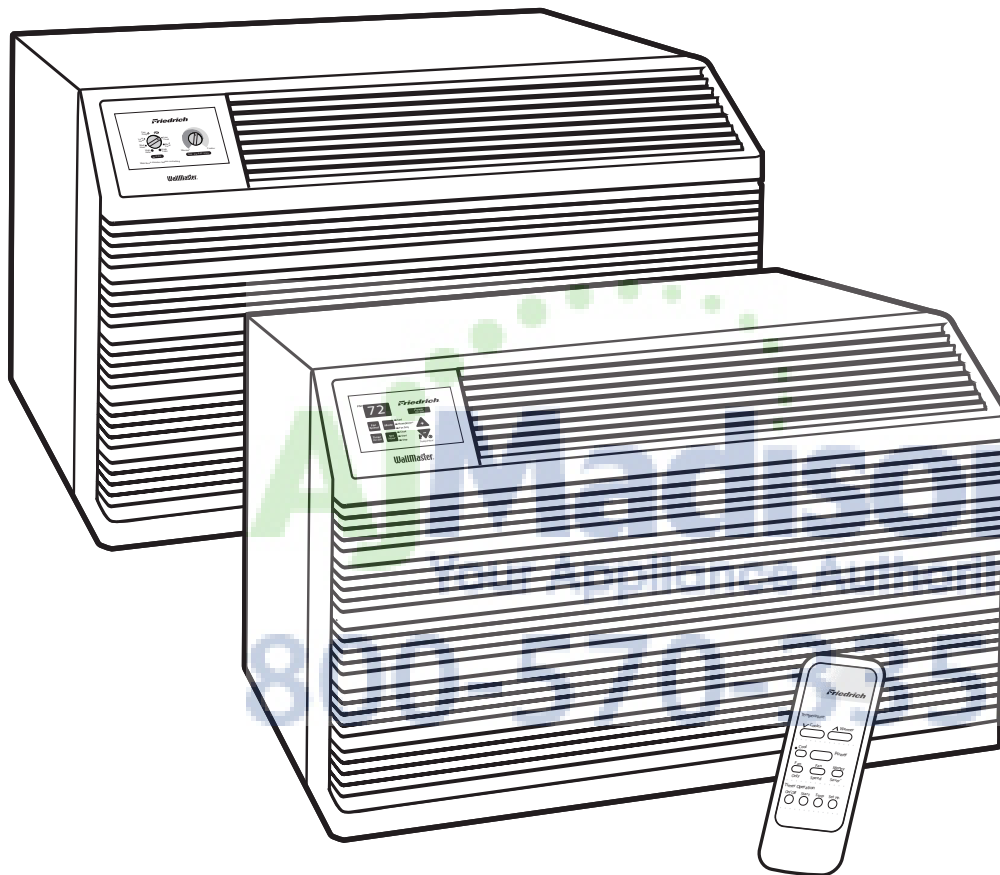


Friedrich

Service Manual



WallMaster[®] Thru-the-Wall

Models

2009

2008

WM-ServMan (04-09)

TECHNICAL SUPPORT CONTACT INFORMATION

The logo for Friedrich, featuring a stylized 'F' with a curved line through it, followed by the word 'Friedrich' in a bold, italicized sans-serif font. A registered trademark symbol (®) is located at the end of the word.

Friedrich®

FRIEDRICH AIR CONDITIONING CO.

Post Office Box 1540 · San Antonio, Texas 78295-1540

4200 N. Pan Am Expressway · San Antonio, Texas 78218-5212

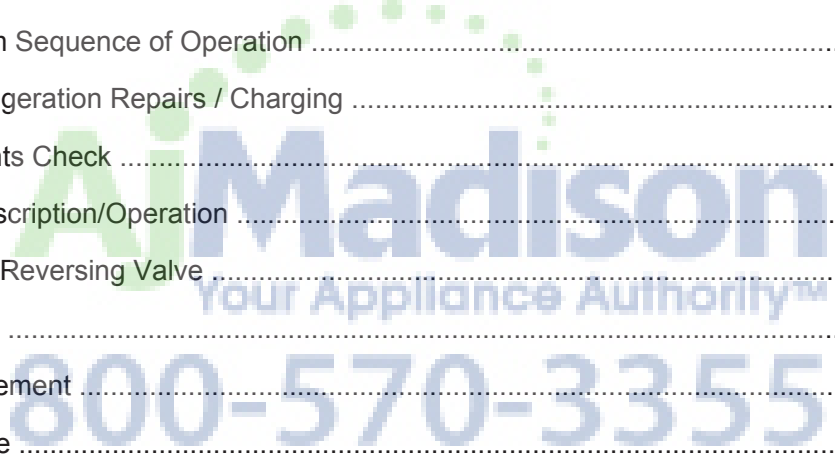
(210) 357-4400 · FAX (210) 357-4490

www.friedrich.com

Printed in the U.S.A.

Table Of Contents

Important Safety Information	2-4
Introduction	4
WallMaster Model Number Code and Serial Number Identification	5
Performance Data / Sleeve and Chassis Dimensions	6
Electrical Data	7
Functional Components	8
How to Operate the Electronic WallMaster Room Air Conditioner	9-10
Remote Control	11
Electronic Control: Operation, Testing, Error Codes, Rebooting	12-13
How to Operate the WallMaster with Rotary Controls, Control Testing	14
Electronic Control Heat Pump Operation	15
Components Testing	15-17
Refrigeration System Sequence of Operation	18
Sealed System Refrigeration Repairs / Charging	19-22
Hermetic Components Check	23-26
Reversing Valve Description/Operation	24
Testing the Coil and Reversing Valve	25-26
Compressor Checks	27-28
Compressor Replacement	29-30
Routine Maintenance	31-32
General Troubleshooting	33-39
Wiring Diagrams	40-44
Installation Accessories	45
Installation Instructions for "WSC" Sleeve	46-47
Installation Instructions for Baffle Adapter Kit	48
Seal Gasket Installation Instructions	49
Installation Instructions for Internal Drain Kit (IDK)	50
Assembly and Installation Instructions for Drain Kit (DK)	51
Installation Instructions for Sub-Base	52
Installation Instructions for Architectural Grille Model AG-48-49	53-54
Warranty	55



IMPORTANT SAFETY INFORMATION

The information contained in this manual is intended for use by a qualified service technician who is familiar with the safety procedures required for installation and repair, and who is equipped with the proper tools and test instruments required to service this product.

Installation or repairs made by unqualified persons can result in subjecting the unqualified person making such repairs as well as the persons being served by the equipment to hazards resulting in injury or electrical shock which can be serious or even fatal.

Safety warnings have been placed throughout this manual to alert you to potential hazards that may be encountered. If you install or perform service on equipment, it is your responsibility to read and obey these warnings to guard against any bodily injury or property damage which may result to you or others.

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read and obey all safety messages.



This is a safety Alert symbol.

This symbol alerts you to potential hazards that can kill or hurt you and others.

All safety messages will follow the safety alert symbol with the word "WARNING" or "CAUTION". These words mean:



You can be killed or seriously injured if you do not follow instructions.



You can receive minor or moderate injury if you do not follow instructions.

All safety messages will tell you what the potential hazard is, tell you how to reduce the chance of injury, and tell you what will happen if the instructions are not followed.



A message to alert you of potential property damage will have the word "NOTICE". Potential property damage can occur if instructions are not followed.

PERSONAL INJURY OR DEATH HAZARDS

ELECTRICAL HAZARDS:

- Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenance, or service.
- Make sure to follow proper lockout/tag out procedures.
- Always work in the company of a qualified assistant if possible.
- Capacitors, even when disconnected from the electrical power source, retain an electrical charge potential capable of causing electric shock or electrocution.
- Handle, discharge, and test capacitors according to safe, established, standards, and approved procedures.
- Extreme care, proper judgment, and safety procedures must be exercised if it becomes necessary to test or troubleshoot equipment with the power on to the unit.

- Do not spray or pour water on the return air grille, discharge air grille, evaporator coil, control panel, and sleeve on the room side of the air conditioning unit while cleaning.
- Electrical component malfunction caused by water could result in electric shock or other electrically unsafe conditions when the power is restored and the unit is turned on, even after the exterior is dry.
- Never operate the A/C unit with wet hands.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Use on a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- Follow all safety precautions and use proper and adequate protective safety aids such as: gloves, goggles, clothing, adequately insulated tools, and testing equipment etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

REFRIGERATION SYSTEM HAZARDS:

- Use approved standard refrigerant recovering procedures and equipment to relieve pressure before opening system for repair.
- Do not allow liquid refrigerant to contact skin. Direct contact with liquid refrigerant can result in minor to moderate injury.
- Be extremely careful when using an oxy-acetylene torch. Direct contact with the torch's flame or hot surfaces can cause serious burns.
- Make sure to protect personal and surrounding property with fire proof materials.
- Have a fire extinguisher at hand while using a torch.
- Provide adequate ventilation to vent off toxic fumes, and work with a qualified assistant whenever possible.
- Always use a pressure regulator when using dry nitrogen to test the sealed refrigeration system for leaks, flushing etc.
- Make sure to follow all safety precautions and to use proper protective safety aids such as: gloves, safety glasses, clothing etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

MECHANICAL HAZARDS:

- Extreme care, proper judgment and all safety procedures must be followed when testing, troubleshooting, handling, or working around unit with moving and/or rotating parts.
- Be careful when, handling and working around exposed edges and corners of sleeve, chassis, and other unit components especially the sharp fins of the indoor and outdoor coils.
- Use proper and adequate protective aids such as: gloves, clothing, safety glasses etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

PROPERTY DAMAGE HAZARDS

FIRE DAMAGE HAZARDS:

- Read the Installation/Operation Manual for this air conditioning unit prior to operating.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Connect to a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- Failure to follow these instructions can result in fire and minor to serious property damage.

WATER DAMAGE HAZARDS:

- Improper installation maintenance, or servicing of the air conditioner unit, or not following the above Safety Warnings can result in water damage to personal items or property.
- Insure that the unit has a sufficient pitch to the outside to allow water to drain from the unit.
- Do not drill holes in the bottom of the drain pan or the underside of the unit.
- Failure to follow these instructions can result in result in damage to the unit and/or minor to serious property damage.

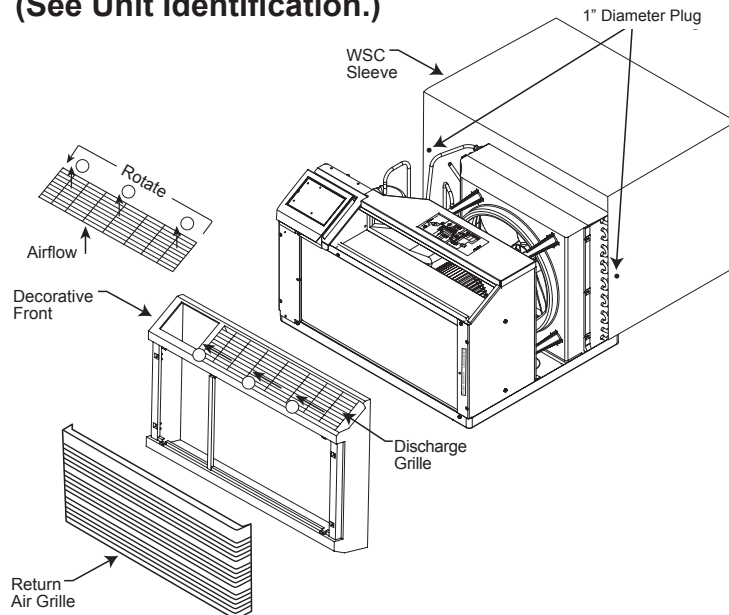
INTRODUCTION

This service manual is designed to be used in conjunction with the installation manuals provided with each unit.

This service manual was written to assist the professional HVAC service technician to quickly and accurately diagnose and repair any malfunctions of this product.

This manual, therefore, will deal with all subjects in a general nature. (i.e. All text will pertain to all models).

IMPORTANT: It will be necessary for you to accurately identify the unit you are servicing, so you can be certain of a proper diagnosis and repair. (See Unit Identification.)



FRIEDRICH WALLMASTER 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 _____

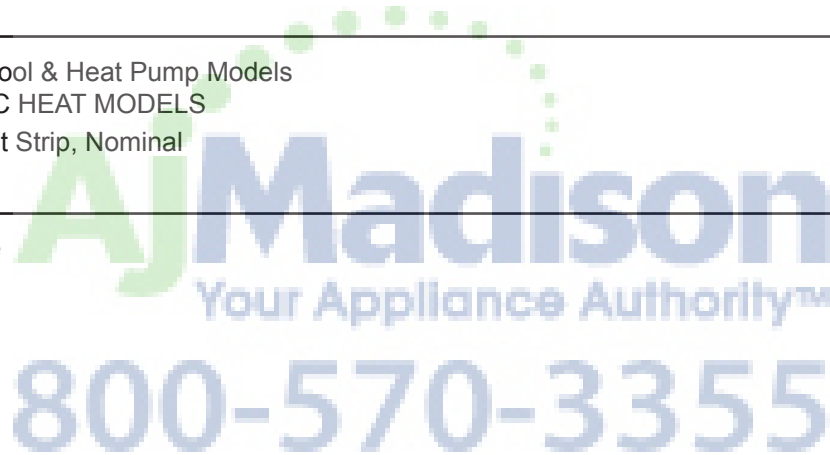
1 = 115 Volts
3 = 230-208 Volts

7th DIGIT _____

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

8th DIGIT _____

Major Change



SERIAL NUMBER IDENTIFICATION GUIDE

<p>Serial Number</p> <p>Decade Manufactured</p> <p>L=0 C=3 F=6 J=9 A=1 D=4 G=7 B=2 E=5 H=8</p>	L	C	J	R	<p>00001</p> <p>Production Run Number</p>
<p>Year Manufactured</p> <p>A=1 D=4 G=7 K=0 B=2 E=5 H=8 C=3 F=6 J=9</p>					<p>Product Line</p> <p>X = WallMaster</p>
<p>Month Manufactured</p> <p>A=Jan D=Apr G=Jul K=Oct B=Feb E=May H=Aug L=Nov C=Mar F=Jun J=Sept M=Dec</p>					

2008 / 2009 PERFORMANCE DATA

COOLING PERFORMANCE DATA*	EVAPORATOR AIR TEMP. DEG. F		EVAPORATOR TEMP. DEG. F		CONDENSER TEMPERATURE DEG. F	Discharge Temp	Suction Temp	Liquid Temp	Super Heat	Sub-Cooling	OPERATING PRESSURES		ELECTRICAL RATINGS			R-22 REF. Charge in OZ.	Evap CFM	Motor RPM	BREAKER FUSE 60 Hertz Amps
	Discharge Air	Temp. Drop F.	T(in)	T(out)							Suction	Discharge	Amps Cool	Amps Heat	Locked Rotor Amps				
WS08B10A-D	55	25	55	55	127	165	61	102	18	25	87	281	7.1		36.2	20.5	257	1100	15
WS08B10A-F	55	25	55	55	125	179	74.5	102	18	25	87	281	6.9		36.2	18.9	257	1100	15
WS10B10A-D	52	28	53	51	128	176	68	105	16	24	79	293	9.0		45.0	22.0	248	1100	15
WS14B10A-D	52	28	52	52	128	179	63	99	14	28	82	297	12.4		58.0	44.9	293	1300	15
WS14B10A-E	52	28	52	52	128	179	63	99	14	28	82	297	12.4		58.0	44.9	293	1300	15
WS10B30A-D	55	25	53	57	131	179	68	106	16	23	77	289	4.6		26.0	22.5	235	1100	15
WS13B30B-E	50	30	52	50	131	180	61	103	13	24	81	305	6.9/6.5		27.4	36.5	288	1280	15
WS13B30B-F	50	30	52	50	131	180	61	103	13	24	81	305	6.9/6.5		27.4	36.5	288	1280	15
WS16B30A-D	52	28	51	53	121	154	54	99	18	32	74	315	7.7		35.0	47.6	292	1421	15
WS16B30A-E	52	28	51	53	121	154	54	99	18	32	74	315	7.7		35.0	47.6	292	1421	15
WE10B33A-C	53	27	54	52	126	180	82	99	16	31	82	289	4.6	15.2	45.0	38.0	225	1074	20
WE10B33C-A	53	27	54	52	126	180	82	99	16	31	82	289	4.6	15.2	45.0	38.0	225	1074	20
WE13B33B-D	50	30	52	50	131	180	61	103	13	24	81	305	6.9/6.5	15.7	27.4	36.5	288	1280	20
WE13B33C-A	50	30	52	50	131	180	61	103	13	24	81	305	6.9/6.5	15.7	27.4	36.5	288	1280	20
WE13B33B-E	50	30	52	50	131	180	61	103	13	24	81	305	6.9/6.5	15.7	27.4	36.5	288	1280	20
WE16B33A-C	52	28	51	53	121	174	57	100	18	30	74	315	6.5	16.1	35.0	35.2	281	1305	20
WE16B33C-A	52	28	51	53	121	174	57	100	18	30	74	315	6.5	16.1	35.0	35.2	281	1305	20
WE16B33A-D	52	28	51	53	121	174	57	100	18	30	74	315	6.5	16.1	35.0	35.2	281	1305	20
WY10B33A-C	53	27	54	52	126	180	66	99	16	31	82	225	4.6	4 / 15.2	26.0	38.0	225	1074	20
WY10B33C-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
WY10B33A-D	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-C	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
WY13B33C-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
WY13B33A-D	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

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


Specifications ★ ENERGYSTAR® models

Model	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 Sleeve	Weight Lbs. Ship/Net
WALLMASTER											
★ WS08B10A	8000	—	115	6.8	762	—	—	10.5	1.3	245	WSC 97/93
★ WS10B10A	10000	—	115	8.7	954	—	—	10.5	2.4	245	WSC 107/103
★ WS14B10A	13500	—	115	12.0	1415	—	—	9.5	3.3	295	WSC 116/112
★ WS10B30A	10000/10000	—	230/208	4.6/5.0	1005/996	—	—	10.0/10.0	2.1	260	WSC 105/101
WS13B30B	12500/12000	—	230/208	6.3/6.7	1404/1379	—	—	8.9/8.7	3.3	280	WSC 113/109
WS16B30A	15800/15000	—	230/208	7.8/8.5	1756/1705	—	—	9.0/8.8	4.2	290	WSC 123/119
WE10B33C	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	WSC 107/103
WE13B33C	12500/12000	11000/9100	230/208	6.3/6.7	1404/1379	16.0/14.7	3550/2950	8.9/8.7	3.3	280	WSC 115/111
WE16B33C	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	WSC 125/121
★ WY10B33C	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	WSC 111/107
WY13B33C	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	WSC 120/116

Sleeve / Chassis Dimensions

Model	Height	Width	Depth	Depth with Front Extension	Minimum Extension Into Room	Minimum Extension Outside	Thru-the-wall Finished Hole	
							Height	Width
WSC Sleeve	16 3/4"	27"	16 3/4"	23"	7 1/2"	9/16"	17 1/4"	27 1/4"
Chassis	15 3/4"	26 1/2"	21"	—	—	—	—	—




ELECTRICAL DATA

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before service or installation.</p> <p>All electrical connections and wiring MUST be installed by a qualified electrician and conform to the National Electrical Code and all local codes which have jurisdiction.</p> <p>Failure to do so can result in personal injury or death.</p>

NOTICE
<p style="text-align: center;">FIRE HAZARD</p> <p>Not following the above WARNING could result in fire or electrically unsafe conditions which could cause moderate or serious property damage.</p> <p>Read, understand and follow the above warning.</p>

Wire Size	Use ONLY wiring size recommended for single outlet branch circuit.
Fuse/Circuit Breaker	Use ONLY the correct HACR type and size fuse/circuit breaker. Read electrical ratings on unit's rating plate. Proper circuit protection is the responsibility of the homeowner.
Grounding	Unit MUST be grounded from branch circuit through service cord to unit, or through separate ground wire provided on permanently connected units. Be sure that branch circuit or general purpose outlet is grounded.
Receptacle	The field supplied outlet must match plug on service cord and be within reach of service cord. Do NOT alter the service cord or plug. Do NOT use an extension cord. Refer to the table above for proper receptacle and fuse type.

Plug/Outlet/Circuit Rating

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



The consumer - through the AHAM Room Air Conditioner Certification Program - can be certain that the AHAM Certification Seal accurately states the unit's cooling and heating capacity rating, the amperes and the energy efficiency ratio.



*HACR: Heating Air Conditioning and Refrigeration

FUNCTIONAL COMPONENTS

A. Mechanical components

Drain pan valve

Temperature-sensitive valve that opens up to drain off condensate water when the outside temperature falls below 40°F and closes when the outside temperature reaches 60°F

Plenum assembly

Diffuser with directional louvers used to direct the conditioned airflow.

Blower wheel

Attaches to the indoor side of the fan motor shaft and is used for distributing unconditioned, room side air through the heat exchanger and delivering conditioned air into the room.

Slinger fan blade

Attaches to the outdoor side of the fan motor shaft and is used to move outside air through the condenser coil, while slinging condensate water out of the base pan and onto the condenser coil, thus lowering the temperature and pressures within the coil.

B. Electrical components

Thermostat

Used to maintain the specified room side comfort level

System switch

Used to regulate the operation of the fan motor, the compressor or to turn the unit off. For troubleshooting, refer to the wiring diagrams and schematics in the back of this service manual.

Capacitor

Reduces line current and steadies the voltage supply, while greatly improving the torque characteristics of the fan motor and compressor motor.

MoneySaver® switch

When engaged, it sends the power supply to the fan motor through the thermostat, which allows for a cycle-fan operation.

