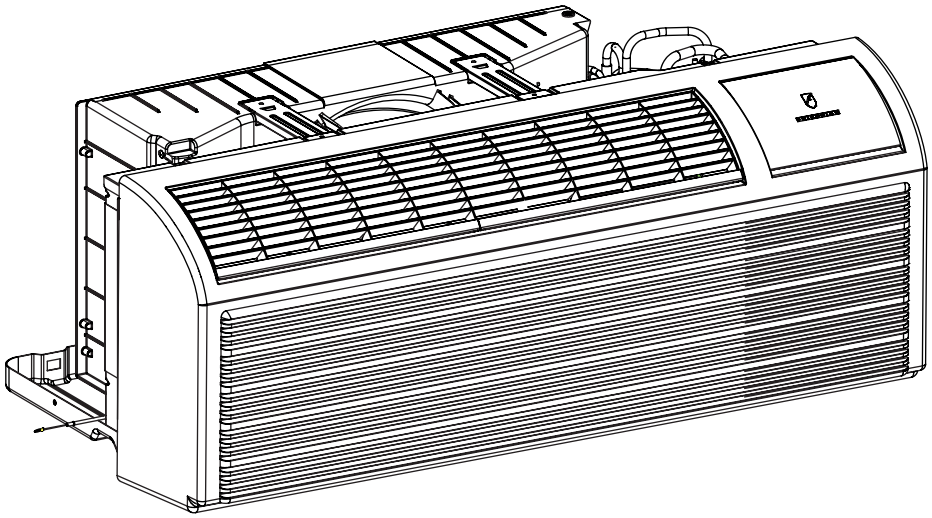
FRIEDRICH

Freshaire® R-32 Series PTAC Packaged Terminal Air Conditioners & Heat Pumps

Service Manual



Standard Chassis Models Using R-32 Refrigerant

9K	**PVH09K3FC, PVH09R3FC**
12K	**PVH12K3FC, PVH12R3FC**

THE EXPERTS IN ROOM AIR CONDITIONING

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INTRODUCTION

Important Safety Information

The information in this manual is intended for use by a qualified 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.

Maintenance is the responsibility of the owner. Failure to properly maintain or repair equipment may result in personal injury and/or various types of property damage (fire, flood, etc.).

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.
Due to continuing research in new energy-saving technology, all information in this manual is subject to change without notice.

This service manual is designed to be used in conjunction with the installation and operation manuals provided with each air conditioning system.
This service manual was written to assist the professional service technician to quickly and accurately diagnose and repair malfunctions.

Installation procedures are not given in this manual. They are given in the Installation/Operation manual which can be acquired on the Friedrich website. Click the Link or scan the QR code to be directed to the Professional page where you can locate our technical literature.

SAFETY IS 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 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.

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

WARNING Indicates a hazard which, if not avoided, can result in severe personal injury or death and damage to product or other property.

CAUTION Indicates a hazard which, if not avoided, can result in personal injury and damage to product or other property.

NOTICE Indicates property damage can occur if instructions are not followed.

This symbol indicates that this appliance uses a flammable refrigerant. If the refrigerant is leaked and is exposed to an external ignition source, there is a risk of fire.

This symbol indicates that the Operation Manual should be read carefully.

This symbol indicates that service personnel should be handling this equipment with reference to the installation manual.

This symbol indicates that information is available such as the Installation and Operation manual, or the Service Manual.

INTRODUCTION

Personal Injury Or Death Hazards

⚠WARNING: The manufacturer's warranty does not cover any damage or defect to the air conditioner caused by the attachment or use of any components, accessories or devices (other than those authorized by the manufacturer) into, onto or in conjunction with the air conditioner. You should be aware that the use of unauthorized components, accessories or devices may adversely affect the operation of the air conditioner and may also endanger life and property. The manufacturer disclaims any responsibility for such loss or injury resulting from the use of such unauthorized components, accessories or devices.

⚠WARNING: This appliance is not intended for use by persons (Including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

⚠WARNING: The maximum altitude for this appliance is 2,000 meters(6,562 feet).

Do not use above 2,000 meters(6,562 feet).

⚠WARNING: Electrical Shock Hazard

Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to the National Code and all local codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: Read Installation Manual

Read this manual thoroughly prior to equipment installation or operation. It is the installer's responsibility to properly apply and install the equipment. Installation must be in conformance with the NFPA 70-2023 national electric code or current edition, International Mechanic code 2021 or current edition, and any other local or national codes.

⚠WARNING: Safety First

Do not remove, disable, or bypass this unit's safety devices. Doing so may cause fire, injuries, or death.

⚠WARNING: This Product uses R-454B Refrigerant

Refrigerant Safety Group A2L

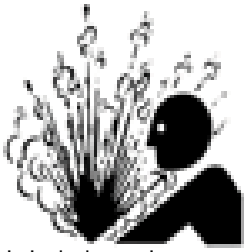
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠WARNING: Refrigeration System under High pressure



Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R454B systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

⚠CAUTION: Do Not Operate Equipment During Active Stages Of Construction

To ensure proper operation, Friedrich requires that all equipment is not operated during active construction phases. This includes active stages of completing framing, drywalling, spackling, sanding, painting, flooring, and moulding in the equipment's designated conditioning space. The use of this equipment during construction could result in premature failure of the components and/or system and is in violation of our standard warranty guidelines. The operation of newly installed equipment during construction will accelerate the commencement and/or termination of the warranty period.

⚠WARNING: Keep all air circulation and ventilation openings free from obstruction.

⚠WARNING: The unit should not be in contact with any equipment that will transmit vibration to the unit. Any excessive vibration or pulsation to the unit could result in damage to the refrigerant tubing.

INTRODUCTION

Personal Injury Or Death Hazards

SAFETY FIRST	⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
	Do not remove, disable or bypass this unit's safety devices. Doing so may cause fire, Doing so may cause fire, injuries, or death.	Ne pas supprime, désactiver ou contourner cette l´unité des dispositifs de sécurité, faire vous risqueriez de provoquer le feu, les blessures ou la mort.	No eliminar, desactivar o pasar por alto los dispositivos de seguridad de la unidad. Si lo hace podría producirse fuego, lesiones o muerte.

⚠ WARNING
ALWAYS USE INDUSTRY STANDARD PERSONAL PROTECTIVE EQUIPMENT (PPE)

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 water on the air conditioning unit while the power is on.
- 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.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Use on a properly grounded outlet only.
- Do not cut or modify the power supply cord or remove the ground prong of the plug.
- Never operate the unit on an extension cord.
- Follow all safety precautions and use proper and adequate protective safety aids such as: gloves, goggles, clothing, properly insulated tools, and testing equipment etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

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Personal Injury Or Death Hazards

- **REFRIGERATION SYSTEM REPAIR HAZARDS:**

- Use approved standard refrigerant recovering procedures and equipment to relieve high 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 certain to protect personal and surrounding property with fire proof materials and 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.

- **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 the 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 the 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.
- Be extremely careful when using acetylene torch and protect surrounding property.
- 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 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 damage to the unit and/or minor to serious property damage.

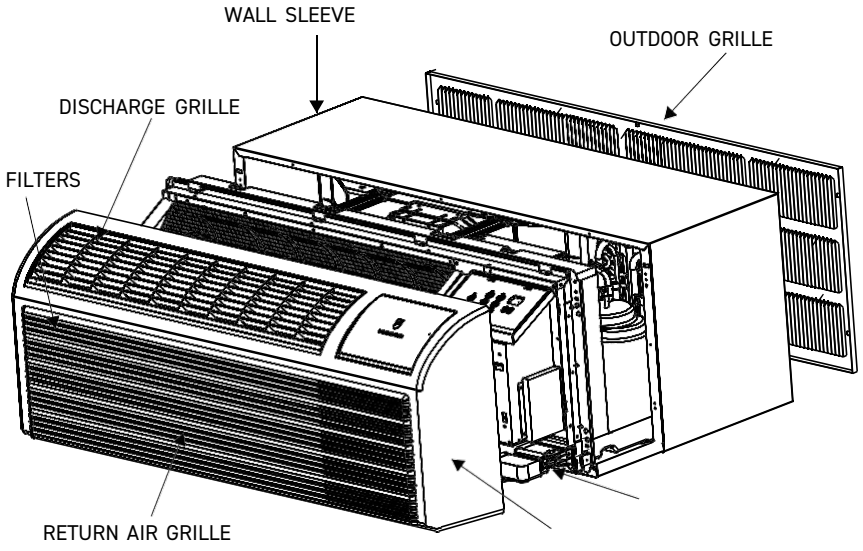
INTRODUCTION

Operation of Equipment in During Construction

- **OPERATION OF EQUIPMENT MUST BE AVOIDED DURING CONSTRUCTION PHASES WHICH WILL PRODUCE AIR-BORNE DUST OR CONTAMINATES NEAR OR AROUND AIR INTAKE OPENINGS:**
- Wood or metal framing;
- Dry walling or sheathing,
- Spackling or applying joint compound.
- Sanding or grinding.
- Moulding or trim work.

NOTICE
Operating the equipment during any phase of active construction noted above can void the equipment's warranty, also leading to poor performance and premature failure

Typical Unit Components and Dimensions

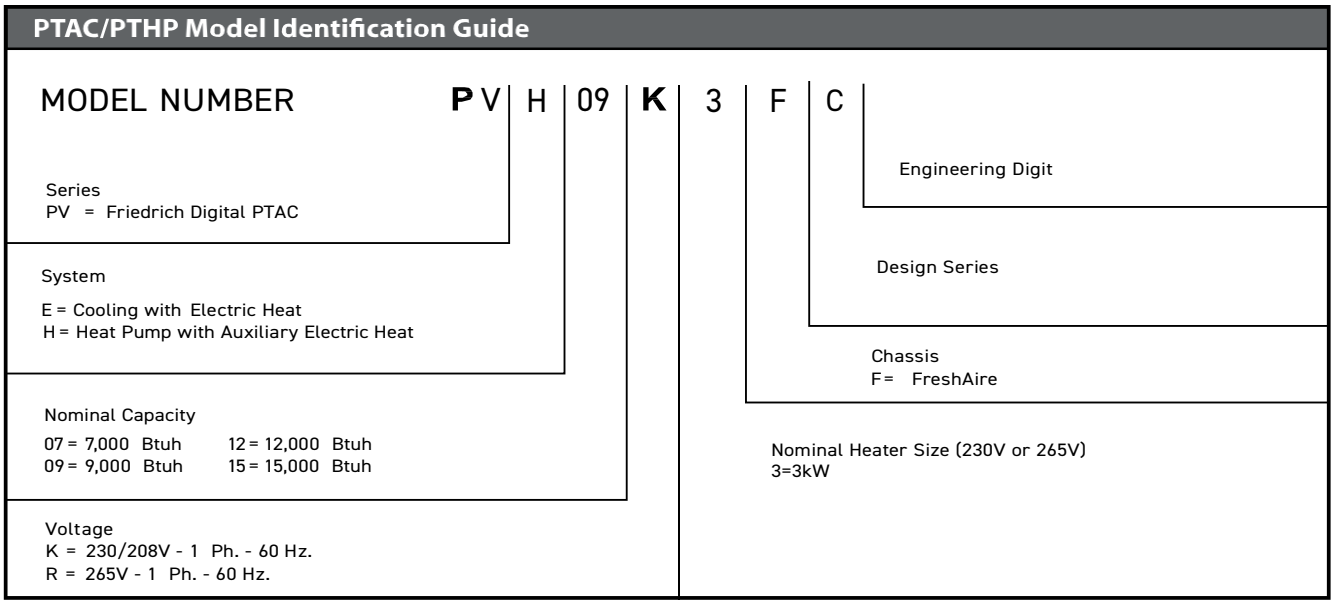


PDXWS Wall Sleeve
Dimensions: 16" H x 42" W x 13-¾" D
Front Cover Dimensions:
16" H x 42" W x 7-¾" D

Cut-Out Dimensions:
16-¼" x 42-¼"

INTRODUCTION

Model Number Reference Guide



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.

Figure 103

Serial Number Reference Guide

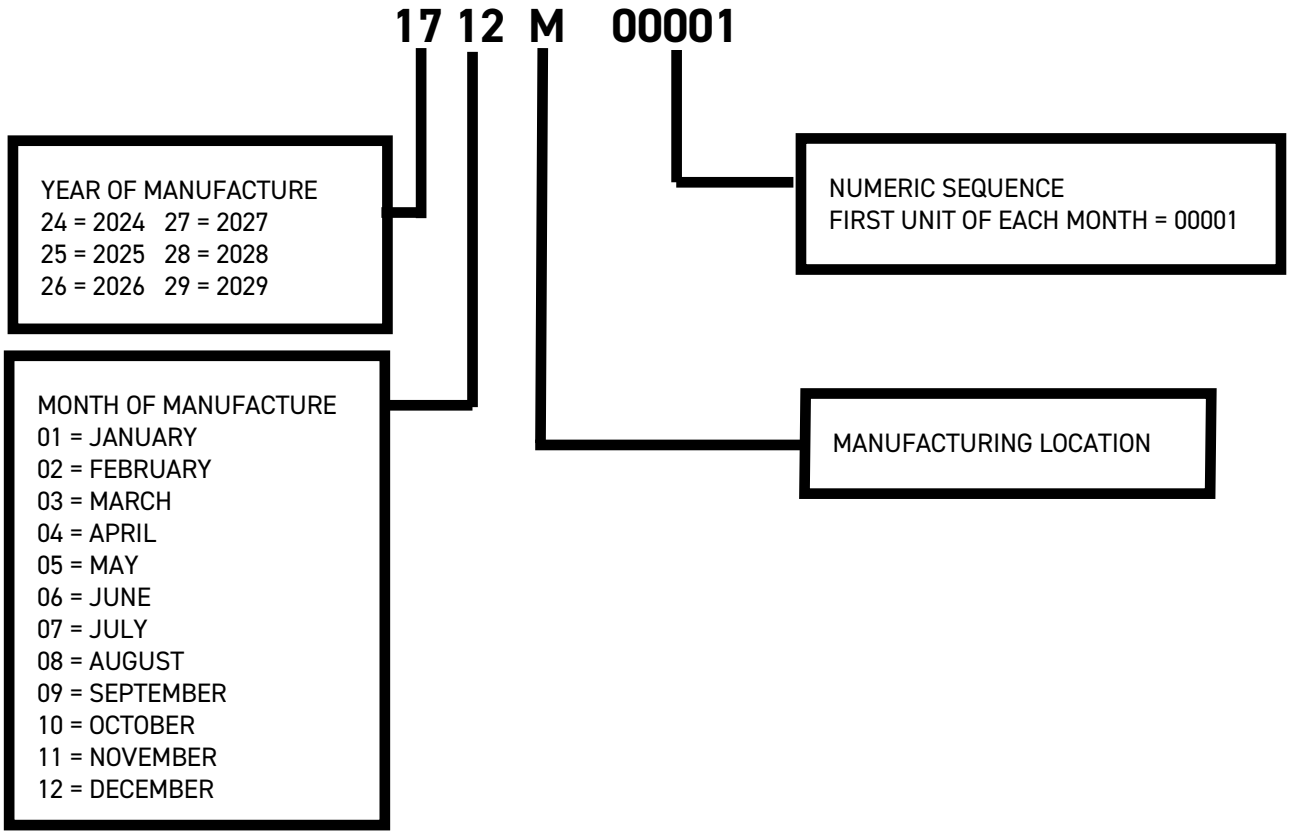


Figure 104

INTRODUCTION

Product Features

Friedrich PTAC Digital Control and Unit Features

The new Friedrich digital PTAC has state of the art features to improve guest comfort, indoor air quality and conserve energy. Through the use of specifically designed control software for the PTAC industry Friedrich has accomplished what other Manufacturer's have only attempted – a quiet, dependable, affordable and easy to use PTAC. Below is a list of features and their benifit to the owner.

ONLY TWO MODELS	
BETTER DEHUMIDIIFICATION	
SOFT START OPERATION	
MERV 8 OUTDOOR AIR FILTER	
DC INVERTER	FreshAire PTACs utilize a DC inverter rotary compressor to ensure part load efficiencies and reliable operation.
REMOTE THERMOSTAT OPERATION	Some applications require the use of a wall-mounted thermostat. All new Friedrich PTACs may be switched from unit control to remote thermostat control easily without the need to order a special model or accessory kit.
INTERNAL DIAGNOSTIC PROGRAM	The Friedrich digital PTAC features a self-diagnostic program that can alert maintenance to component failures or operating problems. The internal diagnostic program saves properties valuable time when diagnosing running problems.
ELECTRONIC TEMPERATURE LIMITING	By limiting the operating range, the property can save energy by eliminating "max cool" or "max heat" situations common with older uncontrolled systems. The new electronic control allows owners to set operating ranges for both heating and cooling independently of one another.
ROOM FREEZE PROTECTION	When the PTAC senses that the indoor room temperature has fallen to 50˚F, the unit will cycle on the fan (high) and the electric strip heat to raise the room temperature to 55˚F, and then cycle off again. This feature works regardless of the mode selected and can be turned off.
CONDENSATE REMOVAL SYSTEM	Condenser fan utilizes slinger ring technology to pick up condensate from the base pan and disperse it on to the condenser coil where it evaporates. This helps to cool the coil and increase the energy efficiency of the unit.
UNIVERSAL ELECTRIC HEATER	Unit has a universal power cord with 20 Amp coming standard out of the box.
FACTORY RUN-TEST	All units are factory run tested to ensure trouble free operation.

INTRODUCTION

Product Features

DIGITAL DEFROST THERMOSTAT	The PV-Series uses a digital thermostat to accurately monitor the outdoor coil conditions to allow the heat pump to run whenever conditions are correct. Running the PTAC in heat pump mode saves energy and reduces operating costs. The digital thermostat allows maximization of heat pump run time.
INSTANT HEAT HEAT PUMP MODE	Heat pump models will automatically run the electric heater to quickly bring the room up to temperature when initially energized, then return to heat pump mode. This ensures that the room is brought up to temperature quickly without the usual delay associated with heat pump units.
SEPARATE HEAT/COOL FAN CYCLE CONTROL	The owner may choose between fan cycling or fan continuous mode based on property preference. Fan continuous mode is used to keep constant airflow circulation in the room during all times the unit is 'ON'. Fan cycle will conserve energy by only operating the fan while the compressor or electric heater is operating. The ability to set the fan cycling condition independently between heating and cooling mode will increase user comfort by allowing the choice of only constantly circulating air in the summer or winter time (unlike other PTAC brands that only allow one selection).
EMERGENCY HEAT OVERRIDE	In the event of a compressor failure in heat pump mode, the compressor may be locked out to provide heat through the resistance heater. This feature ensures that even in the unlikely event of a compressor failure, the room temperature can be maintained until the compressor can be serviced.
CENTRAL DESK CONTROL READY(ONLY FOR UNIT CONTROL)	All Friedrich digital PTACs have low voltage terminals ready to connect a central desk control energy management system. Controlling the unit from a remote location like the front desk can reduce energy usage and requires no additional accessories on the PTAC unit.
INDOOR COIL FROST SENSOR	The frost sensor protects the compressor from damage in the event that airflow is reduced or low outdoor temperatures cause the indoor coil to freeze. When the indoor coil reaches 33°F, the compressor is disabled and the fan continues to operate based on demand. Once the coil temperature returns to 53°F, the compressor returns to operation.
ULTRAQUIET AIR SYSTEM	The PV-Series units feature an indoor fan system design that reduces sound levels without lowering airflow or preventing proper air circulation.
HIGH EFFICIENCY	The Friedrich PTAC has been engineered so that all functional systems are optimized so that they work together to deliver the highest possible performance.
DUAL MOTOR	The dual-motor design means that the indoor motor can run at slower speeds which reduces sound levels indoors.
ROTARY COMPRESSOR	High efficiency rotary compressors are used on all Friedrich PTACs to maximize durability and efficiency.
TOP-MOUNTED AIR FILTERS	All Friedrich PTAC return air filters and PXFTB replacement filter kits are washable, reusable and easily accessed from the top of the unit without the removal of the front cover.
FILTERED FRESH AIR INTAKE	Friedrich PTAC units are capable of introducing up to 40 CFM of outside air into the conditioned space. The outdoor air passes through a washable mesh screen to prevent debris from entering the airstream.
ALUMINIUM ENDPLATES	Outdoor coil endplates made from aluminium reduce corrosion on the outdoor coil common with other coil designs.
R-32 REFRIGERANT	Friedrich PTAC units use environmentally-friendly refrigerant.
BREAK-PROOF CONTROL DOOR	Break-proof control door design maintains the integrity of the unit.
GALVANIZED ZINC WALL SLEEVE AND BASE PAN	Galvanized zinc coated steel wall sleeve and steel base pan undergo an 11-step preparation process, are powder coated with a polyester finish and cured in an oven for exceptional durability.

SPECIFICATIONS

Table 201

General Specifications

Specification	Unit	PVH09K3FC	PVH12K3FC	PVH09R3FC	PVH12R3FC
Power supply	(V-Ph-Hz)	230V-208V/1Ph/60Hz	230V-208V/1Ph/60Hz	265V/1Ph/60Hz	265V/1Ph/60Hz
Operation Volt Range	V	253–187	253–187	292–239	292–239
Cooling Capacity - Test Data	BTU	10240/10190	12470/12430	10150	12430
Cooling Capacity - Rated	BTU	9800/9700	12000/11800	9800	12000
Reverse Cooling Capacity Min./ Max.	BTU	5800-12000	6100-15500	5800-12000	6100-15500
Cooling Watts - Test Data	W	818/822	1033/1040	819	1022.7
Cooling Watts - Rated	W	815/805	1040/1025	815	1040
EER - Test Data		12.52/12.39	12.08/11.94	12.4	12.2
EER - Rated		12.0/12.0	11.5/11.5	12.0/12.0	11.5
Heating Capacity - Test Data	BTU	8883/8839	11935/11875	9060	11980
Heating Capacity - Rated	BTU	8500/8400	11700/11700	8500	11700
Heating Watts - Test Data	W	711/701	891.2/885.9	733	886
Heating Watts - Rated	W	710/700	940/940	710	940
Reverse Heating Capacity Min./ Max.	BTU	5500-10800	6000-14000	5500-10800	6000-14000
COP - Test Data		3.66/3.7	3.93/3.93	3.6	4.0
COP - Rated		3.51/3.51	3.65/3.65	3.5	3.7
Rated Moisture Removal (pints/hour)	P/H	1.4	1.9	1.2	2.4
Sensible Heat Ratio		77.3%	77.4%	78%	78.6%
Reverse Cooling Current	A	3.9/3.6	4.9/4.5	3.1	3.9
Reverse Heating Current	A	3.4/3.1	4.5/4.1	2.7	3.5
Power Factor		1.0	1.0	0.9	1.0
Electric Heating Capacity (230/208V)	Btu/h	12000/9900	17000/13900	12000	12000
Electric Heating Power input (230/208V)	W	3550/2900	5050/4135	3550	3550
Electric Heating Rated current (230/208V)	A	6.1	19.87/21.95	13.4	13.4
Refrigerant Charge Amount	Oz	24.3	27.2	24.3	24.3
Compressor brand		GMCC	GMCC	GMCC	GMCC
Compressor LRA	A	/	/	/	/
Compressor RLA	A	3.2	4.1	2.8	3.5
Indoor Motor Type		DC	DC	DC	DC
Indoor Fan Motor Power	HP	0.0	0.0	0.0	0.0
Indoor Fan Motor RLA	A	0.4	0.4	0.4	0.4
Outdoor Motor Type		AC	AC	AC	AC
Outdoor Fan Motor Power	HP	0.1	0.1	0.1	0.1
Outdoor Fan Motor RLA	A	0.4	0.4	0.4	0.4
Indoor Fan CFM, High	CFM	700	750	700	780
Indoor Fan CFM, Low	CFM	535	560	535	560
MUA Fan CFM	CFM	UP TO 52	UP TO 52	UP TO 52	UP TO 52
Indoor Fan Noise Level(turn on the fresh air)	dBA	52~54 Fan mode	52~55 Fan mode	53~54 Fan mode	52~55 Fan mode

SPECIFICATIONS

Table 201

General Specifications

Specification	Unit	PVH09K3FC	PVH12K3FC	PVH09R3FC	PVH12R3FC
Indoor Fan Noise Level(turn off the fresh air)	dBA	41~49 Fan mode	44~53 Fan mode	44~49 Fan mode	44~52 Fan mode
Indoor Fan Noise Level(turn on the fresh air)cooling mode	dBA	55~56(cooling mode)	54~56(cooling mode)	54~55(cooling mode)	55~56(cooling mode)
Indoor Fan Noise Level(turn off the fresh air)cooling mode	dBA	55~56(cooling mode)	51~55(cooling mode)	52~53(cooling mode)	53~56(cooling mode)
Indoor Fan Noise Level(turn on the fresh air)heating mode	dBA	54~55(heating mode)	54~56(heating mode)	55~56(heating mode)	55~57(heating mode)
Indoor Fan Noise Level(turn off the fresh air)heating mode	dBA	52~54(heating mode)	52~55(heating mode)	52~53(heating mode)	54~56(heating mode)
Outdoor Fan Noise Level (turn on the fresh air)	dBA	68	70	68	68
Outdoor Fan Noise Level (turn off the fresh air)	dBA	68	70	67	67
Outdoor operating temperature range, cooling	F	60.8 ~ 89.6	60.8 ~ 89.6	60.8 ~ 89.6	60.8 ~ 89.6
Outdoor operating temperature range, heating	F	32 ~ 86	32 ~ 86	32 ~ 86	32 ~ 86
Dimensions, HxWxD	inch	41 31/32*21 1/16*16 1/16		41 31/32*21 1/16*16 1/16	
Net Weight	lbs	120	136	120	136
Gross Weight	lbs	141	157	141	157

