cycles (automatic operation)	Anticipator (resistor) wire disconnected at t-stat or system switch	Refer to appropriate wiring diagram
	Anticipator (resistor) shorted or open	Disconnect plus from outlet. Remove resistor from bracket. Insert plug & depress "COOL" & "FAN AUTOMATIC" buttons. Place t-stat to warmest setting. Feel resistor for temperature. If no heat, replace resistor
	Partial loss of charge in t-stat bulb causing a wide differential	Replace t-stat

Problem	Possible Cause	Action
Outside water leaks	Evaporator drain pan cracked or obstructed	Repair, clean or replace as required
	Water in compressor area	Detach shroud from pan & coil. Clean & remove old sealer. Reseal, reinstall & check
	Obstructed condenser coil	Use pressure wash or biodegradable cleaning agent to clean
	Fan blade/slinger ring improperly positioned	Adjust fan blade to 1/2" of condenser coil

HEAT / COOL ROOM AIR CONDITIONERS: TROUBLESHOOTING TIPS

Problem	Possible Cause	Action
Room temperature uneven (Heating cycle)	Heat anticipator (resistor) shorted (on applicable models)	Disconnect power to unit. Remove resistor from t-stat bulb block. Plus in unit & allow to operate. Feel resistor for heat. If not heat, replace resistor
	Wide differential - partial loss of t-stat bulb charge	Replace t-stat & check
	Incorrect wiring	Refer to appropriate wiring diagram. Resistor is energized during "ON" cycle of compressor or fan.

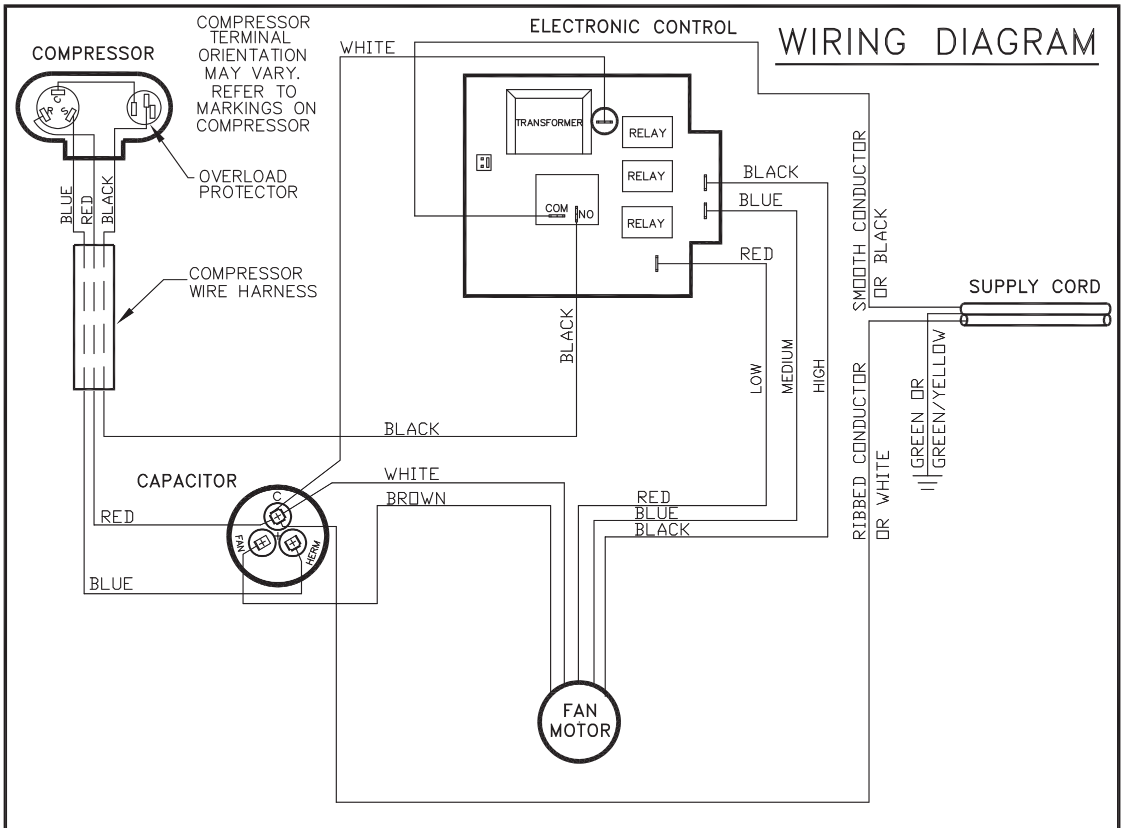
Problem	Possible Cause	Action
Unit will not defrost	Incorrect wiring	Refer to appropriate wiring diagram
	Defrost control timer motor not advancing (applicable models)	Check for voltage at "TM" & "TM1" on timer. If no voltage, replace control
	Defrost control out of calibration (applicable models)	If outside coil temperature is 25°F or below, & preselected time limit has elapsed, replace defrost control
	Defrost control contacts stuck	If contacts remain closed between terminals "2" & "3" of the defrost control after preselected time interval has passed, replace control
	Defrost control bulb removed from or not making good coil contact	Reinstall & be assured that good bulb to coil contact is made