Fan Motor

Dual-shafted fan motor operates the indoor blower wheel and the condenser fan blade simultaneously.

Solenoid

Used to energize the reversing valve on all heat pump units.

Heating element

Electric resistance heater

Heat anticipator

Used to provide better thermostat and room air temperature control.

C. Hermetic components

Compressor

Motorized device used to compress refrigerant through the sealed system.

Reversing valve

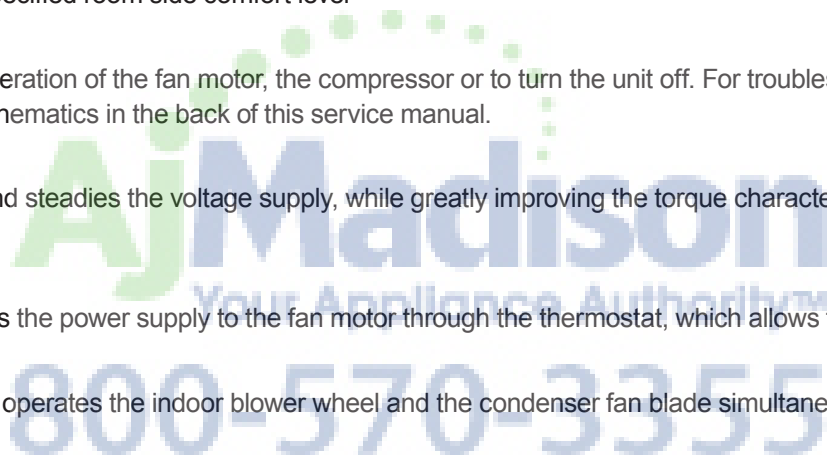
A four-way switching device used on all heat pump models to change the flow of refrigerant to permit heating or cooling.

Check valve

A pressure-operated device used to direct the flow of refrigerant to the proper capillary tube, during either the heating or cooling cycle.

Capillary tube

A cylindrical meter device used to evenly distribute the flow of refrigerant to the heat exchangers (coils.)



How to operate the Friedrich WallMaster

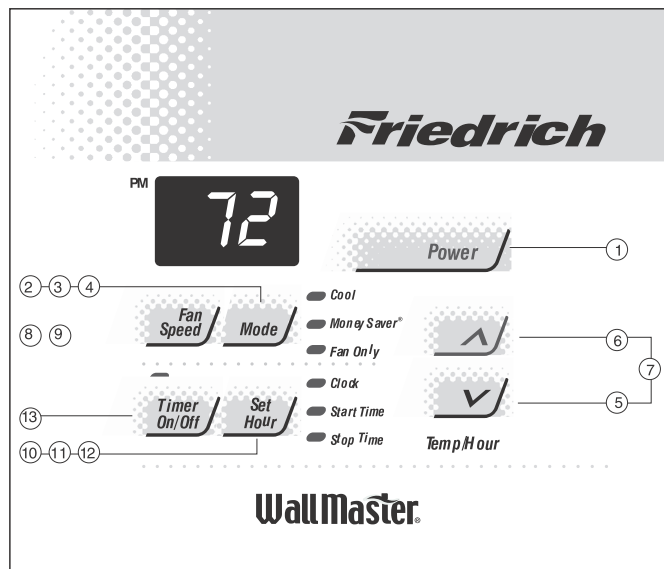


Figure 1: WS Model cool-only control panel

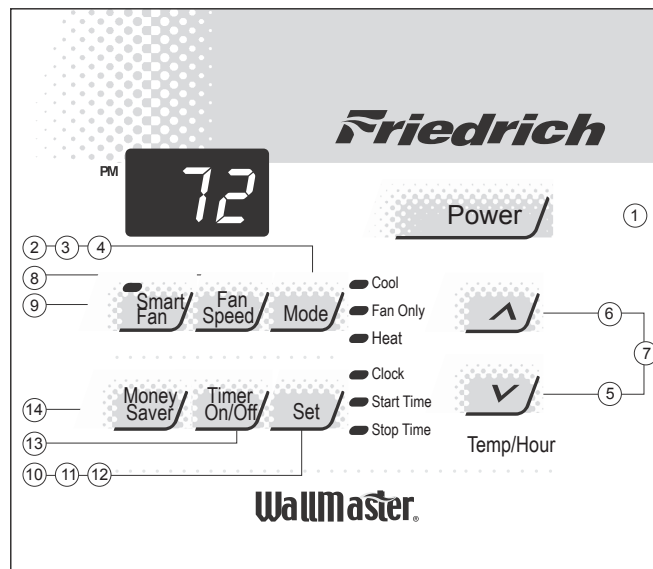


Figure 2: WY/WE Model heat-cool control panel

To start unit

If your air conditioner is installed and plugged into a proper receptacle, it is ready to go. The first time the unit is started, the compressor will delay for three minutes. See Automatic Component Protection on the following page.

- 1 Touch the **Power** button once. The unit will automatically be in **Cool** mode with the temperature set at 75°F (24°C) and the fan speed at F1, the sleep setting.

To set mode of operation

When you first turn the unit on, it will be in the **Cool** mode with constant fan.

- 2 On WS cool-only models, touch the **Mode** button once to activate the **MoneySaver®** (WS models only. See item 14 for Money Saver instructions on WY/WE models).

MoneySaver® is a feature that cycles the fan with the compressor so that the fan does not run all the time. This saves energy and improves dehumidification. MoneySaver® will also run to test the temperature if the off cycle is too long. Or you may prefer constant fan for more air movement. (To return to constant fan, touch the **Mode** button two more times).

In order to run the fan by itself, do the following:

On WY/WS heat-cool models, touch the **Mode** button once to activate the **Fan Only** feature. The **Fan Only** setting will circulate air in the room without the compressor coming on.

- 3 Continuing from MoneySaver® mode, touch the **Mode** button once to activate the **Fan Only** feature (WS cool-only models).

To adjust temperature

- 4 Use the **Mode** button to select either the **Cool** or **MoneySaver®** function (or Heat for WY/WE heat-cool models)
- 5 **COOLER** – Touch the **↓** button to lower the room air temperature.

- 6 **WARMER** – Touch the **↑** button to raise the room air temperature
- 7 Press both the **↑** and **↓** buttons at the same time to switch the temperature from Fahrenheit (°F) to Celsius (°C). Repeat Step 7 to switch from °C back to °F.

To adjust fan speed

- 8 Touch the **Fan Speed** button to see the current setting. Touch it again to change speed. F1 is the lowest setting (SLEEP SETTING / LOW), F2 is MEDIUM, and F3 is HIGH.

To activate Smart Fan(WS cool-only models)

- 9 There is a fourth option, **SF**, when selecting the fan speed. This is the SMART FAN function. SMART FAN DOES NOT OPERATE IN CONJUNCTION WITH THE FAN ONLY MODE.

To activate Smart Fan(WY/WE heat-cool models)

- 9 Press the **Smart Fan** button to activate the Smart Fan. The light will indicate that this feature is in use.

Smart Fan will adjust the fan speed automatically to maintain the desired comfort level. For example, if the outside doors in your home are opened for an extended period of time, or more people enter a room, Smart Fan may adjust to a higher fan speed to compensate for the increased heat load. This keeps you from having to adjust the fan speed on your own.

To set the hour clock

- 10 Touch the **Set Hour** button to see the current setting. The number that is displayed is the approximate time (hour only). Use the **↑** and **↓** buttons to change the settings. BE SURE TO SET A.M. AND P.M. ACCORDINGLY. (P.M. is indicated by a red light in the upper left corner of the display).

To set the timer

NOTE: Set the HOUR CLOCK (**Set Hour**) before attempting to set timer functions.

You can set the **Start Time** and **Stop Time** a minimum of one hour apart, and a maximum of 23 hours apart.

- ⑪ After setting the time, press the **Set Hour** button once (Start light on). Use the **▲** and **▼** buttons to select the time that the unit will **START**.
- ⑫ After selecting the **Start Time**, press the **Set Hour** button once. (Stop Light on). Use the **▲** and **▼** buttons to select the time that the unit will **STOP**. After selecting the stopping time, press the **Set Hour** button once.
- ⑬ Press the **Timer On/Off** button (light turns on) to activate the timer function. To deactivate this function, press the **Timer On/Off** button once again (light turns off). Once the on and off times have been selected, they will remain in memory and cycle daily until changed.

NOTE: If the unit is unplugged or the power is interrupted, the HOUR must be reset or the **Timer On/Off** will not function when desired.

To Activate Money Saver (WY/WE models)

- ⑭ Press the **Money Saver** button to activate the Money Saver feature. The light will indicate the Money Saver is in use.

MoneySaver® is a feature that cycles the fan with the compressor so that the fan does not run all the time. This saves energy and improves dehumidification. MoneySaver® will also run to test the temperature if the off cycle is too long. Or you may prefer constant fan for more air movement. (To return to constant fan, touch the **Mode** button two more times).

Automatic component protection

Your unit is equipped with Automatic Component Protection.

To protect the compressor of the unit, there is a three minute delay if you turn the unit off or if power is interrupted. The fan will not be affected. Also, if you switch from **Cool** mode to **Fan Only** mode, and switch back to **Cool** mode, there is a three-minute delay before the compressor comes back on.

The logo for Madison Your Appliance Authority features the word "Madison" in a large, blue, sans-serif font. Above the letters "i" and "s" in "Madison" are several green circles of varying sizes, arranged in a semi-circular pattern. Below "Madison" is the tagline "Your Appliance Authority™" in a smaller, blue, sans-serif font. At the bottom of the logo is the phone number "800-570-3355" in a large, blue, sans-serif font.

800-570-3355

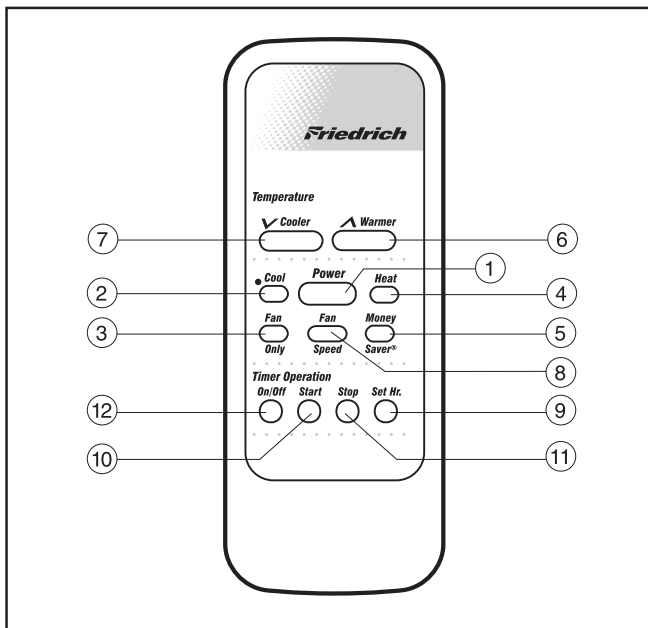


Figure 3: WY/WE heat-cool model remote control

Additional RC1 wireless remote controls can be purchased from your Friedrich dealer.

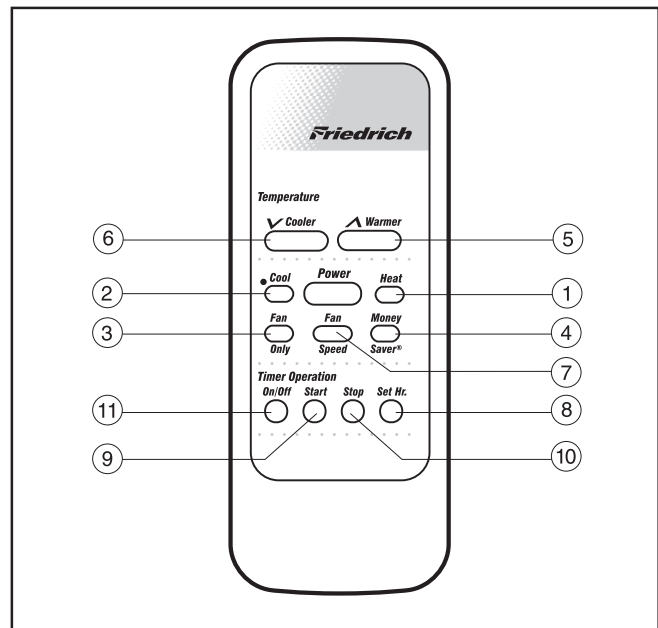


Figure 4: WS Models Only

Additional RC1 wireless remote controls can be purchased from your Friedrich dealer.

Using the remote control

To start unit

- ① **POWER** - Press the **Power** button once. The unit will automatically start in the mode and fan speed it was last left on.

To set mode of operation

- ② **COOL** - Press the **Cool** button to automatically switch the operating mode to COOL.
- ③ **FAN ONLY** - Press the **Fan Only** button if you want to run the fan only.
- ④ **HEAT (WY/WE models only)** - Press the **Heat** button to automatically switch the operating mode to HEAT.
- ⑤ **MoneySaver®** - Press the **Money Saver®** button to activate the MoneySaver® feature. This feature cycles the fan with the compressor so that the fan does not run all the time.

To adjust temperature

- ⑥ **WARMER** - Press the **Warmer** button to raise the temperature setting.
- ⑦ **COOLER** - Press the **Cooler** button to lower the temperature setting.

To adjust fan speed

- ⑧ **FAN SPEED** - Press the **Fan Speed** button to see the current setting. Press again to change the fan speed. F1 is the lowest setting (SLEEP / LOW), F2 is MEDIUM, F3 is HIGH, and SF is the SMART FAN setting.

To set the hour clock

- ⑨ **SET HOUR CLOCK** - Press the **Set Hr.** button once to see the current clock setting. Continue pressing the button until you arrive at the current time (Hour only). Minutes are not shown on the display. Make sure that the A.M. / P.M. setting is correct.

To set the timer

NOTE: You can set the START and STOP times a minimum of one hour apart, and a maximum of 23 hours apart.

- ⑩ **TIMER START** - Press **Start** to view the current start time for cooling. Continue pressing the START button until you arrive at the start time you desire. The start time for cooling will then be set.
- ⑪ **TIMER STOP** - Press the **Stop** button. Continue pressing the STOP button until you arrive at the stop time you desire. The stop time for cooling will then be set.
- ⑫ **TIMER ON / OFF** - Press the **On/Off** button (under **Timer Operation**) to activate (light on) or deactivate (light off) the timer. Once the on and off times have been selected, they will remain in memory and cycle daily until changed.

NOTE: If the unit is unplugged or the power is interrupted, the **Set Hr.** function must be reset or the **Timer On/Off** function will not work.

ELECTRONIC CONTROL PANEL

Figure 5: "WS" Cooling only models
Electronic Control Panel



Figure 6: "WE"/"WY" heat/cool models
Electronic 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 **Temp/Hour** \wedge button on the **WS/WE/WY** models (see figures 5 and 6).
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 the **SET** temperature by pressing any key (except the **Power** (on/off button) or it can do so automatically after 10 seconds have elapsed.

ACTIVATING TEST MODE

Activate **Test Mode** by pressing at the same time, the **Mode** button and the **Temp/Hour** \checkmark button on the **WS/WE/WY** models (see figures 5 and 6).

ERROR CODE MODE

Error Code Mode is used to display all error codes stored since reset. It is a sub-mode of **Test Mode**. Unit must be in **Test Mode** to enter the **Error Code** function.

Activating Error Code Mode: Press the **TIMER On/Off** button on the **WS/WE/WY** models (see figures 5 and 6). The **LED** for the **TIMER On/Off** will flash 1 bps (beats per second) while **Error Code Mode** is active. Pressing the **Temp/Hour** \wedge button will display "00". Consecutive presses will scroll through all error codes stored. Press the **Temp/Hour** \checkmark button to see the reverse order of the error codes. When the end of the stored error codes is reached the temperature **Set Point** will appear. (Each error code is listed once)

The LEDs for **Set/Hour**: "**Start Time**" and "**Stop Time**" will blink 1 bps while **Test Mode** is active.

Test Mode has a duration of 90 minutes. **Test Mode** can be activated under any function, including **Off**.

Test Mode is cancelled by pressing the **Power** (on/off) button, unplugging the unit, or when the 90 minutes times out.

Test Mode settings are factory default of:

Unit operation **On**, **MoneySaver On**, **Cool Mode**, 60 degrees F, speed fan on **High**. "**Timer**" and "**Set Hour**" features are non-functional.

Test Mode overrides the three minute compressor Lock-out, all delays for fan motor start, speed change, and when switching modes.

Exiting Error Code Mode: press the **Timer On/Off** button.

Clearing Error Codes: Error codes are cleared from the memory by exiting from **Error Code Mode**.

MEMORY: On WS/WE/WY

The electronic control has a memory to retain all functions and settings, as set up by the user, in the event of a power failure. For example: 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.

ERROR CODES LISTING FOR “WS” MODELS

- E1 SHORT CYCLE SITUATION:** Defined as a compressor that starts and stops more frequently than it should.
- E2 KEYBOARD STUCK ERROR:** If any key button is stuck or pressed for 20 seconds or more, the unit considers it stuck. If a key is stuck it will be ignored until released. If the “**Mode**” key is stuck, the unit’s function will default to Cool mode.
- E3 FROST PROBE OPEN:** Normal operation is allowed. Ohm frost probe. Replace if Ohm value not read. If Ohm value is present replace the board.

- E4 FROST PROBE SHORT:** Normal operation is allowed. Replace probe.
- E5 INDOOR PROBE OPEN:** Control assumes indoor ambient temperature is 90 degrees F and unit will operate. Ohm indoor probe. Replace probe if Ohm value is not present.
- E6 INDOOR PROBE SHORT:** Control assumes ambient temperature is 90 degrees F and unit will operate. Replace probe.

(See note and other information below)

ERROR CODES LISTING FOR “WE/WY” MODELS

- E1 SHORT CYCLE SITUATION:** Defined as a compressor that starts and stops more frequently than it should.
- E2 KEYBOARD STUCK ERROR:** If any key button is stuck or pressed for 20 seconds or more, the unit considers it stuck. If a key is stuck it will be ignored until released. If the “**Mode**” key is stuck, the unit’s function will default to Cool mode.
- E3 AMBIENT (INDOOR) AIR PROBE OPEN OR SHORT:** Control will assume ambient temperature is 90 degrees F when in Cool mode and 60 degrees F when in Heat mode. Unit will operate (see note below).
- E4 EVAPORATOR TEMPERATURE PROBE OPEN OR SHORT:** Normal operation is allowed. Replace probe (see note below).
- E5 CONDENSER TEMPERATURE PROBE OPEN OR SHORT:** Normal operation is allowed. Replace probe.
- E7 MOTOR OPERATION**
- E9 HEAT PUMP FAILURE**


NOTE: All error codes display for probes open or shorted will allow unit to operate. Unit may ice up if faulty components are not replaced.

Indoor Coil Frost Probe Sensor (WS/WE/WY Models): Disables compressor at 30 degrees F +/- 3 degrees F. Compressor resumes operation when indoor coil temperature reaches 55 degrees F.

Outdoor Coil Frost Probe Sensor (on WY models): Disables the compressor at 30 degrees F. Compressor resumes operation when temperature reaches 43 +/- 5 degrees F.

Indoor Air Probe Sensor (WS/WE/WY Models): Control range is 60 degrees F to 90 degrees F +/- 3 degrees F.

REBOOT THE CONTROL PANEL

To reboot the control panel on a WallMaster unit: with the unit on, simultaneously hold down the **Mode** button and the **Temperature Arrow**  button for approximately 10 seconds. If the panel will reboot, you will hear the fan come on and the temperature window will read 60 degrees. If this happens, all you need to do is turn the unit off for about 10 seconds and then turn it back on to finish the reboot cycle. If the panel does not reboot, you will most likely need to have the panel replaced.

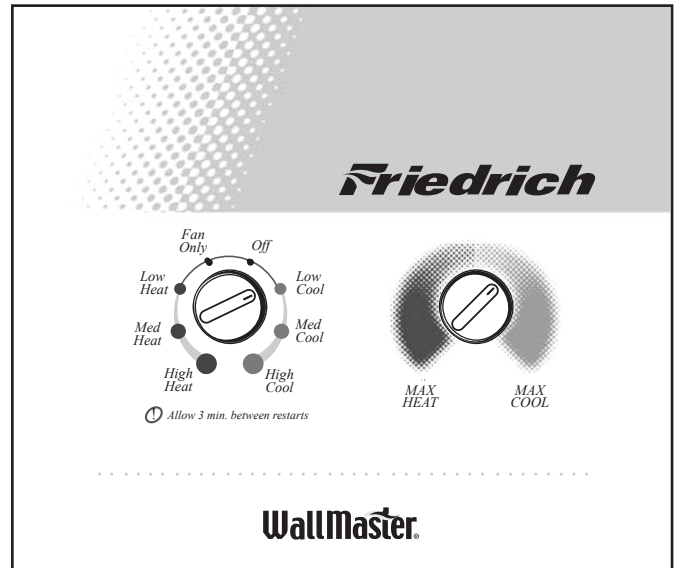
FOR UNITS WITH ROTARY CONTROLS SYSTEM CONTROL SWITCH

("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



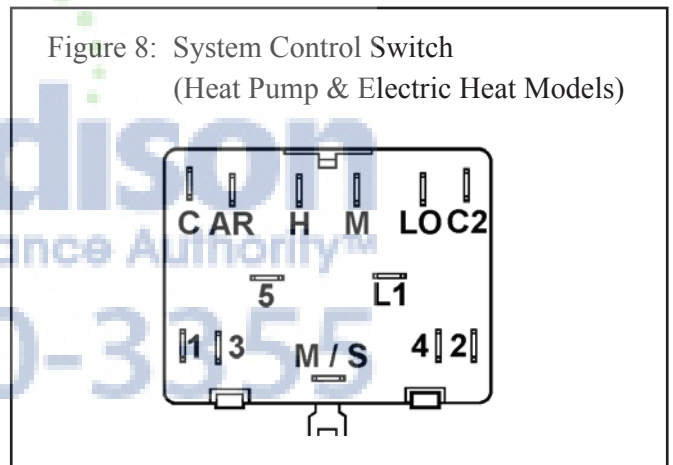
⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.</p>

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.