SPECIFICATIONS

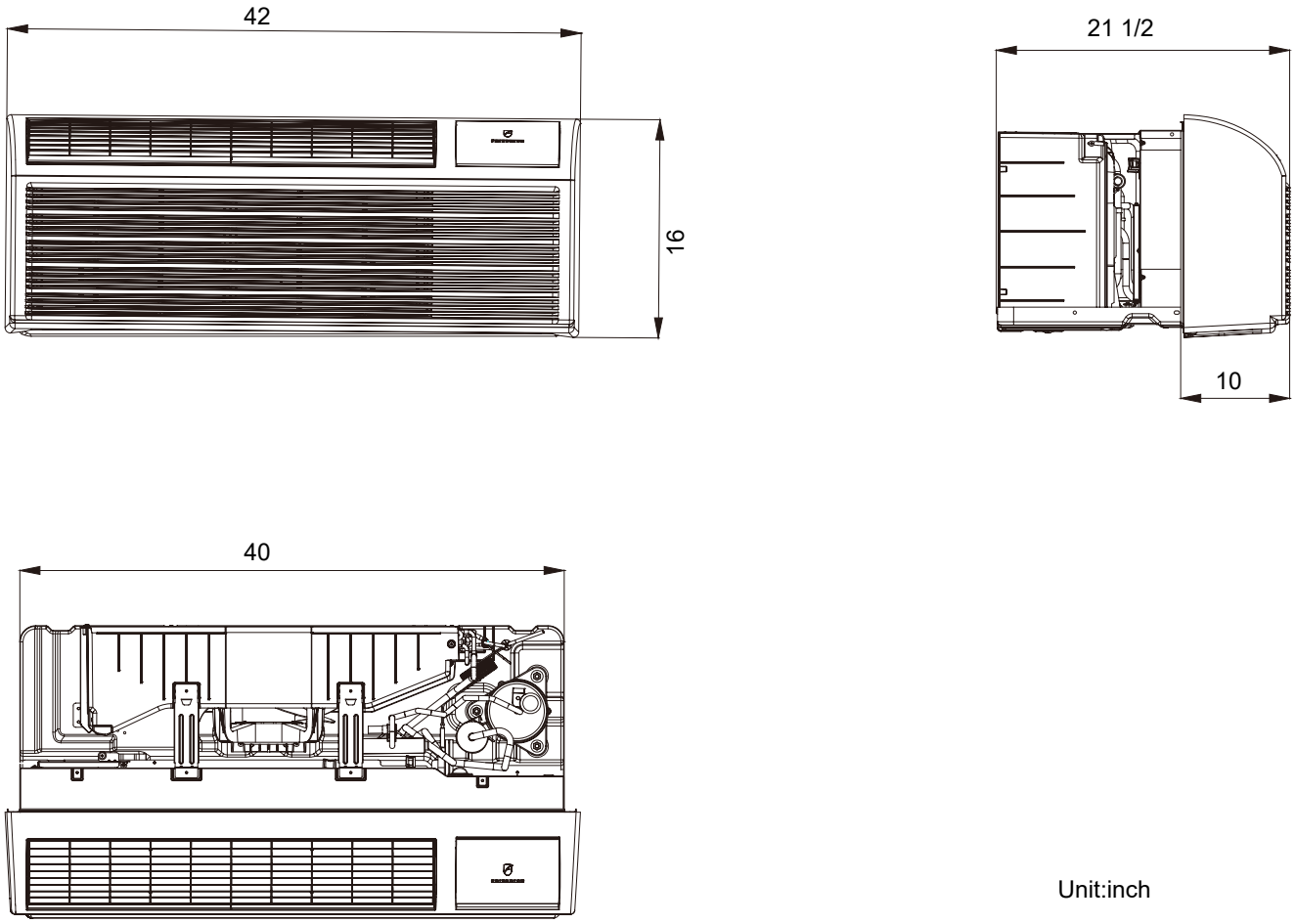
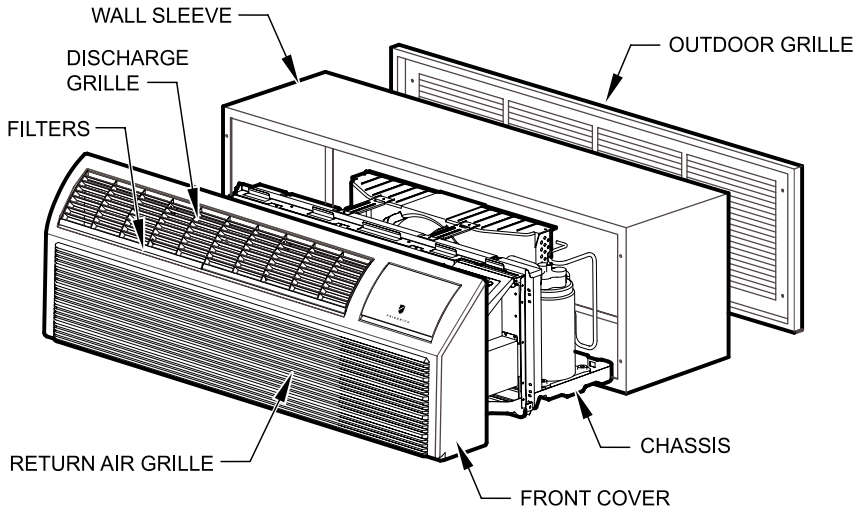


Figure 202 (Chassis Specs)



PDXWS Wall Sleeve Dimensions:
16" H x 42" W x 13-¾" D

Front Cover Dimensions:
16" H x 42" W x 7-¾" D

Cut-Out Dimensions:
16-¼" x 42-¼"

Figure 203 (Typical Unit Components and Dimensions)

SPECIFICATIONS

Electrical Data

All 230/208 volt units are equipped with LCDI power cords.

All 265 volt units are equipped with non-LCDI power cords.

NOTE: Use Copper Conductors ONLY. Wire sizes are per NEC, check local codes for overseas applications.

NOTE: Use on single dedicated circuit within specified amperage rating.

Table 204 RECEPTACLES AND FUSE TYPES

Voltage	230V			265V		
Amps	15	20	30	15	20	30
Heater Size	2.5 kW	3.5 kW	5.0 kW	2.5 kW	3.5 kW	5.0 kW
Receptacles						
NEMA# Receptacle	6-15R	6-20R	6-30R	7-15R	7-20R	7-30R
NEMA# Plug	6-15P	6-20P	6-30P	7-15P	7-20P	7-30P

⚠WARNING

Electrical Shock Hazard

Turn off electrical power before service or installation.

ALL electrical connections and wiring **MUST** be installed by a qualified electrician and conform to the National Code and all local codes which have jurisdiction.

Failure to do so can result in property damage, personal injury and/or death.

FUSE/CIRCUIT BREAKER	Use ONLY type and size fuse or HVAC/R circuit breaker indicated on unit's rating plate. Proper current protection to the unit is the responsibility of the owner. NOTE: A time delay fuse is provided with 265V units.
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. The field supplied outlet must match plug on service cord and be within reach of service cord. Refer to Table 1 for proper receptacle and fuse type. Do NOT alter the service cord or plug. Do NOT use an extension cord.
RECEPTACLE	The field supplied outlet must match plug on service cord and be within reach of service cord. Refer to Table 1 for proper receptacle and fuse type. Do NOT alter the service cord or plug. Do NOT use an extension cord.

B. Power Cord Information (230/208V models only)

All Friedrich 230/208V PTAC units are shipped from the factory with a Leakage Current Detection Interrupter (LCDI) equipped power cord. The LCDI device meets the UL and NEC requirements for cord connected air conditioners effective August 2004.

To test your power supply cord:

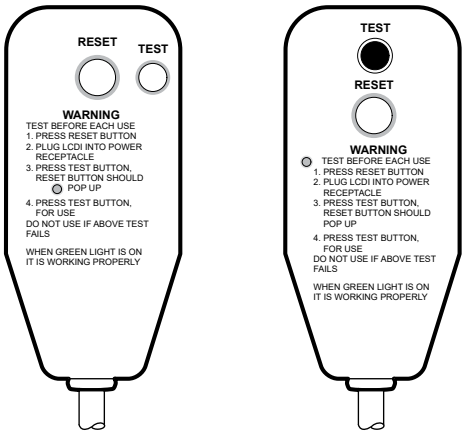
1. Plug power supply cord into a grounded 3 prong outlet.
2. Press RESET.
3. Press TEST (listen for click; Reset button trips and pops out).
4. Press and release RESET (listen for click; Reset button latches and remains in). Check that the green LED indicator is on. The power supply cord is ready for operation.

NOTE: The LCDI device is not intended to be used as a switch.

Once plugged in the unit will operate normally without the need to reset the LCDI device.

If the LCDI device fails to trip when tested or if the power supply cord is damaged it must be replaced with a new supply cord obtained from the product manufacturer, and must not be repaired.

Figure 205
Typical LCDI Devices



15/20A LCDI Device **30A LCDI Device**

FRP014

SPECIFICATIONS

Electrical Data

TABLE 206							
MODEL	HEATER kW	Power Cord Kit	Voltage	BRANCH CKT AMPS	MCA	Watts	Receptacle
PVH09K	2.5(optional)	PXPCFA23015	230/208	15	13.9	2500	NEMA 6-15r
	3.5(default)	PXPCFA23020	230/208	20	19.9	3600	NEMA 6-20r
PVH12K	1.5(optional)	PXPCFA23015	230/208	15	13.9	2500	NEMA 6-15r
	3.5(default)	PXPCFA23020	230/208	20	19.9	3600	NEMA 6-20r
	5.0(optional)	PXPCFA23030	230/208	30	27.5	5000	NEMA 6-30r
PVH09R	2.5(optional)	PXPCFA26515	265	15	12.0	2500	NEMA 7-15r
	3.5(default)	PXPCFA26520	265	20	16.8	3500	NEMA 7-20r
PVH12R	1.5(optional)	PXPCFA26515	265	15	7.3	1500	NEMA 7-15r
	3.5(default)	PXPCFA26520	265	20	16.8	3500	NEMA 7-20r
	5.0(optional)	PXPCFA26530	265	30	23.8	5000	NEMA 7-30r

Electrical Wiring for 265 Volt Models

Power Cord Installation

All 265V PTAC/PTHP units come with a factory installed non-LCDI power cord for use in a subbase.If the unit is to be hard-wired refer to the instructions below.

NOTE: It is recommended that the PXSB subbase assembly, the PXCJA conduit kit(or equivalent) be installed on all hardwire units.If installing a flush-floor mounted unit,make sure the chassis can be removed from the sleeve for service and maintenance.

⚠WARNING

Electrical Shock Hazard

Turn off electrical power before service or installation.
ALL electrical connections and wiring **MUST** be installed by a qualified electrician and conform to the National Code and all local codes which have jurisdiction.
Failure to do so can result in property damage, personal injury and/or death.

To install the line voltage power leads and conduit to chassis, follow the instructions below . PXCJA Conduit Kit is required with this setup.

1. Follow the removal process of the chassis's junction box .
2. Prepare the 265V(or 230V)power cord for connection to the chassis' power cord connector by cutting the cord to the appropriate length (refer to Figures 207 thru 209).Power cord harness selection shown on Table 206

SPECIFICATIONS

Electrical Data

Figure 207

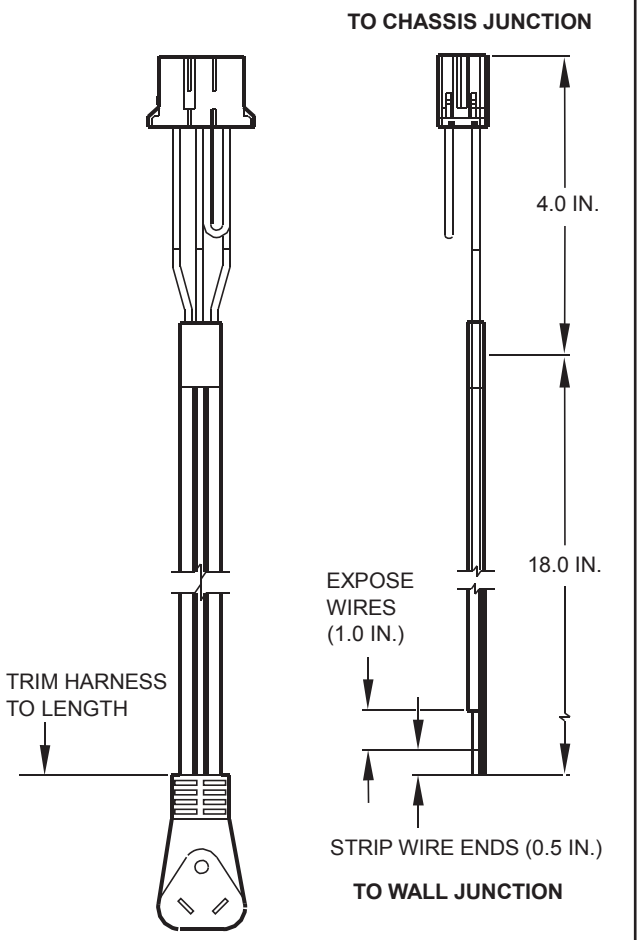


Figure 208

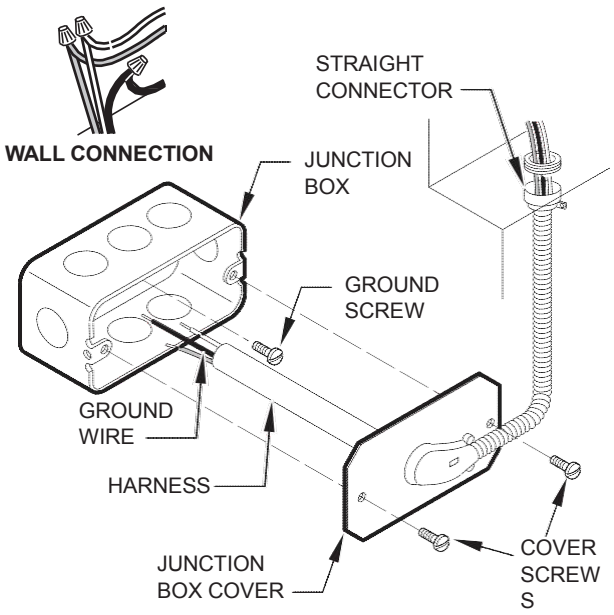
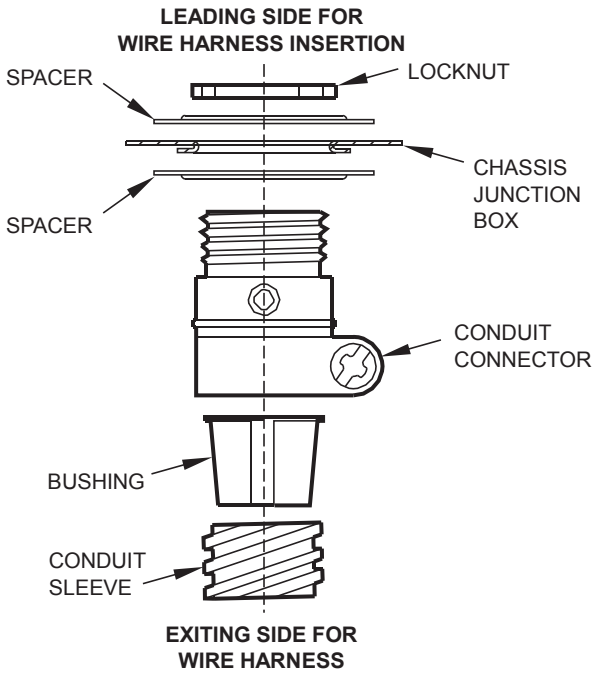


Figure 209



3. Route the cut ends of harness through the conduit connector assembly and flex conduit sleeve. Be sure to use the supplied conduit bushing to prevent damage to the cord by the conduit. The cord should pass through the Locknut, Spacer, Chassis Junction Box, Conduit Connector, Bushing, then the Conduit Sleeve. See Figure 209.

4. Route the cut ends of the power cord through the elbow connector at the other end of the conduit. Tighten screws on elbow connect or to secure conduit sleeve.

5. Fasten and secure the elbow connector to the wall junction box cover with locknut. Place and mount the wall junction box with the four wall mounting screws making sure to pass the wall lines through the junction box. Connect and join all wall lines with the stripped ends using wire nuts. Tighten both screws of the wall junction box cover to junction box.

OPERATION

Function and Control
Buttons and Display

1) Buttons

There are ON/OFF, UP, DOWN, HEAT, COOL, CONSTANT FAN and fan speed of HIGH, LOW, AUTO buttons.

1. ON/OFF: Press to turn power on or off to the unit.
2. COOL, HEAT: choose the mode of operation
3. HIGH, LOW, AUTO: choose the fan speed.
4. UP, DOWN: Adjust the setting temperature , default: 60-90°F.

2) Dual 8 Digital Tube Display and LED

Two 8 digital tube and 7 LEDs (ON/OFF, HIGH, LOW, AUTO, HEAT, COOL, CONSTANT FAN)

1. Mode LED display: when the unit is running in a certain mode, the corresponding LED is lit up.
2. ON/OFF LED: at ON status, the LED is lit up.
3. CONSTANT FAN LED: when this function is enabled, the LED is lit up.
4. Fan speed LED: when the unit is running at HIGH, LOW or AUTO fan speed, the corresponding LED is lit up.
5. Dual 8 digital tube display: normally, it displays the indoor ambient temperature. When the UP/DOWN button is pressed it displays the setting temperature. When some error occurs, it displays the ERROR CODE.

Temperature Definition

Indoor setting temperature (Ts)
Indoor ambient temperature (T1)
Indoor coil temperature (T2)
Outdoor coil temperature (T3)
Outdoor ambient temperature (T4)
Compressor discharge temperature (T5)
Indoor outlet air temperature (T6)

System Basic Function

Once the compressor starts, the compressor won't stop with the change of the indoor temperature. Once the compressor stops, it can only start after a 3 minute delay. (The compressor can stop immediately at the time of mode switch over, turning off the unit, adjusting setting temperature and turning off from a function error.) Depending on the different ambient temperatures and setting temperatures, the compressor runs at different frequencies to achieve the best energy savings and comfort. This is the advantage over traditional A/C compressors.

1) Cooling Mode

Working conditions and process for cooling:

When Indoor ambient temperature ≥Indoor setting temperature +2°F, cooling turns on.
When Indoor ambient temperature ≤Indoor setting temperature -2°F, cooling turns OFF.
When Indoor setting temperature - 2°F<Indoor ambient temperature <Indoor setting temperature + 2°F, the unit keeps previous running status.

Indoor fan control in cooling mode:

The indoor fan will run synchronously with cooling demand. During no demand period if the CONSTANT FAN button is turned off, it will run for 30 seconds and then turn off..When CONSTANT FAN is ON, it will always be running.

Outdoor fan control in cooling mode:

The outdoor fan has two speeds, low and high. When Outdoor ambient temperature is above 80°F, the fan operates in high speed.
When Outdoor ambient temperature drops to 77°F the fan operates in low speed.

2) Heating Mode

Working conditions and process for heating:

When Indoor ambient temperature ≤Indoor setting temperature -2°F, the unit is running in heating mode. The heat pump or electric heating will start depending on the ambient temperature condition
When Indoor ambient temperature ≥Indoor setting temperature + 4°F, the heating is turned OFF.
When Indoor setting temperature -2°F <Indoor ambient temperature <Indoor setting temperature + 4°F, the unit keeps at the previous running status.
Electric heater does not work with heat pump at the same time.
When Outdoor ambient temperature >44°F , unit will run heat pump all the time.
When 32°F < Outdoor ambient temperature < 44°F, unit will run in electric heating mode to meet the first cycle demand. From the second cycle on, heat pump will operate.
When Outdoor ambient temperature ≤32°F, the E-heater will operate exclusively.
During heat pump mode, once outdoor coil temperature freezes to 5°F, or any fault occurs, unit will switch over to electric heating mode.

Outdoor fan control in heat pump mode:

When Outdoor ambient temperature is above 57°F, outdoor fan runs at low speed to lower the noise;
When Outdoor ambient temperature drops to 53°F, outdoor fan runs at high speed, in order to ensure the heating capacity.

OPERATION

Function and Control

Electric heating mode:

The unit is equipped with a universal E-heater, which contains two independent heating elements. The 20A heater incorporates a 2.5kW and a 1.0kW element. The 30A heater incorporates a 3.5kW and a 1.5kW element.

Power Cord Selection

Use the appropriate power cord for each heating configuration as shown in the table below.

Power Cord	15A	20A	30A
9K BTU Unit	2.5kW	3.5kW	N/A
12k BTU Unit	1.5kW	3.5kW	5kW

Indoor fan control in heating mode:

The indoor fan will run synchronously with the heating demand. During no demand period, it will run for 30s (heat pump) or 1 min (E-heating) after CONSTANT FAN button is turned off, then turns OFF. When CONSTANT FAN is ON, it will always run.

Defrost

In heat pump mode, if the compressor runs continuously for over 30 minutes and Outdoor coil temperature < 26°F, or runs continuously for 90 minutes and Outdoor coil temperature <32°F the unit will enter defrost stage. Indoor fan will shut down. After the defrosting cycle is finished, the unit turns to E-heating for the first cycle to heat up quickly.

3) Room Freeze Protection (AUTO HEATING)

This is valid only in standby mode. The dual 8 digital tube displays “L0”.

Entry condition: #5 DIP SWITCH is set to ON to enable the indoor freeze protection and the main board detects the indoor ambient temperature is lower than 50°F(10°C) for 3 consecutive minutes.

Quitting condition: When indoor ambient temperature rises to 55 °F(13°C), the heating will stop.

4) Temperature Sensor Open Circuit or Short Circuit Protection

If the temperature sensor has an open circuit or a short circuit, the ERROR CODE will display on the digital tube. If the malfunction of the temperature sensor is detected for 30 seconds, the unit will turn off.

5) Power cut protection

After power cut recovery, unit will have a time delay of 2 to 4 minutes to restart E-heating. The DC-inverter soft start compressor will restart after 3 minutes.

6) Compressor and DC-inverter features

The DC-inverter compressor has a high efficiency rating and energy savings can be 30% to 80%. Operation voltage range is 160VAC~270VAC, making the unit operation more stable under a wider voltage range power input. With its soft start feature, power surges can be avoided, and also lower the noise level. Without the frequent start-stop, room temperature will be more stable and more comfortable.

The high performance IPM contains a PFC module and under heavy loading PF can be up to 99%, thus decreases EMI pollution to power supply system, and also decreasing power surges.

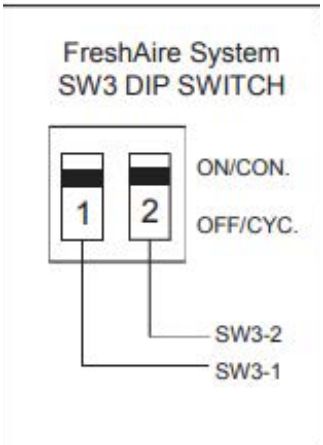
The compressor driver chip is high performance, making the compressor more stable and reliable.

OPERATION

Function and Control

7) Smart fresh air system

The control logic as the below table 1 and table 2 , the DIP switch is SW3 on the main board.



DIP switch SW3 function			
Freshaire System	Engagement Method	Mode	Description
	Sw3 Dip Switch 1	ON/ OFF	FA fan runs only when Dip Switch is set to "ON"
			FA fan NEVER RUNS when Dip Switch is set to "OFF"
	Sw3 Dip Switch 2	Cycle/ Con-tinuous	FA fan cycles On/ Off with the unit indoor fan when Dip Switch 1 is set to "ON" & Dip Switch 2 is se to "Cycle"
			"FA fan runs continuously when Dip Switch 1 is set to ""ON"" & Dip Switch 2 is set to ""Continuous"""

Relationship Between Inputs and Outputs						
INPUTS			OUTPUT			
FreshAir Mode		24V wall Thermostat	In Demand		No Demand	
Enable	Continuous	ID Fan Speed Selection	ID Fan Operation	Fresh-Air Fan Operation	ID Fan Operation	Fresh-Air Fan Operation
YES	NO	High	High	ON	High	ON
		low	low		low	
		Auto	Auto		OFF	OFF
	YES	High	High		High	O N
		low	low		low	
		Auto	Auto		low	
NO	NO	High	High	OFF	High	OFF
		low	low		low	
		Auto	Auto		OFF	
	YES	High	High		High	
		low	low		low	
		Auto	Auto		OFF	

OPERATION

Function and Control

Relationship Between Inputs and Output by 24V Wall Thermostat						
INPUTS			OUTPUT			
FreshAire Mode		24V wall Thermostat	In Demand		No Demand	
Enable	Continuous	ID Fan Speed Selection	ID Fan Operation	Fresh-Air Fan Operation	ID Fan Operation	Fresh-Air Fan Operation
YES	NO	High	High	ON	High	ON
		low	low		low	
		Auto	Auto		OFF	OFF
	YES	High	High		High	O N
		low	low		low	
		Auto	Auto		low	
NO	NO	High	High	OFF	High	OFF
		low	low		low	
		Auto	Auto		OFF	
	YES	High	High		High	
		low	low		low	
		Auto	Auto		OFF	

Relationship Between Inputs and Output by 12V Wall Thermostat						
INPUTS			OUTPUT			
FreshAire Mode		12V wall Thermostat	In Demand		No Demand	
Enable	Continuous	ID Fan Speed Selection	ID Fan Operation	Fresh-Air Fan Operation	ID Fan Operation	Fresh-Air Fan Operation
YES	NO	High	High	ON	High	ON
		low	low		low	
		Auto	Low		OFF	OFF
	YES	High	High		High	ON
		low	low		low	
		Auto	Low		low	
NO	NO	High	High	OFF	High	OFF
		low	low		low	
		Auto	Low		OFF	
	YES	High	High		High	
		low	low		low	
		Auto	Low		OFF	

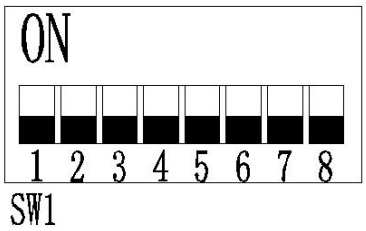
Return to Basic Troubleshooting

OPERATION

Function and Control

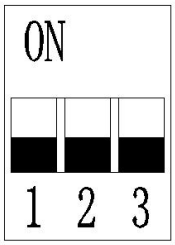
Advanced Functions

1) DIP Switch Function [after reprogramming, disconnect the power cord and wait 2 minutes for the electronic components (capacitors/ resistors) to cool down or bleed off. Then power up again to make changes effective]



SW1

1 Reserved
2 Heat pump
ON- valid; OFF-invalid
3 E-heater
ON- valid; OFF-invalid
4 Humidity Control & Fresh Air Activate ON
5 Room freeze protection
ON- valid; OFF- invalid
6 Auto-restart
ON- valid; OFF- invalid
7 Reserved
8 Reserved



SW2

⚠ CAUTION

SW2 DIP switch must be matched with the unit capacity, otherwise the compressor will fail to operate correctly. Do not change dip switches on SW2!