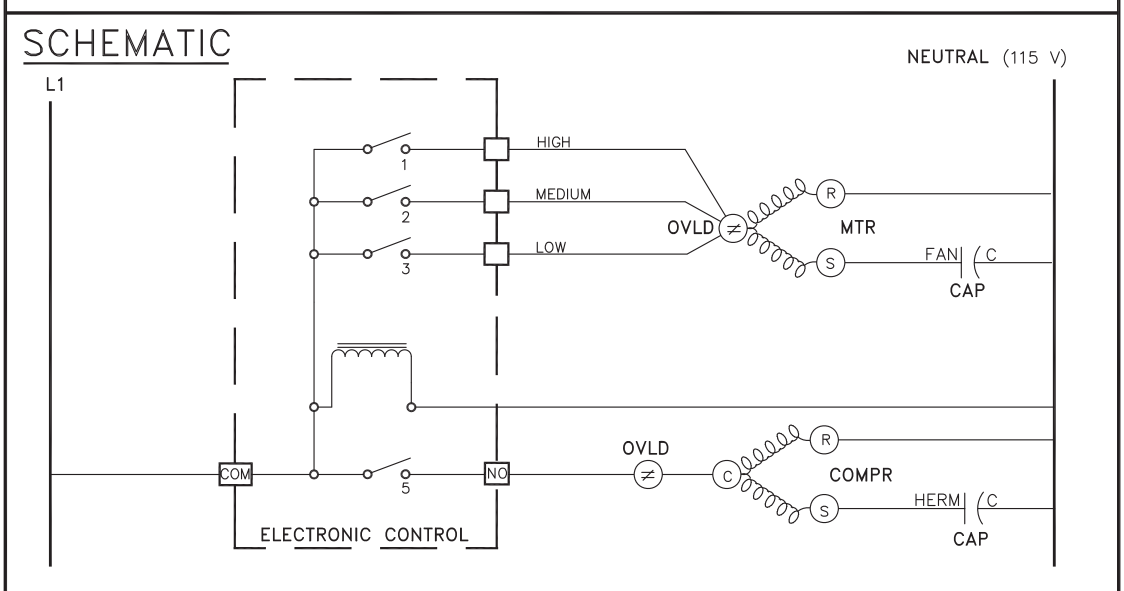
Problem	Possible Cause	Action
Does not heat adequately	Exhaust or fresh air door open	Check if operating properly. Instruct customer on proper use of control
	Dirty filter	Clean as recommended in Owner's Manual
	Unit undersized	Check heat rise across coil. If unit operates efficiently, check if insulation can be added to attic or walls. If insulation is adequate, recommend additional unit or larger one
	Outdoor t-stat open (applicable models)	T-stat should close at 38°F. Check continuity of control. If temperature is below 38F, replace control
	Heater hi-limit control cycling on & off	Check for adequate fan air across heater. Check control for open at 160°F & close at 150°F
	Shorted supplementary heater	Ohmmeter check, approx. 32-35 ohms
	Incorrect wiring	Check applicable wiring diagram

Problem	Possible Cause	Action
Unit cools when heat is called for	Incorrect wiring	Refer to applicable wiring diagram
	Defective solenoid coil	Check for continuity of coil
	Reversing valve fails to shift	Block condenser coil & switch unit to cooling. Allow pressure to build up in system, then switch to heating. If valve fails to shift, replace valve.
	Inoperative system switch	Check for continuity of system switch

Problem	Possible Cause	Action
Cooling adequate, but heating insufficient	Heating capillary tube partially restricted	Check for partially starved outer coil. Replace heating capillary tube
	Check valve leaking internally	Switch unit several times from heating to cooling. Check temperature rise across coil. Refer to specification sheet for correct temperature rise
	Reversing valve failing to shift completely; bypassing hot gas	Deenergize solenoid coil, raise head pressure, energize solenoid to break loose. If valve fails to make complete shift, replace valve.