ELECTRONIC CONTROL OPERATION

Heat Pump w/back up Electric Heat

If the indoor ambient air themister reads 55 degrees, turn off the compressor and turn on the electric heat and continue fan operation until temp setting is satisfied. Then revert to standard heat pump operation.

If the compressor is time delayed:

1. Turn on the electric heat until the compressor is not time delayed.
2. When the compressor's 3 minute time delay is over, turn off the electric heat, wait 5 seconds, then turn on the compressor.

Defrost:

If the outdoor coil thermister reads 30 degrees for 2 minutes continuously, turn off the compressor and turn on the electric heat and continue fan operation.

If the outdoor coil thermister reaches 43 degrees and the compressor has waited the standard delay time of 180-240 seconds:

1. Turn off the backup electric heat
2. Wait 5 seconds
3. Turn on the compressor
4. Continue fan operation.

COMPONENTS TESTING


THERMOSTAT

("WE" & "WY" Models)

A cross ambient thermostat is used on all electric heat and heat pump WallMaster models (see Figure 9).

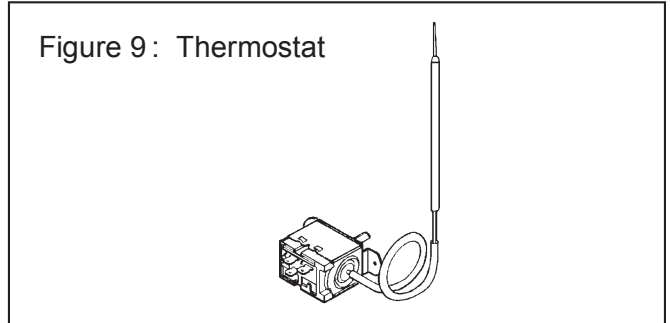
Range from 60° F ($\pm 2^\circ$ F) to 92° F ($\pm 2^\circ$ F).

TEST:

⚠ WARNING	
	ELECTRIC SHOCK HAZARD Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.

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 9: 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.

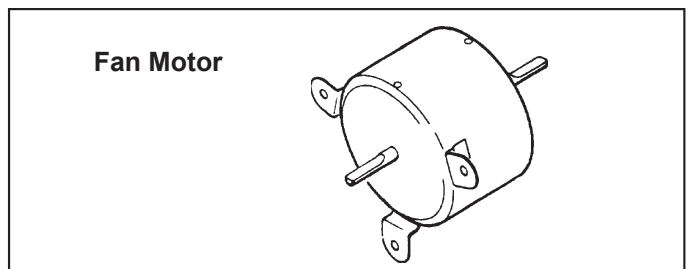
FAN MOTOR

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. (See Figure 23)


⚠ WARNING	
	ELECTRIC SHOCK HAZARD Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.

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. If the control is in the "MoneySaver" mode and the thermostat calls for cooling, the fan will start - then stop after approximately 2 minutes; then the fan and compressor will start together approximately 2 minutes later.



CAPACITORS

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before servicing. Discharge capacitor with a 20,000 Ohm 2 Watt resistor before handling.</p>
	<p>Failure to do so may result in personal injury, or death.</p>

Many motor capacitors are internally fused. Shorting the terminals will blow the fuse, ruining the capacitor. A 20,000 ohm 2 watt resistor can be used to discharge capacitors safely. Remove wires from capacitor and place resistor across terminals. When checking a dual capacitor with a capacitor analyzer or ohmmeter, both sides must be tested.

Capacitor Check with Capacitor Analyzer

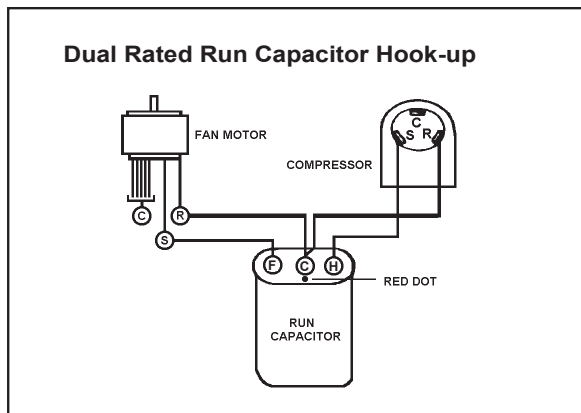
The capacitor analyzer will show whether the capacitor is "open" or "shorted." It will tell whether the capacitor is within its micro farads rating and it will show whether the capacitor is operating at the proper power-factor percentage. The instrument will automatically discharge the capacitor when the test switch is released.

Capacitor Connections

The starting winding of a motor can be damaged by a shorted and grounded running capacitor. This damage usually can be avoided by proper connection of the running capacitor terminals.

From the supply line on a typical 230 volt circuit, a 115 volt potential exists from the "R" terminal to ground through a possible short in the capacitor. However, from the "S" or start terminal, a much higher potential, possibly as high as 400 volts, exists because of the counter EMF generated in the start winding. Therefore, the possibility of capacitor failure is much greater when the identified terminal is connected to the "S" or start terminal. The identified terminal should always be connected to the supply line, or "R" terminal, never to the "S" terminal.

When connected properly, a shorted or grounded running capacitor will result in a direct short to ground from the "R" terminal and will blow the line fuse. The motor protector will protect the main winding from excessive temperature.



DEFROST THERMOSTAT

("WY" Electromechanical Control Models Only)

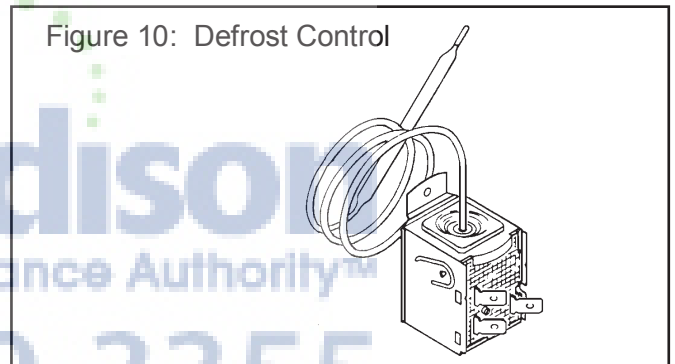
This thermostat is a single pole - double throw with contacts between terminal "2" and "3" closing on temperature rise and contacts between terminals "2" and "1" closing on temperature fall. When the contacts between terminals "2" and "3" open, power to the compressor is interrupted. When contacts between terminals "2" and "1" make, power is supplied 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 10: Defrost Control

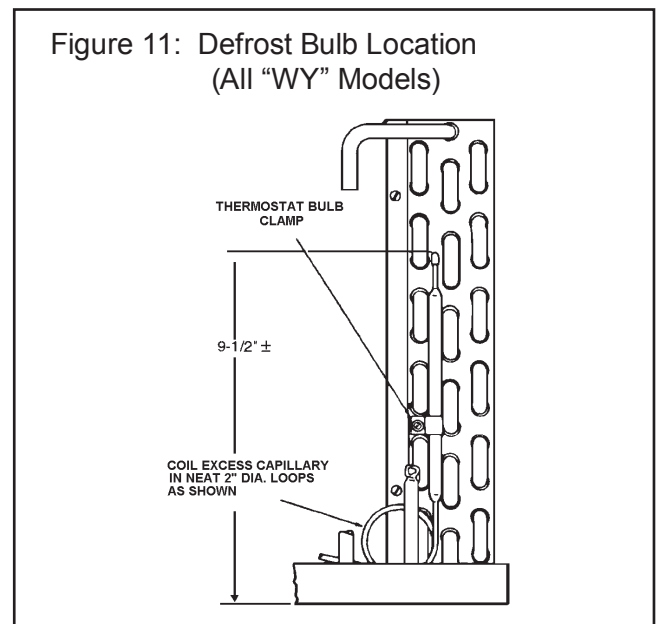


DEFROST BULB LOCATION

(All "WY" Electromechanical Control Models)

The defrost control bulb must be mounted securely and in the correct location to operate properly (see Figure 11).

Figure 11: Defrost Bulb Location
(All "WY" Models)



HEATING ELEMENT

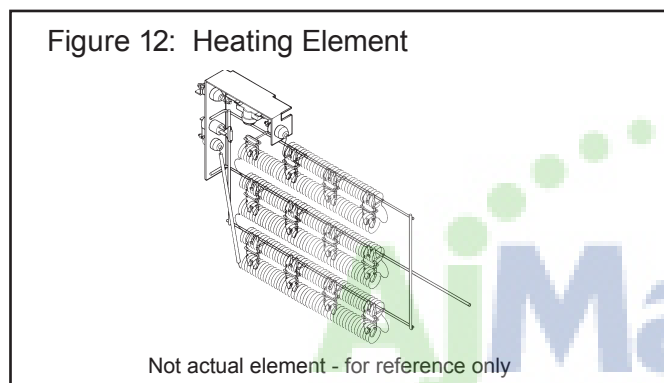
("WE" & "WY" Electronic and Electromechanical Models)

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

The heating element has two heater limit switches (bimetal thermostats) connected in series with it. The number 1 limit located near the bottom, will open the circuit when the temperature reaches 130°F +/-5°. The number 2 is a high limit switch near the top of the element. It is designed to open the circuit at 165°F +/-8°.

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

Test the heater element for continuity below 130°F. The element's resistance value is 13.7 Ohms +/-5%.

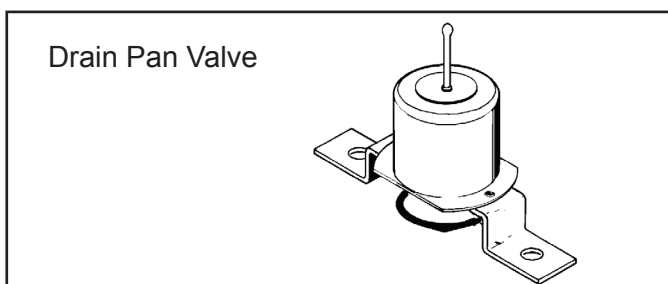


DRAIN PAN VALVE

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.



REFRIGERATION SYSTEM SEQUENCE OF OPERATION

A good understanding of the basic operation of the refrigeration system is essential for the service technician. Without this understanding, accurate troubleshooting of refrigeration system problems will be more difficult and time consuming, if not (in some cases) entirely impossible. The refrigeration system uses four basic principles (laws) in its operation they are as follows:

1. "Heat always flows from a warmer body to a cooler body."
2. "Heat must be added to or removed from a substance before a change in state can occur"
3. "Flow is always from a higher pressure area to a lower pressure area."
4. "The temperature at which a liquid or gas changes state is dependent upon the pressure."

The refrigeration cycle begins at the compressor. Starting the compressor creates a low pressure in the suction line which draws refrigerant gas (vapor) into the compressor. The compressor then "compresses" this refrigerant, raising its pressure and its (heat intensity) temperature.

The refrigerant leaves the compressor through the discharge line as a hot High pressure gas (vapor). The refrigerant enters the condenser coil where it gives up some of its heat. The condenser fan moving air across the coil's finned surface facilitates the transfer of heat from the refrigerant to the relatively cooler outdoor air.

When a sufficient quantity of heat has been removed from the refrigerant gas (vapor), the refrigerant will "condense" (i.e. change to a liquid). Once the refrigerant has been condensed (changed) to a liquid it is cooled even further by the air that continues to flow across the condenser coil.

The WallMaster design determines at exactly what point (in the condenser) the change of state (i.e. gas to a liquid) takes place. In all cases, however, the refrigerant must be totally condensed (changed) to a Liquid before leaving the condenser coil.

The refrigerant leaves the condenser Coil through the liquid line as a warm high pressure liquid. It next will pass through the refrigerant drier (if so equipped). It is the function of the drier to trap any moisture present in the system, contaminants, and large particulate matter.

The liquid refrigerant next enters the metering device. The metering device is a capillary tube. The purpose of the metering device is to "meter" (i.e. control or measure) the quantity of refrigerant entering the evaporator coil.

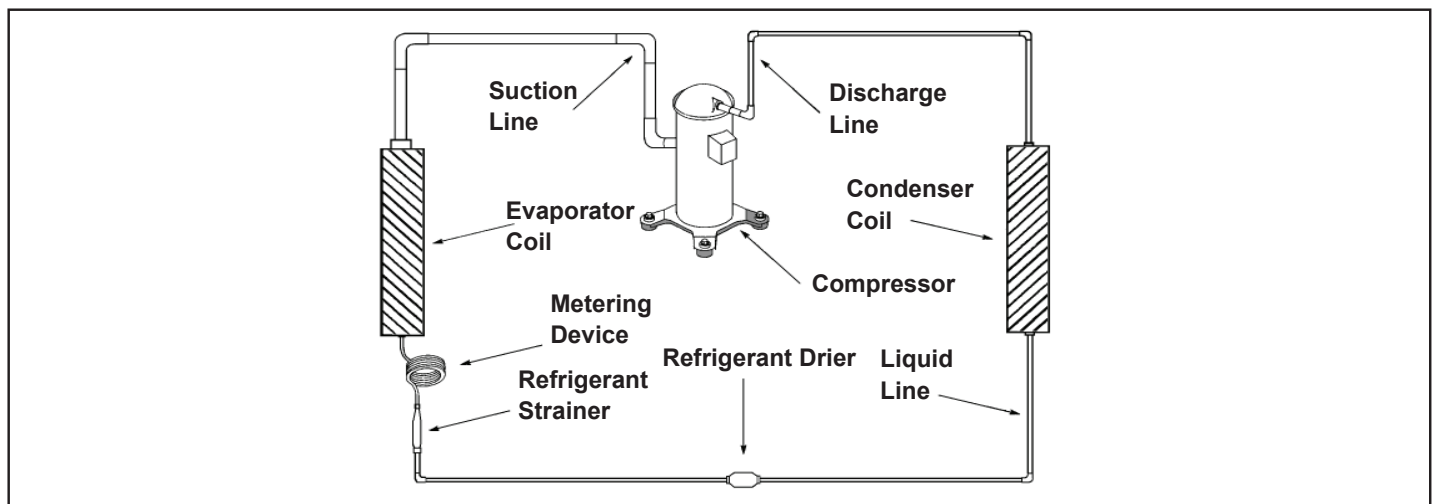
In the case of the capillary tube this is accomplished (by design) through size (and length) of device, and the pressure difference present across the device.

Since the evaporator coil is under a lower pressure (due to the suction created by the compressor) than the liquid line, the liquid refrigerant leaves the metering device entering the evaporator coil. As it enters the evaporator coil, the larger area and lower pressure allows the refrigerant to expand and lower its temperature (heat intensity). This expansion is often referred to as "boiling". Since the unit's blower is moving indoor air across the finned surface of the evaporator coil, the expanding refrigerant absorbs some of that heat. This results in a lowering of the indoor air temperature, hence the "cooling" effect.

The expansion and absorbing of heat cause the liquid refrigerant to evaporate (i.e. change to a gas). Once the refrigerant has been evaporated (changed to a gas), it is heated even further by the air that continues to flow across the evaporator coil.

The particular system design determines at exactly what point (in the evaporator) the change of state (i.e. liquid to a gas) takes place. In all cases, however, the refrigerant must be totally evaporated (changed) to a gas before leaving the evaporator coil.

The low pressure (suction) created by the compressor causes the refrigerant to leave the evaporator through the suction line as a cool low pressure vapor. The refrigerant then returns to the compressor, where the cycle is repeated.



SEALED REFRIGERATION SYSTEM REPAIRS

IMPORTANT

ANY SEALED SYSTEM REPAIRS TO COOL-ONLY MODELS REQUIRE THE INSTALLATION OF A LIQUID LINE DRIER. ALSO, ANY SEALED SYSTEM REPAIRS TO HEAT PUMP MODELS REQUIRE THE INSTALLATION OF A SUCTION LINE DRIER.


EQUIPMENT REQUIRED:


1. Voltmeter
2. Ammeter
3. Ohmmeter
4. E.P.A. Approved Refrigerant Recovery System
5. Vacuum Pump (capable of 200 microns or less vacuum.)
6. Acetylene Welder
7. Electronic Halogen Leak Detector (G.E. Type H-6 or equivalent.)
8. Accurate refrigerant charge measuring device such as:
 - a. Balance Scales - 1/2 oz. accuracy
 - b. Charging Board - 1/2 oz. accuracy

9. High Pressure Gauge - (0 - 400 lbs.)
10. Low Pressure Gauge - (30 - 150 lbs.)
11. Vacuum Gauge - (0 - 1000 microns)

EQUIPMENT MUST BE CAPABLE OF:

1. Recovery CFC's as low as 5%.
2. Evacuation from both the high side and low side of the system simultaneously.
3. Introducing refrigerant charge into high side of the system.
4. Accurately weighing the refrigerant charge actually introduced into the system.
5. Facilities for flowing nitrogen through refrigeration tubing during all brazing processes.

⚠ WARNING	
	RISK OF ELECTRIC SHOCK Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenances or service. Failure to do so could result in electric shock, serious injury or death.

⚠ WARNING	
	HIGH PRESSURE HAZARD Sealed Refrigeration System contains refrigerant and oil under high pressure. Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants. Failure to follow these procedures could result in serious injury or death.

Proper refrigerant charge is essential to proper unit operation. Operating a unit with an improper refrigerant charge will result in reduced performance (capacity) and/or efficiency. Accordingly, the use of proper charging methods during servicing will insure that the unit is functioning as designed and that its compressor will not be damaged.

Too much refrigerant (overcharge) in the system is just as bad (if not worse) than not enough refrigerant (undercharge). They both can be the source of certain compressor failures if they remain uncorrected for any period of time. Quite often, other problems (such as low air flow across evaporator, etc.) are misdiagnosed as refrigerant charge problems. The refrigerant circuit diagnosis chart will assist you in properly diagnosing these systems.

An overcharged unit will at times return liquid refrigerant (slugging) back to the suction side of the compressor eventually causing a mechanical failure within the compressor. This mechanical failure can manifest itself as valve failure, bearing failure, and/or other mechanical failure. The specific type of failure will be influenced by the amount of liquid being returned, and the length of time the slugging continues.

Not enough refrigerant (undercharge) on the other hand, will cause the temperature of the suction gas to increase to the point where it does not provide sufficient cooling for the compressor motor. When this occurs, the motor winding temperature will increase causing the motor to overheat and possibly cycle open the compressor overload protector. Continued overheating of the motor windings and/or cycling of the overload will eventually lead to compressor motor or overload failure.

Refrigerant Charging

NOTE: Because The WallMaster System Is A Sealed System, Service Process Tubes Will Have To Be Installed. First Install A Line Tap And Remove Refrigerant From System. Make Necessary Sealed System Repairs And Vacuum System. Crimp Process Tube Line And Solder End Shut. Do Not Leave A Service Valve In The Sealed System.

Method Of Charging / Repairs


The acceptable method for charging the WallMaster system is the Weighed in Charge Method. The weighed in charge method is applicable to all units. It is the preferred method to use, as it is the most accurate.

The weighed in method should always be used whenever a charge is removed from a unit such as for a leak repair, compressor replacement, or when there is no refrigerant charge left in the unit. To charge by this method, requires the following steps:


1. Install a piercing valve to remove refrigerant from the sealed system. (Piercing valve must be removed from the system before recharging.)
2. Recover Refrigerant in accordance with EPA regulations.

⚠ WARNING	
	BURN HAZARD Proper safety procedures must be followed, and proper protective clothing must be worn when working with a torch. Failure to follow these procedures could result in moderate or serious injury.

3. Install a process tube to sealed system.

⚠ CAUTION	
	FREEZE HAZARD Proper safety procedures must be followed, and proper protective clothing must be worn when working with liquid refrigerant. Failure to follow these procedures could result in minor to moderate injury.

4. Make necessary repairs to system.
5. Evacuate system to 300 microns or less.
6. Weigh in refrigerant with the property quantity of R-22 refrigerant.
7. Start unit, and verify performance.

⚠ WARNING	
	BURN HAZARD Proper safety procedures must be followed, and proper protective clothing must be worn when working with a torch. Failure to follow these procedures could result in moderate or serious injury.

8. Crimp the process tube and solder the end shut.

⚠ WARNING



ELECTRIC SHOCK HAZARD

Turn off electric power before service or installation.

Extreme care must be used, if it becomes necessary to work on equipment with power applied.

Failure to do so could result in serious injury or death.

⚠ WARNING



HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants.

Failure to follow these procedures could result in serious injury or death.

Undercharged Refrigerant Systems

An undercharged system will result in poor performance (low pressures, etc.) in both the heating and cooling cycle.

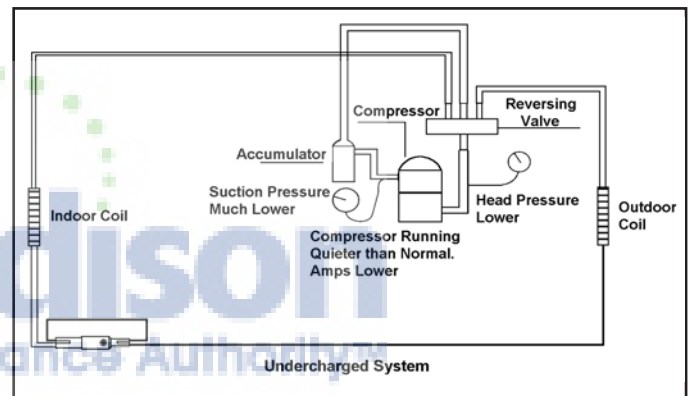
Whenever you service a unit with an undercharge of refrigerant, always suspect a leak. The leak must be repaired before charging the unit.