Advanced Settings

Under OFF mode, hold [COOL] and [LOW] or [HEAT] and [HIGH], two keys at the same time continuously for 10 seconds. 'd0' will be displayed, indicating that the system has entered the advanced operation status.

[COOL] or [HEAT] key is used to switch parameter code and parameter value;

[+] or [-] keys are used to switch parameter code or set parameter value;
[ON/OFF] key is used to save and exit settings.

Menu NO.	Function	"Parameter value"	Explanation
do	Unit of temperature	F	Fahrenheit (default)
		C	Celsius
dl	Control master	p	By control panel or IR remote thermostat(default)
		r	By 24V universal remote thermostat
		rE	By12V smart wired controller
		rF	VRPXEMRT2 and VRPXEMWRT2
d2	Max temperature setting	d3 to 90°F	The Min value is d2 (default 90°F)
d3	Min temperature setting	60°F to d2	The Max value is d3 (default 60°F)
d4	Indoor temperature calibration	-9°C to 9°C	If unit of temperature is changed, calibration should be done again. If using the default value, it can be ignored. (default 0°C/0°F)
		-9°F to 9°F	
d5	Temperature display selection	0 o r 1	0- displays room temperature (default),
			1- displays set point.

OPERATION

Function and Control

Advanced Settings Example
Setting target: d0(C), d1(r), d2(86°F), d3(64°F), d4(30°F), d5(1).

Step 1: hold [HEAT] and [HIGH FAN SPEED] two keys at the same time continuously for 10 seconds.	Display:'d0''
Step 2: short press [HEAT] key.	Display: 'F'
Step 3: short press [+] or [-] key.	Display: 'C' (setting d0 has finished)
Step 4: short press [HEAT] key.	Display:'d0'
Step 5: short press [+] key.	Display:'d1'
Step 6: short press [HEAT] key.	Display: 'P'
Step 7: short press [+] or [-] key.	Display: 'r' (setting d1 has finished)
Step 8: short press [HEAT] key.	Display:'d1'
Step 9: short press [+] key.	Display:'d2'
Step10: short press [HEAT] key.	Display:'32'
Step11: short press [-] key twice.	Display:'86' (setting d2 has finished)
Step12: short press [HEAT] key.	Display:'d2'
Step13: short press [+] key.	Display:'d3'
Step14: short press [HEAT] key.	Display:'16'
Step15: short press [+] key twice.	Display:'64' (setting d3 has finished)
Setp16: short press [HEAT] key.	Display:'d3'
Step17: short press [+] key.	Display:'d4'
Setp18: short press [HEAT] key.	Display:'0'

Memory Function

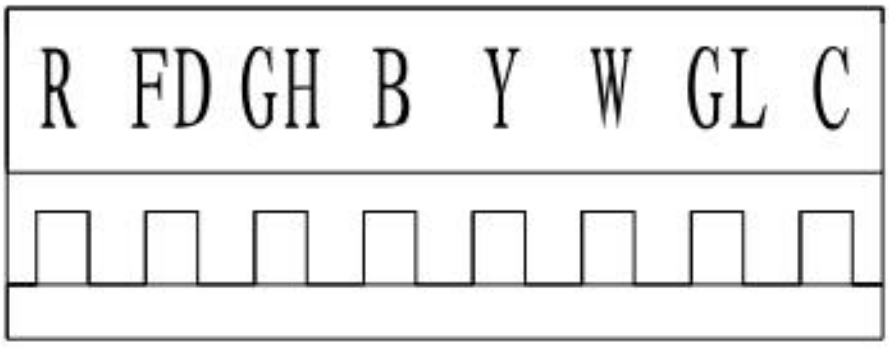
The unit will run the same status from the last moment before power down.

FD Control (front-desk control) & 24V REMOTE THERMOSTAT

The unit can be turned ON/OFF by front desk control switch. The control terminal is located on the remote thermostat interface, FD.

OPERATION

Function and Control



Control logic
(a). Turn ON unit: short R and FD then release one time within 5s.
(b). Turn OFF unit: short R and FD then release twice within 5s.
(c). Force unit shut down for one time: short R and FD short over 5s.

NOTE: After forcing unit shut down, you can turn on the unit again by control panel.

For the 24V remote thermostat compressor runs in different frequencies according to different temperature conditions and capacity demands. You don't need to change the wiring.

Protection Functions

To ensure the system running safely, electric control has following protections. For problem solving, please refer to TROUBLE SHOOTING sections.

1) Outdoor unit overload protection in COOLING mode
When condenser coil temperature exceeds the 140˚F, compressor decreases the operating frequency to 30Hz. If this protection is not enough and condenser coil temperature reaches 149˚F, compressor will be turned off.

2) Evaporator Freeze protection (will not display error code)
When evaporator coil temperature drops to 1°C and lasts for 5 minutes, compressor and outdoor fan will stop,but indoor fan keeps on running.

3) Compressor discharge overheat protection
When compressor discharge temperature reaches 226˚F, compressor will decrease operating frequency to 30Hz. If this protection is not enough and discharge temperature reaches 239˚F, compressor will be turned off.

4) Evaporator overheat protection in HEAT PUMP mode
When evaporator coil temperature exceeds 140˚F, compressor decreases the operating frequency to 30Hz. If this protection is not enough and evaporator coil temperature reaches 149˚F, compressor will be turned off. At this time the back-up electric heater will be turned on.

5) Input over-current protection
When input current exceeds 8 amps, compressor will decrease the operating frequency to 30Hz. If this protection is not enough and current reaches 9 amps, compressor will be turned off.

6) Compressor over-current protection.
When compressor operating current exceeds 7.5 amps, the compressor will be shut down.

7) IPM fault protection
When IPM faults, include overheat or over current, unit will be shut down and all outputs are shut down. Control panel displays the error code.

8) Temperature sensor fault protection
Any temperature sensor faults will shut down unit. The error code will be displayed
.

OPERATION

Function and Control

9) Communication fault protection
If communication faults between indoor unit and outdoor unit for continuously 2 minutes, unit will shut down and display error code on display panel.

10) Compressor starting fault
If compressor fails to start, it will try to restart after 3 minutes. Error code will not be displayed on display panel for the first 3 attempts to restart. If the compressor fails to start on the 4th try, it will not attempt restart any more and an error code will occur.

11) DC-BUS overvoltage/undervoltage protection
If the unit senses the DC-BUS is overvoltage or undervoltage, the unit stops and an error code will occur. and be displayed on display panel.

12) EEPROM fault
When the unit is powered up, if system monitors the EEPROM chip fault (broken chip or incorrect data),
control panel displays error code and will not operate any more.

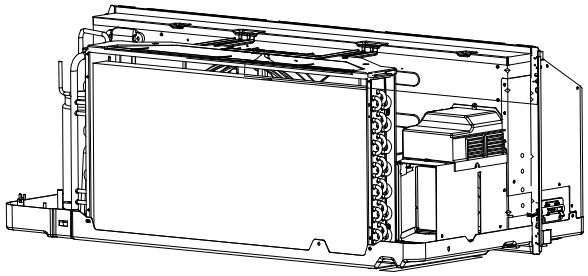
OPERATION

System Configuration

Fresh Air Vent Control

To operate the FreshAire module please see Dip switch #3. With dip switch in the "on" position FreshAire module will be on continuously. With dip switch in the "OFF" position FreshAire module will be not be activated.

Figure 501
Air Vent Control



POWER-DRIVEN VENT DOOR

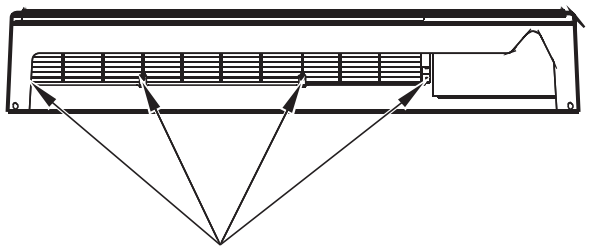
FRP025

Adjusting Air

To adjust air direction:

1. Remove front panel. See Figure 501.
2. Remove louver screws that hold louver insert in place (from back side of front panel). See Figure 502.
3. Turn louver insert and rotate 180°. See Figure 503.
4. Replace louver insert.
5. Replace screws and front panel.

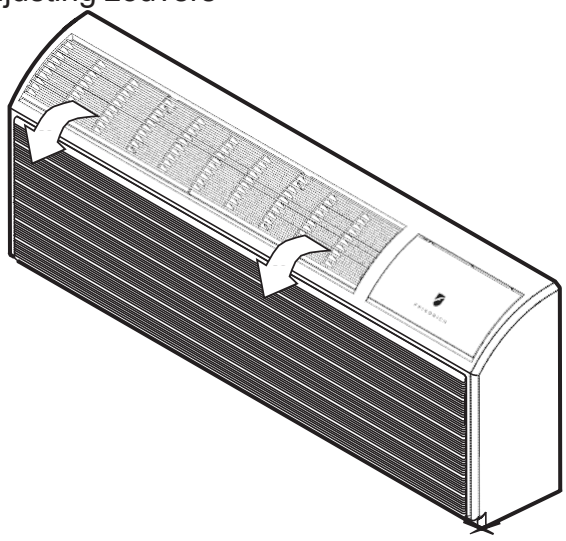
Figure 502
Backside of Front Panel



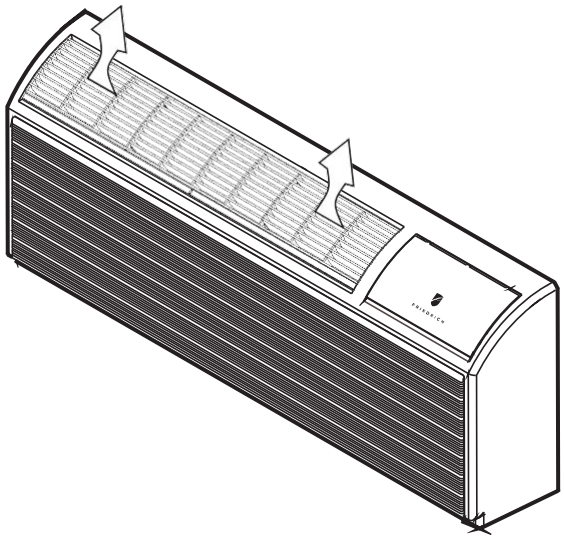
LOUVER SCREWS

FRP026

Figure 503
Adjusting Louvers



AIR DISCHARGE OUTWARD (Default)



AIR DISCHARGE UPWARD

FRP027

OPERATION

System Configuration Fresh Air Vent Control

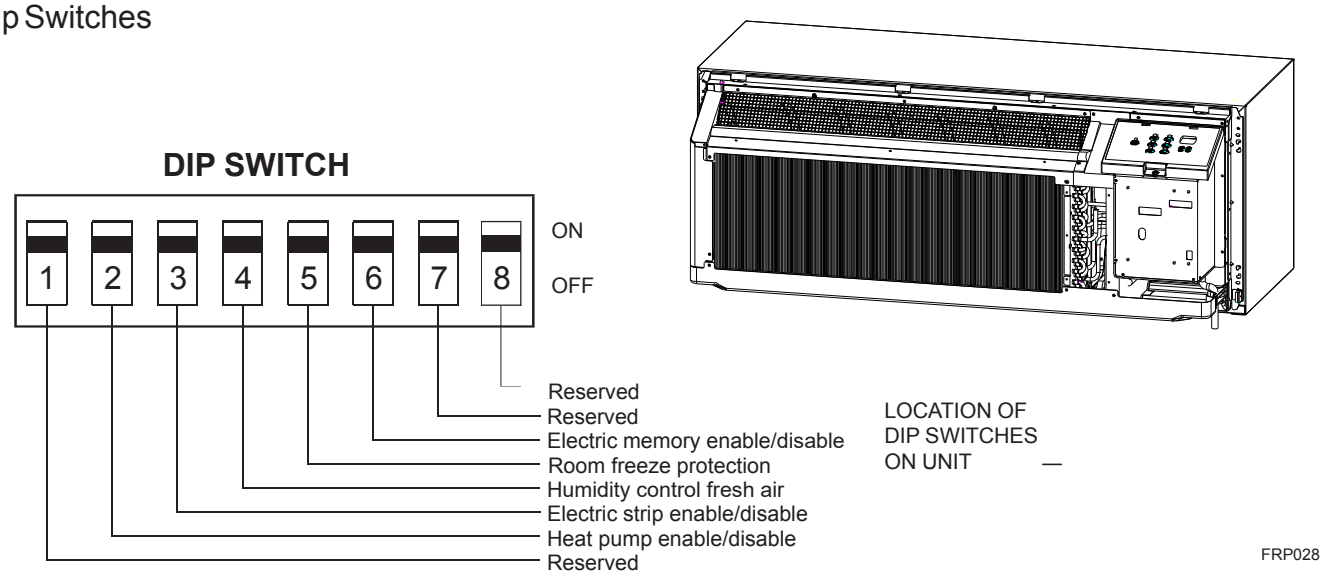
The adjustable control dip switches are located at the front portion of the digital Smart Center. The inputs are only visible and accessible with the front cover removed from the PTAC.

Dip Switch Setting

Switch 1-Reserved.
Switch 2-Heat pump enable/disable.
Moving Dip Switch #2 to "OFF" can be set as Emergency Heat Override. In the unlikely event of a compressor failure, a heat pump unit may be switched to operate in only the electric heat mode until repairs can be made.
Switch 3-Electric strip enable/disable.
Switch 4-Humidity control fresh air enable/disable
The factory setting is enabled, moving Dip switch 4 to ON and when the user uses VRPXEMRT2 or VRPXEMWRT2 controller, the unit can control the fresh air on and off according to the indoor humidity; when the Dip switch is set to OFF, the indoor humidity can't control the fresh air on/off.

Switch 5-Room Freeze Protection Units are shipped from the factory With the room freeze protection enable.Room Freeze Protection can be switched off at the owner's preference by moving Dip Switch 5 to "OFF". This feature will monitor the indoor room conditions and in the event that the room falls below 50°F, the unit will automatically run "heating". This occurs regardless of mode.
Switch 6-Electric memory enable/disable
The factory setting is enabled. The smart center will remember user's setting. After power cut recovery, the unit will operate the same status as before power cut. Moving Dip Switch 6 to "OFF"will disable this feature, smart center will no more remember settings.
Switch 7,Switch 8-Reserved.

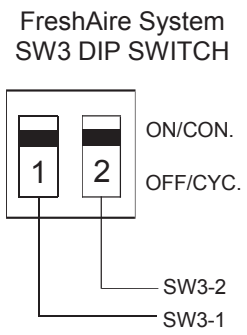
Figure 28
Dip Switches



Switch	Description	Function	Factory setting	Option
#1	Reserved	/	OFF	/
#2	Heat pump	ON-enable heat pump; OFF-disable heat pump, run electric heat only.	HP models-ON Electric heat only-OFF	OFF-Overrides compressor operation(HP models only)
#3	Electric strip	ON-enable electric heat; OFF-disable electric heat.	ON	Factory set. Do not change.
#4	Humidity control fresh air	ON-enable; OFF-disable.	ON	OFF
#5	Room Freeze Protection	ON-Allows the unit to ensure the indoor room temperature does not fall below 50°F even when turned off; OFF-disable freeze protection.	ON	OFF
#6	Electric memory enable/disable	ON-enable; OFF-disable.	ON	OFF
#7	Reserved	/	OFF	/
#8	Reserved	/	OFF	/

OPERATION

System Configuration Fresh Air Vent Control



	Engagement Method	Mode	Description
FreshAire System	SW3-1	ON / OFF	Fresh-Air Fan runs only when Dip Switch is set to 'ON'
			Fresh-Air Fan NEVER RUNS when Dip Switch is set to 'OFF'
	SW3-2	Cycle / Continuous	Fresh-Air Fan runs continuously when SW3-1 is set to 'ON' & SW3-2 is set to 'ON'
			Fresh-Air Fan cycles On/Off with the Unit Indoor Fan when SW3-1 is set to 'ON' & SW3-2 is set to 'OFF'

OPERATION

Digital Control User Input Configuration

Digital Control Panel

FRP029

Cooling Mode

Pressing the “Cool” button after turn the unit on will put the unit into cooling mode. Press “UP” or “DOWN” button to adjust the set point, the unit will start the compressor and run appropriate frequency to maintain a comfortable room temperature. The compressor will come on anytime that the room temperature is 2℉above the set point. The fan will come on with compressor.

Heating Mode

After turn on the unit, press the “Heat” button will put the unit into heating mode.

Heat Pump Models (PVH)

When the “Heat” button is pressed initially the unit may call for electric strips to bring the room to the set point. When the room temperature falls 2℉below the set point, the unit will turn on the compressor or electric strip. The fan will run with compressor or electric strips. When the outdoor ambient temperature falls below 32°F or outdoor coil temperature drops to 5℉, the unit will operate the electric strip instead of heat pump. During heat pump mode, CPU detects the outdoor coil gets freeze, unit will go to defrost. During the defrost operation (10min at most), there will be no heating provide. After finishing defrost, electric heating will come on to warm the room quickly.

Emergency Heat Operation

In the event of a compressor failure in heat pump mode, the compressor may be locked out to provide heat through the electric strip heater automatically. This feature ensures that even in the unlikely event of a compressor failure, the room temperature can be maintained until the compressor can be serviced. If the unit still can’t run electric heater stably, switch Dip switch 2 to OFF, it controls the emergency heat setting.

Constant Fan

Pressing the “Constant Fan” button will provide constant or cycle fan operation in cooling or heating modes. The fan speed selection is made by pressing either “High” or “Low” fan speed button.

OPERATION

Settings- Detailed Configurations

This section is about how to set the unit operating parameter, include display temperature unit, Fahrenheit or Celsius, control master, temperature limit, temperature calibration, display set point or room temperature.
Under OFF mode, hold [Cool] and [Low] two keys at the same time continuously for 5 seconds. This time displays 'd0', indicates that system has entered the senior operation status.
[Cool] key is used to switch parameter code and parameter value;
[UP] or [DOWN] keys are used to switch parameter code or set parameter value; [Power] key is used to save and exit settings.

Menu NO.	Function	"Parameter value"	Explanation
do	Unit of temperature	F	Fahrenheit (default)
		C	Celsius
dl	Control master	p	By control panel
		r	By 24V universal remote thermostat
		rE	By 12V smart wired controller
		rF	VRPXEMRT2 and VRPXEMWRT2
d2	Max temperature setting	d3 to 90°F	The Min value is d2 (default 90°F)
d3	Min temperature setting	60°F to d2	The Max value is d3 (default 90°F)
d4	Indoor temperature calibration	-9°C to 9°C	If unit of temperature is changed, calibration should be done again. If using the default value, it can be ignored. (default 0°C/0°F)
		-9°F to 9°F	
d5	Temperature display selection	0 o r 1	0- displays room temperature (default),
			1- displays set point.

One example:
Setting target:d0(C),d1(r), d2(88),d3(58),d4(-1),d5(1).
Step1: hold [Cool] and [Low] two keys at the same time continuously for 5 seconds. Display:'d0'
Step2: short press [Cool] key. Display: 'F'(setting d0 has finished)
Step3: short press [Cool] key. Display:'d0'
Step4: short press [UP] key. Display:'d1'
Step5: short press [Cool] key. Display: 'P'
Step6: short press [UP] or [DOWN] key. Display: 'r' (setting d1 has finished)
Step7: short press [Cool] key. Display:'d1'
Step8: short press [UP] key. Display:'d2'
Step9: short press [Cool] key. Display:'90'
Step10: short press [DOWN] key twice. Display:'88' (setting d2 has finished)
Step11: short press [Cool] key. Display:'d2'
Step12: short press [UP] key. Display:'d3'
Step13: short press [Cool] key. Display:'60'
Step14: short press [UP] key twice. Display:'58' (setting d3 has finished)
Step15: short press [Cool] key. Display:'d3'
Step16: short press [UP] key. Display:'d4'
Step17: short press [Cool] key. Display:'0' (setting d4 has finished)
Step18: short press [Power] key to exit.

OPERATION

General Knowledge Sequence Of Refrigeration

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 in its operation which 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 when a demand is received from the thermostat. 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 vapor, 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 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. I

The liquid refrigerant next enters the metering device. The metering device is called 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" or atomizing. 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, or cooling.

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.

OPERATION

Refrigerant System Diagram

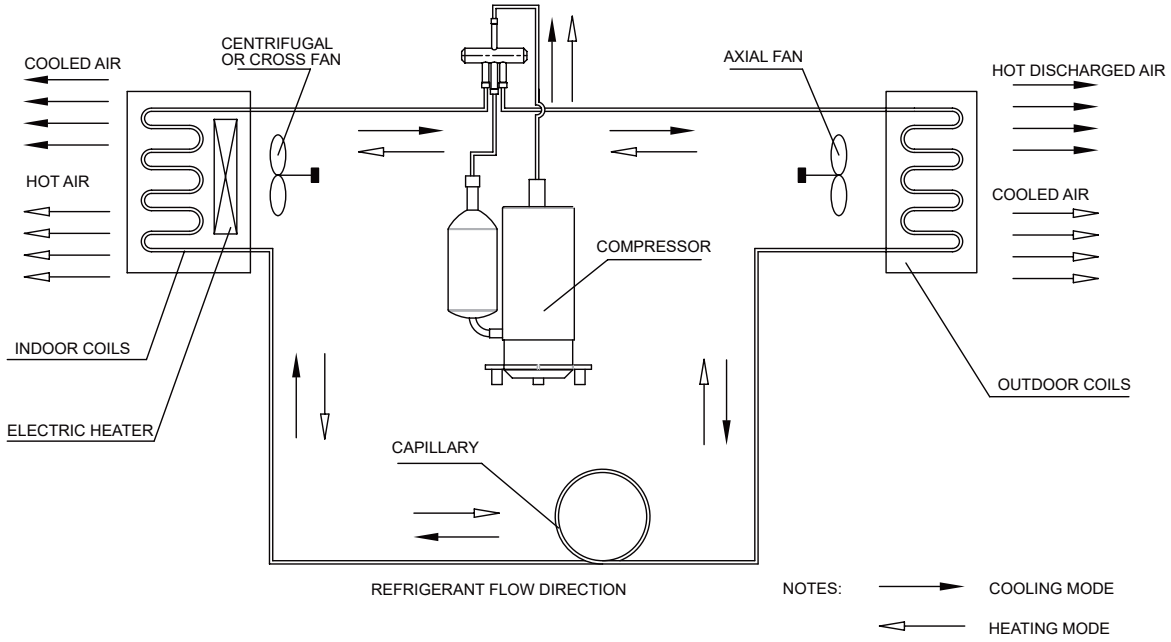


Figure 301 (Sequence of Operation)

ROUTINE MAINTENANCE

Coils & Chassis

NOTE: Do not use a caustic (alkaline) or acidic cleaning agent on coils or base pan. Use a biodegradable cleaning agent and de-greaser. The use of harsh cleaning materials may lead to deterioration of the aluminum fins or the coil end plates.

The indoor coil and outdoor coils and base pan should be inspected periodically (annually or semi-annually) and cleaned of all debris (lint, dirt, leaves, paper, etc.) as necessary. Under extreme conditions, more frequent cleaning may be required. Clean the coils with and base pan with a coil comb or soft brush and compressed air or vacuum. A low pressure washer device may also be used; however, you must be careful not to bend the aluminum fin pack. Use a sweeping up and down motion in the direction of the vertical aluminum fin pack when pressure cleaning coils.

NOTE: It is extremely important to insure that none of the electrical and/or electronic parts of the unit get wet when cleaning. Be sure to cover all electrical components to protect them from water or spray.

NOTE: When installed on or near sea coast environments, it recommended that all coils be cleaned at minimum biannually.

Decorative Front

Use a damp (not wet) cloth when cleaning the control area to prevent water from entering the unit, and possibly damaging the electronic control.

The decorative front and the cabinet can be cleaned with warm water and a mild liquid detergent. Do NOT use solvents or hydrocarbon based cleaners such as acetone, naphtha, gasoline, benzene, etc.

The indoor coil can be vacuumed with a dusting attachment if it appears to be dirty. DO NOT BEND FINS. The outdoor coil can be gently sprayed with a garden hose.

The air filter should be inspected weekly and cleaned if needed by vacuuming with a dust attachment or by cleaning in the sink using warm water and a mild dishwashing detergent. Dry the filter thoroughly before reinstalling. Use caution, the coil surface can be sharp.

Fan Motor & Compressor

The fan motor & compressor are permanently lubricated and require no additional lubrication.

Wall Sleeve

Inspect the inside of the wall sleeve and drain system periodically (annually or semi-annually) and clean as required. Under extreme conditions, more frequent cleaning may be necessary. Clean both of these 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.

Inspect for mold or mildew periodically. If present, ensure the sealing gasket around the unit is in good condition and not allowing outside air (or light) through the gasket.

Blower Wheel / Housing / Condensor Fan / Shroud

Inspect the indoor blower and its 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.

Electrical / Electronic

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.

Air Filter

To ensure proper unit operation, the air filter should be cleaned at least monthly, and more frequently if conditions warrant. The unit must be turned off before the filter is cleaned.