WIRING DIAGRAM: MODELS WS08B10A-A/B, WS10B10A-A/B, WS14B10A-A/B, WS10B30A-A/B, WS13B30A-A/B





SWITCH LOGIC X = CLOSED O = OPEN

SWITCH POSITION	CIRCUIT 1	2	3	4	5
OFF	O	O	O	O	O
HI COOL	X	O	O	O	X
MED COOL	O	X	O	O	X
LOW COOL	O	O	X	O	X

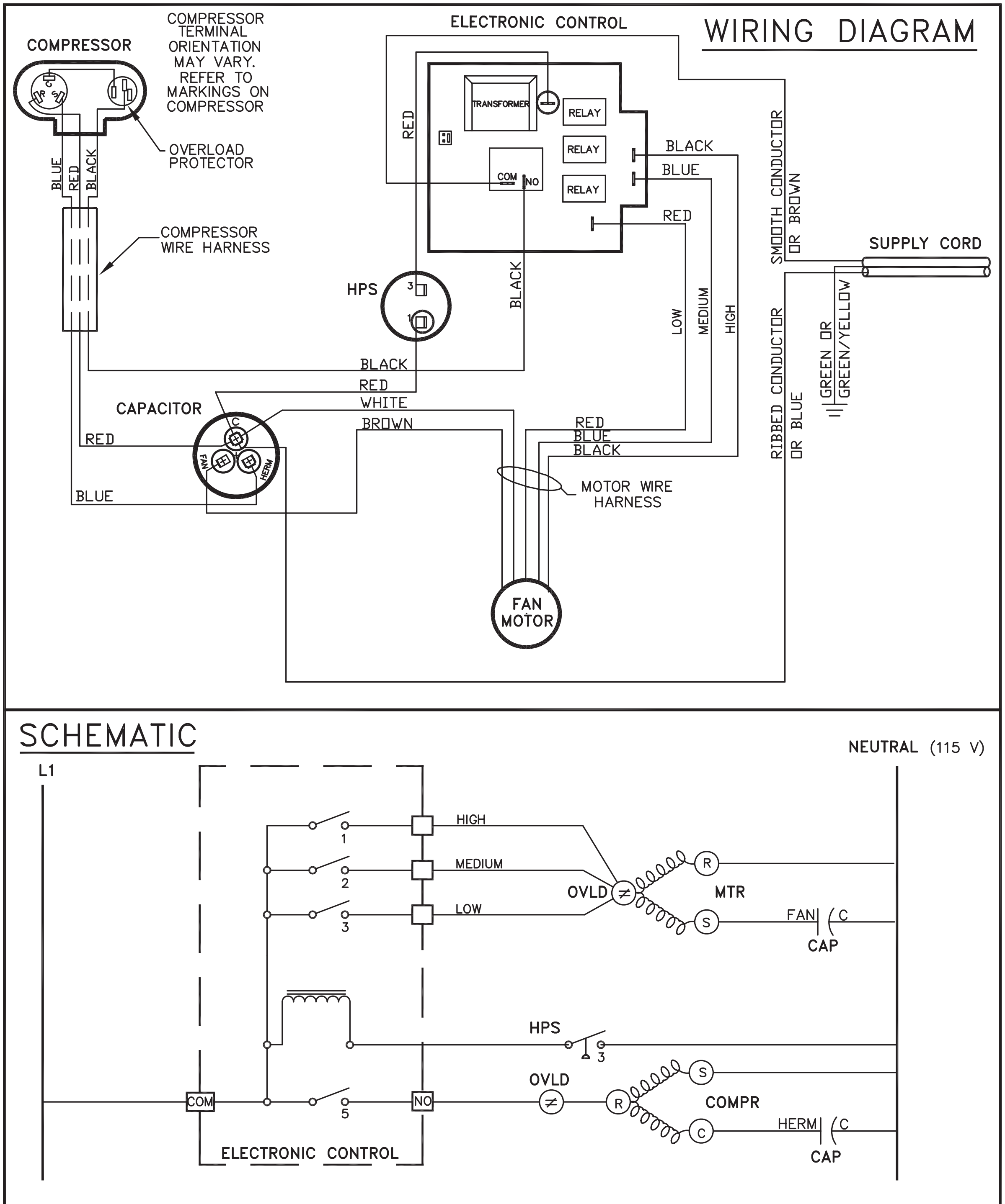
L E G E N D

CAP – CAPACITOR
COMPR – COMPRESSOR
MTR – FAN MOTOR
OVLD – OVERLOAD PROTECTOR

○ – INSULATED TERMINAL
–●– – COMBINATION TERMINAL
ground symbol – GROUND LEAD

PART NO.	REV.
617–581–21	02

WIRING DIAGRAM: MODELS WS16B30A-A/B



SWITCH LOGIC X = CLOSED O = OPEN

SWITCH POSITION	CIRCUIT				
	1	2	3	4	5
OFF	O	O	O	O	O
HI COOL	X	O	O	O	X
MED COOL	O	X	O	O	X
LOW COOL	O	O	X	O	X

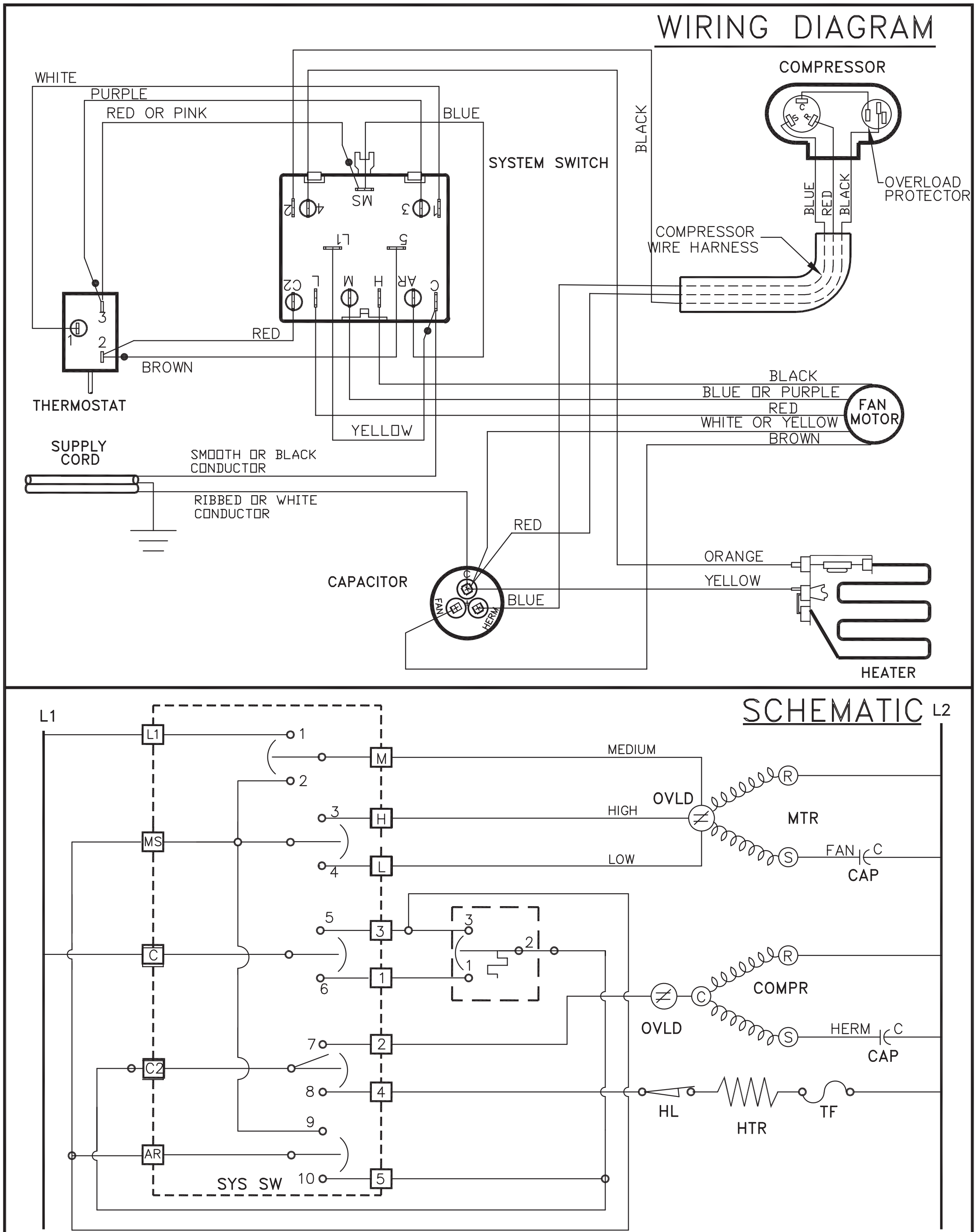
L E G E N D

CAP – CAPACITOR
COMPR – COMPRESSOR
MTR – FAN MOTOR