To check for an undercharged system, turn the unit on, allow the compressor to run long enough to establish working pressures in the system (15 to 20 minutes).

During the cooling cycle you can listen carefully at the exit of the metering device into the evaporator; an intermittent hissing and gurgling sound indicates a low refrigerant charge. Intermittent frosting and thawing of the evaporator is another indication of a low charge, however, frosting and thawing can also be caused by insufficient air over the evaporator.

Checks for an undercharged system can be made at the compressor. If the compressor seems quieter than normal, it is an indication of a low refrigerant charge.

A check of the amperage drawn by the compressor motor should show a lower reading. (Check the Unit Specification.) After the unit has run 10 to 15 minutes, check the gauge pressures. Gauges connected to system with an undercharge will have low head pressures and substantially low suction pressures.



Overcharged Refrigerant Systems

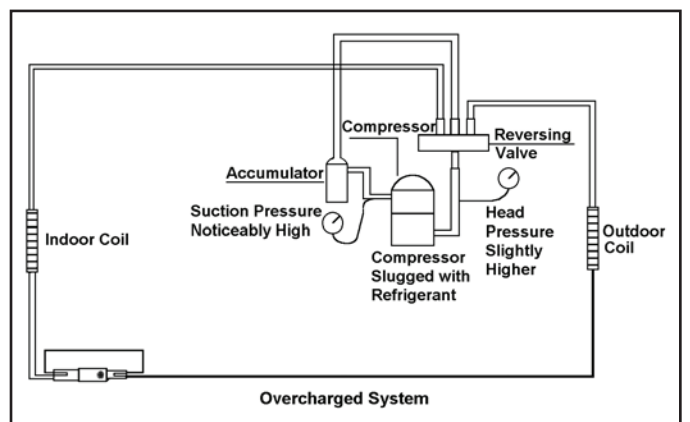
Compressor amps will be near normal or higher. Noncondensables can also cause these symptoms. To confirm, remove some of the charge, if conditions improve, system may be overcharged. If conditions don't improve, Noncondensables are indicated.

Whenever an overcharged system is indicated, always make sure that the problem is not caused by air flow problems. Improper air flow over the evaporator coil may indicate some of the same symptoms as an over charged system.

An overcharge can cause the compressor to fail, since it would be "slugged" with liquid refrigerant.

The charge for any system is critical. When the compressor is noisy, suspect an overcharge, when you are sure that the air quantity over the evaporator coil is correct. Icing

of the evaporator will not be encountered because the refrigerant will boil later if at all. Gauges connected to system will usually have higher head pressure (depending upon amount of over charge). Suction pressure should be slightly higher.



Restricted Refrigerant System

Troubleshooting a restricted refrigerant system can be difficult. The following procedures are the more common problems and solutions to these problems. There are two types of refrigerant restrictions: Partial restrictions and complete restrictions.

A partial restriction allows some of the refrigerant to circulate through the system.

With a complete restriction there is no circulation of refrigerant in the system.

Restricted refrigerant systems display the same symptoms as a "low-charge condition."

When the unit is shut off, the gauges may equalize very slowly.

Gauges connected to a completely restricted system will run in a deep vacuum. When the unit is shut off, the gauges will not equalize at all.

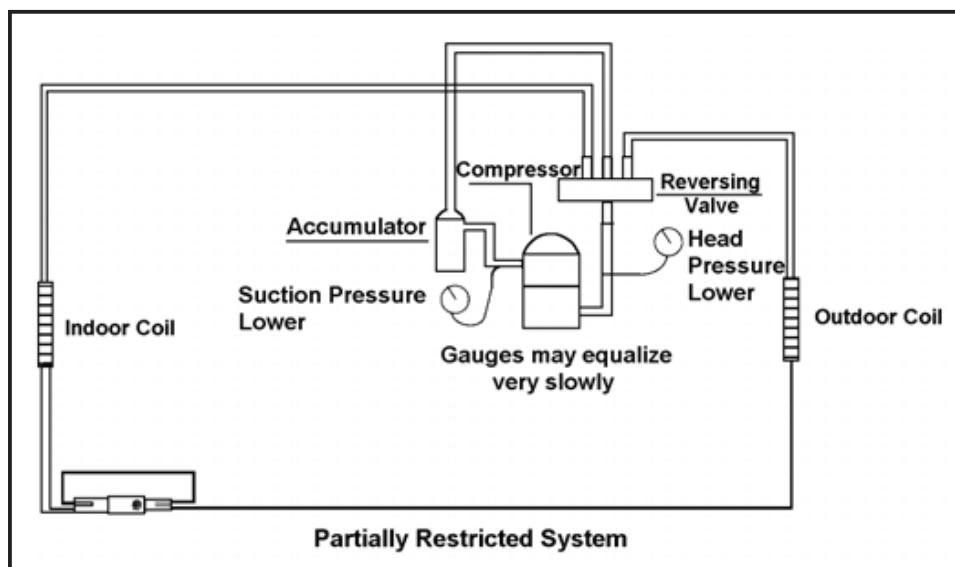
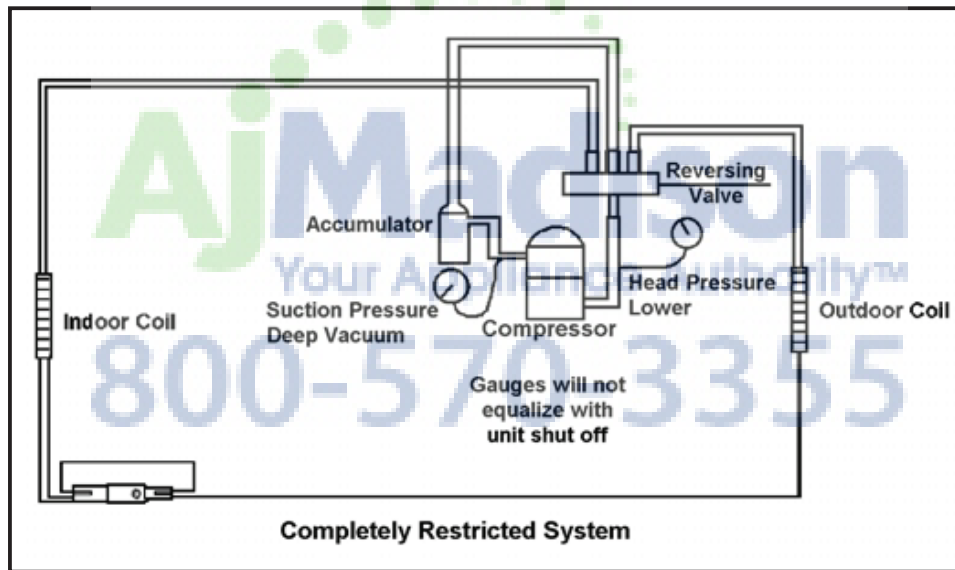
A quick check for either condition begins at the evaporator. With a partial restriction, there may be gurgling sounds

at the metering device entrance to the evaporator. The evaporator in a partial restriction could be partially frosted or have an ice ball close to the entrance of the metering device. Frost may continue on the suction line back to the compressor.

Often a partial restriction of any type can be found by feel, as there is a temperature difference from one side of the restriction to the other.

With a complete restriction, there will be no sound at the metering device entrance. An amperage check of the compressor with a partial restriction may show normal current when compared to the unit specification. With a complete restriction the current drawn may be considerably less than normal, as the compressor is running in a deep vacuum (no load.) Much of the area of the condenser will be relatively cool since most or all of the liquid refrigerant will be stored there.

The following conditions are based primarily on a system in the cooling mode.



HERMETIC COMPONENTS CHECK

⚠ WARNING



BURN HAZARD

Proper safety procedures must be followed, and proper protective clothing must be worn when working with a torch.

Failure to follow these procedures could result in moderate or serious injury.

⚠ WARNING



CUT/SEVER HAZARD

Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc.

Failure to do so could result in serious injury.

METERING DEVICE

Capillary Tube Systems

All units are equipped with capillary tube metering devices.

Checking for restricted capillary tubes.

1. Connect pressure gauges to unit.
2. Start the unit in the cooling mode. If after a few minutes of operation the pressures are normal, the check valve and the cooling capillary are not restricted.
3. Switch the unit to the heating mode and observe the gauge readings after a few minutes running time. If the system pressure is lower than normal, the heating capillary is restricted.
4. If the operating pressures are lower than normal in both the heating and cooling mode, the cooling capillary is restricted.

CHECK VALVE

A unique two-way check valve is used on the reverse cycle heat pumps. It is pressure operated and used to direct the flow of refrigerant through a single filter drier and to the proper capillary tube during either the heating or cooling cycle.

Failure of the slide in the check valve to seat properly in either mode of operation will cause flooding of the cooling coil. This is due to the refrigerant bypassing the heating or cooling capillary tube and entering the liquid line.

One-way Check Valve
(Heat Pump Models)



COOLING MODE

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).

NOTE: The slide (check) inside the valve is made of teflon. Should it become necessary to replace the check valve, place a wet cloth around the valve to prevent overheating during the brazing operation.

HEATING MODE


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).

CHECK VALVE OPERATION

In the cooling mode of operation, high pressure liquid enters the check valve forcing the slide to close the opposite port (liquid line) to the indoor coil. Refer to refrigerant flow chart. This directs the refrigerant through the filter drier and cooling capillary tube to the indoor coil.

In the heating mode of operation, high pressure refrigerant enters the check valve from the opposite direction, closing the port (liquid line) to the outdoor coil. The flow path of the refrigerant is then through the filter drier and heating capillary to the outdoor coil.

REVERSING VALVE DESCRIPTION/OPERATION

⚠ WARNING	
	ELECTRIC SHOCK HAZARD Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.

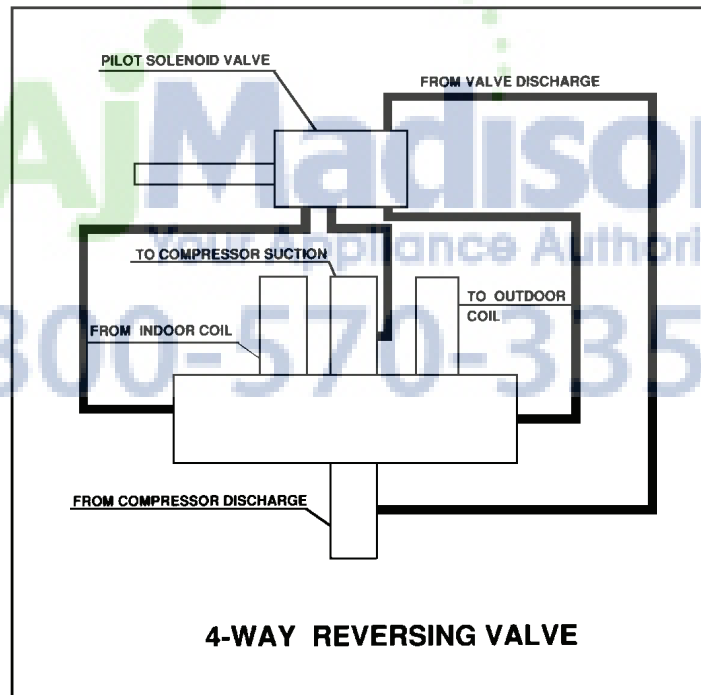
The Reversing Valve controls the direction of refrigerant flow to the indoor and outdoor coils. It consists of a pressure-operated, main valve and a pilot valve actuated by a solenoid plunger. The solenoid is energized during the heating cycle only. The reversing valves used in the RAC system is a 2-position, 4-way valve.

The single tube on one side of the main valve body is the high-pressure inlet to the valve from the compressor. The center tube on the opposite side is connected to the low pressure (suction) side of the system. The other two are connected to the indoor and outdoor coils. Small capillary tubes connect each end of the main valve cylinder to the

“A” and “B” ports of the pilot valve. A third capillary is a common return line from these ports to the suction tube on the main valve body. Four-way reversing valves also have a capillary tube from the compressor discharge tube to the pilot valve.

The piston assembly in the main valve can only be shifted by the pressure differential between the high and low sides of the system. The pilot section of the valve opens and closes ports for the small capillary tubes to the main valve to cause it to shift.

NOTE: System operating pressures must be near normal before valve can shift.



TESTING THE COIL

⚠ WARNING



ELECTRIC SHOCK HAZARD

Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenances or service.

Failure to do so could result in electric shock, serious injury or death.

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.

1. Turn off high voltage electrical power to unit.
2. Unplug line voltage lead from reversing valve coil.
3. Check for electrical continuity through the coil. If you do not have continuity replace the coil.
4. Check from each lead of coil to the copper liquid line as it leaves the unit or the ground lug. There should be no continuity between either of the coil leads and ground; if there is, coil is grounded and must be replaced.
5. If coil tests okay, reconnect the electrical leads.
6. Make sure coil has been assembled correctly.

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

CHECKING THE REVERSING VALVE

NOTE: You must have normal operating pressures before the reversing valve can shift.

⚠ WARNING



HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants.

Failure to follow these procedures could result in serious injury or death.

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.

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

When sluggish or 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.

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 heating to cooling.

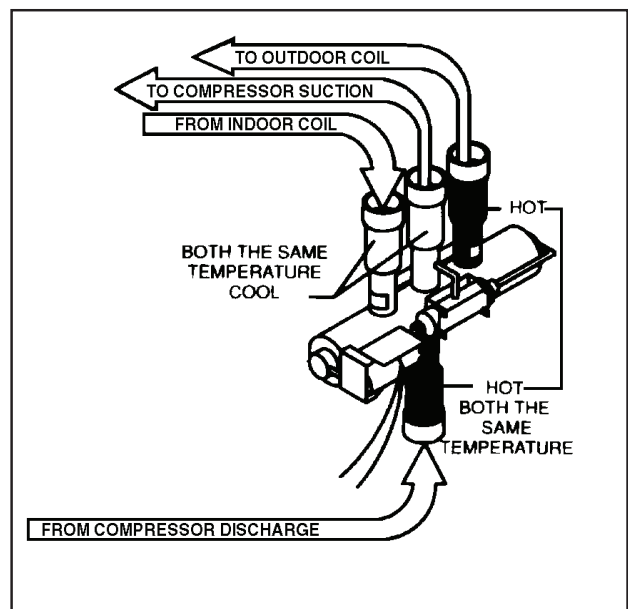
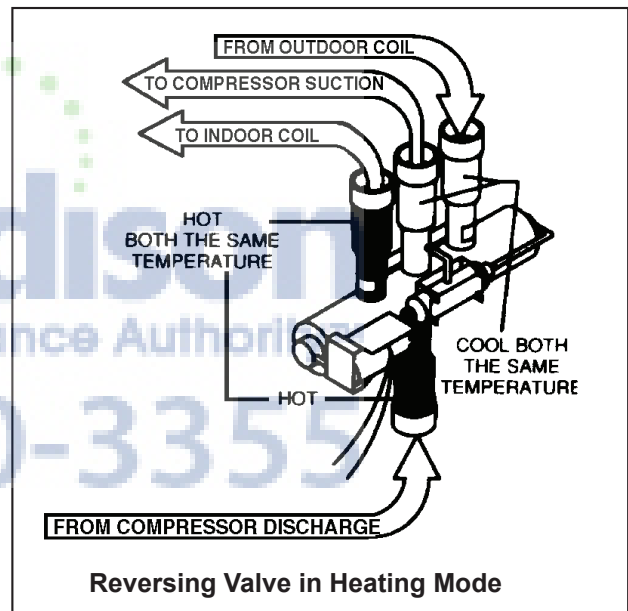
If the valve is stuck in the heating position, block the air flow through the indoor coil and allow discharge pressure to build in the system. Then switch the system from heating to cooling.

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


Dented or damaged valve body or capillary tubes can prevent the main slide in the valve body from shifting.

If you determine this is the problem, replace the reversing valve.

After all of the previous inspections and checks have been made and determined correct, then perform the "Touch Test" on the reversing valve.




Touch Test in Heating/Cooling Cycle

⚠ WARNING	
	<p>BURN HAZARD</p> <p>Certain unit components operate at temperatures hot enough to cause burns.</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn.</p> <p>Failure to follow these procedures could result in minor to moderate injury.</p>

The only definite indications that the slide is in the mid-position is if all three tubes on the suction side of the valve are hot after a few minutes of running time.

NOTE: A condition other than those illustrated above, and on Page 31, indicate that the reversing valve is not shifting properly. Both tubes shown as hot or cool must be the same corresponding temperature.

Procedure For Changing Reversing Valve

⚠ WARNING	
	<p>HIGH PRESSURE HAZARD</p> <p>Sealed Refrigeration System contains refrigerant and oil under high pressure.</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants.</p> <p>Failure to follow these procedures could result in serious injury or death.</p>


NOTICE

FIRE HAZARD

The use of a torch requires extreme care and proper judgment. Follow all safety recommended precautions and protect surrounding areas with fire proof materials. Have a fire extinguisher readily available. Failure to follow this notice could result in moderate to serious property damage.

1. Install Process Tubes. Recover refrigerant from sealed system. PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.
2. Remove solenoid coil from reversing valve. If coil is to be reused, protect from heat while changing valve.
3. Unbrazed all lines from reversing valve.
4. Clean all excess braze from all tubing so that they will slip into fittings on new valve.
5. Remove solenoid coil from new valve.

6. Protect new valve body from heat while brazing with plastic heat sink (Thermo Trap) or wrap valve body with wet rag.
7. Fit all lines into new valve and braze lines into new valve.

⚠ WARNING	
	<p>EXPLOSION HAZARD</p> <p>The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.</p> <p>Failure to follow proper safety procedures could result in serious injury or death.</p>


8. Pressurize sealed system with a combination of R-22 and nitrogen and check for leaks, using a suitable leak detector. Recover refrigerant per EPA guidelines.
9. Once the sealed system is leak free, install solenoid coil on new valve and charge the sealed system by weighing in the proper amount and type of refrigerant as shown on rating plate. Crimp the process tubes and solder the ends shut. Do not leave Schrader or piercing valves in the sealed system.

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. "Re-wet" 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.

COMPRESSOR CHECKS

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.</p> <p>Failure to do so could result in serious injury or death.</p>

Locked Rotor Voltage (L.R.V.) Test

Locked rotor voltage (L.R.V.) is the actual voltage available at the compressor under a stalled condition.

Single Phase Connections

Disconnect power from unit. Using a voltmeter, attach one lead of the meter to the run “R” terminal on the compressor and the other lead to the common “C” terminal of the compressor. Restore power to unit.

Determine L.R.V.

Start the compressor with the volt meter attached; then stop the unit. Attempt to restart the compressor within a couple of seconds and immediately read the voltage on the meter. The compressor under these conditions will not start and will usually kick out on overload within a few seconds since the pressures in the system will not have had time to equalize. Voltage should be at or above minimum voltage of 197 VAC, as specified on the rating plate. If less than minimum, check for cause of inadequate power supply; i.e., incorrect wire size, loose electrical connections, etc.

Amperage (L.R.A.) Test

The running amperage of the compressor is the most important of these readings. A running amperage higher than that indicated in the performance data indicates that a problem exists mechanically or electrically.

Single Phase Running and L.R.A. Test

NOTE: Consult the specification and performance section for running amperage. The L.R.A. can also be found on the rating plate.

Select the proper amperage scale and clamp the meter probe around the wire to the “C” terminal of the compressor.


Turn on the unit and read the running amperage on the meter. If the compressor does not start, the reading will indicate the locked rotor amperage (L.R.A.).


External Overload

The compressor is equipped with an external overload which senses both motor amperage and winding temperature. High motor temperature or amperage heats the overload causing it to open, breaking the common circuit within the compressor.

Heat generated within the compressor shell, usually due to recycling of the motor, is slow to dissipate. It may take anywhere from a few minutes to several hours for the overload to reset.


Checking the External Overload

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.</p> <p>Failure to do so could result in serious injury or death.</p>

⚠ WARNING	
	<p>BURN HAZARD Certain unit components operate at temperatures hot enough to cause burns.</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn.</p> <p>Failure to follow this warning could result in moderate to serious injury.</p>

With power off, remove the leads from compressor terminals. If the compressor is hot, allow the overload to cool before starting check. Using an ohmmeter, test continuity across the terminals of the external overload. If you do not have continuity; this indicates that the overload is open and must be replaced.

Single Phase Resistance Test

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.</p> <p>Failure to do so could result in serious injury or death.</p>

Remove the leads from the compressor terminals and set the ohmmeter on the lowest scale (R x 1).

Touch the leads of the ohmmeter from terminals common to start ("C" to "S"). Next, touch the leads of the ohmmeter from terminals common to run ("C" to "R").

Add values "C" to "S" and "C" to "R" together and check resistance from start to run terminals ("S" to "R"). Resistance "S" to "R" should equal the total of "C" to "S" and "C" to "R."

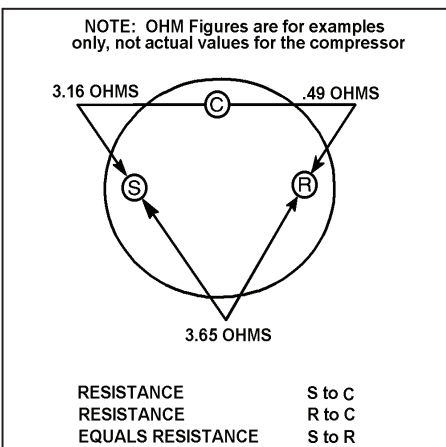
In a single phase PSC compressor motor, the highest value will be from the start to the run connections ("S" to "R"). The next highest resistance is from the start to the common connections ("S" to "C"). The lowest resistance is from the run to common. ("C" to "R") Before replacing a compressor, check to be sure it is defective.