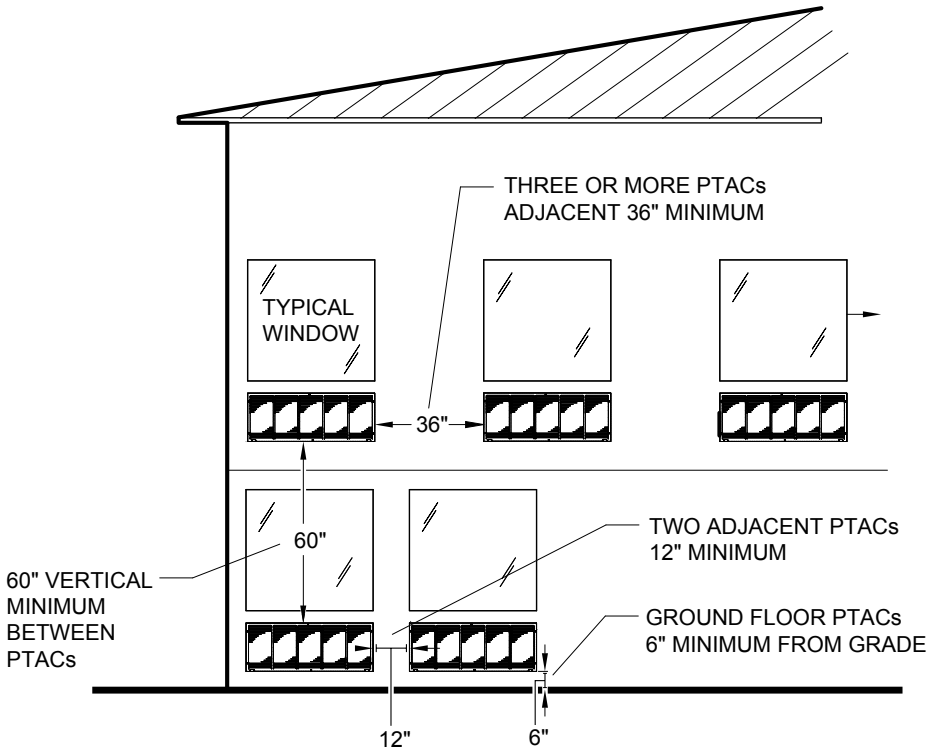
INSTALLATION

PTAC Installation Recommendations

For proper PTAC unit performance and maximum operating life refer to the minimum installation clearances below:

Figure 1

PTAC units should be installed no closer than 12" apart when two units are side by side. If three or more PTAC units are to operate next to one another allow a minimum of 36" between units. Also,a vertical clearance of 60" should be maintained between units installed. In the interior of the room the unit should be located a minimum of 1/4" from the floor and a minimum of 36" from the ceiling.



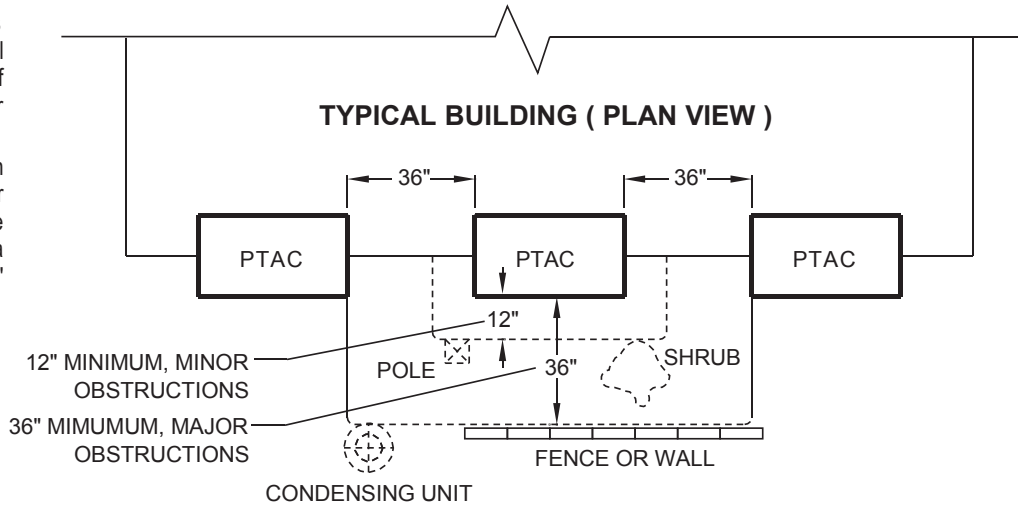
VIEW: OUTSIDE BUILDING ELEVATION

FRP001

For PTACs on the ground floor or anytime obstructions are present, use the following guidelines:

Figure 2

- For minor obstructions such as lamp poles or small shrubbery a clearance of 12" from the outdoor louver should be maintained.
- For major obstructions such as a solid fence, wall or other heat rejecting device like a condensing unit, a minimum distance of 36" should be kept.



FRP002

The above suggestions are for reference only and do not represent all possible installations.Please contact Friedrich for information regarding affects of other installation arrangements.By following these simple recommendations you can be confident that your Friedrich PTAC will provide years of worry free operation.

INSTALLATION

Wall Sleeve Installation Instructions (PDXWS)

NOTE: Insure that the unit is only installed in a wall structurally adequate to support the unit including the sleeve, chassis and accessories.If the sleeve projects more than 8" into the room, a subbase or other means of support MUST be used. Please read these instructions completely before attempting installation.

⚠WARNING

Falling Object Hazard

Not following Installation Instructions for mounting your air conditioner can result in property damage, injury, or death.

NOTICE

DO NOT allow any pitch toward the inside.

Flashing on all 4 sides of the opening is recommended.

Potential property damage can occur if instructions are not followed.

For Deep Wall Installation (Greater than 13 1/4") See next page

The following instructions apply ONLY to walls less than 13 ¼" in depth.

1 The PXDR10 Drain Kit,(optional for new construction) see page 10 if applicable, must be installed before the wall sleeve is installed into the wall.

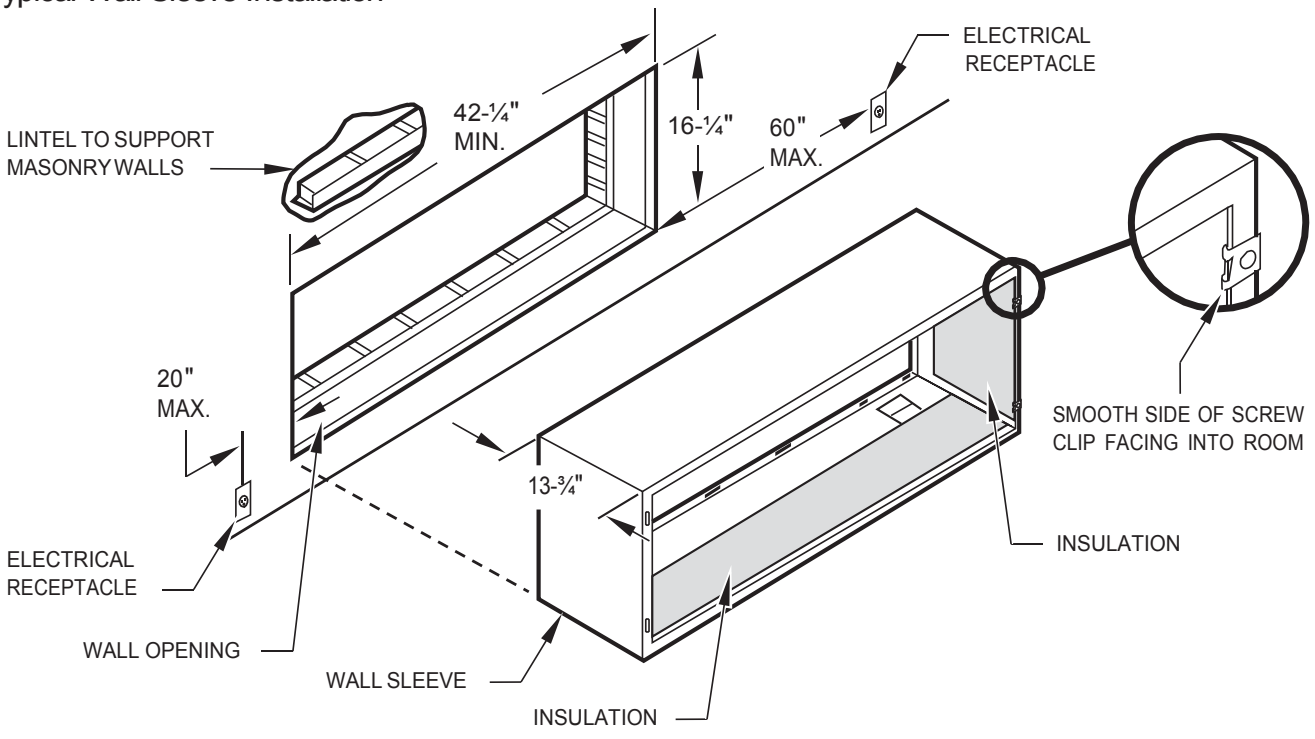
2 The External Drain (for new construction or unit replacement) see other page if applicable, must be installed before the wall sleeve is installed into the wall.

3 From inside the building, position the wall sleeve in the opening and push it into the wall until it protrudes at least ¼" on the outside (See Figure 9,).

4 Position the wall sleeve with a slight tilt towards the outside to facilitate condensate drainage. It should be level side-to-side and the front should be ¼ bubble higher than the back.

Figure 3

Typical Wall Sleeve Installation



NOTE: All 230/208V units are manufactured with a 60" power cord and all 265V units with a 18" power cord.

FRP003

INSTALLATION

Alternate Wall Installations

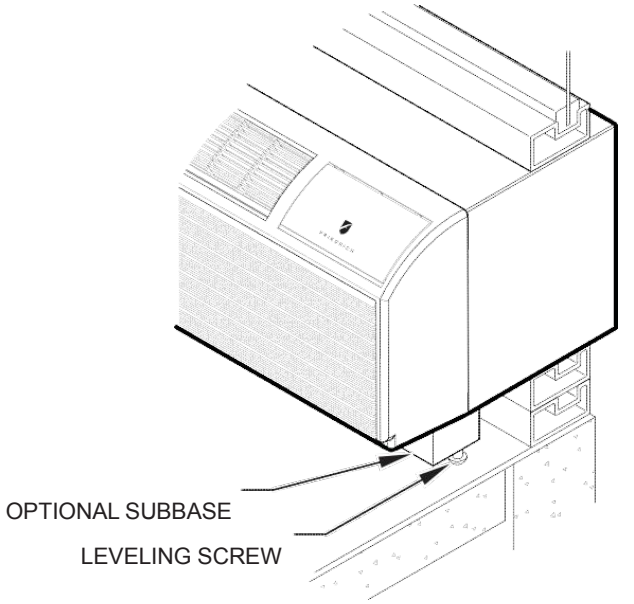
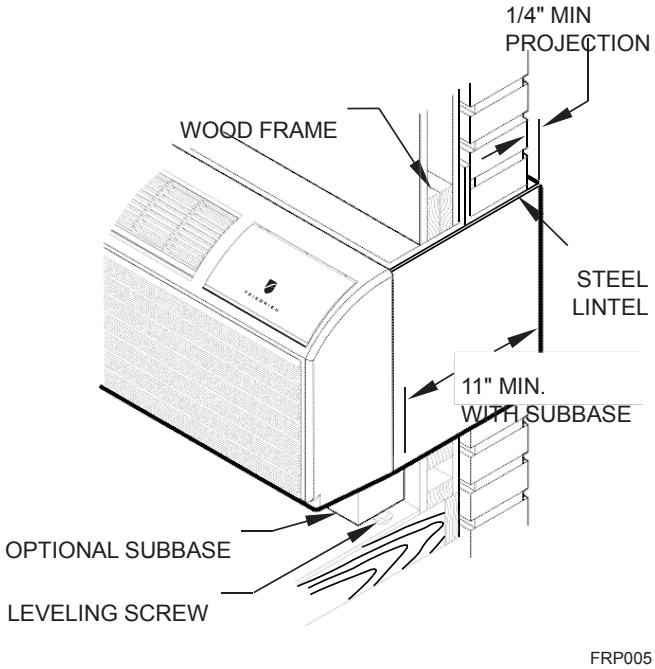


Figure 5
Frame and Brick Veneer



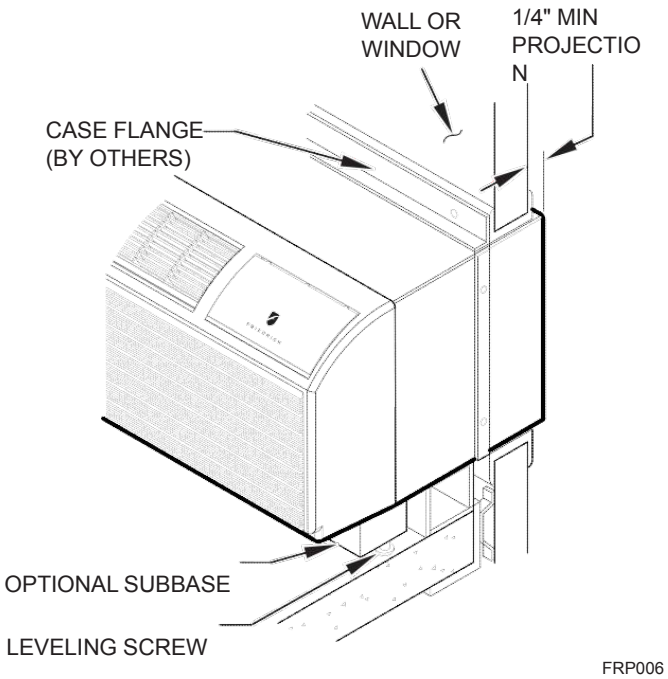
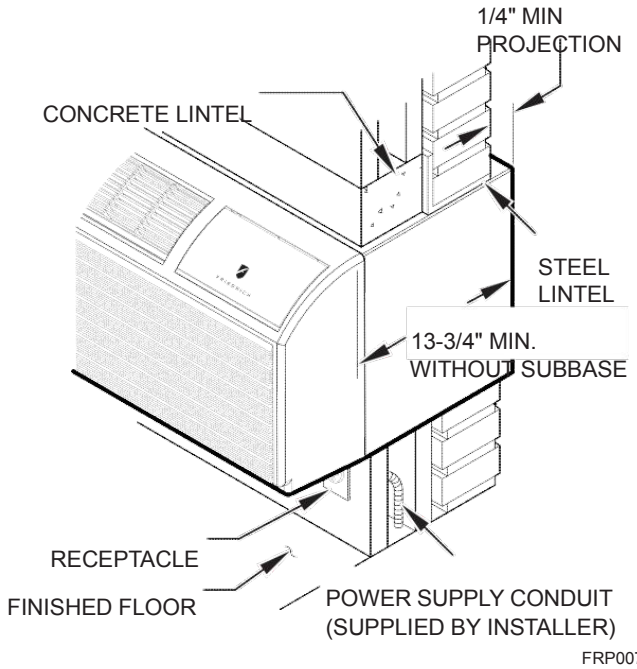


Figure 7
Block and Brick Veneer

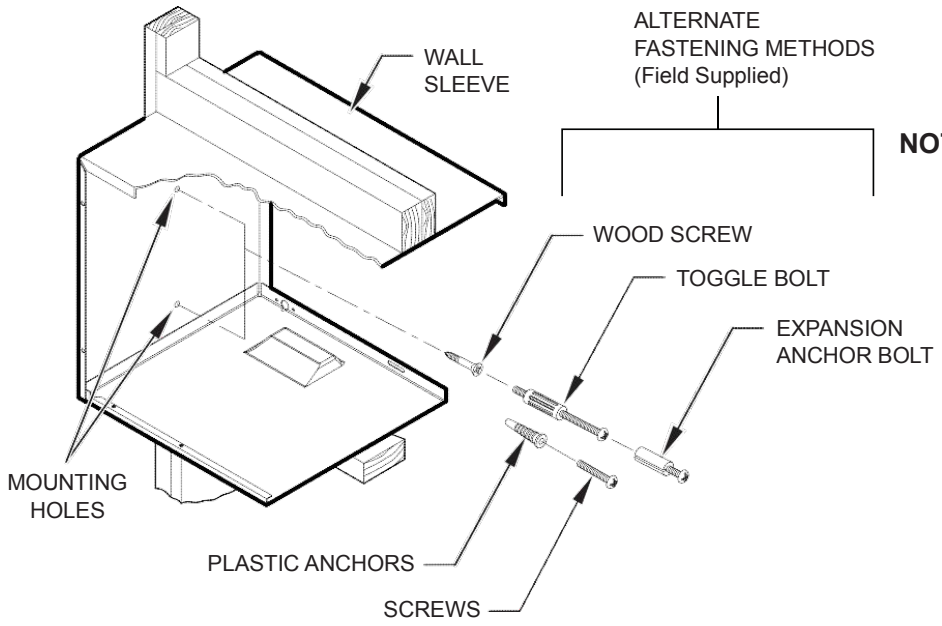


NOTE: Follow all wall system manufacturer installation instructions. For sunrooms and modular buildings, adhere to their installation instructions for supporting and sealing sleeve to their frames. All wall and window/wall installations must provide for proper drainage. In applications where the drain holes on the PTAC wall sleeve are not exposed beyond the wall an internal drain system is recommended. It is the installer's responsibility to ensure there is adequate drainage for the PTAC unit.

INSTALLATION

Alternate Wall Installations

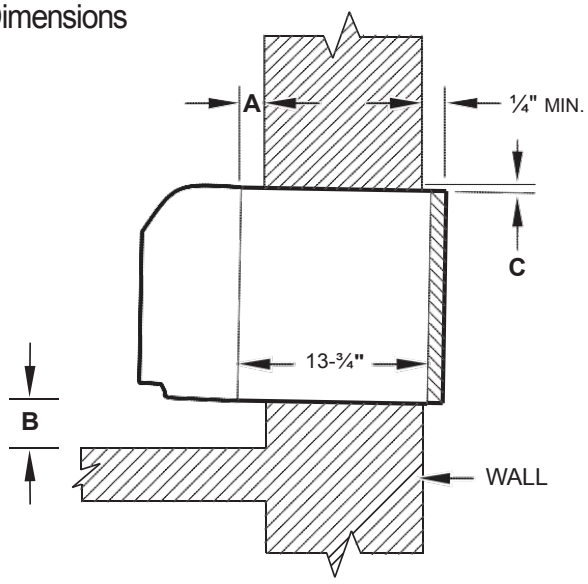
Figure 8
Wall Sleeve Attachment



NOTE: The Wall Sleeve must be horizontally level (side-to-side) and pitched 1/4 bubble to the outside when installed in an opening.
The mounting hole location should be approximately 2-4” from the top and bottom of the sleeve.

FRP008

Figure 9
Dimensions



Dimension*	A Allow for wall finishing	B Allow for floor finishing		C Allow for proper drainage
	(Minimum)	Min.	Max.	(Front-to-Back)
No Accessories	¼"	¼"	---	---
With Subbase	1-¾"	3-½"	5"	---
With Lateral Duct	¾"	¼"	---	---
Wall Sleeve Tilt	---	---	---	¼"

* If more than one accessory is to be used, use the maximum dimension. If the wall thickness is more than 13-¾" - (A+ ¼"), a sleeve extension must be used.

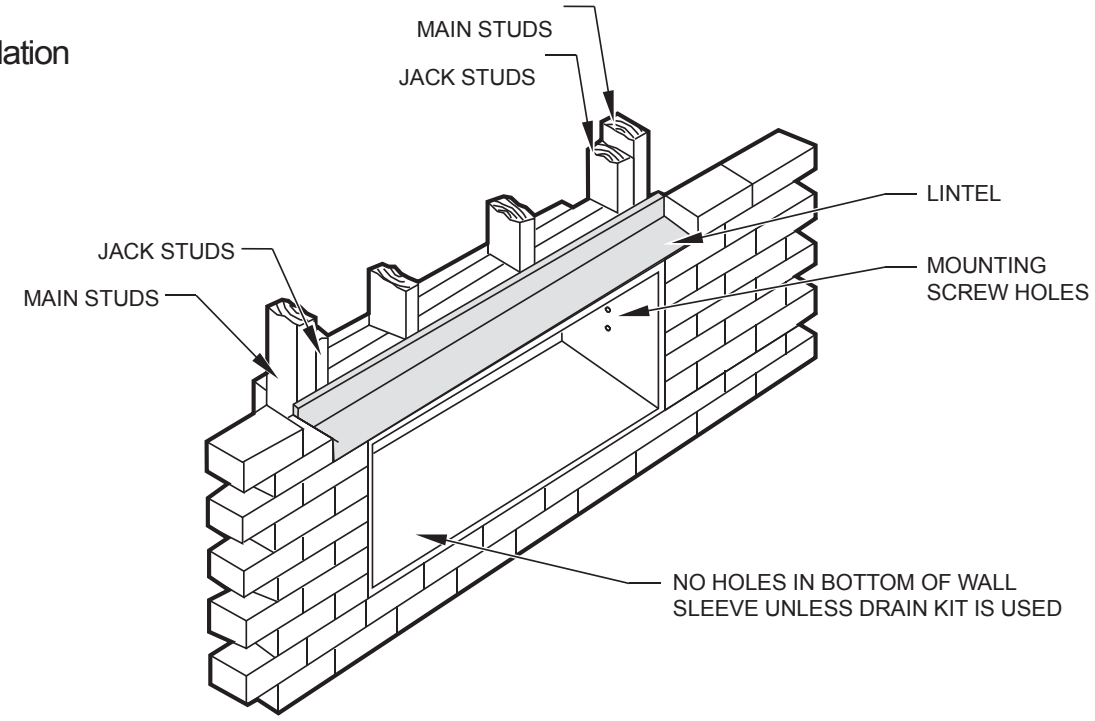
FRP009

INSTALLATION

Alternate Wall Installations

5. Drill two 3/16" holes through each side of the sleeve approximately 4" from top and 4" from bottom of sleeve. Screw four #10 x 1" screws (included) or appropriate fasteners for your installation, through the holes in the sides of the wall sleeve.
6. Apply sealant around the wall sleeve where it projects through the inside and outside wall surfaces. Apply the sealant to the screw heads or the tops of the fasteners used in Step #5.
7. If the chassis and exterior grille are to be installed later, leave the weatherboard and center support in place, otherwise remove and dispose of them. (See Figure 13, Page 12).
8. Provide a support lintel if the wall sleeve is installed in a concrete or masonry wall (See Figure 10, Page 9).

Figure 10
Lintel Installation



NOTE: Construct wall opening to comply with all applicable building codes.

FRP010

One-Piece Deep Wall Sleeve Installation (PDXWSEXT)

If the wall is thicker than 13 1/4" a deep wall sleeve or wall sleeve extension MUST be used. The deep wall sleeve may be special ordered through your Sales Representative.

INSTALLATION

PXDR10 Drain Kit Installation

PXDR10 Drain Kit Installation Instructions (optional for new construction)

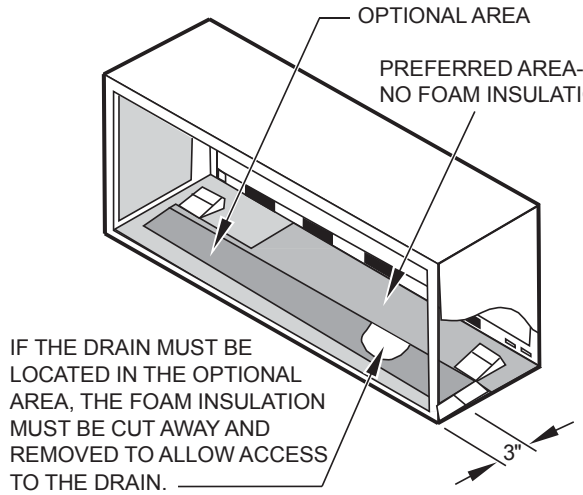
NOTE: Determine whether drain will be located within the wall, on the indoor side, or will drain to the exterior of the building. Follow appropriate instructions below depending on your particular type of installation.

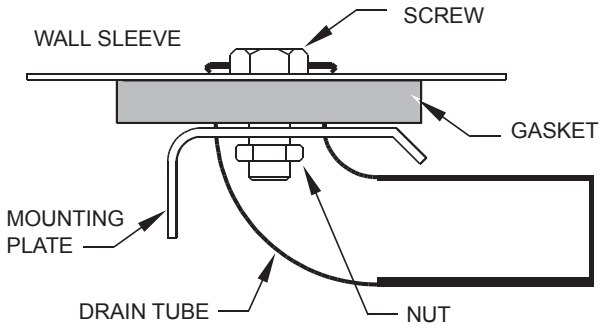
Internal Drain

NOTE: If installing an internal drain, you MUST install a drain kit on the wall sleeve before the wall sleeve is installed.

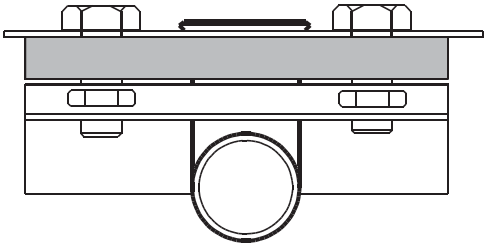
1. Refer to Figure 11 and locate the drain within the "Preferred" area of best drainage.Maintain at least a ½" clearance from the embossed area.
2. Using the mounting plate with the ½" hole as a template, mark and drill two, 3/16" mounting holes and a ½" drain hole in the sleeve bottom.
3. Remove the backing from the gasket and mount it on the flat side of the mounting plate (See Figure 12, Page 11). Insert the drain tube through the hole in the gasket and mounting plate so the tube flange will be against the wall sleeve.
4. Position the assembly beneath the drilled holes and secure it with #10-24 x ½" machine screws and lock nuts provided. Seal the tops of the screws with silicone caulking.
5. Use ½" I D copper tube, PVC pipe, or vinyl hose (obtained locally) to connect the internal drain tube to the drain system in the building.
6. Referring to Figure 12, Detail A, Page 11, locate and assemble the two cover plates and gaskets over the drain holes at the rear of the wall sleeve. Attach them with the #10 sheet metal screws provided. Make certain that the four overflow slots at the rear of the wall sleeve are not blocked (See drawing of the back of the sleeve Figure 12, Page 11).
7. If a deep wall extension (PDXWSEXT) is used, after installing the field supplied flashing,caulk as required. Be sure to caulk around the flashing and the wall sleeve where the hole was drilled for the drain tube.