OVLD – OVERLOAD PROTECTOR
HPS – HIGH PRESSURE SWITCH

○ – INSULATED TERMINAL
—●— – COMBINATION TERMINAL
—╢ – GROUND LEAD

PART NO.	REV.
617–581–20	03

WIRING DIAGRAM: MODELS WE10B33A-A, WE13B33A-A



SWITCH LOGIC

X = CLOSED
0 = OPEN

SWITCH POSITION	CIRCUIT									
	1	2	3	4	5	6	7	8	9	10
OFF	O	O	O	O	O	O	O	O	O	O
LOW COOL	O	O	O	X	X	O	X	O	X	O
MEDIUM COOL	O	X	O	O	X	O	X	O	X	O
HIGH COOL	O	O	X	O	X	O	X	O	X	O
HIGH HEAT	O	O	X	O	O	X	O	X	O	X
MEDIUM HEAT	O	X	O	O	O	X	O	X	O	X
LOW HEAT	O	O	O	X	O	X	O	X	O	X
FAN ONLY	X	O	O	O	O	O	O	O	O	O

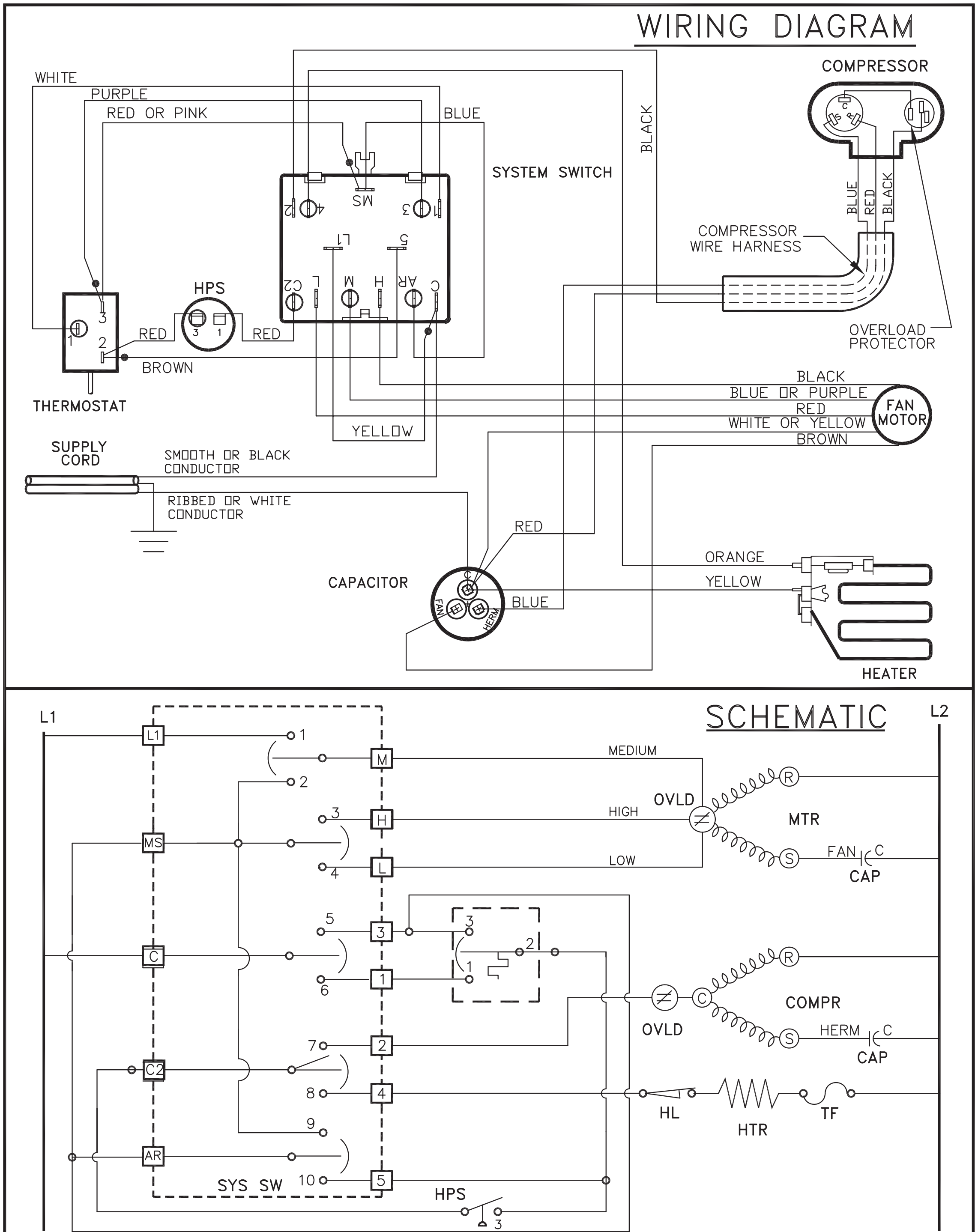
L E G E N D

AR – ANTICIPATOR RESISTOR
MS – MONEY SAVER/ROCKER SWITCH
CAP – CAPACITOR
COMPR – COMPRESSOR
MTR – FAN MOTOR
OVLD – OVERLOAD PROTECTOR
SYS SW – SYSTEM SWITCH
IDT – INDOOR THERMOSTAT