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. If a reading is obtained the compressor is grounded and must be replaced.

Check the complete electrical system to the compressor and compressor internal electrical system, check to be certain that compressor is not out on internal overload.

Complete evaluation of the system must be made whenever you suspect the compressor is defective. If the compressor has been operating for sometime, a careful examination must be made to determine why the compressor failed.



Many compressor failures are caused by the following conditions:

1. Improper air flow over the evaporator.
2. Overcharged refrigerant system causing liquid to be returned to the compressor.
3. Restricted refrigerant system.
4. Lack of lubrication.
5. Liquid refrigerant returning to compressor causing oil to be washed out of bearings.
6. Noncondensables such as air and moisture in the system. Moisture is extremely destructive to a refrigerant system.
7. Capacitor test (see page 21).

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 refrigerant 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 performance 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.

COMPRESSOR REPLACEMENT


Recommended procedure for compressor replacement

⚠ WARNING	
	<p>RISK OF ELECTRIC SHOCK</p> <p>Unplug and/or disconnect all electrical power to the unit before performing inspections, maintenances or service.</p> <p>Failure to do so could result in electric shock, serious injury or death.</p>

1. Be certain to perform all necessary electrical and refrigeration tests to be sure the compressor is actually defective before replacing.

⚠ WARNING	
	<p>HIGH PRESSURE HAZARD</p> <p>Sealed Refrigeration System contains refrigerant and oil under high pressure.</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants.</p> <p>Failure to follow these procedures could result in serious injury or death.</p>

2. Recover all refrigerant from the system through the process tubes. **PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.** Do not use gauge manifold for this purpose if there has been a burnout. You will contaminate your manifold and hoses. Use a Schrader valve adapter and copper tubing for burnout failures.

⚠ WARNING	
	<p>HIGH TEMPERATURES</p> <p>Extreme care, proper judgment and all safety procedures must be followed when testing, troubleshooting, handling or working around unit while in operation with high temperature components. Wear protective safety aids such as: gloves, clothing etc.</p> <p>Failure to do so could result in serious burn injury.</p>

NOTICE	
FIRE HAZARD	
<p>The use of a torch requires extreme care and proper judgment. Follow all safety recommended precautions and protect surrounding areas with fire proof materials. Have a fire extinguisher readily available. Failure to follow this notice could result in moderate to serious property damage.</p>	


3. After all refrigerant has been recovered, disconnect suction and discharge lines from the compressor and remove compressor. Be certain to have both suction and discharge process tubes open to atmosphere.
4. Carefully pour a small amount of oil from the suction stub of the defective compressor into a clean container.
5. Using an acid test kit (one shot or conventional kit), test the oil for acid content according to the instructions with the kit.
6. If any evidence of a burnout is found, no matter how slight, the system will need to be cleaned up following proper procedures.
7. Install the replacement compressor.

⚠ WARNING	
	<p>EXPLOSION HAZARD</p> <p>The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.</p> <p>Failure to follow proper safety procedures result in serious injury or death.</p>

8. Pressurize with a combination of R-22 and nitrogen and leak test all connections with an electronic or Halide leak detector. Recover refrigerant and repair any leaks found.


Repeat Step 8 to insure no more leaks are present.


9. Evacuate the system with a good vacuum pump capable of a final vacuum of 300 microns or less. The system should be evacuated through both liquid line and suction line gauge ports. While the unit is being evacuated, seal all openings on the defective compressor. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

⚠ CAUTION	
	<p>FREEZE HAZARD</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn when working with liquid refrigerant.</p> <p>Failure to follow these procedures could result in minor to moderate injury.</p>

10. Recharge the system with the correct amount of refrigerant. The proper refrigerant charge will be found on the unit rating plate. The use of an accurate measuring device, such as a charging cylinder, electronic scales or similar device is necessary.

SPECIAL PROCEDURE IN THE CASE OF MOTOR COMPRESSOR BURNOUT

⚠ WARNING	
	<p>ELECTRIC SHOCK HAZARD Turn off electric power before service or installation.</p> <p>Failure to do so may result in personal injury, or death.</p>

⚠ WARNING	
	<p>HIGH PRESSURE HAZARD Sealed Refrigeration System contains refrigerant and oil under high pressure.</p> <p>Proper safety procedures must be followed, and proper protective clothing must be worn when working with refrigerants.</p> <p>Failure to follow these procedures could result in serious injury or death.</p>

⚠ WARNING	
	<p>EXPLOSION HAZARD The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.</p> <p>Failure to follow proper safety procedures result in serious injury or death.</p>

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. Use approved flushing agent to remove all contamination from system. Inspect suction and discharge line for carbon deposits. Remove and clean if necessary. Ensure all acid is neutralized.
4. Reassemble the system, including new drier strainer and capillary tube.
5. Proceed with step 8-10 on previous page.

ROTARY COMPRESSOR SPECIAL TROUBLESHOOTING AND SERVICE

Basically, troubleshooting and servicing rotary compressors is the same as on the reciprocating compressor with only one main exception:

NEVER, under any circumstances, charge a rotary compressor through the **LOW** side. Doing so would cause permanent damage to the new compressor.

ROUTINE MAINTENANCE

⚠ WARNING



ELECTRIC SHOCK HAZARD

Turn off electric power before inspections, maintenances, or service.

Extreme care must be used, if it becomes necessary to work on equipment with power applied.

Failure to do so could result in serious injury or death.

NOTICE

Units are to be inspected and serviced by qualified service personnel only. Use proper protection on surrounding property. Failure to follow this notice could result in moderate or serious property damage.

AIR FILTER

Clean the unit air intake filter at least every 300 to 350 hours of operation. Clean the filters with a mild detergent in warm water and allow to dry thoroughly before reinstalling.

COILS AND BASE PAN

⚠ WARNING



EXCESSIVE WEIGHT HAZARD

Use two people to lift or carry the unit, and wear proper protective clothing.

Failure to do so may result in personal injury.

NOTICE

Do not use a caustic coil cleaning agent on coils or base pan. Use a biodegradable cleaning agent and degreaser, to prevent damage to the coil and/or base pan.

⚠ WARNING



CUT/SEVER HAZARD

Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc.

Failure to do so could result in serious injury.

The indoor coil (evaporator coil), the outdoor coil (condenser coil) and base pan should be inspected periodically (yearly or bi-yearly) and cleaned of all debris (lint, dirt, leaves, paper, etc.). Clean the coils and base pan with a soft brush and compressed air or vacuum. If using a pressure washer, be careful not to bend the aluminium fin pack. Use a sweeping up and down motion in the direction of the vertical aluminum fin pack when pressure cleaning coils. Cover all electrical components to protect them from water or spray. Allow the unit to dry thoroughly before reinstalling it in the sleeve.

BLOWER WHEEL / HOUSING / CONDENSER FAN / SHROUD

Inspect the indoor blower housing, evaporator blade, condenser fan blade and condenser shroud periodically (yearly or bi-yearly) and clean of all debris (lint, dirt, mold, fungus, etc.). Clean the blower housing area and blower wheel with an antibacterial / antifungal cleaner. Use a biodegradable cleaning agent and degreaser on condenser fan and condenser shroud. Use warm or cold water when rinsing these items. Allow all items to dry thoroughly before reinstalling them.

ELECTRONIC / ELECTRICAL / MECHANICAL

Periodically (at least yearly or bi-yearly): inspect all control components: electronic, electrical and mechanical, as well as the power supply. Use proper testing instruments (voltmeter, ohmmeter, ammeter, wattmeter, etc.) to perform electrical tests. Use an air conditioning or refrigeration thermometer to check room, outdoor and coil operating temperatures. Use a sling psychrometer to measure wet bulb temperatures indoors and outdoors.

Inspect the surrounding area (inside and outside) to ensure that the unit's clearances have not been compromised or altered.

ROUTINE MAINTENANCE (Continued)

NOTICE

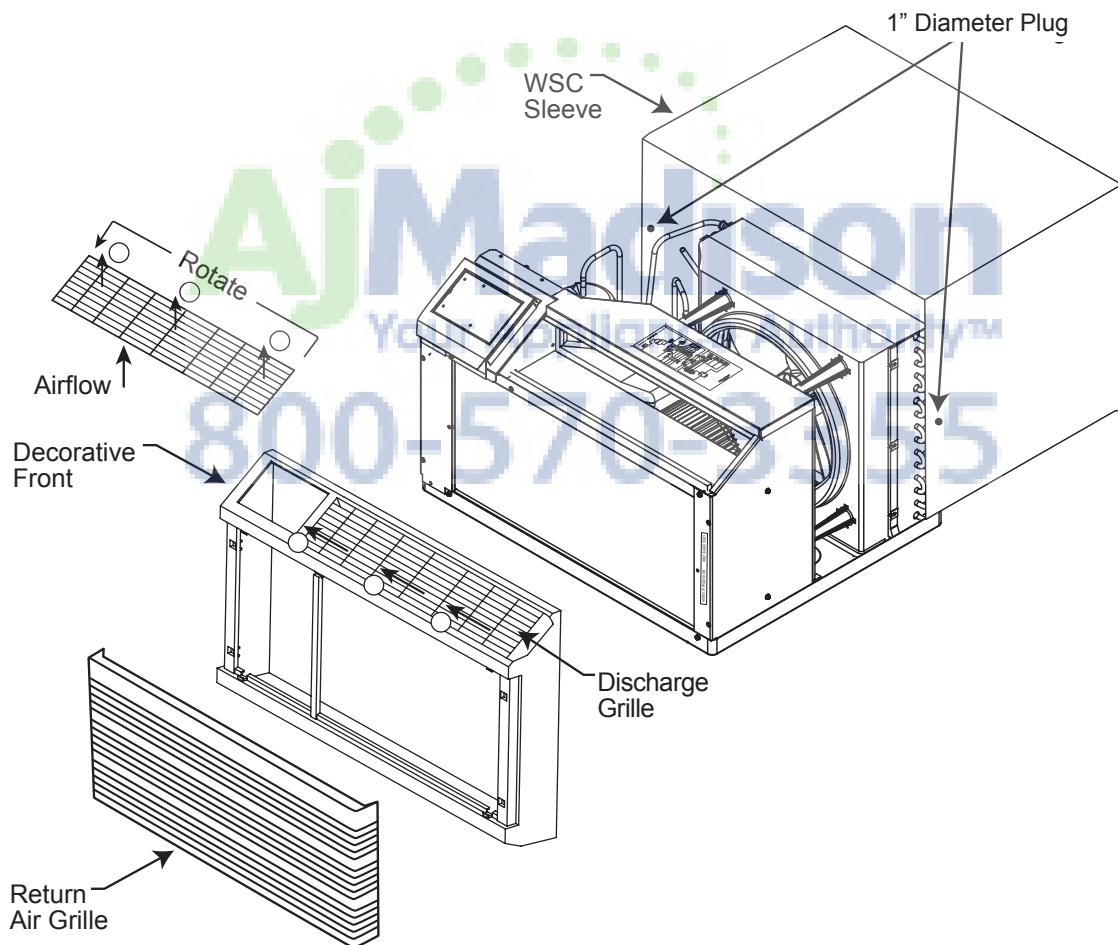
Do not drill holes in the bottom of the drain pan or the underside of the unit. Not following this notice could result in damage to the unit or condensate water leaking inappropriately which could cause water damage to surrounding property.

SLEEVE / DRAIN

Inspect the sleeve and drain system periodically (at least yearly or bi-yearly) and clean of all obstructions and debris. Clean both areas with an antibacterial and antifungal cleaner. Rinse both items thoroughly with water and ensure that the drain outlets are operating correctly. Check the sealant around the sleeve and reseal areas as needed.

FRONT COVER

Clean the front cover when needed. Use a mild detergent. Wash and rinse with warm water. Allow it to dry thoroughly before reinstalling it in the chassis.



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 & replace if inoperative
	Compressor hums but cuts off on 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 or open control board	Test for continuity
	Loose or disconnected wiring at switch, control board 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 or thermistors	Test for continuity
	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
	Thermistor shorted	Replace thermistor or electronic control board

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
	Defective thermistor	Replace thermistor or electronic control board

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 or evaporator coil	Check for proper fan speed or blocked coils
	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
	Defective thermistor	Replace thermistor or electronic control board

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. No chassis gasket installed. Install chassis gasket
	Poor installation resulting in rain entering the room	Check installation instructions. Reseal as required
	Condensation on discharge grille louvers	Dirty evaporator coil. Use pressure wash or biodegradable cleaning agent to clean. Environmental phenomena: point supply louvers upward
	Chassis gasket not installed	Install gasket, per Installation manual
	Downward slope of unit is too steep inward	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 towards back of unit	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 or thermistor short cycles	Defective thermistor	Replace thermistor or electronic control board
	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)	Heat anticipator (resistor) wire disconnected at t-stat or system switch	Refer to appropriate wiring diagram
	Heat 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
	Defective thermistor	Replace thermistor or electronic control board

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 fin pack

HEAT PUMP TROUBLESHOOTING

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.
	Defective thermistor or control board	Replace thermistor or electronic control board

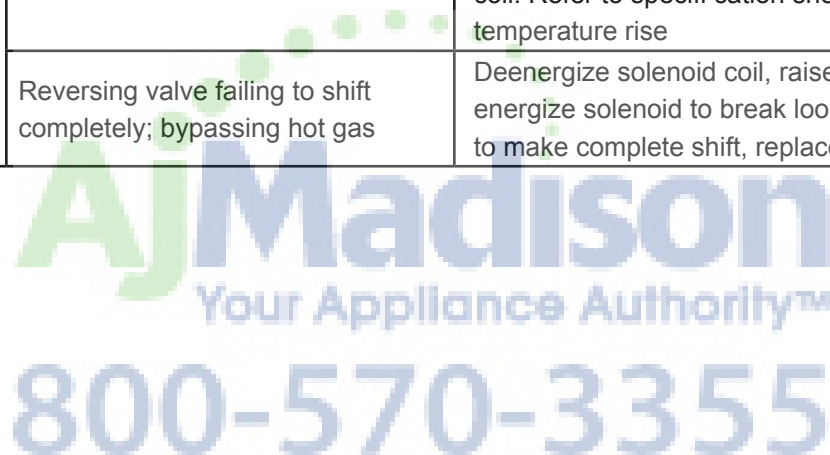
Problem	Possible Cause	Action
Unit will not defrost	Incorrect wiring	Refer to appropriate wiring diagram
	Defrost control out of calibration (applicable models)	If outside coil temperature is 25°F or below, & preselected time limit has elapsed, replace defrost control
	Defrost control contacts stuck	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
	Outdoor coil thermistor	Replace thermistor or electronic control board

Problem	Possible Cause	Action
Does not heat adequately	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 38°F, 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
	Defective thermistor or electronic control board	Replace thermistor or electronic control board

HEAT PUMP TROUBLESHOOTING

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 or defrost thermostat or outdoor thermistor or electronic board	Check for continuity. Replace defective component.

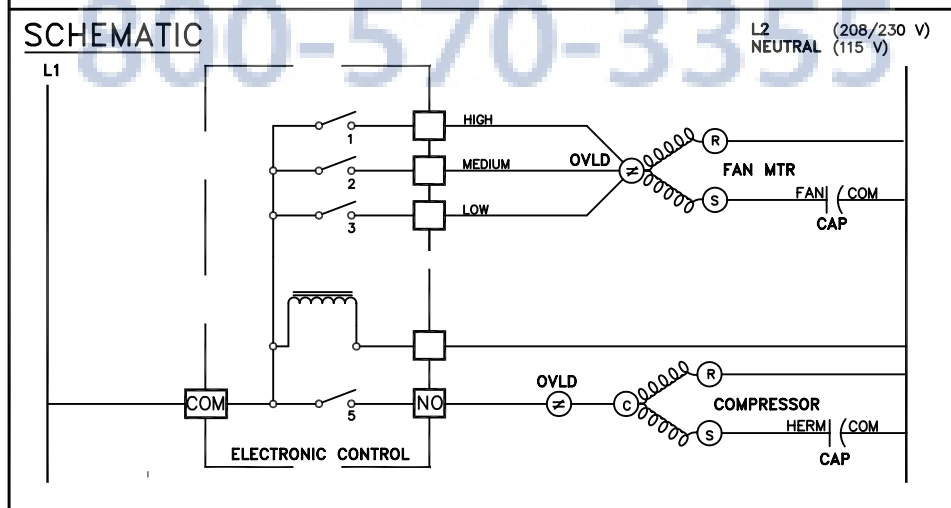
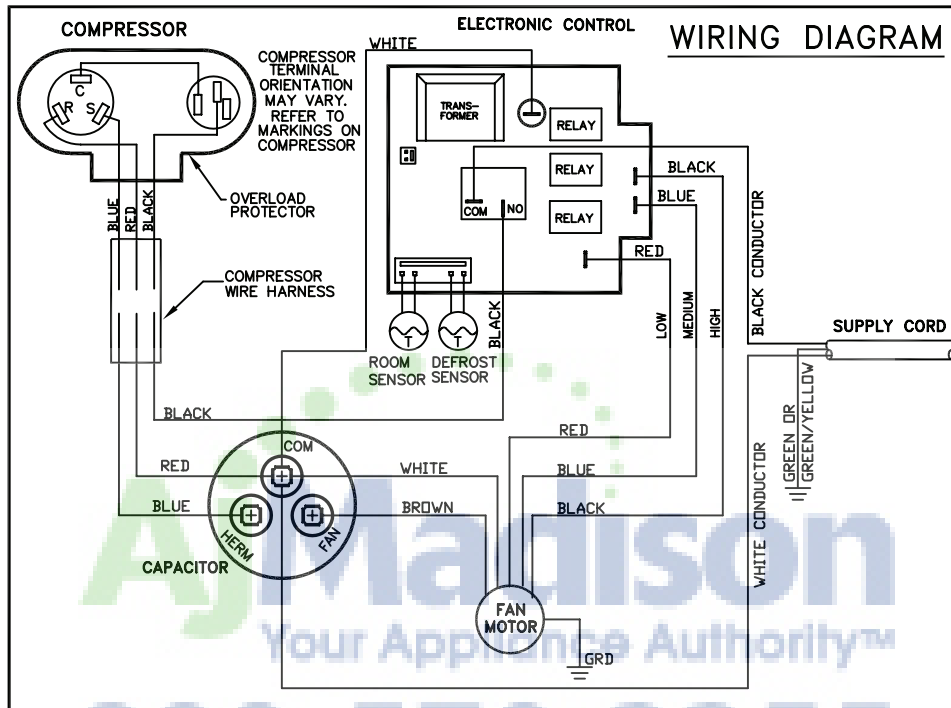
Problem	Possible Cause	Action
Heating insufficient	Heating capillary tube partially restricted	Check for partially starved outer coil. Replace heating capillary tube
	Check valve leaking internally	Switch unit several times from heating to cooling. Check temperature rise across coil. Refer to specification 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.