Figure 11
Drain Kit Location and Installation





SIDE VIEW



FRONT VIEW

FRP011

PXDR10	
QUANTITY	**DESCRIPTION**
2	COVER PLATES
1	MOUNTING PLATE
1	DRAIN TUBE
3	MOUNTING PLATE GASKET
4	#10 X ½" SHEET METAL SCREWS
2	#10-24 X ½ " MACH. SCREWS
2	#10-24 X ½" LOCKNUTS

External Drain (for new construction or unit replacement)

When using an external drain system, the condensate is removed through either of two drain holes on the back of the wall sleeve. Select the drain hole which best meets your drainage situation and install the drain kit. Seal off the other with a cover plate.

Drain Tube Installation (See Figure 12)

1. Peel the backing tape off the gaskets and apply the sticky side to one cover plate and one mounting plate as shown in Details A and B.
2. Place the drain tube through the gasket and the mounting plate with the flange toward the wall sleeve.
3. Attach the drain tube assembly to one of the two drain holes at the rear of the wall sleeve. The large flange on the mounting plate is positioned at the bottom of the sleeve facing toward the sleeve, Detail B. When the drain tube is positioned at the desired angle, tighten the screws.

Cover Plate Installation

4. Mount the foam gasket to the cover plate. Using two #10 x ½" sheet metal screws (provided), attach the cover plate to the remaining drain hole. Make certain the large flange on the plate is positioned at the bottom of the sleeve.
5. Discard the additional cover plate, gasket, machine screws, and locknuts.

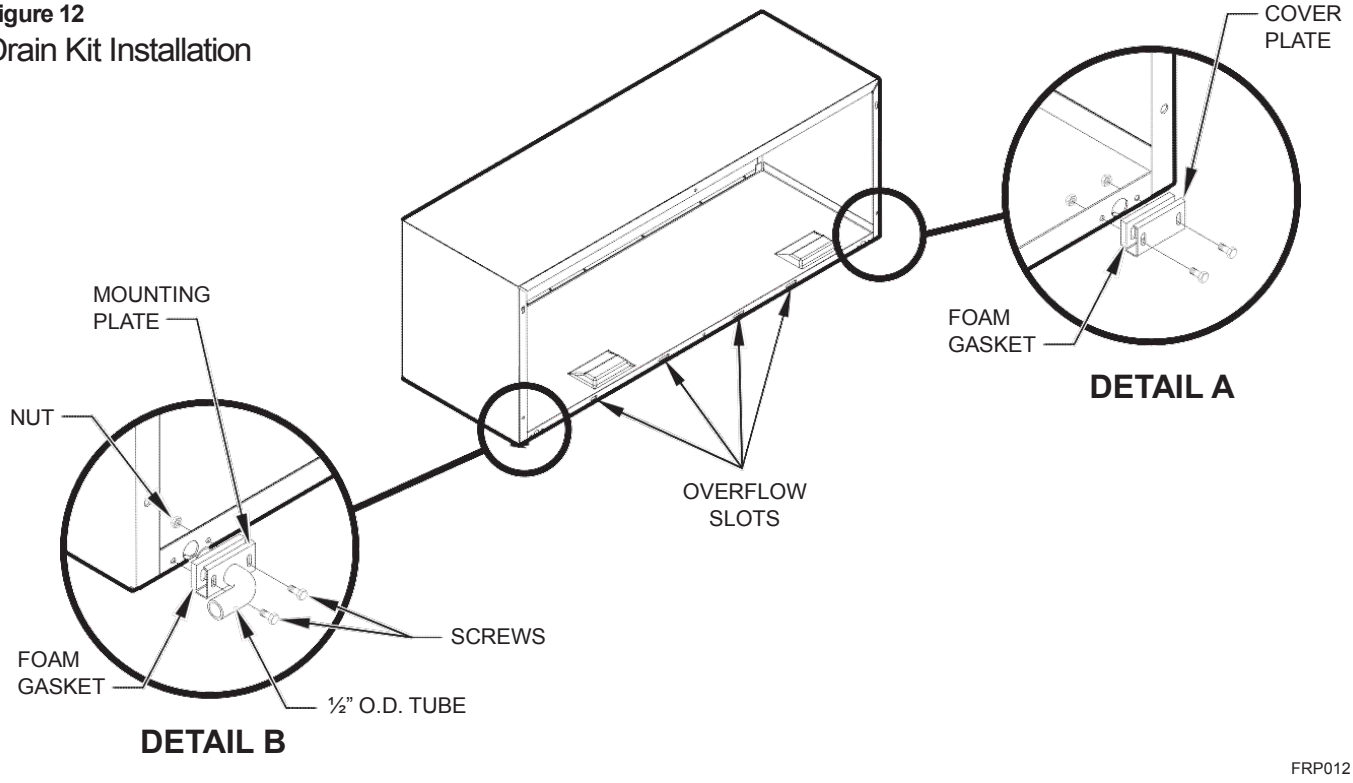
NOTICE

If the wall sleeve has not been installed, the drain tube must be rotated to a horizontal position until after the sleeve is installed. Tighten the mounting plate screws when the tube is in the proper position. Make certain that the four overflow slots at the rear of the wall sleeve are not blocked (See Figure 12).

When sealing the sleeve on the outside of the building, be careful NOT to let the sealant block the two condensate drain holes or the four overflow slots at the bottom flange of the sleeve.

Potential property damage can occur if instructions are not followed.

Figure 12
Drain Kit Installation



NOTE: The large flange on the mounting plate is positioned at the bottom of the sleeve facing toward the sleeve. The drain tube must be rotated to a horizontal position to allow for the wall sleeve to be installed into the wall. Once the wall sleeve is installed, return the drain tube to a downward angle.

PXGA Standard Grille Installation Instructions

1. Remove the center support and weatherboard if still installed in the sleeve.
2. Insert six plastic grommets into the grille openings from the outside of the grille as shown in Figure 13.
3. Insert two #8 x ⅜" sheet metal screws (provided) in the top two outside edge plastic grommets, and tighten them half way into the grommets.
4. Grasp the grille by the attached plastic handles. Position it with the condensate drain knockouts facing down.

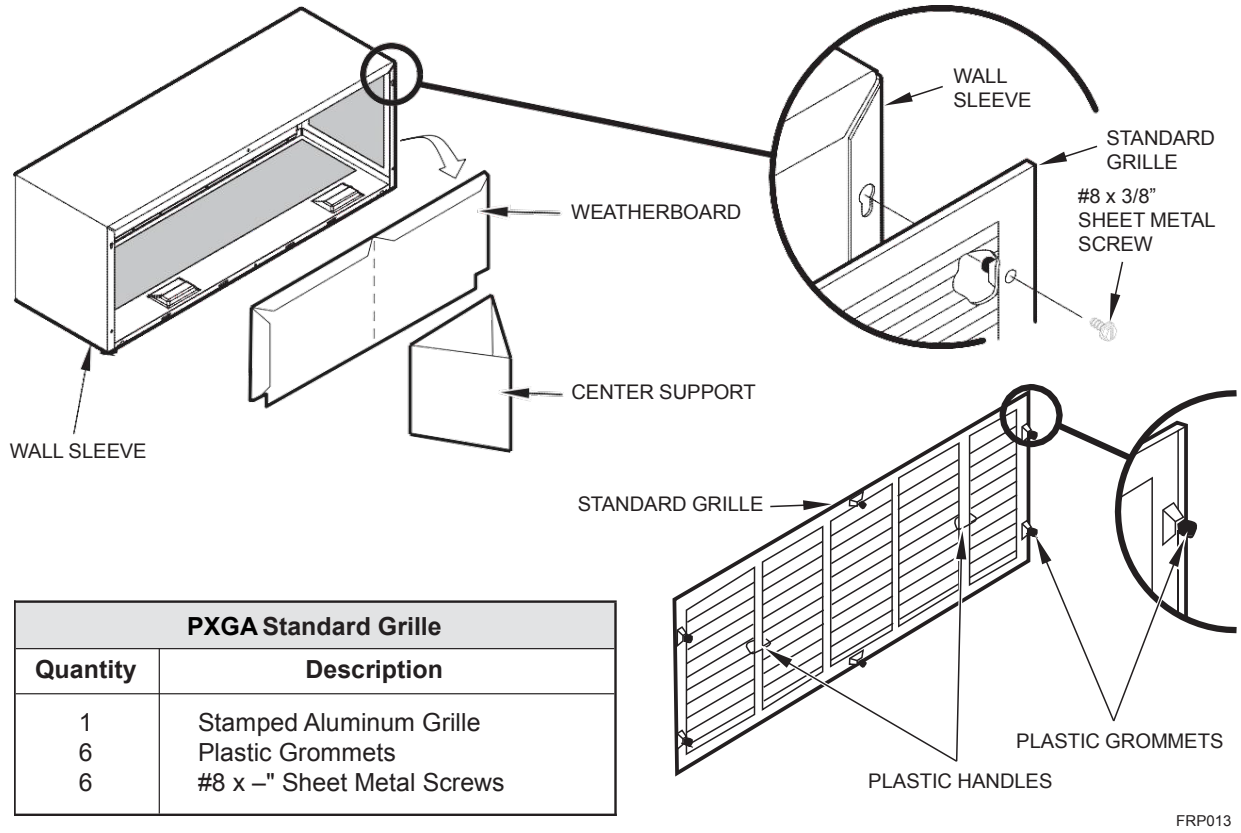
   From inside the building, maneuver the grille through the wall sleeve and pull toward you until the screw heads are inserted into the keyhole slots at the top of the wall sleeve. Tighten the two screws completely.
5. Insert the remaining screws into the remaining holes and tighten securely.

⚠ WARNING

Falling Object Hazard

Not following Installation Instructions for mounting your air conditioner can result in property damage, injury, or death.

Figure 13
Standard Grille



PXGA Standard Grille	
Quantity	**Description**
1	Stamped Aluminum Grille
6	Plastic Grommets
6	#8 x –" Sheet Metal Screws

INSTALLATION

PXGA Standard Grille

CAUTION

Unit Damage Hazard

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

3. Carefully remove shipping tape from the front panel and power vent door. See Figure 20.

Figure 20
Shipping Tape Location

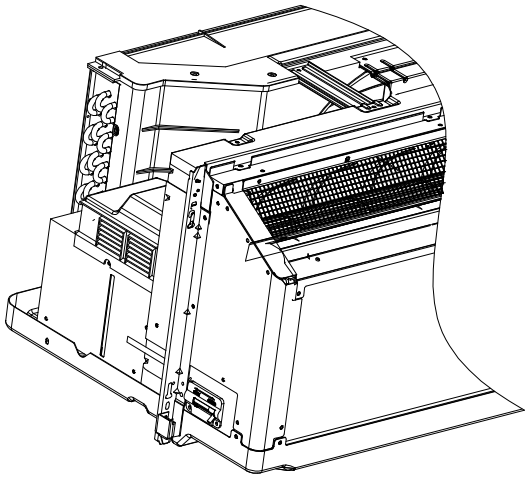
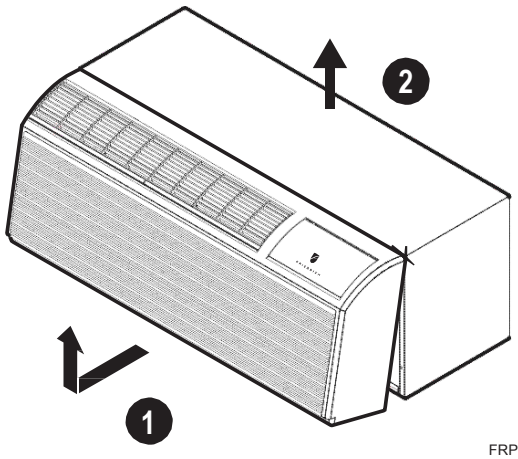


Figure 21
Removing Front Panel



4. Remove front panel,see Figure 21.

Pull out at the bottom to release it from the tabs (1). Then lift up (2).

NOTE: If the unit is mounted flush to the floor, the service cord MUST be rerouted at the bottom of the front cover on the side closest to the receptacle. A notch MUST be made in the front cover side where the cord exits the unit. It is the responsibility of the installer to create an exit notch.

Remote Control Thermostat Installation

Install Thermostat

1. Approximately 5 ft from the floor.
2. Close to or in a frequently used room,preferably on an inside wall.
3. On a section of wall without pipes or ductwork.

The Thermostat should NOT be mounted:

1. Close to a window, on an outside wall, or next to a door leading outside.
2. Where it can be exposed to direct sunlight or heat, such as the sun, a lamp,fireplace or any other temperature radiating object which may cause a false reading.
3. Close to or in the direct airflow of supply registers and/or return air grilles.
4. Any areas with poor air circulation, such as a corner, behind a door,or an alcove.

Remote Thermostat and Low Voltage Control Connections

Remote Thermostat

All Friedrich PV model PTAC units are factory configured to be controlled by either the chassis mounted Smart Center or a 24V remote wall mounted thermostat.The thermostat may be auto or manual changeover as long as the control configuration matches that of the PTAC unit.

NOTE: All PV models require a single stage cool, dual stage heat thermostat with an B reversing valve control.The Friedrich RT7 thermostat can be configured for either model.

To control the unit with a wall mounted thermostat follow the steps below:

1. Unplug the unit before doing any work
2. Remove the low voltage terminal block from the unit.
3. Remove the fireproof cover from the unit.
4. Connect the corresponding terminals from the wall thermostat to the terminal block.
5. Reinstall the fireproof cover.
6. Plug the terminal block on the unit.
7. Restore power to the unit.
8. Under OFF mode, set menu NO.'d1' to “r”, details refer to the previous section "Settings- Detailed Configurations" on page 31.
9. The unit is now controlled by the wall thermostat only.
10. If the accessory escutcheon kit (PDXRTA) is to be used, install it over the existing control panel.

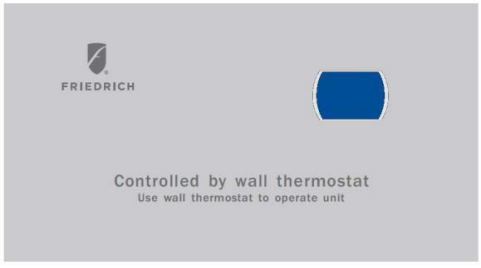
NOTE: The unit control panel no longer controls the unit. To restore the control panel, set menu NO.'d1' back to "P", details refer to the previous section "Settings- Detailed Configurations" on page 2.

Thermostat Connections

R = 24V Power from Unit
Y = Call for Cooling
W = Call for Heating
B = Reversing Valve Energized in Heating Mode
GL = Call for Low Fan
GH = Call for High Fan
C = Common Ground

*If only one G terminal is present on thermostat connect to GL for low speed fan or to GH for high speed fan operation.

Figure 30
Control board with optional **PDXRTB** escutcheon kit installed



FRP030

⚠WARNING

Electrical Shock Hazard

Turn off electrical power before service or installation.
ALL electrical connections and wiring **MUST** be installed by a qualified electrician and conform to the National Code and all local codes which have jurisdiction.
Improper connection of the thermostat control wiring and/or tampering with the units internal wiring may result in property damage, personal injury or death.

Front Desk Control Terminal

(ONLY FOR UNIT CONTROL)

The Friedrich PV model PTAC has built-in provisions for connection to an external switch to control power to the unit. The switch can be a central desk control system.
For front desk control operation, connect one side of the normal open switch to the R terminal and the other to the FD terminal.

The control logic as below:
(a). Turn ON unit: short R and FD then release for one time within 5s.
(b). Turn OFF unit: short R and FD then release for twice within 5s.
(c). Force unit shut down for one time: short R and FD short over 5s.
NOTE: After forced shut down, you can turn on the unit again by control panel.

NOTE: The desk control system and switches must be field supplied.

Energy Management

Sometimes known as Front Desk Control, an input is provided so that the unit can be manually disabled from a remote location. If the unit detects 24Vac on this input, it will automatically turn itself off. If no voltage is detected on the input , the unit will run normally.

NOTE: It is the installer's responsibility to ensure that all control wiring connections are made in accordance with the installation instructions. Improper connection of the thermostat control wiring and/or tampering with the unit's internal wiring can void the equipment warranty. Other manufacturer's PTACs and even older Friedrich models may have different control wire connections. Questions concerning proper connections to the unit should be directed to Friedrich.

Final Inspection & Start-up Checklist

- ❑ Inspect and ensure that all components and accessories have been installed properly and that they have not been damaged during the installation process.
- ❑ Check the condensate water drain(s) to ensure they are adequate for the removal of condensate water, and that they meet the approval of the end user.
- ❑ Ensure that all installations concerning clearances around the unit have been adhered to.Check to ensure that the unit air filter, indoor coil, and outdoor coil are free from any obstructions.
- ❑ Ensure that the entire installation is in compliance with all applicable national and local codes and ordinances that have jurisdiction.
- ❑ Secure components and accessories, such as the chassis, decorative front cover and control door.
- ❑ Start the unit and check for proper operation of all components in each mode of operation.Instruct the owner or operator of this units operation, and the manufacturer's recommended routine maintenance schedule.

NOTE: A log for recording the dates of maintenance and/or service is recommended.

- ❑ Present the owner or operator of the equipment with the Installation & Operation manual, all accessory installation instructions, and the name, address and telephone number of the Authorized Friedrich Warranty Service Company in the area for future reference if necessary.

Routine Maintenance

To ensure proper unit operation and life expectancy the following maintenance procedures should be performed on a regular basis.

⚠WARNING

Electrical Shock Hazard
Unplug Unit or turn off electrical power to unit prior to performing maintenance procedures

Failure to do so can result in electrical shock or death

Front Panel Air Filter

To ensure proper unit operation, the air filters should be cleaned at least monthly, and more frequently if conditions warrant.The unit must be turned off before the filters are cleaned.

To remove the air filters,filter grasp the top of the filters and lift out of the front cabinet.Reverse the procedure to reinstall the filters.

Clean the filters with a mild detergent in warm water, and allow them to dry thoroughly before reinstalling.

Fresh Air Filter

The fresh air filter should be cleaned or replaced after 3 months of use for maximum effectiveness The unit must be turned off before the filters are replaced.

To replace the fresh air filters,drag the unit from wall sleeve and pull the tape sticked to fresh air filter.

Coils & Chassis

NOTE: Do not use a caustic coil cleaning agent on coils or base pan. Use a biodegradable cleaning agent and degreaser.The use of harsh cleaning materials may lead to deterioration of the aluminum fins or the coil end plates.

The indoor coil and outdoor coils and base pan should be inspected periodically (annually or semi-annually) and cleaned of all debris (lint, dirt, leaves, paper, etc) as necessary. Under extreme conditions, more frequent cleaning may by required.Clean the coils and base pan with a soft brush and compressed air or vacuum.A pressure washer may also be used, however, you must be careful not to bend the aluminium fin pack.Use a sweeping up and down motion in the direction of the vertical aluminium fin pack when pressure cleaning coils.

NOTE: It is extremely important to insure that none of the electrical and/or electronic parts of the unit get wet. Be sure to cover all electrical components to protect them from water or spray.

Decorative Front

The decorative front and discharge air grille may be cleaned with a mild soap or detergent.Do NOT use solvents or hydrocarbon based cleaners such as acetone, naphtha, gasoline, benzene, etc , to clean the decorative front or air discharge grilles.

Use a damp (not wet) cloth when cleaning the control area to prevent water from entering the unit, and possibly damaging the electronic control.

Fan Motor & Compressor

The fan motor & compressor and are permanently lubricated, and require no additional lubrication.

Wall Sleeve

Inspect the inside of the wall sleeve and drain system periodically (annually or semi-annually) and clean as required.

Under extreme conditions, more frequent cleaning may be necessary. Clean both of these 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.

TROUBLESHOOTING

Figure 711

Basic Troubleshooting

Malfunction	Possible Reasons	Solution
Start Failure	Unit does not have power; Power line damaged or power not available.	"Check the indicator LED on the LCID power head, it should be lit up, if not, push the RESET button, if still no voltage, but power grid has output, you need to change the power cord."
	Power cord protection trip.	Check the power cord for damage, push the RESET button. If not solved, replace the power cord.
	Power cord isn't plugged in correctly.	Plug in cord correctly.
	PCB fuse is broken.	Check if any load (in fan, out fan, reversing valve, power transformer) has a short circuit. Eliminate the error and replace the fuse with the same type.
	Bad contact between main board and control panel.	Check the contact wires, make sure all contact well.
	Compressor delay start.	It's normal, compressor will start after 3 minutes
	Power fail protection.	When power on, because of auto-restart, unit will delay starting in 120~240s
	Unit in protection mode.	Please check the ERROR CODE
	Main board or Control panel is bad.	Replace the main board or control panel
Control panel does not work	When the unit is switched to 24V remote thermostat or 12V smart controller, the control panel will not be functioning.	If you need to use control panel to take control, you need to switch the control master. See the ADVANCED SETTINGS section.
Indoor fan/outdoor fan does not function or runs slowly	Fan is locked by something or the power wires are poorly connected; fan capacitor is poorly connected; fan capacitor is out of service life.	Disconnect the power cord, check whether the fan can run smooth by hand or other tools, whether motor wire is connected well. If fan has slow running speed replace capacitor.
Not cooling/heating adequately	Something is blocking the indoor/outdoor air outlet.	Make sure that there are no obstacles at the indoor/outdoor air outlet.
		Make sure that the grill is suitable for the unit, inappropriate grill will cause the compressor to fault; make sure that the grill has more than 70% .
	Set unsuitable temperature.	Set higher/lower temperature by the control board. NOTE: temperature setting restriction will restrict the setting temperature. See the ADVANCED SETTINGS section.
	Indoor air filter is dirty.	Should clean the filter at least every month.
	Room is hot/cold.	Let unit run a little longer that room temperature will be lower/higher.
	Heat leakage between indoor and outdoor.	Block the leakage place.
	Indoor coil not cold/heat.	Charge the refrigerant.
Unit has noise	"Some moving parts of the unit are loose causing bad vibration. Something in the air way."	Make sure that all moving parts are assembled well, and nothing is in the air way.
Bad smell when heating	The dust on the E-heater is heating.	The bad smell will disappear a little later.
Outlet temperature is not always cooling/ heating	Outlet temperature is not high enough when heating by heat pump.	When outdoor ambient temp is low, the heat pump will not be able to offer enough heat. Soon after that, the E-heater will come on to heat.. Possible Maintenance is required.
	Fan stops when cooling/heating.	It is normal when the CONSTANT FAN is OFF. You can enable the CONSTANT FAN.