HTR – HEATER
HL – HEATER LIMIT
TF – THERMAL FUSE
(symbol) – GROUND LEAD
(symbol) – COMBINATION TERMINAL
(symbol) – PLASTIC INSULATOR

PART NO.	REV.
617-581-22	02

WIRING DIAGRAM: MODELS WE16B33A-A



SWITCH LOGIC

X = CLOSED
0 = OPEN

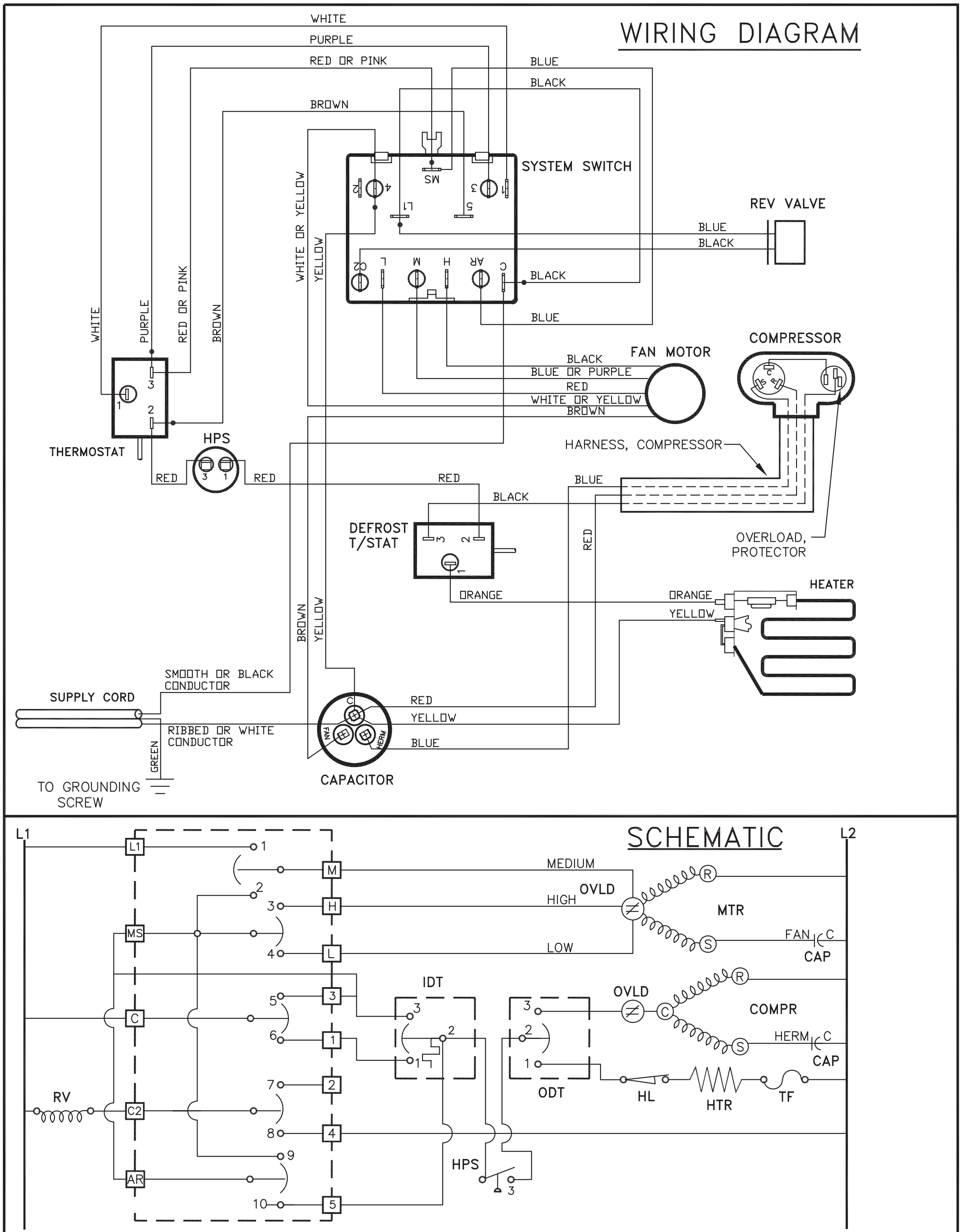
SWITCH POSITION	CIRCUIT									
	1	2	3	4	5	6	7	8	9	10
OFF	O	O	O	O	O	O	O	O	O	O
LOW COOL	O	O	O	X	X	O	X	O	X	O
MEDIUM COOL	O	X	O	O	X	O	X	O	X	O
HIGH COOL	O	O	X	O	X	O	X	O	X	O
HIGH HEAT	O	O	X	O	O	X	O	X	O	X
MEDIUM HEAT	O	X	O	O	O	X	O	X	O	X
LOW HEAT	O	O	O	X	O	X	O	X	O	X
FAN ONLY	X	O	O	O	O	O	O	O	O	O

LEGEND

AR – ANTICIPATOR RESISTOR
MS – MONEY SAVER/ROCKER SWITCH
CAP – CAPACITOR
COMPR – COMPRESSOR
MTR – FAN MOTOR
OVLD – OVERLOAD PROTECTOR
SYS SW – SYSTEM SWITCH
IDT – INDOOR THERMOSTAT
HPS – HIGH PRESSURE SWITCH
HTR – HEATER
HL – HEATER LIMIT
TF – THERMAL FUSE
(symbol) – GROUND LEAD
(symbol) – COMBINATION TERMINAL
(symbol) – PLASTIC INSULATOR