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:	
	1	2	3	4	5	6	* TEMPERATURE OF VALVE BODY ** WARMER THAN VALVE BODY	
							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.
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

WALLMASTER WIRING DIAGRAM ELECTRONIC CONTROL COOL ONLY MODELS: WS08B10A-D,A-F WS10B10A-D WS14B10A-D WS14B10A-E WS10B30A-D WS13B30B-E,B-F WS16B30A-D,A-E



SWITCH LOGIC
X = CLOSED
O = OPEN

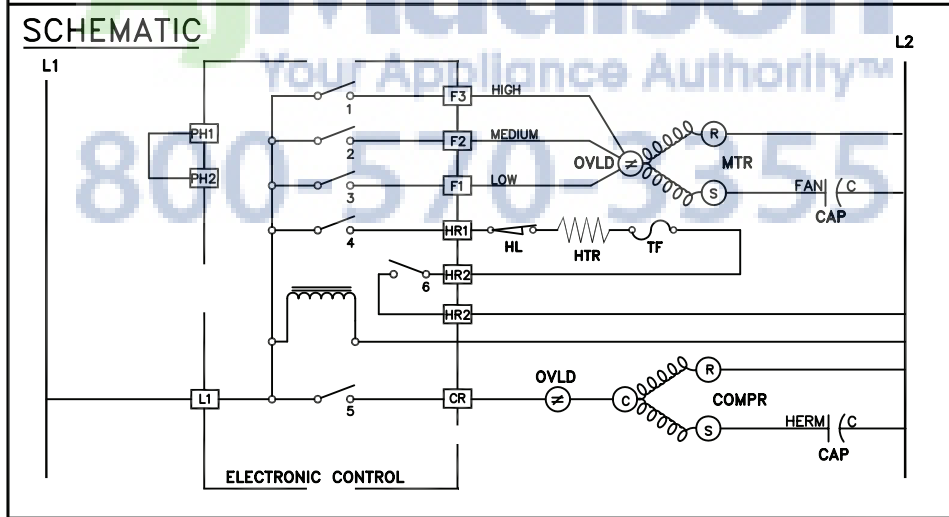
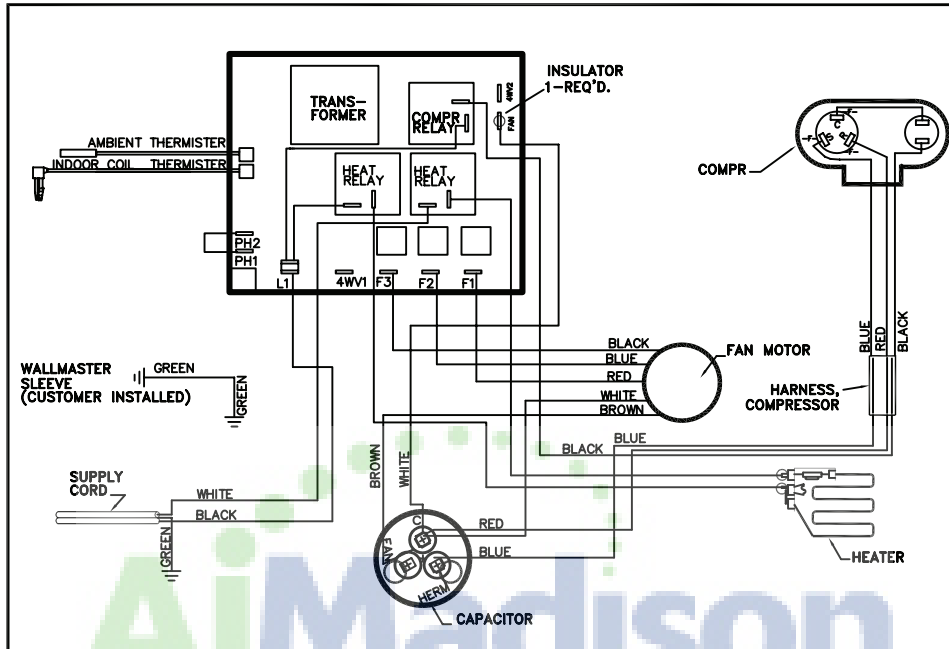
SWITCH POSITION	1	2	3	4	5
OFF	O	O	O	O	O
HI COOL	X	O	O	O	X
MED COOL	O	X	O	O	X
LOW COOL	O	O	X	O	X

LEGEND

CAP - CAPACITOR	○ - INSULATED TERMINAL
COMPR - COMPRESSOR	⊕ - COMBINATION TERMINAL
MTR - FAN MOTOR	— — - GROUND LEAD
OVLD - OVERLOAD PROTECTOR	

PART NO. 921-300-00 REV. 00

WALLMASTER WIRING DIAGRAM ELECTRONIC CONTROL COOL WITH ELECTRIC HEAT MODELS: WE10B33C-A WE13B33C-A WE16B33C-A



SWITCH LOGIC X = CLOSED
O = OPEN

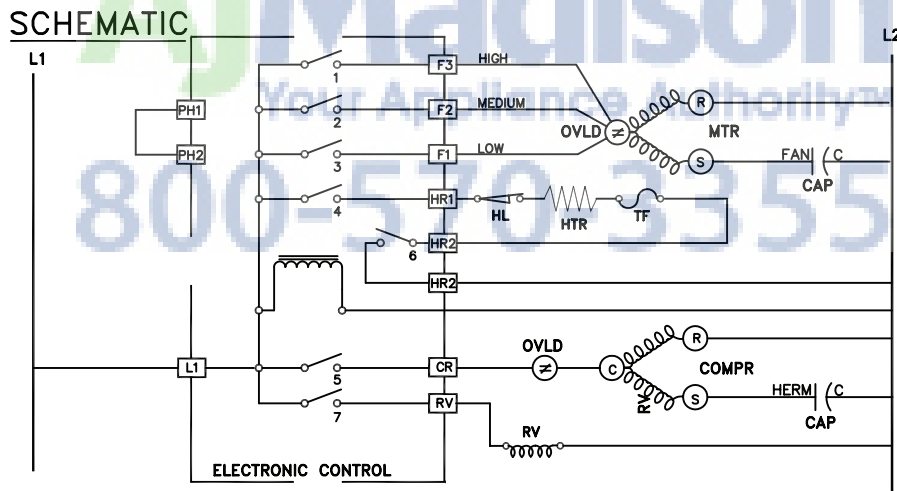
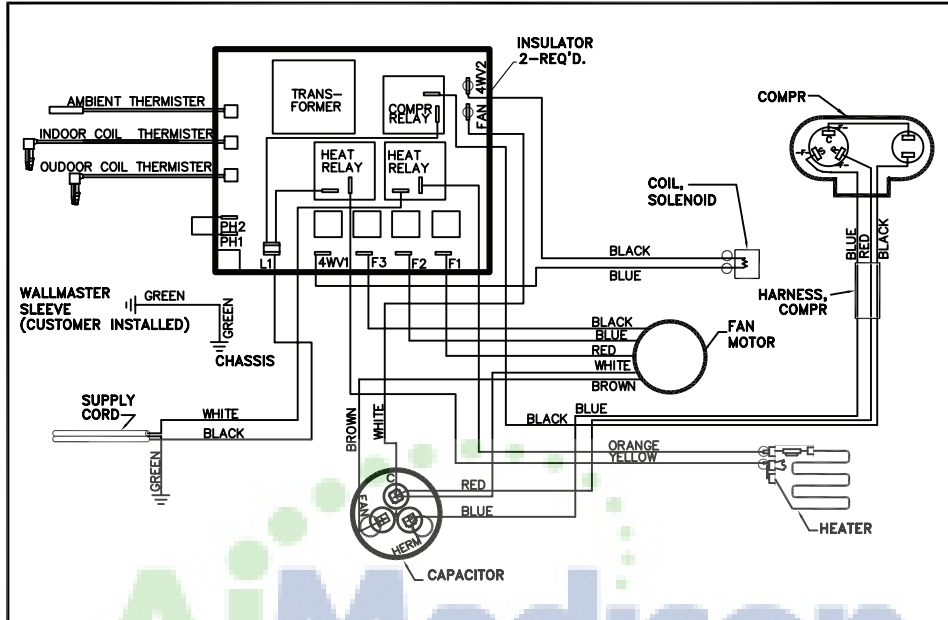
SWITCH POSITION	1	2	3	4	5	6
OFF	O	O	O	O	O	O
HI COOL	X	O	O	X	O	O
MED COOL	O	X	O	O	X	O
LOW COOL	O	O	X	O	X	O
HI HEAT	X	O	X	O	X	X
MED HEAT	O	X	O	X	O	X
LOW HEAT	O	O	X	X	O	X
HI FAN	X	O	O	O	O	O
MED FAN	O	X	O	O	O	O
LOW FAN	O	O	X	O	O	O

LEGEND

CAP - CAPACITOR		INSULATED TERMINAL
COMPR - COMPRESSOR		COMBINATION TERMINAL
MTR - FAN MOTOR		GROUND LEAD
OVLD - OVERLOAD PROTECTOR		

PART NO. 921-303-00 REV. 00

WALLMASTER WIRING DIAGRAM ELECTRONIC CONTROL HEAT PUMP WITH ELECTRIC HEAT MODELS: WY10B33C-A WY13B33C-A

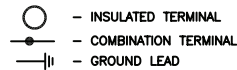


SWITCH LOGIC X = CLOSED
O = OPEN

SWITCH POSITION	1	2	3	4	5	6	7
OFF	0	0	0	0	0	0	0
HI COOL	X	0	0	0	X	0	0
MED COOL	0	X	0	0	X	0	0
LOW COOL	0	0	X	0	X	0	0
HI HEAT	X	0	0	0	X	0	X
MED HEAT	0	X	0	0	X	0	X
LOW HEAT	0	0	X	0	X	0	X
HI FAN	X	0	0	0	0	0	0
MED FAN	0	X	0	0	0	0	0
LOW FAN	0	0	X	0	0	0	0

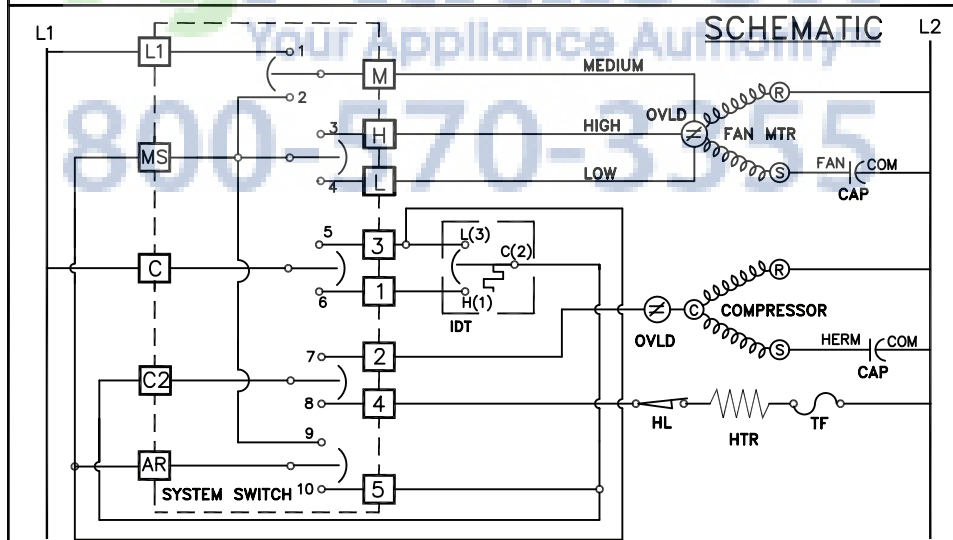
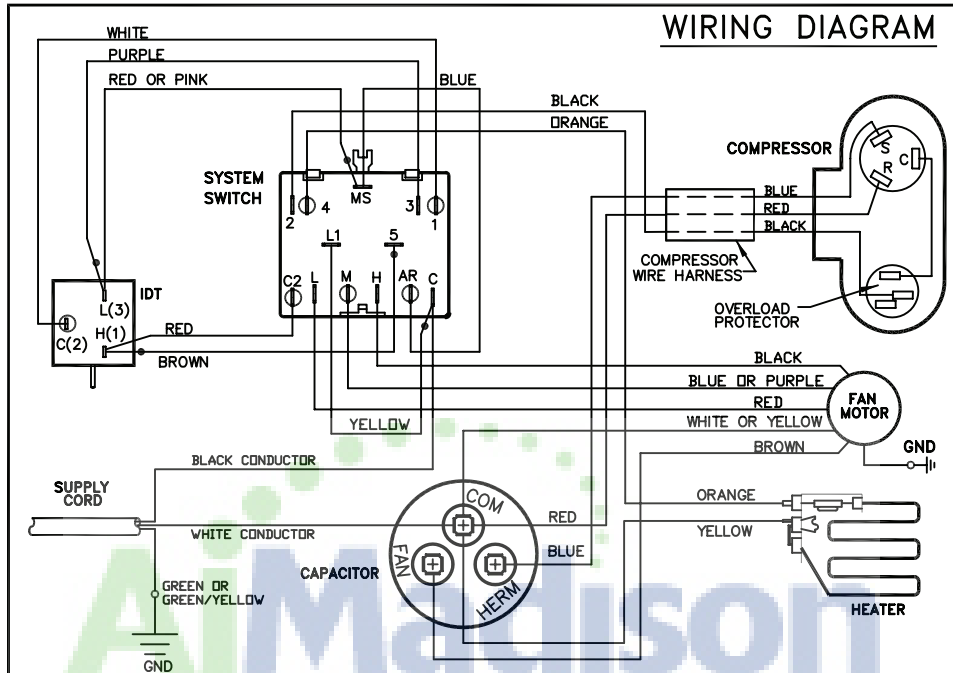
LEGEND

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



PART NO. 921-304-00 REV. 00

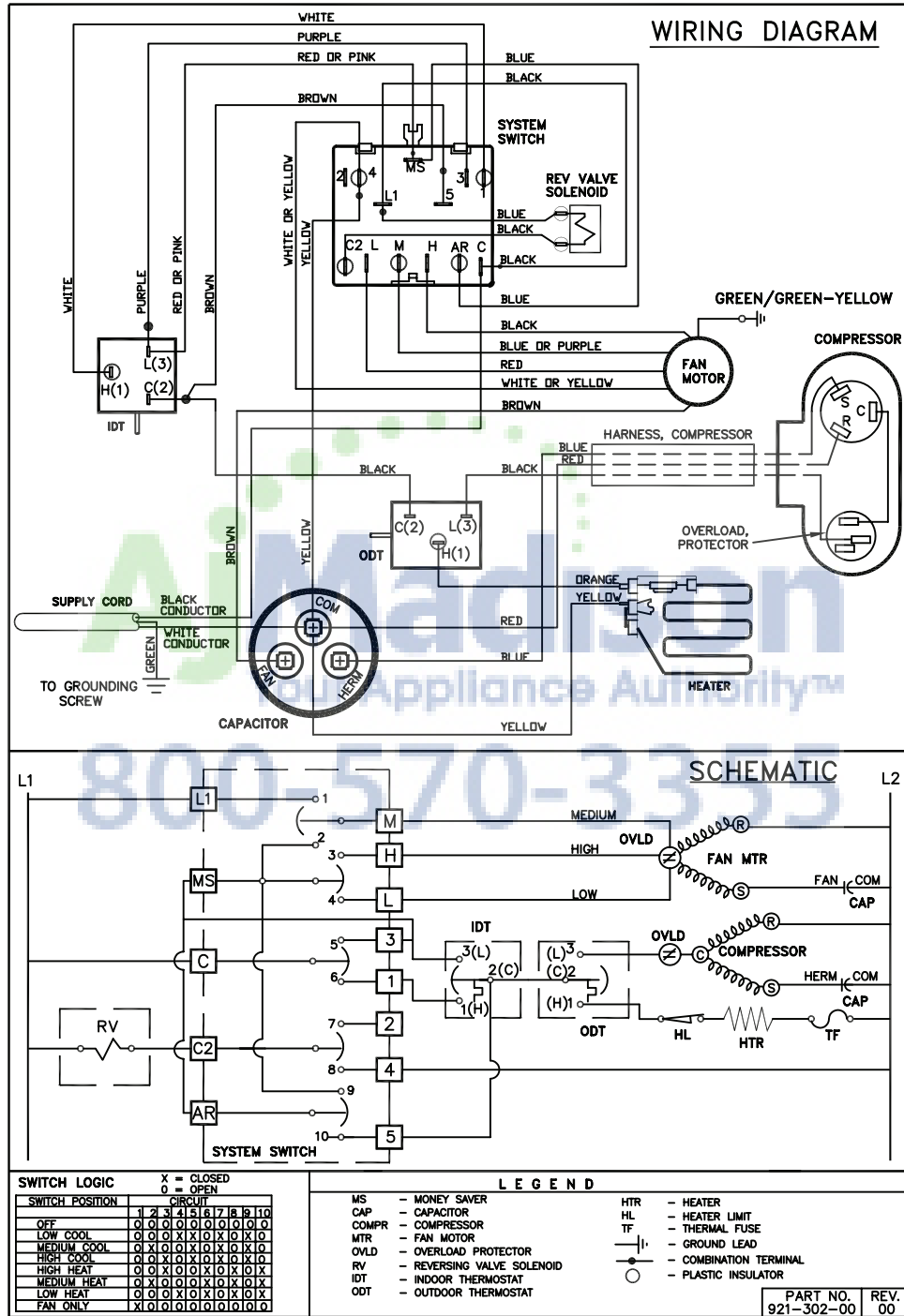
WALLMASTER WIRING DIAGRAM ELECTROMECHANICAL CONTROL COOL WITH ELECTRIC HEAT MODELS: WE10B33A-C WE13B33B-D,B-E WE16B33A-C,A-D



SWITCH LOGIC		LEGEND	
	X = CLOSED O = OPEN	AR - ANTICIPATOR RESISTOR	HTR - HEATER
SWITCH POSITION	CIRCUIT	MS - MONEY SAVER/ROCKER SWITCH	HL - HEATER LIMIT
OFF	1 2 3 4 5 6 7 8 9 10	CAP - CAPACITOR	TF - THERMAL FUSE
LOW COOL	0 0 0 0 0 0 0 0 0 0	COMPR - COMPRESSOR	— — GROUND LEAD
MEDIUM COOL	0 0 0 0 0 0 0 0 0 0	MTR - FAN MOTOR	— — COMBINATION TERMINAL
HIGH COOL	0 0 0 0 0 0 0 0 0 0	OVLD - OVERLOAD PROTECTOR	○ - PLASTIC INSULATOR
HIGH HEAT	0 0 0 0 0 0 0 0 0 0	IDT - INDOOR THERMOSTAT	
MEDIUM HEAT	0 0 0 0 0 0 0 0 0 0		
LOW HEAT	0 0 0 0 0 0 0 0 0 0		
FAN ONLY	X 0 0 0 0 0 0 0 0 0		

PART NO. 921-301-00 REV. 00

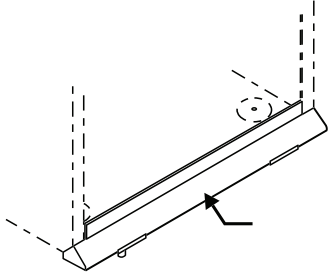
WALLMASTER WIRING DIAGRAM ELECTROMECHANICAL CONTROL HEAT PUMP WITH ELECTRIC HEAT MODELS: WY10B33A-C,A-D WY13B33A-C,A-D



Installation Accessories

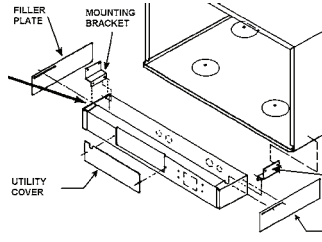
DK / Drain Kit

Installed at the back of the unit and allows for attachment to permanent condensate disposal system, if disposal is necessary or desired.



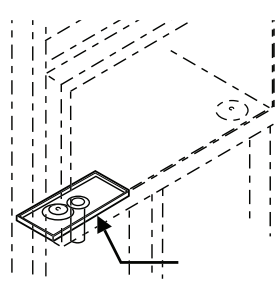
SB / Sub Base

Used as a base for the unit when it is desired to place the cord and receptacle within the installation, or simply as a base for the unit when mounted low in the wall.



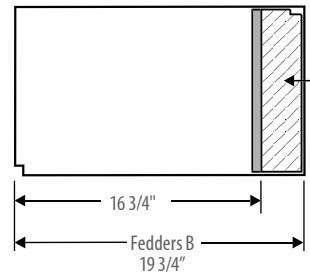
IDK / Internal Drain Kit

New construction applications where a condensate drain system has been built into the wall interior.



BAK / Baffle Adapter Kit

Necessary when installing in a sleeve deeper than 16 3/4" deep, such as Fedders B sleeve (19 3/4" deep).



WallMaster. | Exterior Grilles



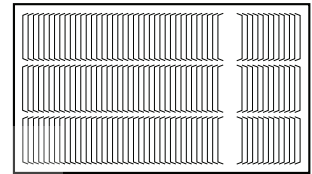
WSC Sleeve Standard Grille



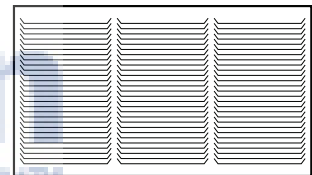
WSC Sleeve Optional Architectural Grille- AG

IMPORTANT: Operating the air conditioner with incorrect rear grille or without Baffle Adapter Kit (on 19 3/4" deep sleeve) will recirculate discharge air and cause compressor overload to trip.

CORRECT Vertical Louvers



INCORRECT Horizontal Louvers



AJ Madison
Your Appliance Authority™
800-570-3355

Friedrich

INSTALLATION INSTRUCTIONS FOR "WSC" SLEEVE

MOUNTING HARDWARE PROVIDED

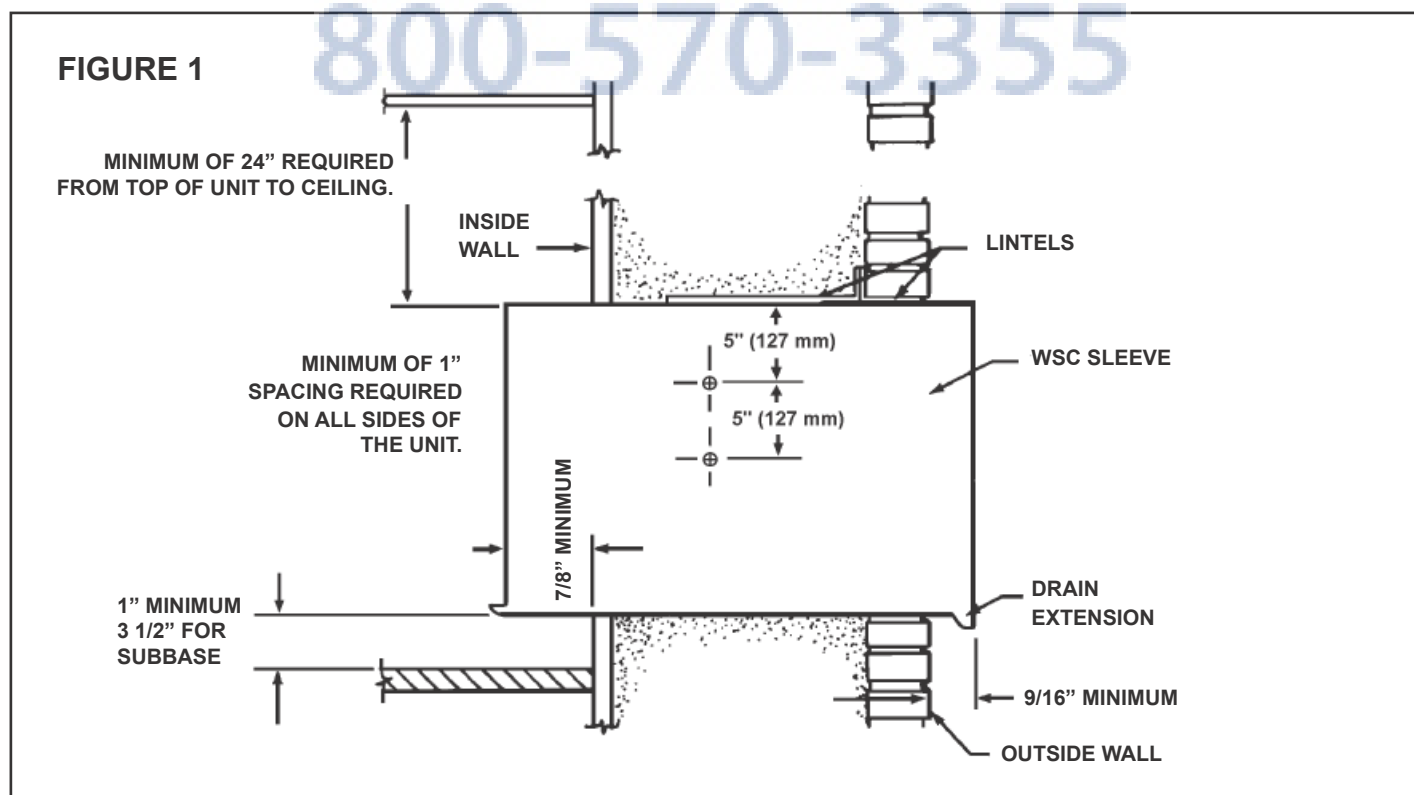
ITEM NO.	DESCRIPTION	QTY.
1	SCREW, #12A X 2"	5

WALL PREPARATION:

STEP 1 The wall opening required for a "WSC" SLEEVE is 17 1/4" high by 27 1/4" wide.