TROUBLESHOOTING

Figure 711

Basic Troubleshooting

Malfunction	Possible Reasons	Solution
Water dripping outdoors.	Drain pipe kit not installed.	Install the drain pipe kit.
Water dripping indoors.	Wall sleeve is not installed correctly.	Install the wall sleeve according to the installation manual.
Indoor coil freeze	Outdoor temperature is too low in cooling mode.	When outdoor temperature is drop to 55°F (12.8°) or below, it will cause that indoor coil to freeze. Open the fresh air door, and running at fan mode.
	Filter is dirty.	Clean the filter to recover the normal air flow

TROUBLESHOOTING

Figure 712

Error code and solutions

ERROR CODE	Meaning	Solutions	Click link for reference
E1	Communication Error between Power, IPM, Main, & or Display electronic boards+B2:C14	Check all Communication Cables; MOD_Com, MB_Com, Display_com& Power Relay_com.	See "Unit does not operate" in troubleshooting section"
E2	Indoor Temp Sensor Open/Shorted	Check if properly connected. Check resistance values. Check for loose wires/broken wires in Molex connectors.	Check Thermistors
E3	Indoor Evaporator Coil Sensor Open/Shorted	Check if properly connected. Check resistance values. Check for loose wires/broken wires in Molex connectors.	Check Thermistors
E4	Indoor Supply Air Sensor Open/Shorted or Overheating of electric heater	Check if properly connected. Check resistance values. Check for loose wires/broken wires in Molex connectors. Check for Over Heating. Check for low air flow or no air flow due to evap coil clog. Evap fan motor compromised, Fan Capacitor compromised, blower wheel compromised. Heater relays compromised.	Check Thermistors Check Heater control
E5	IPM Board in protection mode	Check if compressor wiring is incorrect, IPM PCB compromised, Power PCB compromised, or if compressor compromised. Check for airflow obstructions. Check CN 13 on Power PCB for 15VDC at pins 1 and 2. Check compressor coil resistance. Check IPM PCB for arcing or odors of overheating. Check and monitor power supply stability and ensure proper NEC code grounding at the main breaker and power supply.	Remove IPM PCB (Inverter Board) Power PCB Identification Compressor Checks Remove Power PCB
E6	Outdoor Temp Sensor Open/Shorted	Check if properly connected, check resistance values, check for loose wires/broken wires in Molex connectors.	Check Thermistors
E7	Outdoor Condenser Coil Sensor Open/Shorted	Check if properly connected, check resistance values, check for loose wires/broken wires in Molex connectors.	Check Thermistors
E8	Communication failure to wall controller	Check all connectors between PTAC and wall controller are properly connected. Shutdown unit, and then remove power plug from wall or open fuse/ circuit breaker. Wait 3 or 4 minutes and then reapply power and restart the unit. If E8 error persists, contact Friedrich Technical Support at (1-800-541-6645). for further assistance.	
EC	Compressor attempted to start but failed to start	Check Dip Switch SW2 on Main Board is correct for the BTU of the unit model. Check Compressor wiring is properly connected. Check compressor for Short/Ground, Check IPM Board.	See Operation section for details on dip switches Compressor Checks
EH	EEPROM Error	Replace Main Board, Check for compromised electrical wires to Main Board	Replace Main Board
EF	30 amp power cord installed on PVH09 (230 or 265 volt) Not Allowed	Replace the power cord to 15A or 20A supply cord as required. See Accessory section.	Replace Power Cord
P1	Cooling or Heating overload	Check for low air flow or no air flow due to evaporator or condenser coil blocked with debris. Evap/Cond motor fan motor compromised, Fan Capacitors compromised, blower wheel/fan blade compromised. Check Resistance values for indoor and Outdoor coil thermistors.	Check indoor fan motor Check outdoor fan motor Check Fan Capacitors Check Thermistors

TROUBLESHOOTING

Figure 712

Error code and solutions

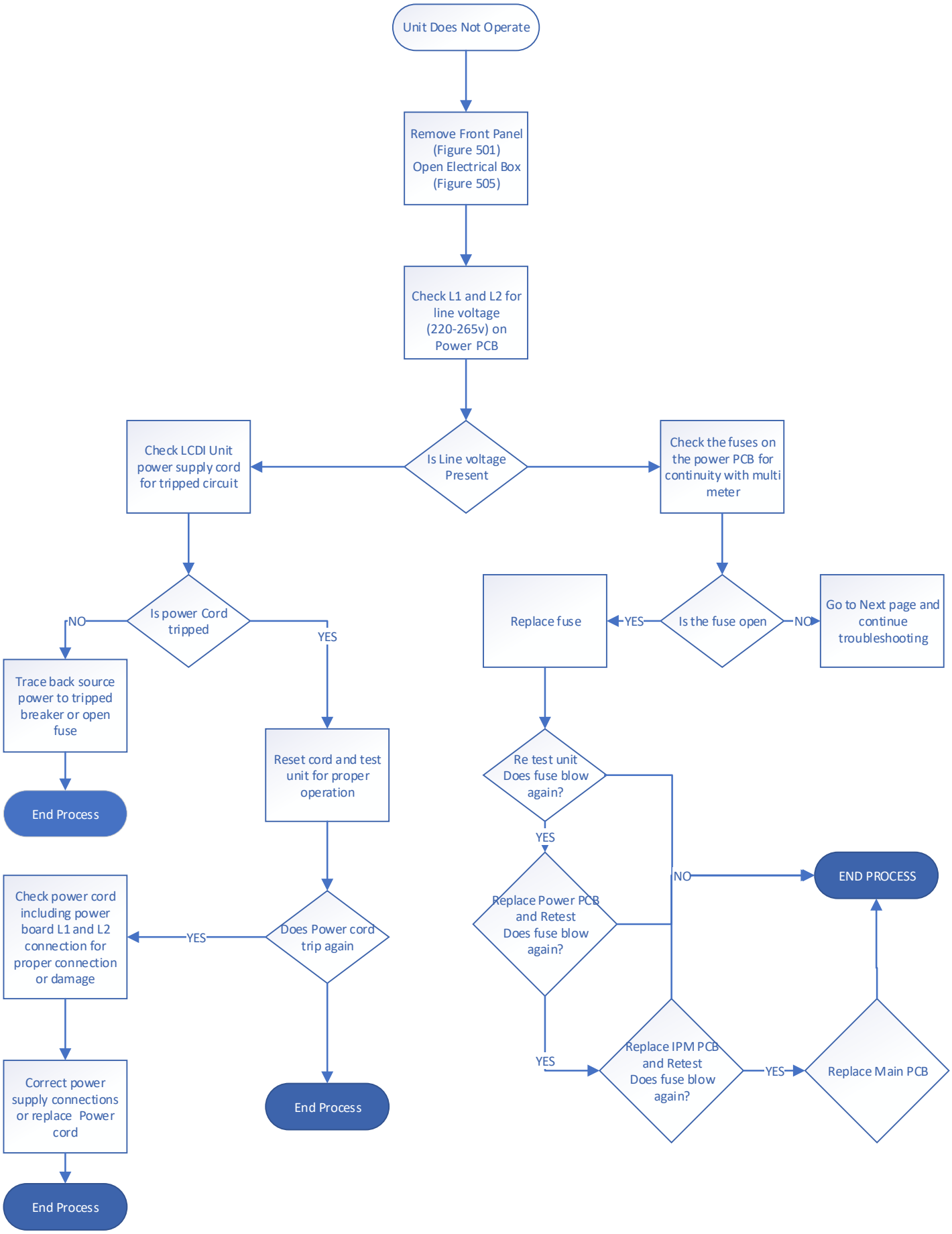
ERROR CODE	Meaning	Solutions	Click link for reference
P2	IPM Over Heat or Over Current Protection invoked	Check for low air flow or no air flow due to evaporator or condenser coil blocked with debris. Evap/Cond motor fan motor compromised, fan Capacitors compromised, blower wheel/fan blade compromised. Check Dip Switch SW2 on Main Board is correct for the BTU of the unit model. Check Compressor wiring is properly connected, Check compressor for Short/Ground, Check IPM PCB.	See Operation section for details on dip switches. Check indoor fan motor Check outdoor fan motor Check Fan Capacitors Check Compressor Check IPM PCB
P4	Compressor Discahrge Over Heat Protection invoked	Check for low air flow or no air flow due to evaporator or condenser coil blocked with debris. Evap/Cond motor fan motor compromised, Fan Capacitors compromised, blower wheel/fan blade compromised. Check Dip Switch SW2 on Main Board is correct for the BTU of the unit model Check Compressor wiring is properly connected, Check compressor for Short/Ground, Check IPM Board,	See Operation section for details on dip switches. Check indoor fan motor Check outdoor fan motor Check Fan Capacitors Check Compressor Check IPM PCB
P7	DC Over/Under Supply Power Voltage Protection invoked	Check for low air flow or no air flow due to evaporator or condenser coil blocked with debris. Indoor blower/ outdoor fan compromised, fan capacitors compromised. Blower wheel/ fan blade compromised. Check dip switch SW2 on main pcb is correct for the BTU of the model. Check compressor wiring is properly connected. Check compressor for short. Check IPM PCB. Check Power Supply is within the required power supply tolerances of +/- 10% Check and monitor power supply stability and ensure proper NEC code grounding at the main breaker and power supply.	See Unit does not Operate Check indoor fan motor Check outdoor fan motor Check Fan Capacitors Check Compressor Check IPM PCB

Return to Error Codes and Solutons

TROUBLESHOOTING

Figure 713

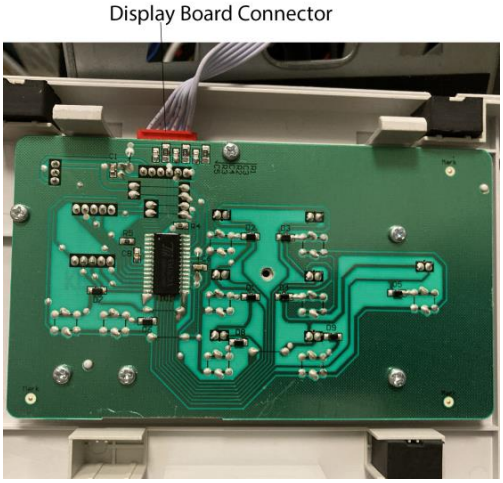
Unit Does Not Operate

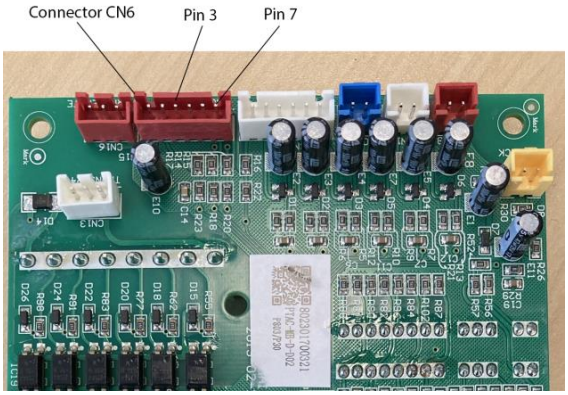


TROUBLESHOOTING

Figure 713

Unit Does Not Operate





Disconnect Display Connector CN6 on top of Main PCB

Set multi meter do read low voltage DC and place Multi Meter leads on pins 3 and 7.

Is Fluctuating 0-6Vdc Present?

NO

Set multimeter to read continuity. Check all wires on display board connector cable to CN6 plug for pin to pin continuity.

Are any wires showing open (OL)?

No

Replace Display Board

YES

Replace Connector cable

YES

Check all wiring and comms cable connectors from Main PCB to the Power PCB

Ensure all connectors are undamaged, fully connected and fully engaged.

Any loose, damaged, or disconnected connectors?

YES

Fix any issues
Reference wiring diagram (figure 801) Main PCB Diagram (Figure 709) Power PCB Diagram (Figure (710)

No

Is Fluctuating 0-6Vdc Present?

YES

END PROCESS

NO

Continue troubleshooting

TROUBLESHOOTING

Check Heater Coil

⚠ 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.

The unit is equipped with a universal E-heater, which contains two independent heating elements. Two limit switches are incorporated into the heater assembly. The primary opens at 160°F and closes at 130°F. The secondary's open temp is 221°F. They can not be replaced independently. If they are found to be faulty the entire heater assembly must be replaced as a unit. The 9K BTU unit incorporates a 2.5 kW and a 1.0 kW element. The 12K BTU unit incorporates a 3.5 kW and a 1.5 kW element.

Gain Access to Main PCB (logic) board
1. Remove front panel (Figure 501).
2. Remove User Interface (Figures 502 thru 504).
3. Open electrical Control Box (Figure 505)
4. Disconnect Red and Blue wires from the Heater relays (Figure 714)
5. Disconnect black wire from Power PCB (Figure 715)

Testing The Heating Element
Testing of the elements can be made with an ohmmeter across the terminals after the 3 heater wires have been disconnected. Readings should always been taken when coil is cold.

The 9K BTU unit incorporates a 2.5 kW and 1.0 kW heater coils.

1) Check 2.5 kW coil
Blue (Heater Common) to Black (Heater 1)
230v = ohms +-3%
265v = ohms +- 3%

2) Check 1.0 kW coil
Blue (Heater Common) to Red (Heater 2)
230v = ohms +-3%
265v = ohms +- 3%

The 12K BTU unit incorporates a 3.5 kW and 1.5 kW heater coils.

1) Check 3.5 kW coil
Blue (Heater Common) to Black (Heater 1)
230v = ohms +-3%
265v = ohms +-3%

2) Check 1.5 kW coil
Blue (Heater Common) to Red (Heater 2)
230v = ohms +-3%
265v = ohms +-3%

If a reading is open or out of tolerance replace the heater assembly.

Reconnect wires and operate heat to place electric heater in demand- See sequence of operation for details.

Check 230/265v at output terminals on heater relays. If 230/265 volts is present and heater element does not operate correctly, replace heater assembly. If 230/265 volts in not present, proceed to figure 717 (Check electric heater control)

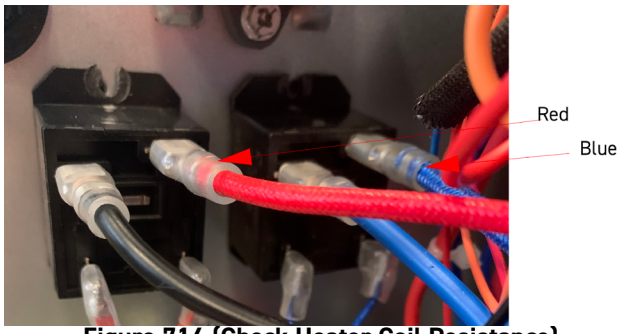


Figure 714 (Check Heater Coil Resistance)

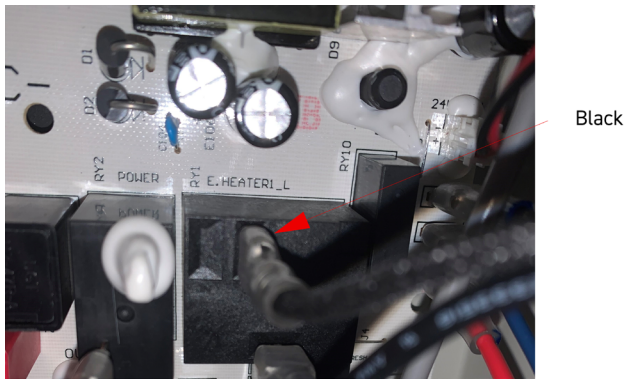


Figure 715 (Check Heater Coil Resistance)

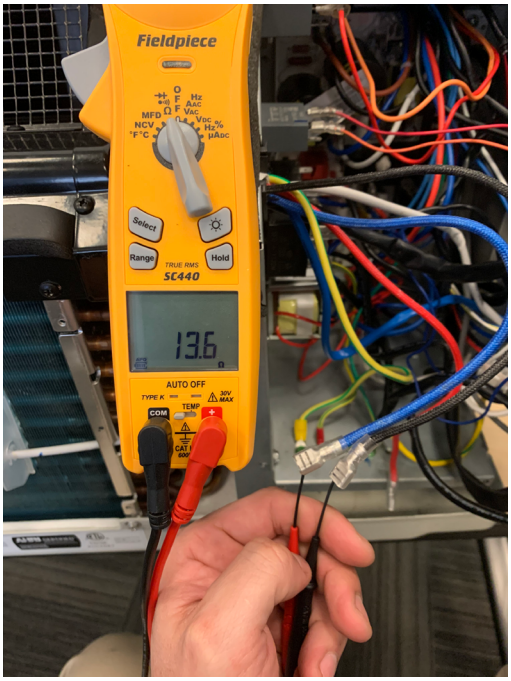
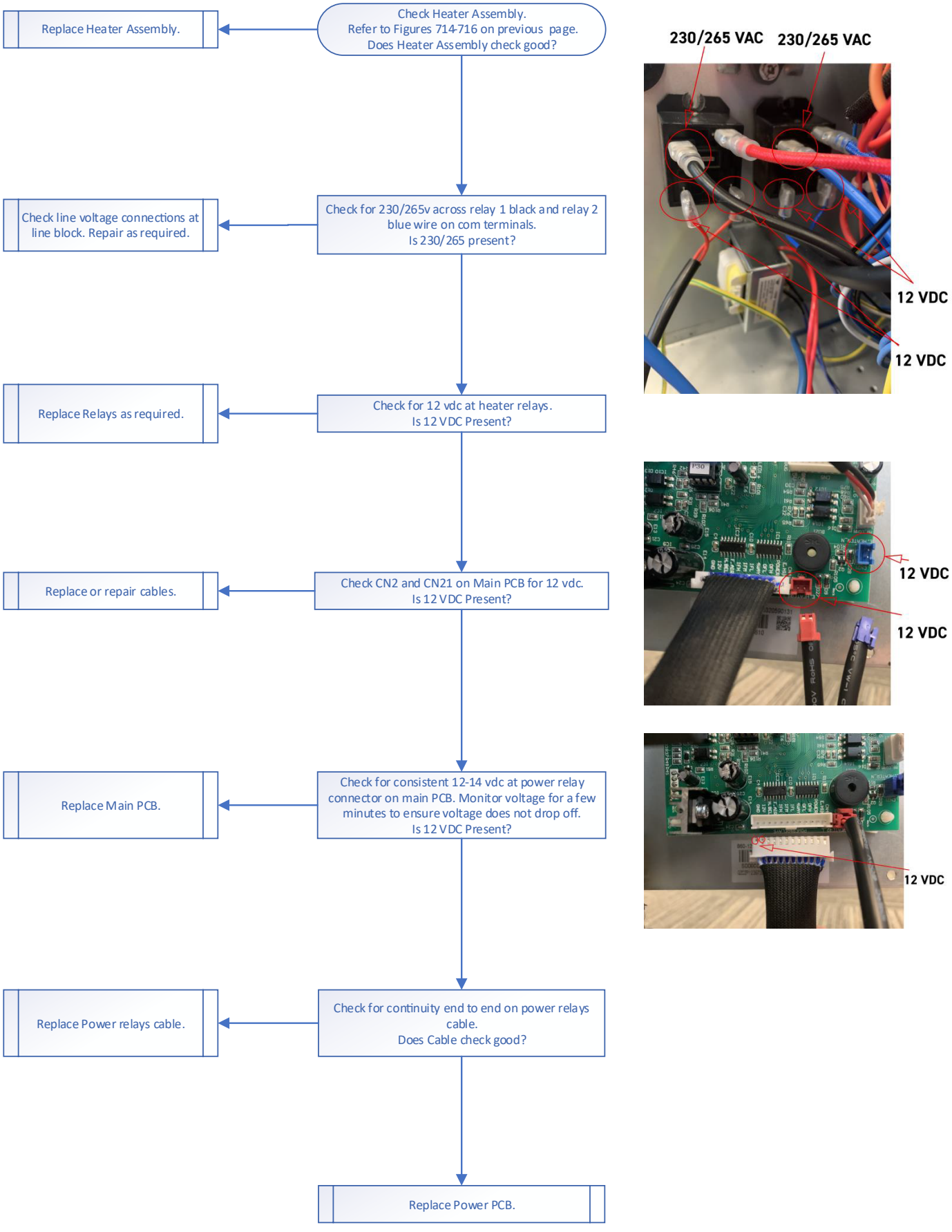


Figure 716 (Check Heater Coil Resistance)

TROUBLESHOOTING

Figure 717

Check Electric Heater Control



TROUBLESHOOTING

Figure 718

Check Thermistors

⚠ 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.

Gain Access to Main PCB (logic) board
1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Using a multi-meter ohm across applicable pins for the sensor you are checking.

5. Refer to thermistor charts in Appendix for resistance and temperature deviation.
5k Indoor ambient temperature (T1) Figure 719
5k Indoor coil temperature (T2) Figure 719
5k Outdoor coil temperature (T3) Figure 719
5k Outdoor ambient temperature (T4) Figure 719
50k Compressor discharge temp (T5) Figure 720
5k Indoor outlet air temperature (T6) Figure 19

6. Replace sensor if open or if resistance values deviate by more than 10% of the listed values.

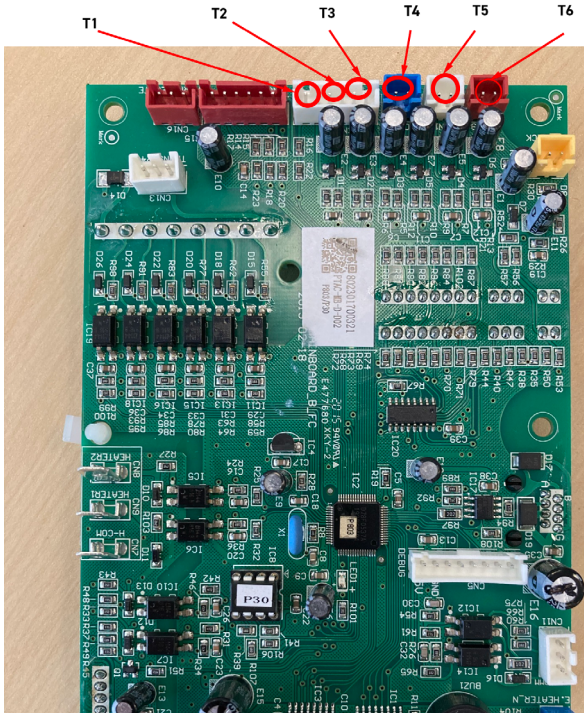


Figure 719 (Thermistor Connections on Main PCB)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Chassis

⚠ 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.

The Front Panel needs to be removed prior to any repair or troubleshooting procedures.

1. Front panel is removed by lifting up and rotating back and down.

⚠ CAUTION

Unit weighs approximately 120 pounds.
Use caution when removing to prevent personal injury or damage to the equipment.

2. Remove 4 mounting screws and slide unit out of sleeve.

Figure 501 (Chassis Removal)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove User Interface

⚠ 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.

1. Remove 1 screw securing User Interface to the control box. (Figure 502)

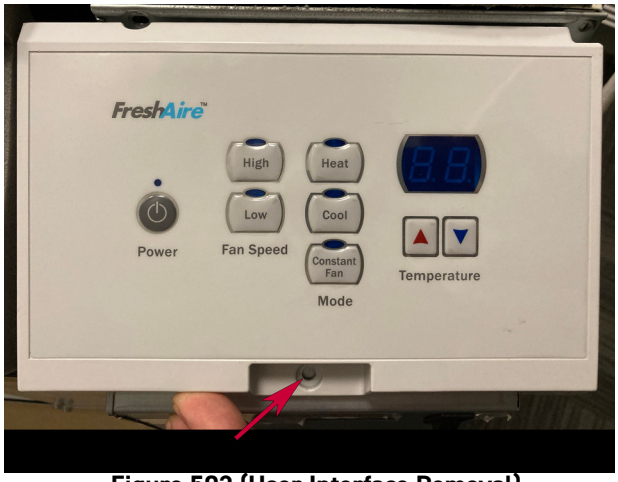


Figure 502 (User Interface Removal)

2. Remove 6 screws attaching display board to user interface. (Figure 503)

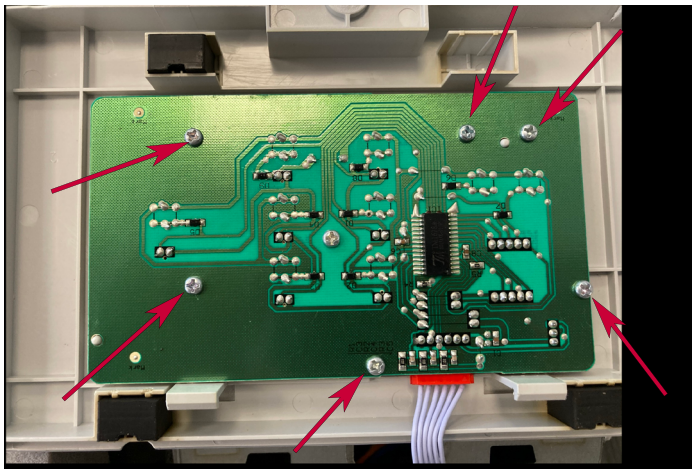


Figure 503 (User Interface Removal)

3. Disconnect plug. (Figure 504)

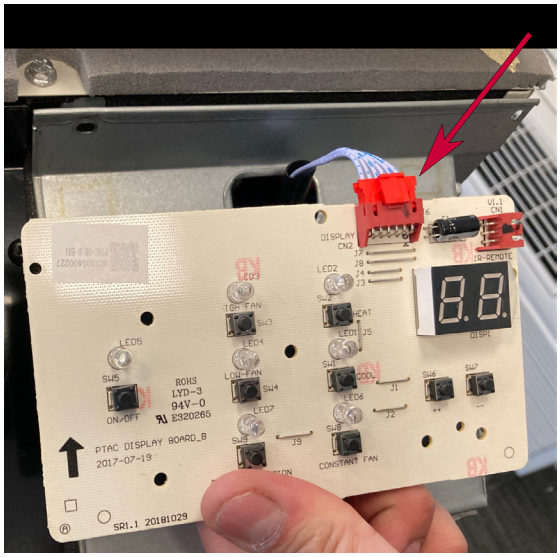


Figure 504 (User Interface Removal)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Open Electrical Control Box

⚠ 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.

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Remove fireproof cover. (See figure 505.1)

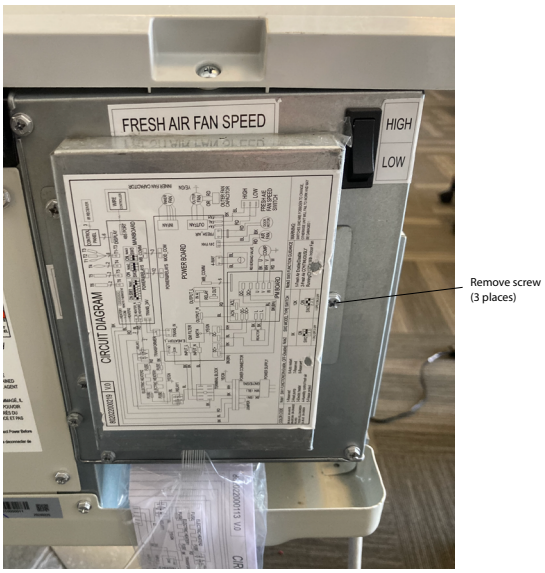


Figure 505.1

4. Remove 7 screws.(Figure 505)

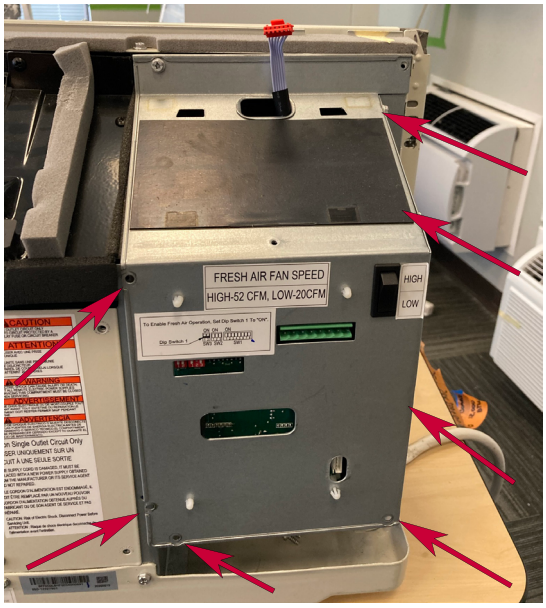


Figure 505.2

5. Unhinge electrical box.

Remove Main PCB (logic) Board

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Snip wire ties to loosen wire bundles. (Figure 506).

NOTE: It is a good practice to take pictures of the wiring connections to facilitate reinstallation.