PART NO. 617-581-15 REV. 04

WIRING DIAGRAM: MODELS WY10B33A-A, WY13B33A-A



SWITCH LOGIC

X = CLOSED
0 = OPEN

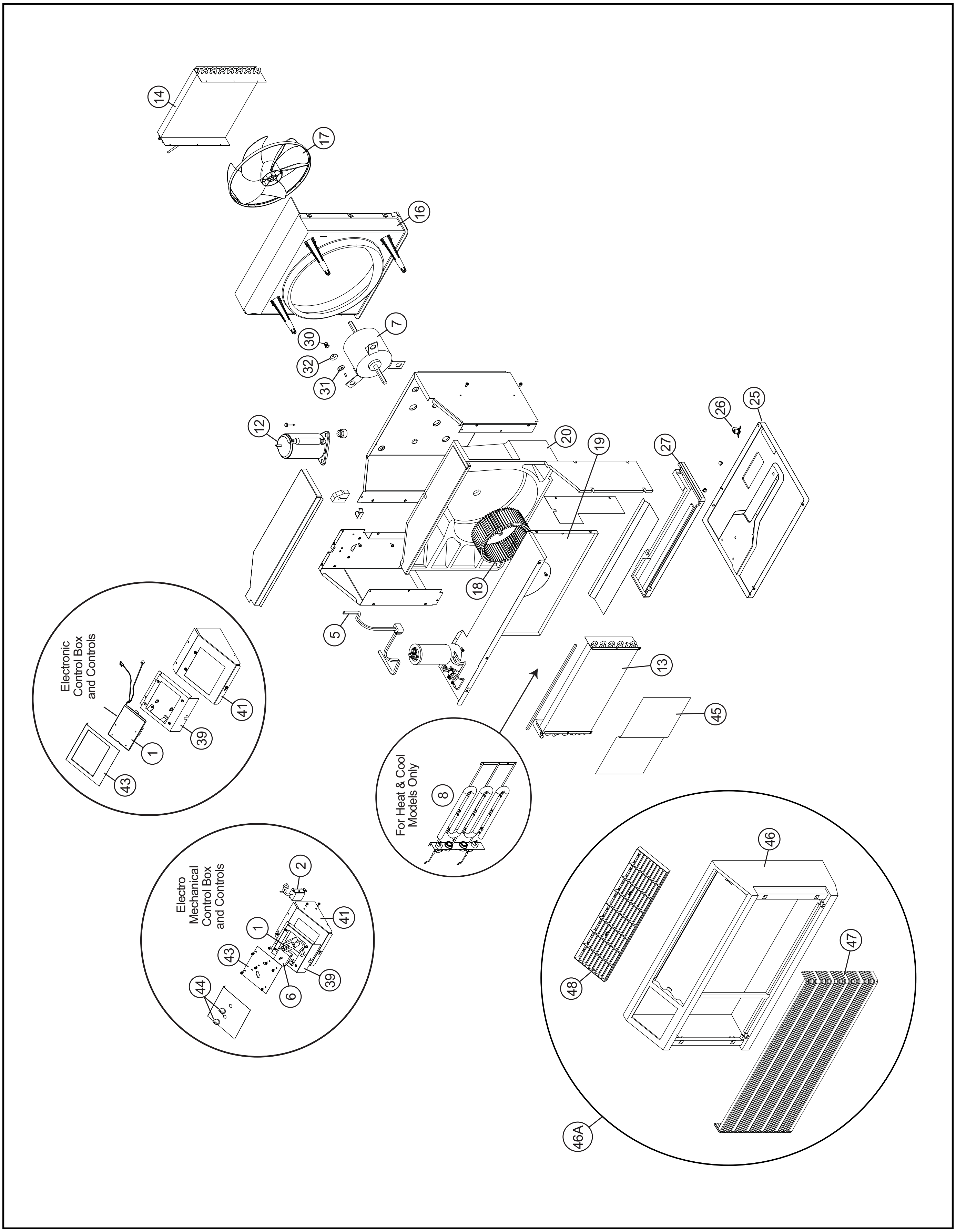
SWITCH POSITION	CIRCUIT									
	1	2	3	4	5	6	7	8	9	10
OFF	O	O	O	O	O	O	O	O	O	O
LOW COOL	O	O	O	X	X	O	X	O	X	O
MEDIUM COOL	O	X	O	O	X	O	X	O	X	O
HIGH COOL	O	O	X	O	X	O	X	O	X	O
HIGH HEAT	O	O	X	O	O	X	O	X	O	X
MEDIUM HEAT	O	X	O	O	O	X	O	X	O	X
LOW HEAT	O	O	O	X	O	X	O	X	O	X
FAN ONLY	X	O	O	O	O	O	O	O	O	O

LEGEND

- MS – MONEY SAVER
- CAP – CAPACITOR
- COMPR – COMPRESSOR
- MTR – FAN MOTOR
- OVLD – OVERLOAD PROTECTOR
- RV – REVERSING VALVE
- IDT – INDOOR THERMOSTAT
- ODT – OUTDOOR THERMOSTAT
- HPS – HIGH PRESSURE SWITCH
- HTR – HEATER
- HL – HEATER LIMIT
- TF – THERMAL FUSE
- (symbol) – GROUND LEAD
- (symbol) – COMBINATION TERMINAL
- (symbol) – PLASTIC INSULATOR