STEP 2 LINTELS must be used in opening of brick veneer and masonry walls to support the material above the "WSC" SLEEVE. The following considerations should also be given:

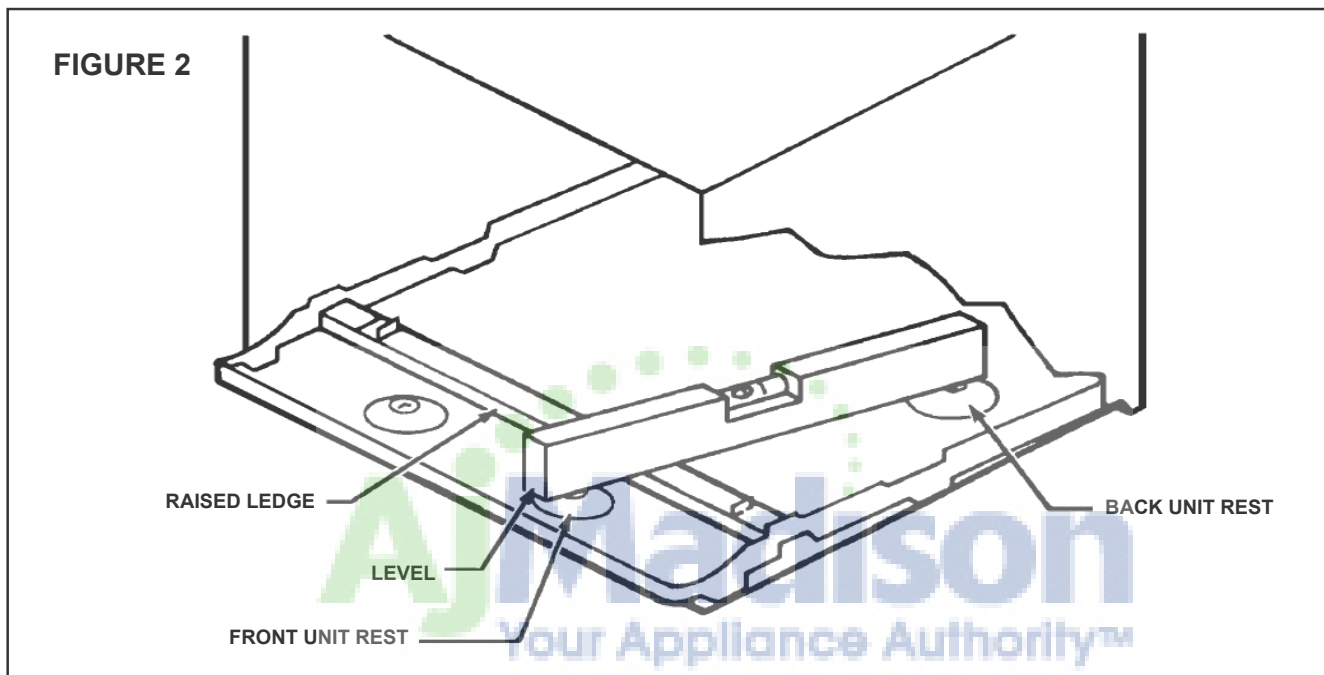
- Adjustable SUB-BASE SB-89 or other unit support **must** be provided for panel wall type construction and for walls less than 8" thick.
- A minimum distance of 1" must be allowed on all sides of the unit to adjacent wall and floor. Where the sub-base is required, the minimum distance from the floor to the sleeve must be 3 1/2". To minimize chances of short cycling of the compressor, the minimum clearance between the ceiling and the top of the unit should be 24". (See Figure 1).




INSTALLATION REQUIREMENTS:

- STEP 1** The “WSC” SLEEVE should be positioned so that the DRAIN EXTENSION extends a minimum of 9/16” beyond the OUTSIDE WALL (See Figure 1).
- STEP 2** The “WSC” SLEEVE must extend a minimum of 7/8” beyond the INSIDE WALL.
- STEP 3** The “WSC” SLEEVE must be installed level side to side.
- STEP 4** The “WSC” SLEEVE must also be installed with a downward tilt toward the outside of the building. If a level is placed so that it rests on the FRONT and BACK UNIT REST as shown in Figure 2, a properly installed unit provides a 1/2 bubble slope to the outside of the building.

CAUTION: SLEEVE projections and leveling precautions must be observed to prevent the entry of water into the room.




⚠ WARNING	
	CUT/SEVER HAZARD
Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc. Failure to do so could result in serious injury.	

SLEEVE INSTALLATION:

- STEP 1** After unpacking the “WSC” SLEEVE from the carton, remove the corrugated FRONT PANEL.
- For immediate installation of sleeve and chassis (skip if installing chassis into sleeve at a later date):** Remove the rear WEATHER PANEL. Reverse grille and place lower edge into sleeve tab (Friedrich logo facing out). Align slots with screw holes. Secure grille with screws.
- Place “WSC” SLEEVE in the wall opening following the instructions given in the INSTALLATION REQUIREMENTS section. Attach the SLEEVE to the INSIDE WALL by driving two #12A x 2” screws in each side of the SLEEVE (see Figure 1.). Shim at the top of the SLEEVE, midway between the sides. Drive one #12A x 2” screw in the top of the sleeve, close to the shim. Install screws from inside the SLEEVE. If the wall opening is not framed with wood, use expansion anchor bolts or molly (toggle) bolts (not provided).
- STEP 2** Once the SLEEVE has been installed, check the LEVEL again to be sure the 1/2 bubble downward tilt is maintained. Apply shims, if required, to maintain the proper slope.
- STEP 3** Caulk the perimeter of the entire opening on the inside and the outside between the SLEEVE and the WALL.
- STEP 4** The corrugated front panel removed in Step 1 above must be remounted back in place if masonry work is to be done and/or if the “WSC” CHASSIS is to be installed at a later date.

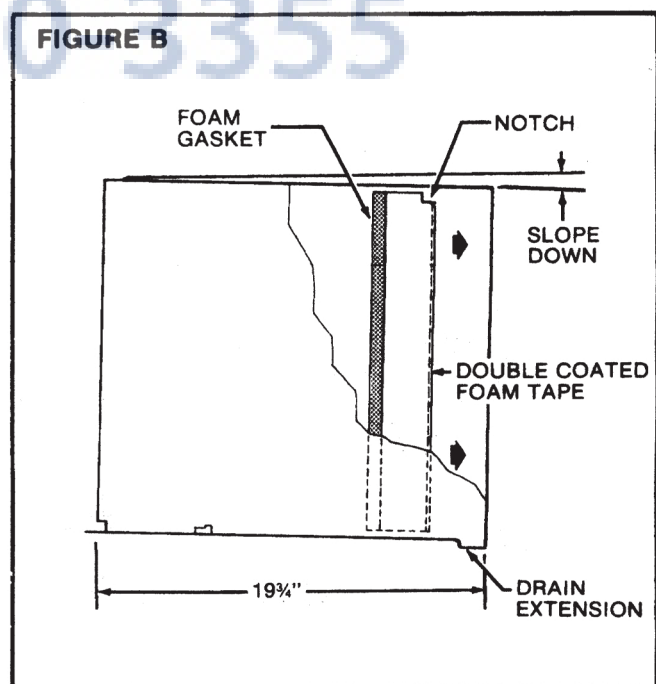
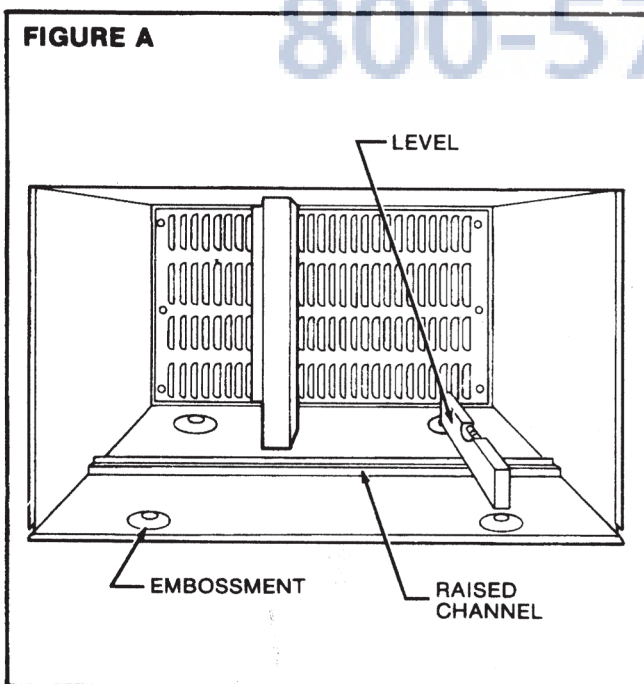


INSTALLATION INSTRUCTIONS FOR BAFFLE ADAPTER KIT (BAK)

⚠ WARNING	
	<p style="text-align: center;">CUT/SEVER HAZARD</p> <p>Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc. Failure to do so could result in serious injury.</p>

NOTE: THIS KIT APPLIES ONLY TO SLEEVES MEASURING 19 $\frac{1}{4}$ " DEEP.

- STEP 1.** Remove old air conditioner from sleeve, clean sleeve interior of debris and examine it for any sign of damaging rust, weak construction, etc. Repair if necessary then proceed.
- STEP 2.** Check to be sure sleeve has a slight downward slope to outside by placing a level on the raised channel near the front and a large embossment near the rear. (See Figure A)
- STEP 3.** Remove paper backing from double coated foam tape and place baffle assembly vertically against rear grille between louvers (Figure A), making sure notch in baffle is at the top (Figure B). Press seal firmly against rear panel especially at top and bottom.



Friedrich

WallMaster

SEALING GASKET INSTALLATION INSTRUCTIONS

⚠ WARNING



CUT/SEVER HAZARD

Be careful with the sharp edges and corners.
Wear protective clothing and gloves, etc.
Failure to do so could result in serious injury.

Remove the black rubber gasket from the air discharge plenum of the air conditioner (see fig. A). Look inside the wall sleeve and check to see if a black rubber gasket is already in place along the bottom front (see fig. B). If one is not in place, thoroughly clean the sleeve area between the front unit rests and the raised ledge (see fig. B). Once this area is clean and completely dry, peel the orange backing from the gasket and apply it to the base of the sleeve (see fig. B). Once the gasket has been properly applied, the sleeve is ready for the air conditioner to be installed per the installation instructions.

FIGURE A

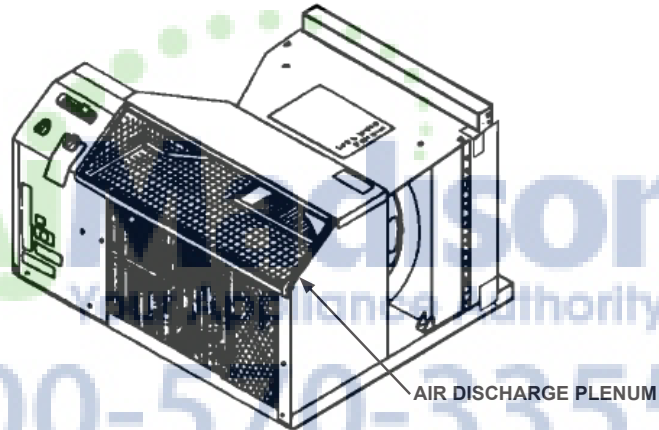
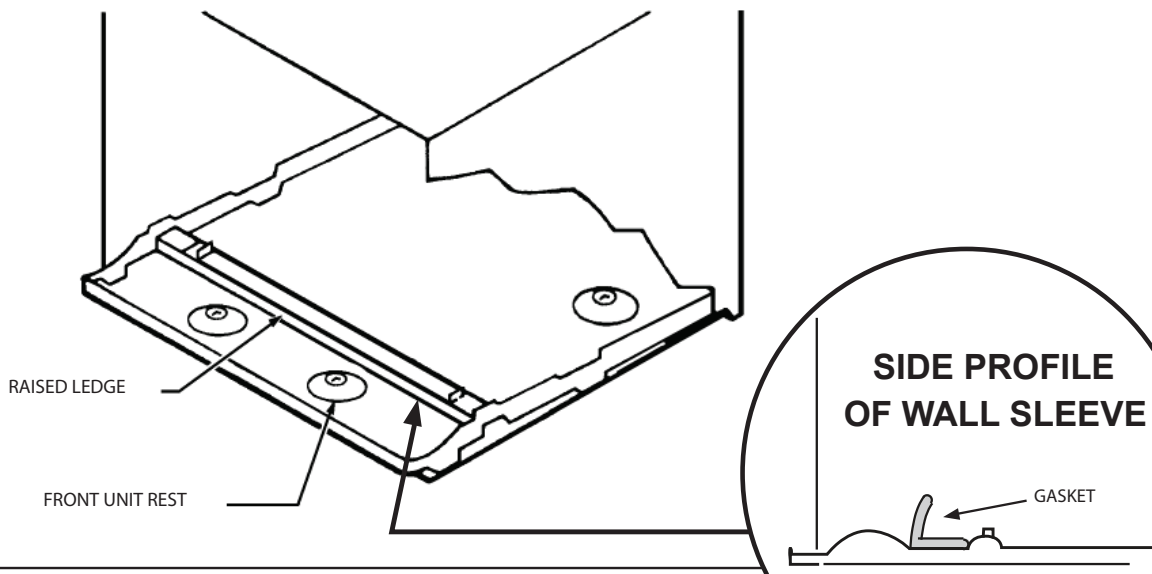
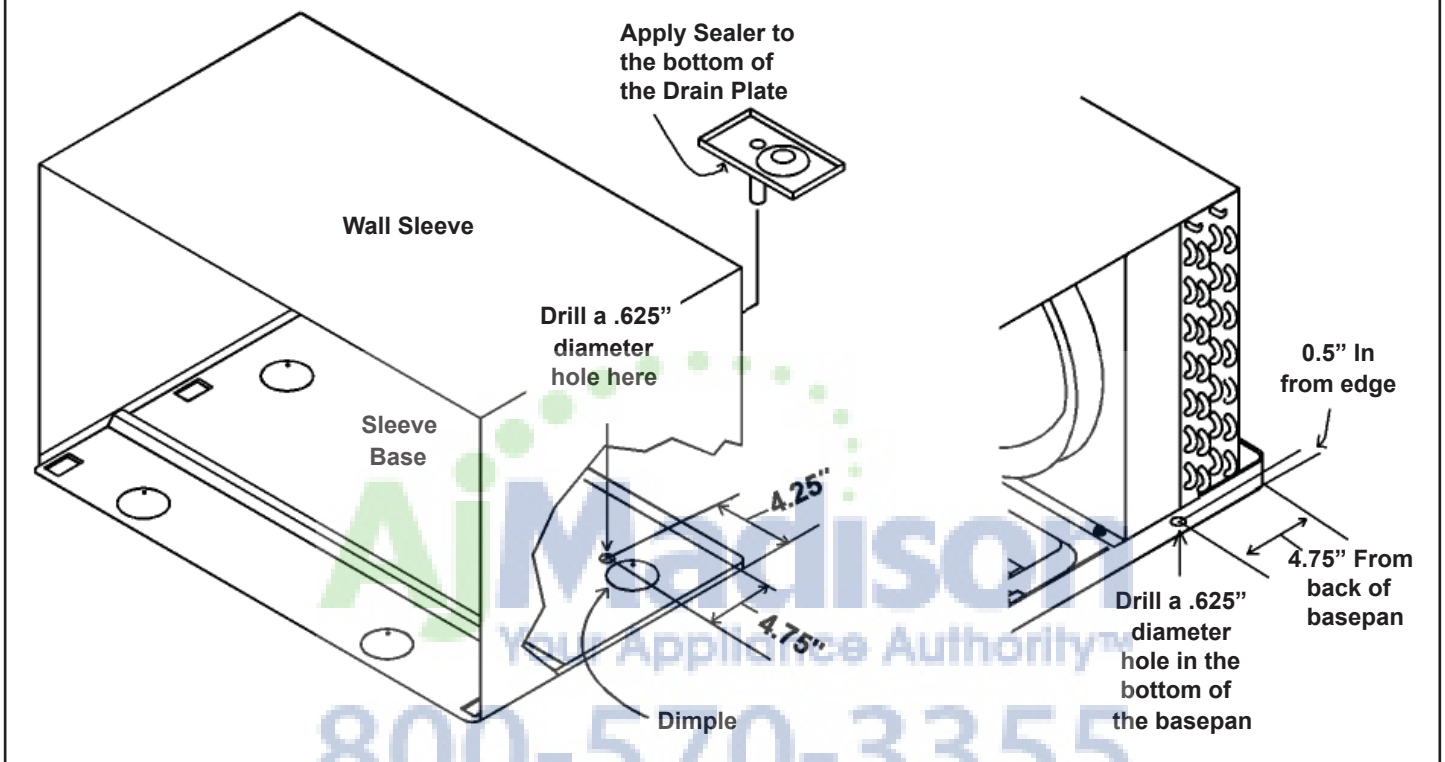


FIGURE B



Friedrich

INSTALLATION INSTRUCTIONS FOR INTERNAL DRAIN KIT (IDK)



⚠ WARNING



CUT/SEVER HAZARD

Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc. Failure to do so could result in serious injury.

1. DRILL A .625" DIAMETER HOLE IN THE BOTTOM OF THE SLEEVE BASE TO THE DIMENSIONS SHOWN.
2. APPLY A SILICONE TYPE OF SEALER TO THE OUTSIDE BOTTOM EDGES OF THE DRAIN PLATE.
3. INSERT THE DRAIN TUBE INTO THE HOLE AND PRESS THE DRAIN PLATE DOWN TO FORM A WATERTIGHT SEAL AGAINST THE SLEEVE BASE.
4. DRILL A .625" DIAMETER HOLE IN THE BOTTOM OF THE BASE PAN AS SHOWN IN THE ILLUSTRATION. THIS HOLE ALLOWS CONDENSATE TO ENTER THE WALL SLEEVE WHERE IT TRAVELS TO THE DRAIN KIT FOR DISPOSAL.

Friedrich

WallMaster® DRAIN KIT (DK)

ASSEMBLY & INSTALLATION INSTRUCTIONS

⚠ WARNING



CUT/SEVER HAZARD

Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc. Failure to do so could result in serious injury.