5. Disconnect wire connectors from Main PCB (logic) board one at a time. Identify plugs for reinstallation.

6. Remove 4 standoffs by pinching tip and applying slight upwards pressure to the board.

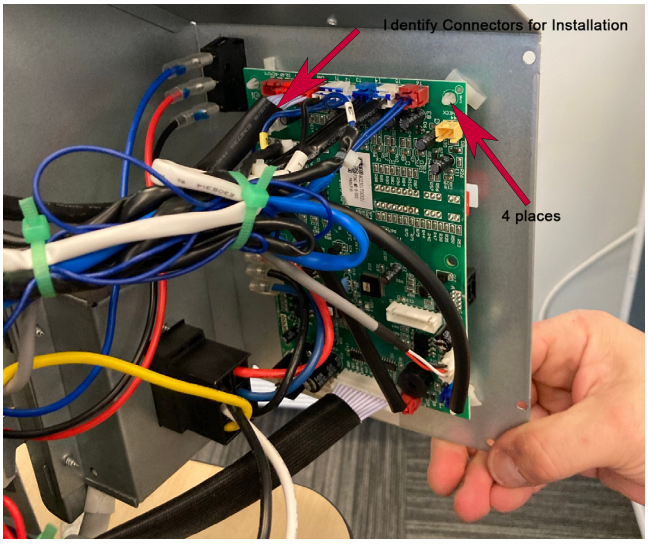


Figure 506

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Power Cord

⚠ 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.

1. Remove front panel (Figure 501).

1. Remove power cord access panel located on right side of control box(2 screws) Figure 507)

Figure 507 (Remove Power Cord)

2. Pinch retainer clips on top and bottom of power cord plug to disconnect (Figure 508).

3. Remove cord grommet (2 screws).

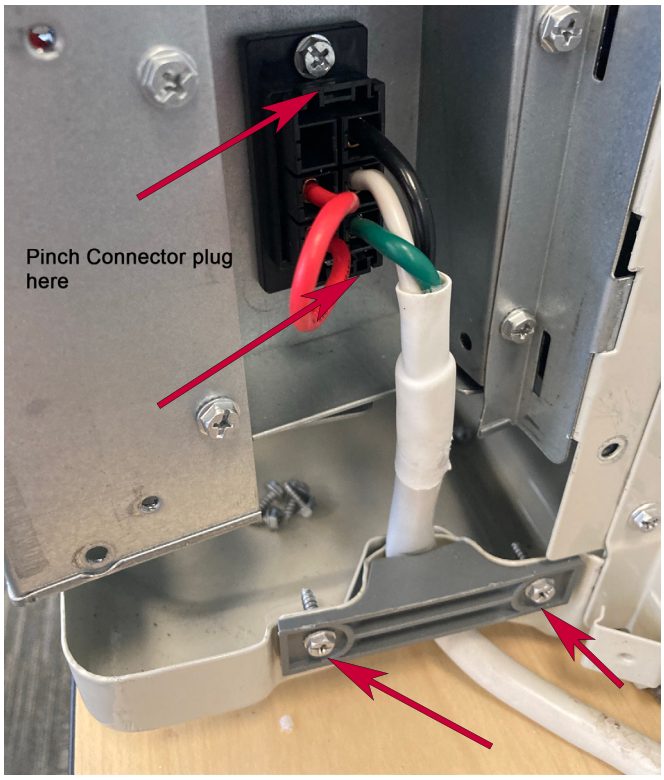


Figure 508 (Remove Power Cord)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Power PCB

⚠ 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.

1. Remove front panel (Figure 501).

3. Open electrical Control Box (Figure 505).

4. Snip wire ties to loosen wire bundles (Figure 509).

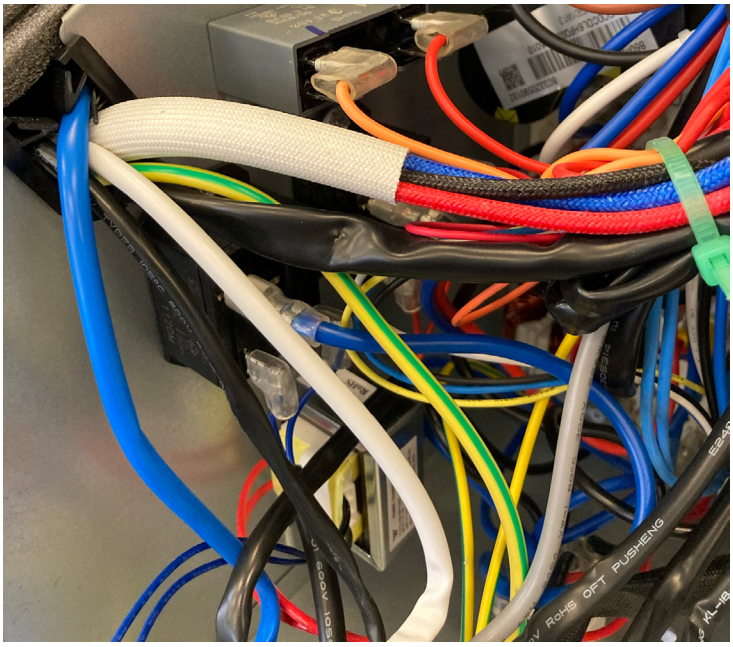


Figure 509 (Remove Power PCB)

NOTE: It is necessary to unmount components to gain access for Power PCB removal.

5. Remove 1 capacitor, 2 heater board relays, and 1 transformer but **DO NOT** disconnect connections (Figure 510).

NOTE: It is a good practice to take pictures of the wiring connections to facilitate reinstallation.

6. Disconnect wire connectors from Power PCB (Power Board) one at a time. and identify plugs for reinstallation .

7. Remove Power PCB (Power Board) (4 screws).

Figure 510 (Remove Power PCB)

Return to Error Codes and Solutons

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove IPM PCB (Inverter Board)

⚠ 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.

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Disconnect CN 13 from the Power PCB.

5. Remove Chassis from Wall (Figure 501).

6. Remove shroud support (2 screws) (Fig 512).

7. Remove IPM PCB Cover (3 screws) (Fig 512).

NOTE: It is a good practice to take pictures of the wiring connections to facilitate reinstallation.

⚠ CAUTION

IPM PCB is attached to a heavy heat sink with thermal paste or a thermal mat which is required to dissipate heat from the IPM PCB. Use care when removing.
PCB needs to drop down through housing. It can fall and be damaged if care is not taken.

8. Disconnect all wires. (Fig 513)

8) Remove 4 mounting screws (Figure 513).

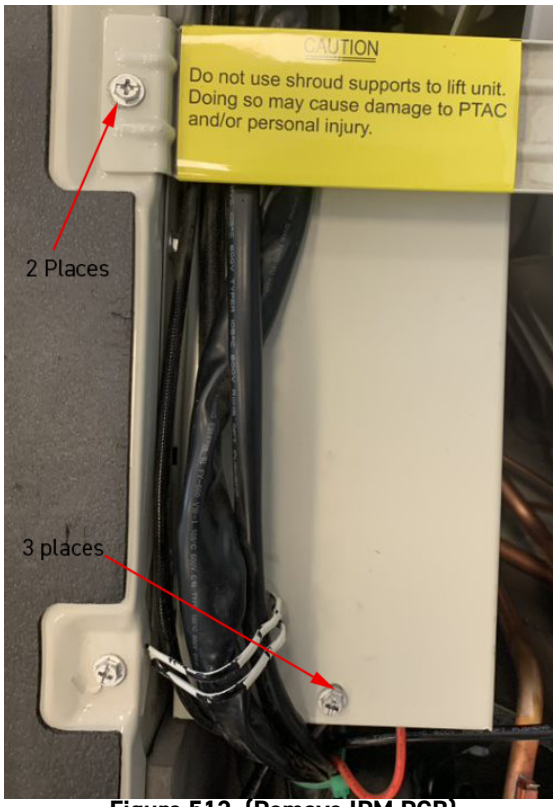


Figure 512 (Remove IPM PCB)

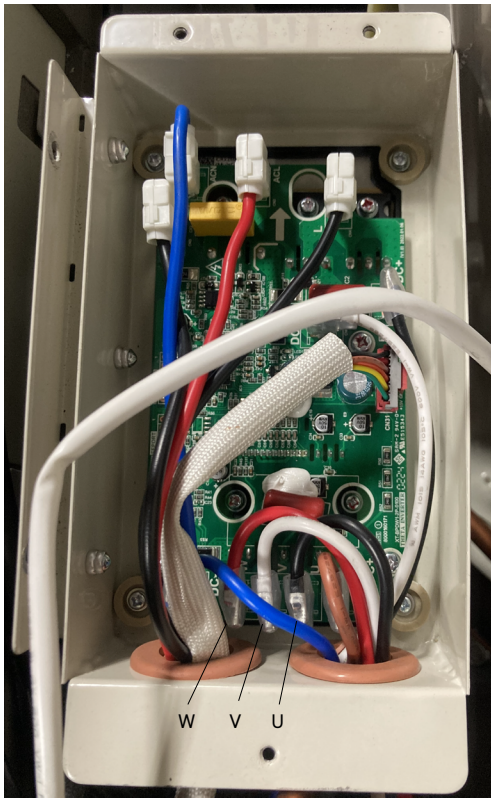


Figure 513 (Remove IPM PCB)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Blower Wheel

⚠ 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.

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Remove indoor fan guard (6 screws) (Figure 514).

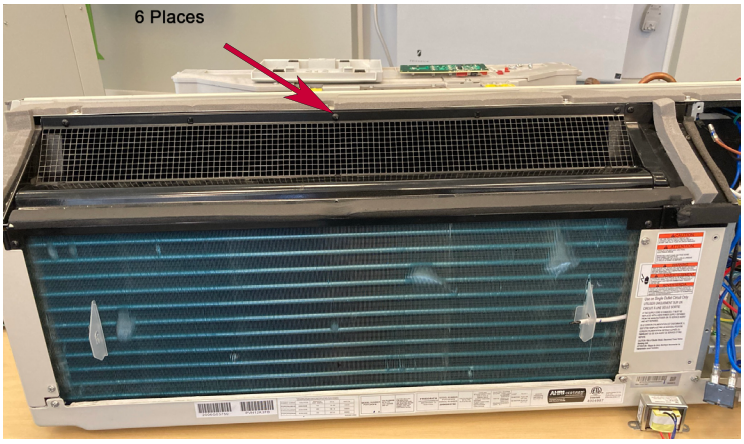


Figure 514 (Remove Indoor Fan Guard)

5. Remove top air guide (6 screws) (Figure 515).

Figure 515 (Remove Top Guide)

6. Remove fresh air intake housing (2 screws) (Figure 516).

Figure 516 (Remove Fresh Air Housing)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Blower Wheel (Continued)

9. Remove left panel (7 screws) (Figure 517).

Figure 517 (Remove Left Panel)

10. Loosen set screw **(DO NOT REMOVE)** from blower motor shaft. (Figure 518).

NOTE: Set screw is a 2.5 mm "Allen Head" screw.

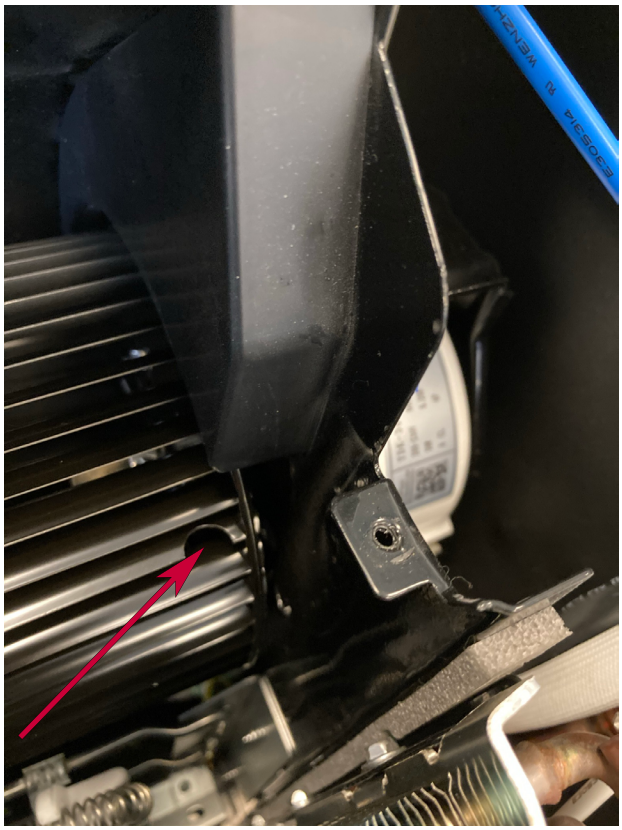


Figure 518 (Blower Wheel Set Screw)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Blower Wheel (Continued)

11. Remove blower end plate (3 screws)(Figure 519).

12. Slide blower assembly out of left side of unit.

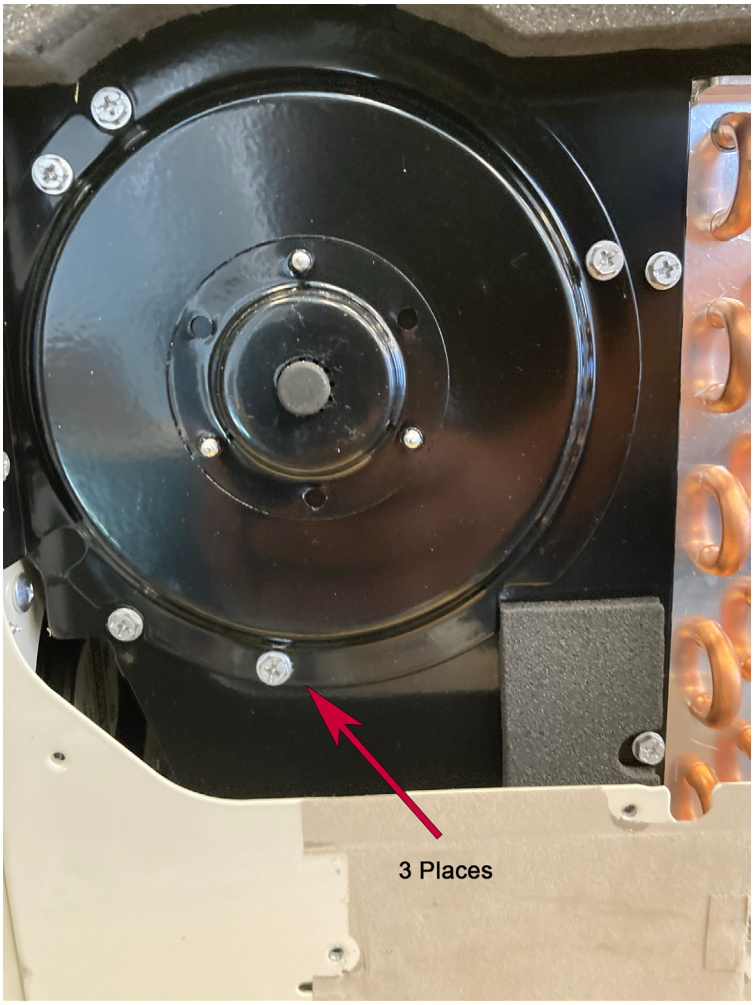


Figure 519 (Blower End Plate)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Blower Wheel Motor

⚠ 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.

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Snip wire ties to loosen wire bundles. (Figure 521)

NOTE: It is a good practice to take pictures of the wiring connections to facilitate reinstallation.

5. Disconnect indoor blower connector on Power PCB (Power Board). (Figure 520).

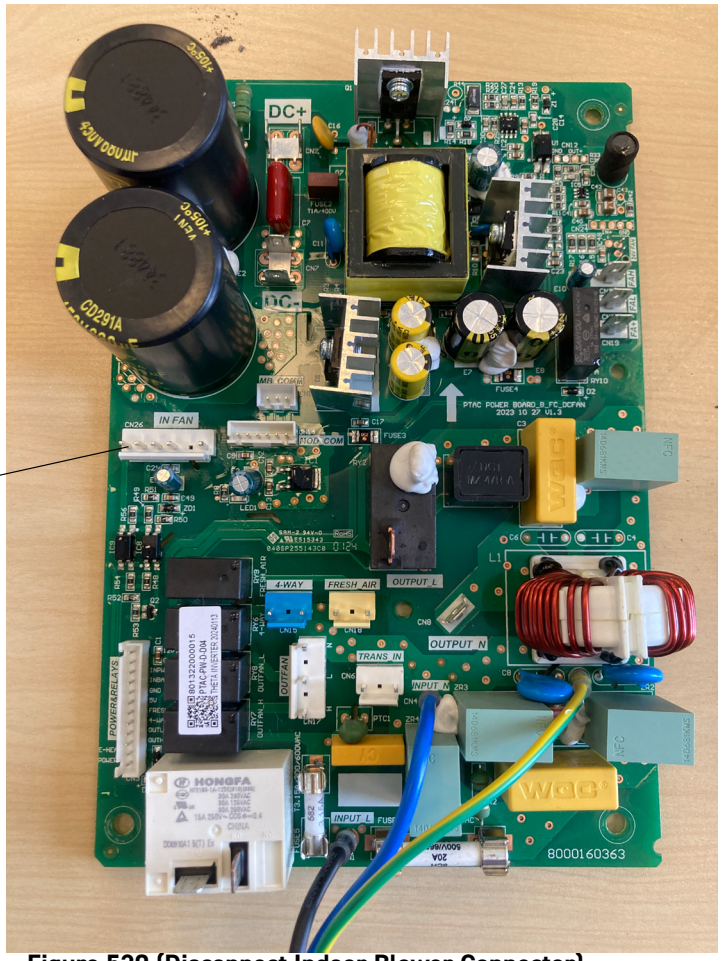


Figure 520 (Disconnect Indoor Blower Connector)

6. Disconnect Indoor blower capacitor connector (Figure 521).

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Blower Wheel Motor (Continued)

7. Remove mounting screws from electrical box rear and side covers and slide out of way to facilitate blower motor replacement (Figure 522).

8. Remove fan motor bracket (3 screws).

9. Remove motor.

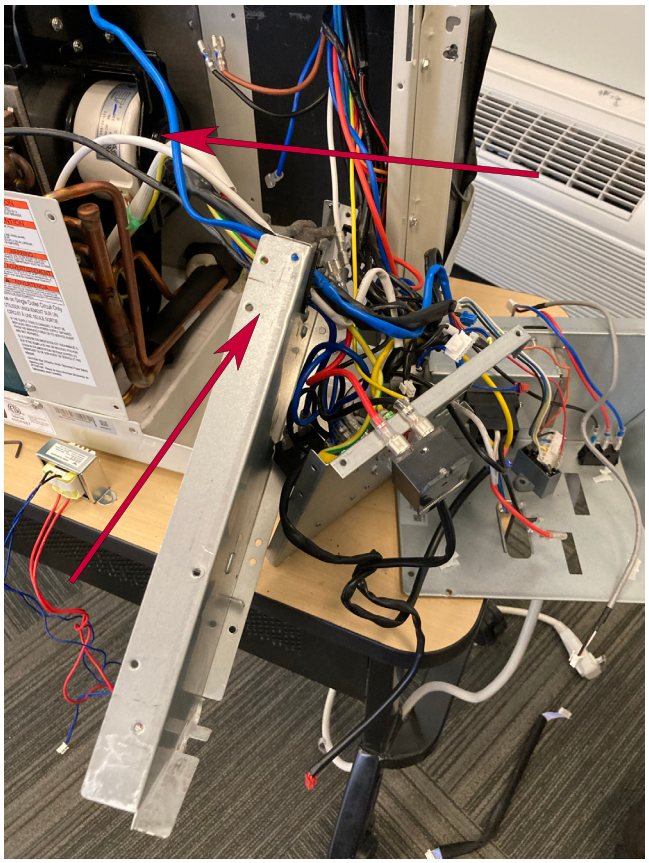


Figure 522 (Remove Indoor Blower Motor Bracket)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Heating Element

⚠ 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.

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

4. Remove Chassis from Wall (Figure 501)

4. Remove indoor fan blower (Figures 514 thru 519).

5. Remove top support bracket (12 screws) (Figure 523)

6. Disconnect blower housing sensor from blower housing (Figure 524).

7. Disconnect Indoor motor capacitor wiring and power connector at Power PCB.

8. Disconnect power leads from heater relays.

9. Disconnect heater ground wire.

10. Remove indoor blower housing (4 screws).

11. Remove heater element assembly from housing (4 screws).

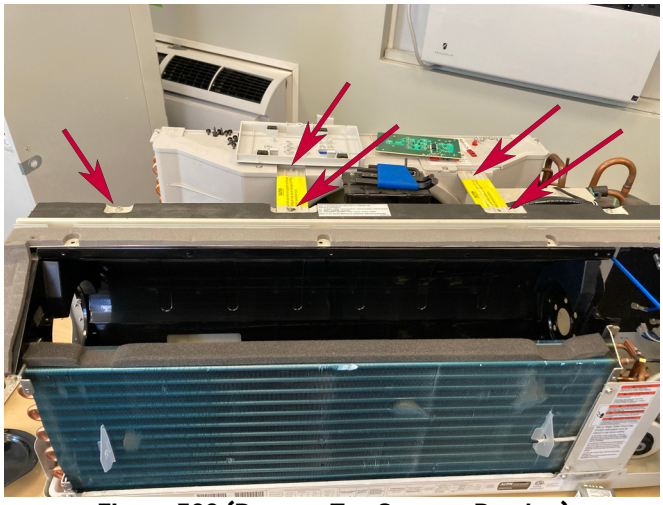


Figure 523 (Remove Top Support Bracket)

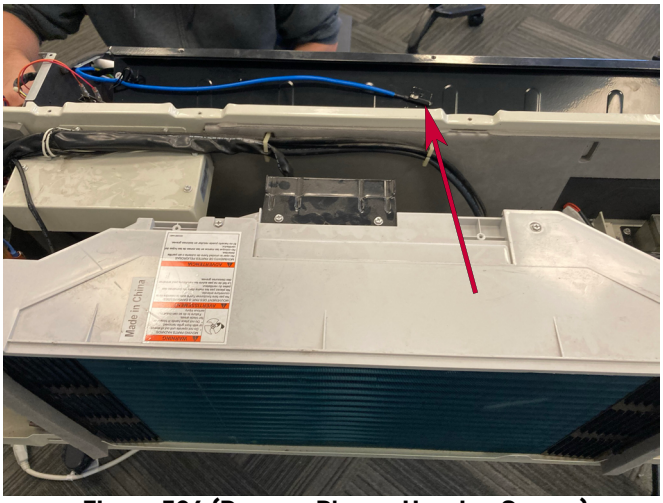


Figure 524 (Remove Blower Housing Sensor)

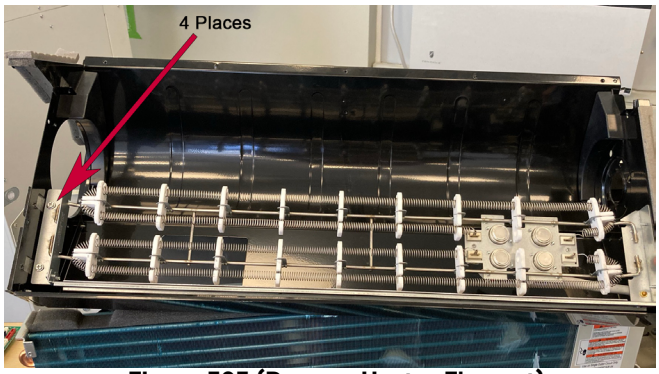


Figure 525 (Remove Heater Element)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Fresh air Components

⚠ 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.

1. Remove Chassis From wall. (Figure 501).

2. Remove Fresh air Cover (Figure 526).

Figure 526 (Remove Fresh Air Housing)

3. Cut wire ties as required.

4. Remove 4 screws from reactor and unplug 2 terminal wires (Figure 527).

5. Remove bracket (2 screws).

6. Remove freshair filter by sliding out.

7. Remove all screws from fresh air housing.

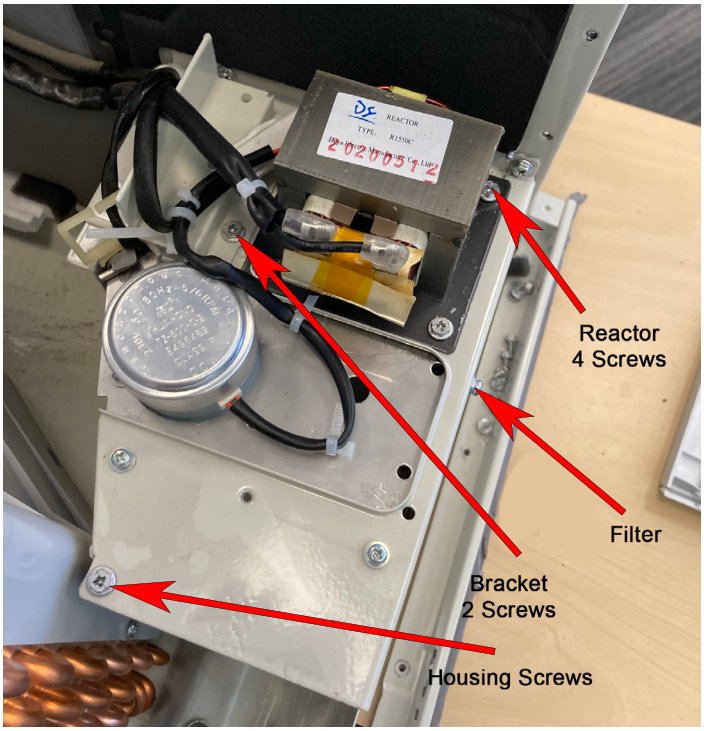


Figure 527 (Remove Fresh Air brackets)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Fresh air Components (Continued)

8) Remove fresh air actuator assembly (1 screw).

9) Remove fresh air fan assembly (2 screws).