PART NO. 617–581–02 | REV. 08

WS, WE & WY SERIES CHASSIS PARTS



WALLMASTER PARTS

REF	DESCRIPTION	PART NO#	115 V	115 V	115 V	230V	230V	230V	230V	230V	230V	230V	230V	CODE
	ELECTRICAL PARTS		WS08B10A-A	WS10B10A-A	WS14B10A-A	WS10B30A-A	WS13B30A-A	WS16B30A-A	WE10B33A-A	WE13B33A-A	WE16B33A-A	WY10B33A-A	WY13B33A-A	
1	ELECTRONIC BOARD	61921176	1	1	1									331
1	ELECTRONIC BOARD	61921177				1	1	1						331
	REMOTE CONTROL	61826605	1	1	1	1	1	1						350
1	THERMOSTAT	25043300							1	1	1	1	1	120
2	THERMOSTAT, DEF.	61350313										1	1	122
3	OVERLOAD	61764507	1											190
3	OVERLOAD	61764519		1										190
3	OVERLOAD	61764528			1									190
3	OVERLOAD	61764554					1			1			1	190
3	OVERLOAD	61764555				1			1			1		190
3	OVERLOAD	61764556						1			1			190
4	CAPACITOR	61080533		1										150
4	CAPACITOR	61080569			1									150
4	CAPACITOR	61080535	1											150
4	CAPACITOR	61080540				1			1			1		150
4	CAPACITOR	61080526						1			1			150
4	CAPACITOR	61080537					1			1			1	150
5	SUPPLY CORD	60500114	1	1										220
5	SUPPLY CORD	60500117			1									220
5	SUPPLY CORD	60500106							1	1	1	1	1	220
5	SUPPLY CORD	60500105				1	1	1						
6	SWITCH SYS. 8 POS.	60607204							1	1	1	1	1	130
7	FAN MOTOR	61871455			1									110
7	FAN MOTOR	61871456				1			1			1		110
7	FAN MOTOR	61871457	1	1										110
7	FAN MOTOR	61871458					1			1			1	110
7	FAN MOTOR	61871459						1			1			110
8	HEATER	62101200							1	1	1	1	1	210
9	COIL, SOLENOID	25063600										1	1	240
	REFRIGERATION SYSTEM PARTS		WS08B10A-A	WS10B10A-A	WS14B10A-A	WS10B30A-A	WS13B30A-A	WS16B30A-A	WE10B33A-A	WE13B33A-A	WE16B33A-A	WY10B33A-A	WY13B33A-A	
10	REVERSING VALVE	25018301										1	1	500
11	CHECK VALVE	61824402										1	1	510
*	FILTER DRIER	60308101	1	1	1	1	1	1	1	1	1			480
*	SUCTION DRIER	61828200										1	1	480
12	COMPRESSOR	61562832	1											600
12	COMPRESSOR	62199700		1										600
12	COMPRESSOR	62199701			1									600
12	COMPRESSOR	62199702				1			1			1		600
12	COMPRESSOR	62199703					1			1			1	600
12	COMPRESSOR	62199704						1			1			600
13	EVAPORATOR COIL	62102300	1	1		1			1					400
13	EVAPORATOR COIL	62103300					1			1				400
13	EVAPORATOR COIL	62103303			1			1			1			400
13	EVAPORATOR COIL	62103305										1	1	400
14	CONDENSER COIL	62103400			1									410
14	CONDENSER COIL	62103401					1			1				410
14	CONDENSER COIL	62103402										1	1	410
14	CONDENSER COIL	62103403						1			1			410
14	CONDENSER COIL	62103500		1		1			1					410
14	CONDENSER COIL	62103501	1											410
*	CAPILLARY TUBE	03760513						1			1			471
*	CAPILLARY TUBE	03760547		1		1			1					471
*	CAPILLARY TUBE	01390000					1			1				471
*	CAPILLARY TUBE	03760550			1									471
*	CAPILLARY TUBE	03760511											1	471
*	CAPILLARY TUBE	03760548	1									1		471

* Not Shown

WALLMASTER PARTS

REF	DESCRIPTION	PART NO#	115 V	115 V	115 V	230V	230V	230V	230V	230V	230V	230V	230V	CODE
	CHASSIS PARTS		WS08B10A-A	WS10B10A-A	WS14B10A-A	WS10B30A-A	WS13B30A-A	WS16B30A-A	WE10B33A-A	WE13B33A-A	WE16B33A-A	WY10B33A-A	WY13B33A-A	
	SHROUD, CONDENSER	62102000	1	1	1	1	1	1	1	1	1	1	1	720
17	FAN BLADE, COND.	62101500	1	1	1	1	1	1	1	1	1	1	1	710
18	BLOWER WHEEL, EVAP.	60610604	1	1	1	1	1	1	1	1	1	1	1	700
19	BLOWER FRONT	62100600			1									742
19	BLOWER FRONT	62100601	1	1		1	1	1	1	1	1	1	1	742
20	SCROLL	62102100	1	1	1	1	1	1	1	1	1	1	1	777
25	BASE PAN	62100904	1											730
25	BASE PAN	62100905		1	1	1	1	1						730
25	BASE PAN ASLY.	61606209							1	1	1	1	1	730
26	BELLOWS,DRAIN VALVE	60179903							1	1	1	1	1	801
27	DRAIN PAN, ASSY.	62101901	1	1	1	1	1	1	1	1	1	1	1	840
*	GROMMET, comp.	61028900	3	3	3	3	3	3	3	3	3	3	3	790
*	BOLT, comp.	91400400	3	3	3	3	3	3	3	3	3	3	3	791
*	COUNTER WEIGHT	61715800	2	2	2	2	2	2	2	2	2	2	2	999
30	RETAINER CUP,FAN MTR	60640600	3	3	3	3	3	3	3	3	3	3	3	999
31	GROMMET,FAN MTR	60640500	3	3	3	3	3	3	3	3	3	3	3	999
32	NUT,FAN MTR	91003000	3	3	3	3	3	3	3	3	3	3	3	999
39	PANEL, CTRL. MOUNT	62100001	1	1	1	1	1	1	1	1	1	1	1	999
41	BRACKET CONRTOL	62100801	1	1	1	1	1	1	1	1	1	1	1	999
43	ESCUTCHEON, COOL	62101106	1	1	1	1	1	1						760
43	ESCUTCHEON, HTG/COOL	62101102							1	1	1	1	1	760
44	KNOBS, CRTL.	61911600							2	2	2	2	2	761
*	HOLDER, AIR FILTER	60865900	2	2	2	2	2	2	2	2	2	2	2	756
*	HOLDER, THERMOSTAT	61900500							1	1	1	1	1	999
	HOLDER, THERMISTER	61925001	1	1	1	1	1	1						999
45	FILTER, AIR	60865811	1	1	1	1	1	1	1	1	1	1	1	754
*	FRONT COMPLETE	61607003	1	1	1	1	1	1	1	1	1	1	1	750
47	GRILLE, INTAKE	61612702	1	1	1	1	1	1	1	1	1	1	1	772
48	GRILLE, EXHAUST	61612801	1	1	1	1	1	1	1	1	1	1	1	773
52	DOOR, CTRL.	61613103							1	1	1	1	1	762
53	END CAP, GRILLE	61613201	1	1	1	1	1	1	1	1	1	1	1	999
	WEATHER SEAL GASKET	61578101	1	1	1	1	1	1	1	1	1	1	1	
REF	DESCRIPTION	PART NO#	115 V	115 V	115 V	230V	230V	230V	230V	230V	230V	230V	230V	CODE
	CHASSIS PARTS		WS08B10A-A	WS10B10A-A	WS14B10A-A	WS10B30A-A	WS13B30A-A	WS16B30A-A	WE10B33A-A	WE13B33A-A	WE16B33A-A	WY10B33A-A	WY13B33A-A	
*	HARDWARE, SCREWS	60846020	1	1	1	1	1	1	1	1	1	1	1	999
*	GASKET, CHASSIS	61717301	1	1	1	1	1	1	1	1	1	1	1	780
*	CARTON, SHIPPING	61841911	1	1	1	1	1	1	1	1	1	1	1	999
	OPTIONAL ACCESSORIES													
*	START KIT	61008903	1	1	1	1	1	1	1	1	1	1	1	160
*	SERV.& PART MANUAL	WM05	1	1	1	1	1	1	1	1	1	1	1	999
55	SLEEVE (ONLY)	61603601	1	1	1	1	1	1	1	1	1	1	1	770
57	LOUVERED GRILLE (OUTDOOR)	61603001	1	1	1	1	1	1	1	1	1	1	1	771
*	FRIEDRICH SCRIPT	61823504	1	1	1	1	1	1	1	1	1	1	1	999