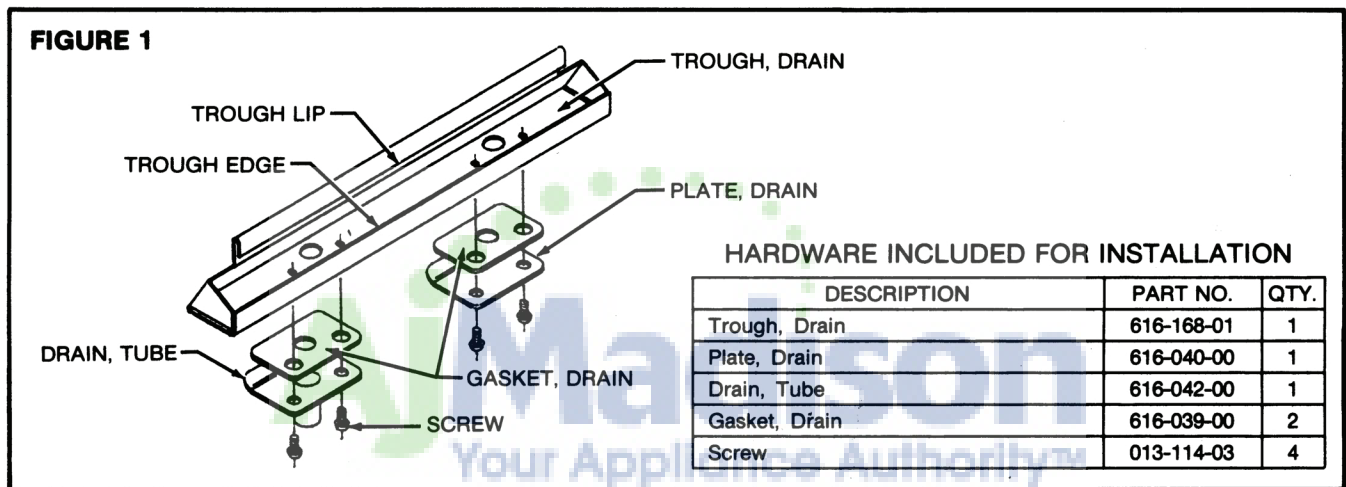
⚠ WARNING



EXCESSIVE WEIGHT HAZARD

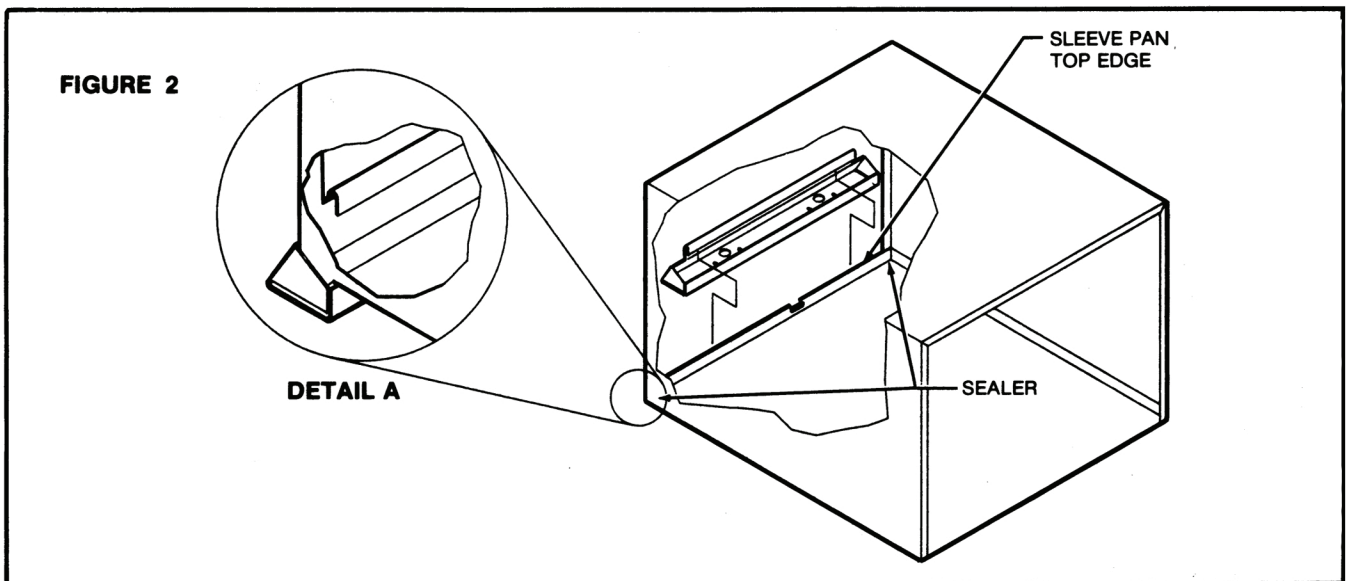
Use two people to lift or carry the unit, and wear proper protective clothing. Failure to do so may result in serious personal injury.

STEP 1. Assemble drain tube and drain plate using both gaskets as shown in Figure 1. It is optional as to which side the drain tube is placed.



STEP 2. With air conditioner unit (and weather panel, if present) removed from sleeve, remove rear louvered grille through the indoor opening.

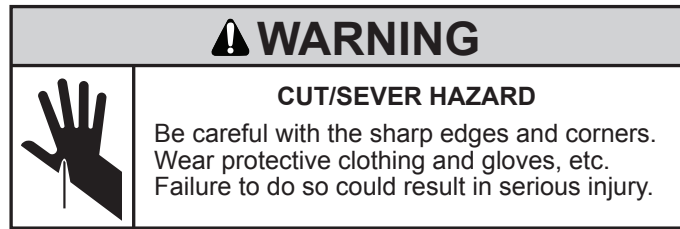
STEP 3. Care must be taken not to drop the drain kit outside. By reaching through the sleeve, butt the trough edge against bottom of outside sleeve. The lip of the trough fits over the top edge of the sleeve pan, as shown in Figure 2.



STEP 4. Push the trough down so that the sleeve pan edge seats in the trough lip as shown in Detail A.

NOTE: The bottom rear corners of the sleeve **MUST** be sealed with silicone caulk (not provided).

INSTALLATION INSTRUCTIONS SUBBASE FOR WS, WE & WY MODELS



These instructions are provided for installation of the WallMaster Subbase. This accessory subbase can be used whenever a WallMaster air conditioner is installed in a wall from 2" to 12" thick, or when additional support or leveling of the unit is desired.

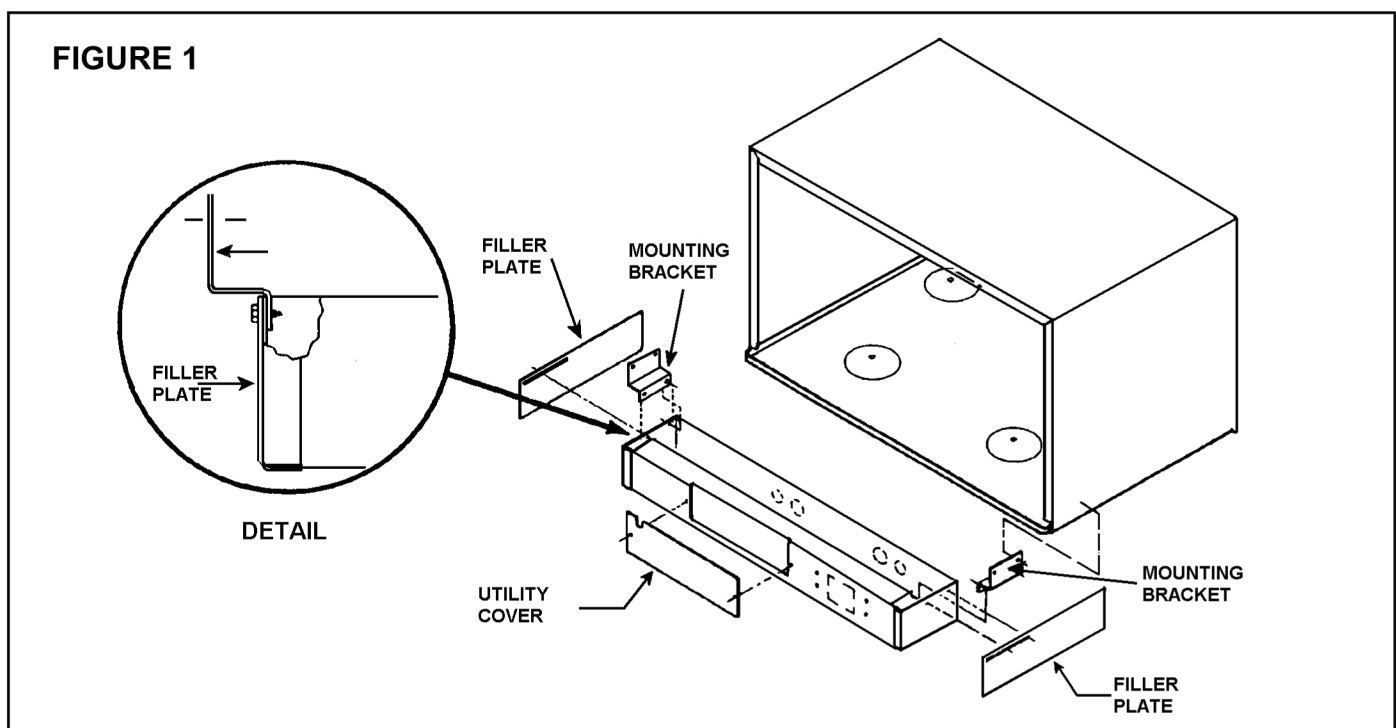
NOTE: The subbase should be assembled to the WSC sleeve before sleeve is installed in the wall, however it may be used with existing installations.

ELECTRICAL DATA

- STEP 1.** A field supplied receptacle to match chassis plug may be installed for power cord connections. Also, a location for an optional field-supplied disconnect switch is available.
- STEP 2.** Refer to chassis nameplate for proper circuit requirements.
- STEP 3.** All wiring must comply with local and national electrical codes.

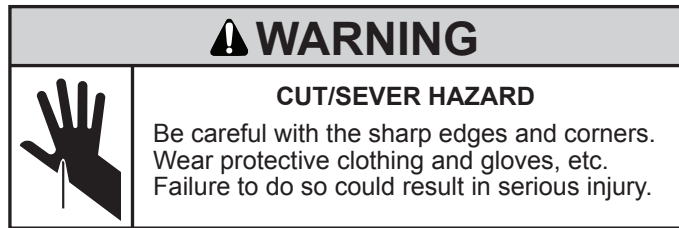
INSTALLATION INSTRUCTIONS

- STEP 1.** Attach left and right side template to WSC sleeve as indicated. Drill two 9/64" diameter holes in both sides. Remove templates.
- STEP 2.** Attach mounting brackets to sides of subbase and filler plate with four 3/8" phillips screws as shown in Figure 1. Do not tighten.





INSTALLATION INSTRUCTIONS ARCHITECTURAL GRILLE MODEL AG



These instructions cover the installation on an Architectural Grille, Model AG, into a WSC model solid-side sleeve. The Architectural Grille must be installed just prior to the installation of the air conditioner chassis.

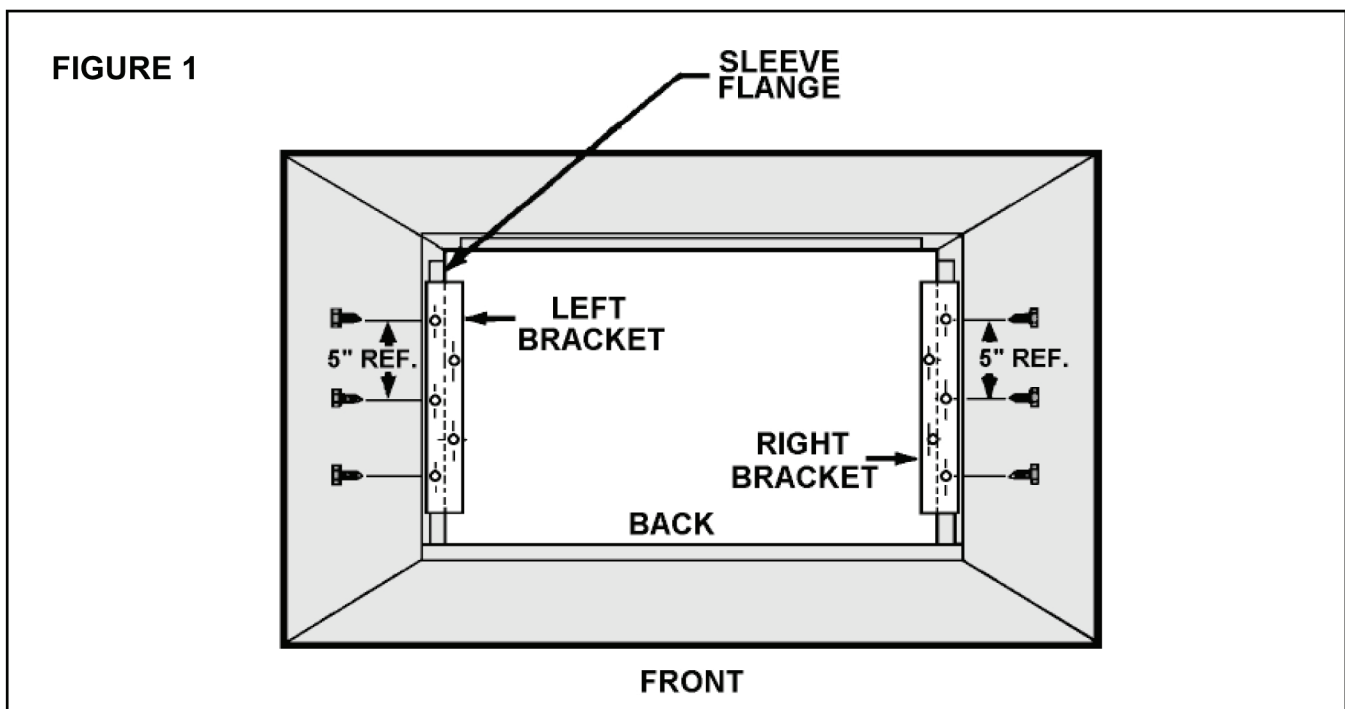
The contents of the package are:

1. AG Architectural Grille
2. Brackets, 2 each
3. Fiber strap
4. Screws (10 each)
5. Instructions


Tools required for installation: A flat-blade screwdriver or 1/4" hex. nut driver.

STEP 1. WSC sleeve should have been installed as specified in the Sleeve Installation Instructions. Remove the front closure panel, louvered metal grille and back weather panel in the sleeve. Should the air conditioner chassis be in the sleeve, remove the chassis and the louvered metal grille using proper procedures.

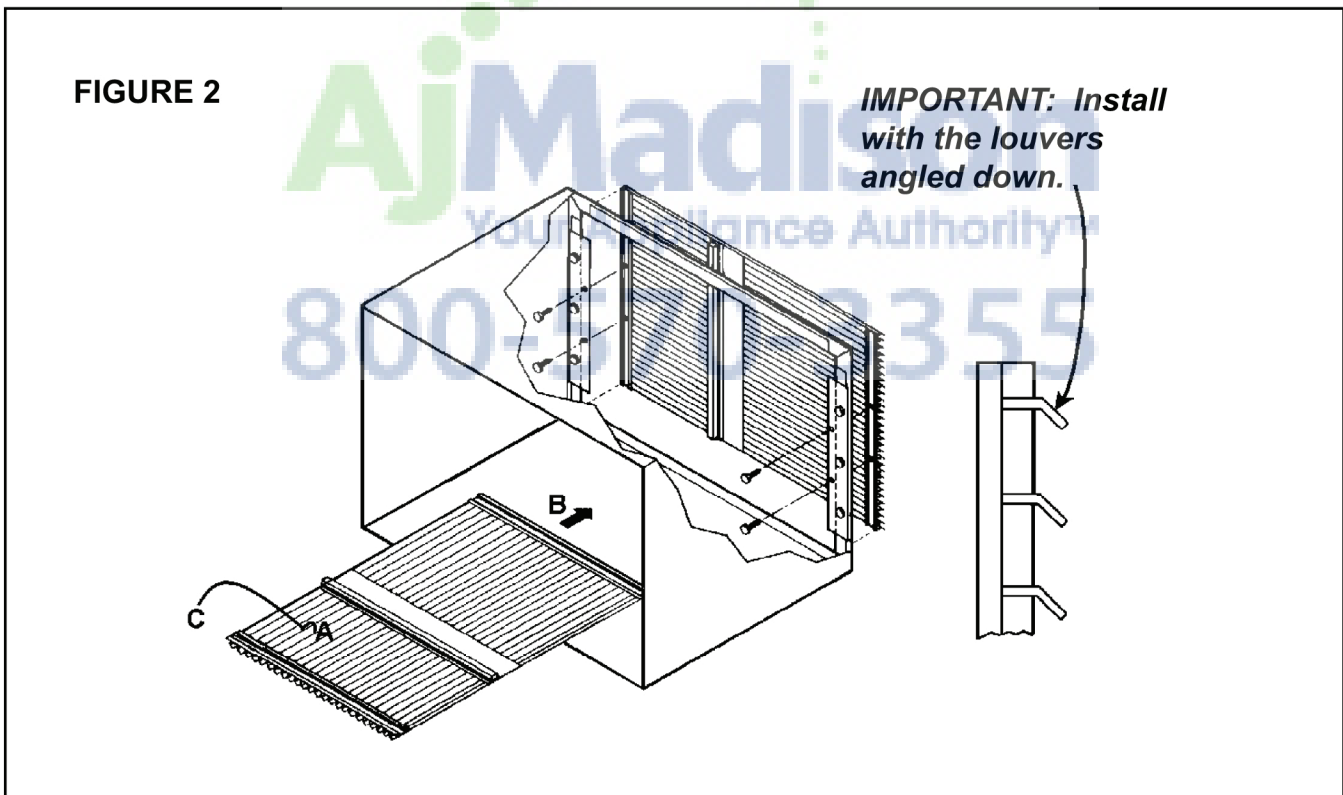
STEP 2. Install the mounting brackets. The brackets are not interchangeable. See Figure 1 below to identify the correct bracket. Position the left bracket on the left flange inside of the WSC sleeve, towards the back, so that the three holes on the bracket line up with the holes on the sleeve flange (same holes used to mount the louvered grille just removed). Mount with the three screws provided. Repeat the procedure to install the right side bracket. See Figure 1.



STEP 3. Install Grille — See Figure 2.

⚠ WARNING	
	CUT/SEVER HAZARD Be careful with the sharp edges and corners. Wear protective clothing and gloves, etc. Failure to do so could result in serious injury.

- A. If the sleeve is installed in a wall above the ground floor, tie the fiber strap provided to one of the horizontal louvers. Tie the other end to any stationary object to prevent damage or injury if the grille is accidentally dropped.
- B. Pass the grille out through the rear opening. Locate the grille so that the louvers are pointing to the outside and down. The mounting holes in the left and right vertical rails must match up with the open holes in the brackets. Fasten the grille with the remaining screws provided. Tighten the screws.
- C. Remove the fiber strap.
- D. Slide the air conditioner chassis into the sleeve according to the chassis instructions.





Friedrich Air Conditioning Company
P.O. Box 1540
San Antonio, TX 78295
210.357.4400
www.friedrich.com

WALLMASTER® THRU-THE-WALL AIR CONDITIONERS LIMITED WARRANTY

FIRST YEAR

ANY PART: If any part supplied by FRIEDRICH fails because of a defect in workmanship or material within twelve months from date of original purchase, FRIEDRICH will repair the product at no charge, provided room air conditioner is reasonably accessible for service. Any additional labor cost for removing inaccessible units and/or charges for mileage related to travel by a Service Agency that exceeds 25 miles one way will be the responsibility of the owner. This remedy is expressly agreed to be the exclusive remedy within twelve months from the date of the original purchase.

SECOND THROUGH FIFTH YEAR

SEALED REFRIGERANT SYSTEM: If the Sealed Refrigeration System (defined for this purpose as the compressor, condenser coil, evaporator coil, reversing valve, check valve, capillary, filter drier, and all interconnecting tubing) supplied by FRIEDRICH in your Room Air Conditioner fails because of a defect in workmanship or material within sixty months from date of purchase, FRIEDRICH will pay a labor allowance and parts necessary to repair the Sealed Refrigeration System; **PROVIDED** FRIEDRICH will not pay the cost of diagnosis of the problem, removal, freight charges, and transportation of the air conditioner to and from the Service Agency, and the reinstallation charges associated with repair of the Sealed Refrigeration System. All such cost will be the sole responsibility of the owner. This remedy is expressly agreed to be the exclusive remedy within sixty months from the date of the original purchase.

APPLICABILITY AND LIMITATIONS: This warranty is applicable only to units retained within the Fifty States of the U.S.A., District of Columbia, and Canada. This warranty is not applicable to:

1. Air filters or fuses.
2. Products on which the model and serial numbers have been removed.
3. Products which have defects or damage which results from improper installation, wiring, electrical current characteristics, or maintenance; or caused by accident, misuse or abuse, fire, flood, alterations and/or misapplication of the product and/or units installed in a corrosive atmosphere, default or delay in performance caused by war, government restrictions or restraints, strikes, material shortages beyond the control of FRIEDRICH, or acts of God.

OBTAINING WARRANTY PERFORMANCE: Service will be provided by the **FRIEDRICH Authorized Dealer or Service Organization** in your area. They are listed in the Yellow Pages. If assistance is required in obtaining warranty performance, write to: Room Air Conditioner Service Manager, Friedrich Air Conditioning Co., P.O. Box 1540, San Antonio, TX 78295-1540.

LIMITATIONS: THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES. Anything in the warranty notwithstanding, ANY IMPLIED WARRANTIES OF FITNESS FOR PARTICULAR PURPOSE AND/OR MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THIS EXPRESS WARRANTY. MANUFACTURER EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGE FOR BREACH OF ANY EXPRESSED OR IMPLIED WARRANTY.

Performance of Friedrich's Warranty obligation is limited to one of the following methods:

1. Repair of the unit
2. A refund to the customer for the prorated value of the unit based upon the remaining warranty period of the unit.
3. Providing a replacement unit of equal value

The method of fulfillment of the warranty obligation is at the sole discretion of Friedrich Air Conditioning.

NOTE: Some states do not allow limitations on how long an implied warranty lasts, or do not allow the limitation or exclusion of consequential or incidental damages, so the foregoing exclusions and limitations may not apply to you.

OTHER: This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

PROOF OF PURCHASE: Owner must provide proof of purchase in order to receive any warranty related services.

All service calls for explaining the operation of this product will be the sole responsibility of the consumer.

All warranty service must be provided by an **Authorized FRIEDRICH Service Agency**, unless authorized by FRIEDRICH prior to repairs being made.

NOTES



TECHNICAL SUPPORT CONTACT INFORMATION

The logo for Friedrich, featuring a stylized 'F' icon followed by the word 'Friedrich' in a bold, italicized sans-serif font. A registered trademark symbol (®) is located at the end of the word. There are faint green dots above the 'i' and 'c' in 'Friedrich'.

FRIEDRICH AIR CONDITIONING CO.

Post Office Box 1540 · San Antonio, Texas 78295-1540

4200 N. Pan Am Expressway · San Antonio, Texas 78218-5212

(210) 357-4400 · FAX (210) 357-4490

www.friedrich.com

Printed in the U.S.A.



Friedrich®

FRIEDRICH AIR CONDITIONING CO.
Post Office Box 1540 · San Antonio, Texas 78295-1540
4200 N. Pan Am Expressway · San Antonio, Texas 78218-5212
(210) 357-4400 · FAX (210) 357-4490
www.friedrich.com

Printed in the U.S.A.

WM-ServMan (04-09)