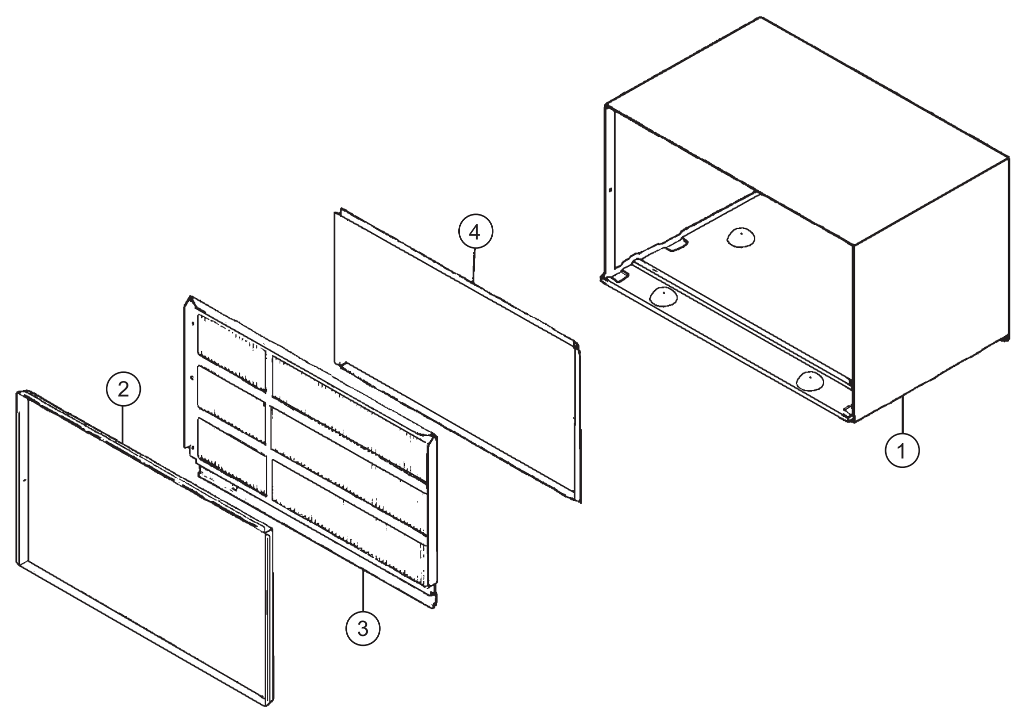
* Not Shown

“WS” - “WE” - “WY” SERIES SLEEVE PARTS

REF.	PART NO.	DESCRIPTION	APPLICATION										
		CHASSIS PARTS, (Cont.)											
1	616-036-01	Sleeve Assembly..	1	1	1	1	1	1	1	1	1	1	1
*	608-460-08	Plastic Bag Assembly...	1	1	1	1	1	1	1	1	1	1	1
2	616-032-00	Panel, Weather Inner	1	1	1	1	1	1	1	1	1	1	1
*	906-011-00	Screw, #8B x 3/8”...	2	2	2	2	2	2	2	2	2	2	2
3	616-030-01	Grille, Louvered..	1	1	1	1	1	1	1	1	1	1	1
*	604-058-04	Friedrich Script...	1	1	1	1	1	1	1	1	1	1	1
*	906-047-01	Screw, #8A x 3/8”	5	5	5	5	5	5	5	5	5	5	5
5	616-033-01	Panel, Weather Outer	1	1	1	1	1	1	1	1	1	1	1
*	616-078-00	Label, Friedrich	1	1	1	1	1	1	1	1	1	1	1
*	616-084-01	Carton, Shipping	1	1	1	1	1	1	1	1	1	1	1

* Not Shown

WS, WE & WY SERIES SLEEVE PARTS



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