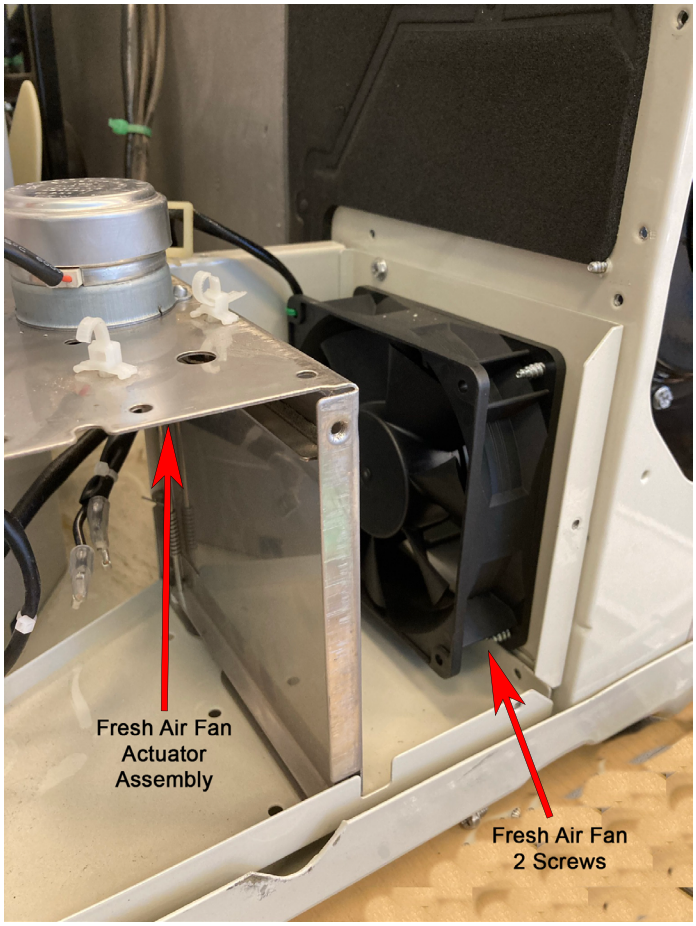


Figure 528 (Remove Fresh Air Actuator and Fan)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Outdoor Fan

⚠ 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.

1. Remove Chassis from wall (Figure 501).

2. Remove front panel (Figure 501). (Not required for Blade replacement)

3. Remove User Interface (Figures 502 thru 504). Not required for Blade replacement)

4. Open electrical Control Box (Figure 505). Not required for Blade replacement)

5. Cut wire ties as required. Not required for Blade replacement)

6. Disconnect outdoor blower connector on power panel. (Figure 529). Not required for Blade replacement)

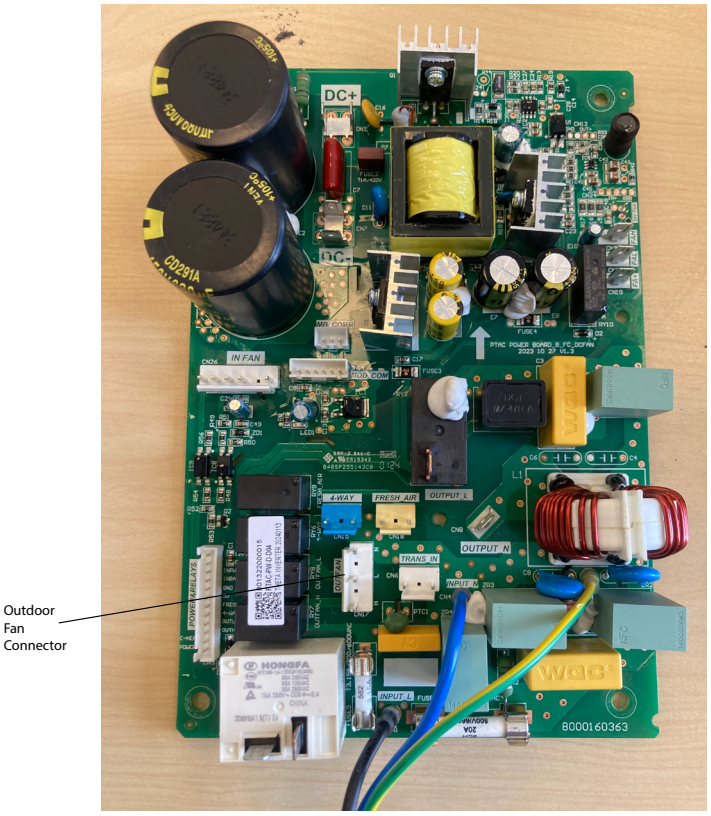


Figure 529 (Disconnect Outdoor Fan Connector)

7. Disconnect Outdoor blower capacitor connector (Figure 530). Not required for Blade replacement)

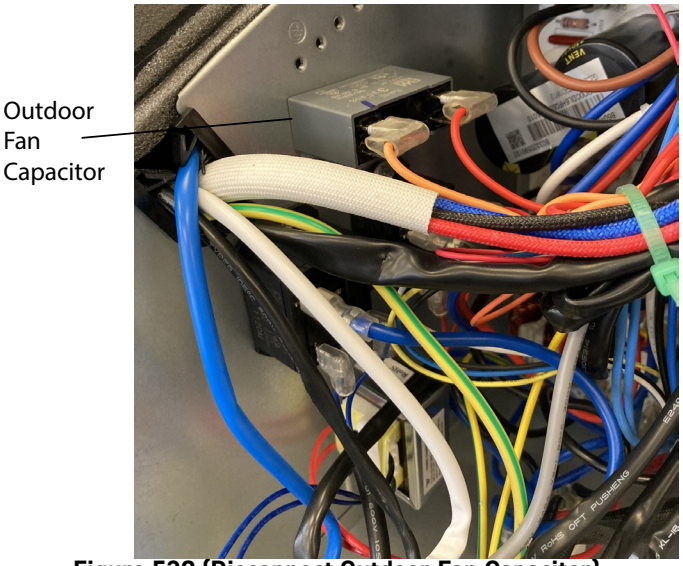


Figure 530 (Disconnect Outdoor Fan Capacitor)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Outdoor Fan (Continued)

8. Remove Brackets and Shrouds (12 screws)(Figure 531 and 532).

9. Remove Mounting screws (4 places) (Figure 533).

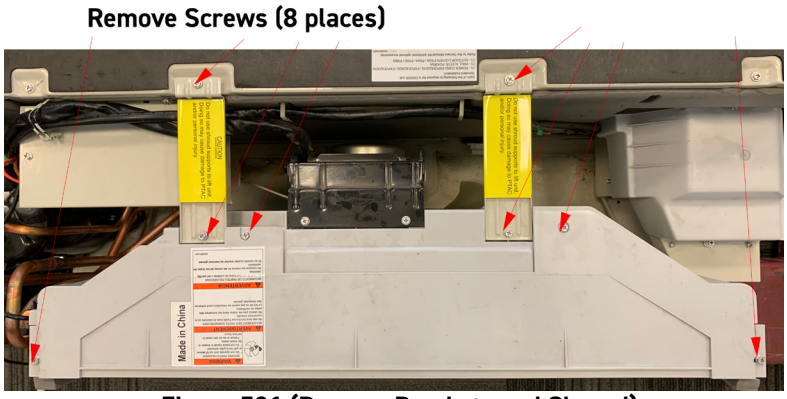


Figure 531 (Remove Brackets and Shroud)

Figure 532 (Remove Brackets and Shroud)

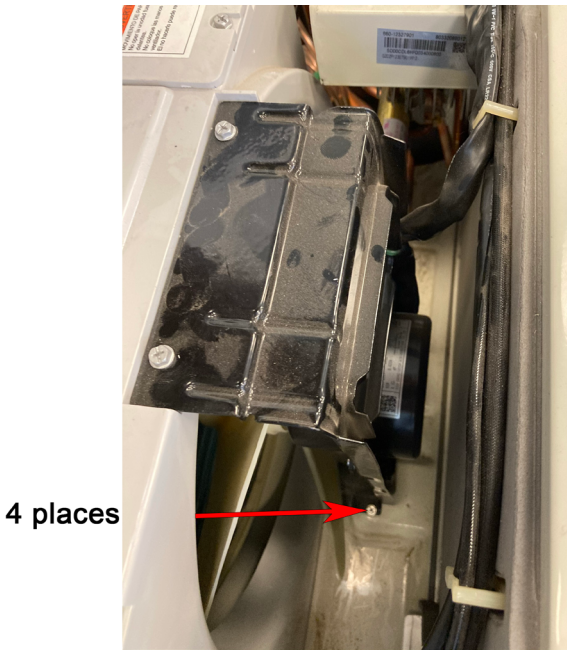


Figure 533 (Remove Mounting bolts)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Outdoor Fan (Continued)

10. Pull up and remove fan housing (Figure 534).
11. Remove shaft nut and fan blade (Figure 535).
12. Remove motor (4 places) (Figure 536).

Figure 534 (Remove Assembly)

Figure 535 (Remove fan blade)

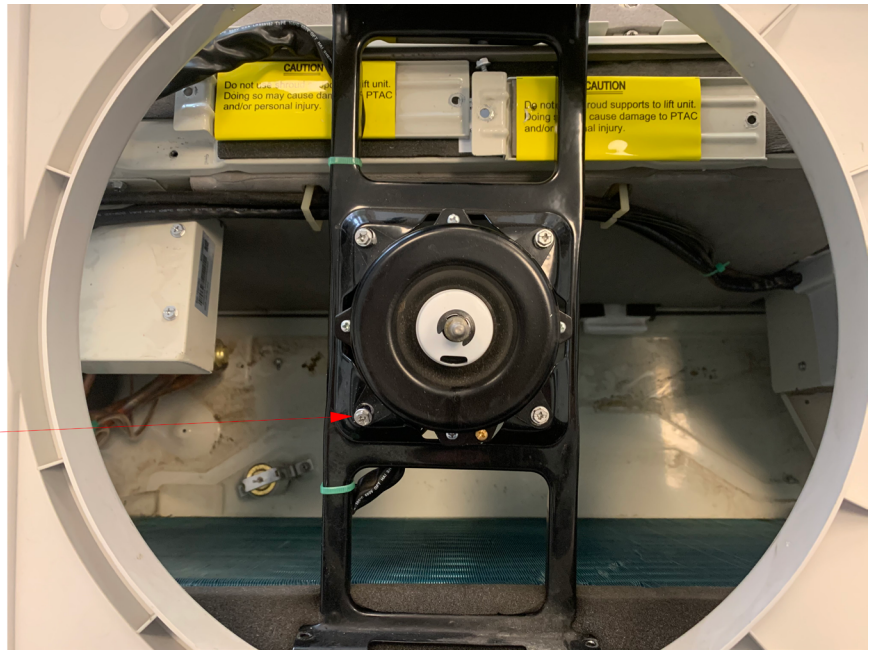


Figure 536 (Remove Fan Motor)

UNIT DISASSEMBLY AND COMPONENT REPLACEMENT

Remove Reversing valve Solenoid

1. Remove Chassis from wall (Figure 501).

2. Remove front panel (Figure 501).

3. Remove User Interface (Figures 502 thru 504).

4. Open electrical Control Box (Figure 505).

5. Cut wire ties as required.

6. Disconnect connector from Power PCB (Power Board) cn 16 and 17 and feed wire through control box housing (Figure 537).

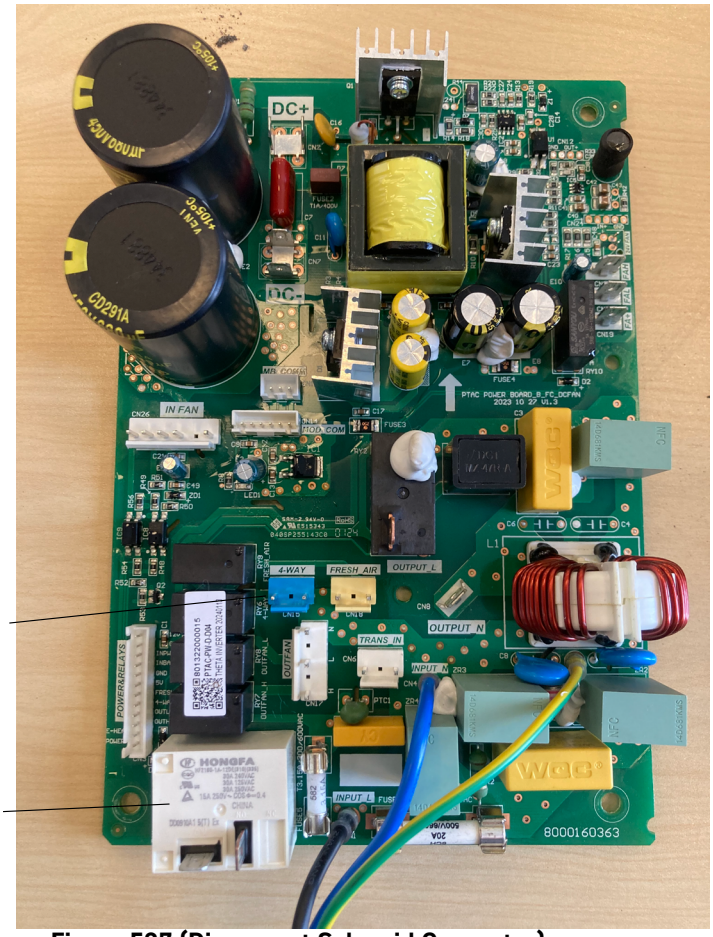


Figure 537 (Disconnect Solenoid Connector)

8. Remove 1 bolt and separate solenoid from valve (Figure 539).

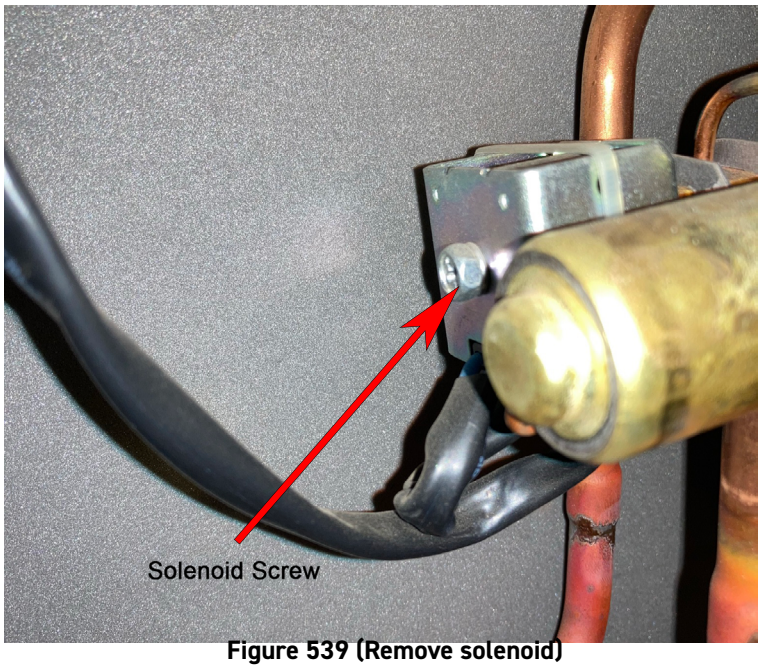


Figure 539 (Remove solenoid)

COMPONENT TESTING

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 to the proper capillary tube during either the heating or cooling cycle.

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.

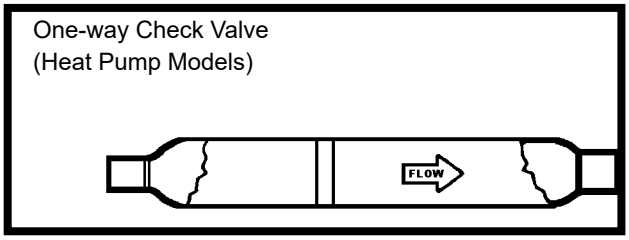


Figure 701 (Check Valve)

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 to the 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 to the heating capillary to the outdoor coil.

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.

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 metered through cooling capillary tubes to evaporator. (Note: liquid refrigerant will also be directed through the heating capillary tubes in a continuous loop during the cooling mode).

HEATING MODE

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 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).

COMPONENT TESTING

Reversing Valve Description And Operation

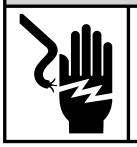
A reversing valve is a component of a heat pump that changes the direction of refrigerant flow, allowing the system to function in both heating and cooling modes.

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 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 plunger 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.

⚠ WARNING



ELECTRIC SHOCK HAZARD

Disconnect power to the unit before servicing. Failure to follow this warning 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.

Checking the Reversing Valve

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

Run the unit in the heating mode then disconnect one of the wires at the reversing valve and the valve should shift to cooling mode. If valve does not shift - replace the valve(verify the unit is properly charged before replacing valve.) For a stuck valve diagnosis run in the cooling mode and check the temp difference between the suction line from the evaporator and the common suction line at the compressor, if there is more than a 3 ˚F difference then change the valve.

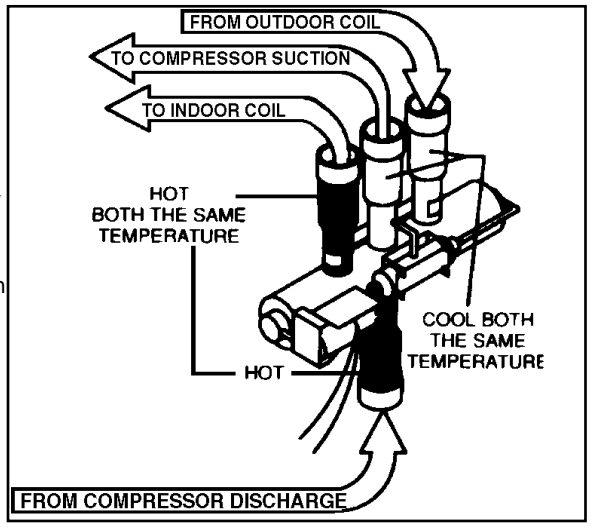


Figure 702 (Reversing Valve in Heating Mode)

Checking The Reversing Valve Solenoid

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 resistance through the coil. If the coil is open 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.

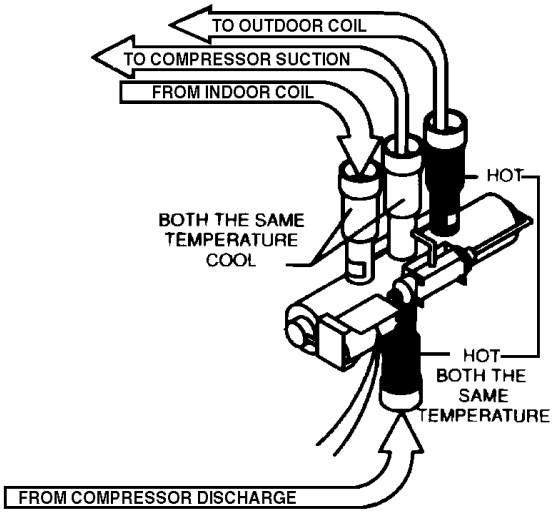


Figure 703 (Reversing Valve in cooling mode)

Return to Error Codes and Solutons

COMPONENT TESTING

Compressor Checks

⚠ WARNING

ELECTRIC SHOCK HAZARD

Turn off electric power before service or installation.

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.

Failure to do so can result in personal injury or death.

⚠ 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.

Overloads

The compressor is equipped with either an external or internal 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 Overloads

External Overloads

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.

Internal Overloads

The overload is embedded in the motor windings to sense the winding temperature and/or current draw. The overload is connected in series with the common motor terminal.

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

Checking the Internal Overload

1. With no power to unit, remove the leads from the compressor terminals.
2. Using an ohmmeter, test continuity between terminals C-S and C-R. If no continuity, the compressor overload is open and the compressor must be replaced.

COMPONENT TESTING

Compressor Checks

⚠ 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.

Gain access to compressor and IPM PCB (Inverter Board) by removing chassis from wall.

1) Disconnect terminals R(U), S(V), and T(W) from the compressor.

Resistance Test.

2) Set Ohm meter to the lowest scale and check continuity between pins R(U), S(V), and T(W).
At room temperature (70°- 95°F) the resistance should be approximately 2.2 ohms. The Ohm values will change significantly at different temperatures. This **does not** indicate that the compressor windings are faulty. A reading of open (infinity), or a significant difference in the resistance between the windings **does** indicate that the compressor windings are faulty.

3) Check for continuity from between pins R(U) to ground, S(V) to ground, and T(U) to ground)
The compressor windings are faulty if the there is continuity from the compressor windings to ground.

4) Common signs compressor is faulty:
- Compressor motor lock.
- Discharge pressure value approaches static pressure value .
- Compressor motor winding abnormality.

Note:
- Don't put a compressor on its side or turn over.
- Assemble the compressor quickly after removing the plugs. Prolonged exposure will damage the internal components of the compressor
- Ensure wiring is correct before operating. Reverse operation will permanently damage the compressor.

- **Electric Reactor**

Common Problems:
- Sound abnormality
- Runs in a sporadic rhythm.

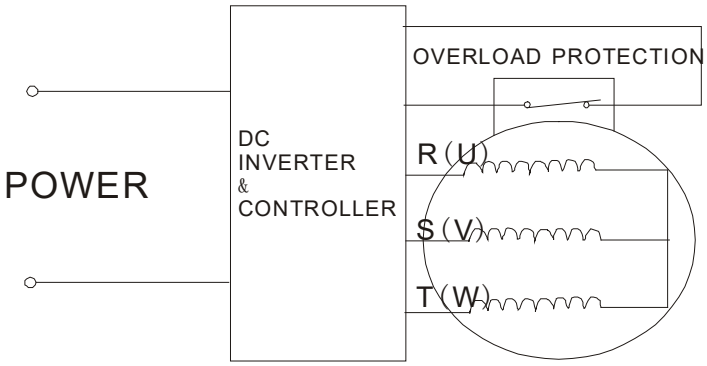


Figure 705 (Compressor Windings)

Return to Error Codes and Solutons

COMPONENT TESTING

Check Indoor and Outdoor Fan Motors

Gain Access to the Power PCB (Power Board).

1. Remove power from the unit.

2. Remove front panel (Figure 501).

3. Remove User Interface (Figures 502 thru 504).

4. Open electrical Control Box (Figure 505).

5. Test Indoor Fan Motor

a. On Power PCB, disconnect Indoor fan connector. (See figure 706.1)

b. Resistance Test.
Test the resistance of the main winding. The indoor fan motor is faulted if the resistance of main winding is 0 (short circuit)or ∞ open circuit.

c. DC Voltage test
Manually rotate indoor fan motor slowly for several revolutions, and measure voltage "YELLOW" and "GND" on motor. The voltage repeats 0V DC and 5V DC.

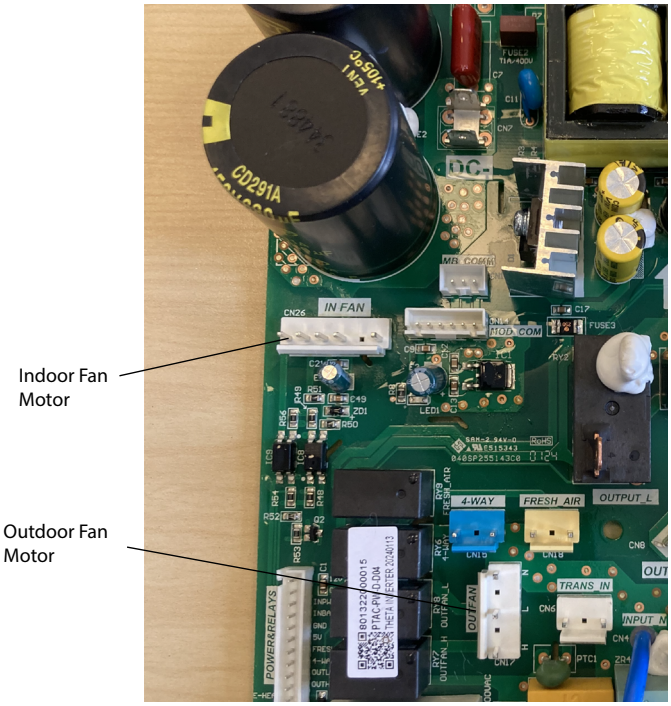


Figure 706.1

Indoor DC Fan Motor

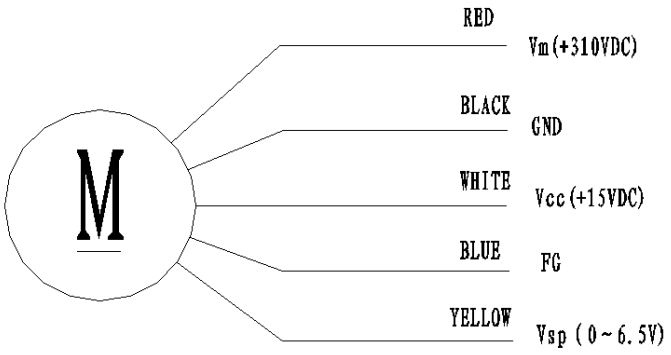


Figure 706.2

6. Test Outdoor Fan motor.

a. Restore power to unit.

b. Place unit in cooling mode and ensure demand for cooling. The outdoor fan has two speeds, low and high. When T4 is above 80°F, the fan operates in high speed.
When T4 drops to 77°F the fan operates in low speed.

c . Check voltage between Neutral and High, or low.
Line voltage (200-300 VAC) should be present.

If no voltage is present check cable and resistance values on motor.

d. Remove power from the unit

e. Disconnect Outdoor fan motor connector from Power PCB. See figure 706.1

f. Check for continuity between pins on fan plug connector.

N-H = 189.6 ohms +-10%
N-M = 216.2 ohms+-10%
N-L = 240.6 ohms +-10%

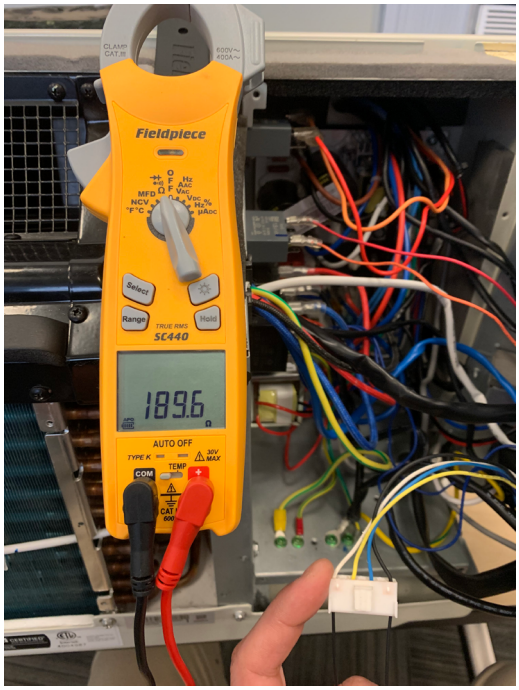


Figure 707

Return to Error Codes and Solutons

COMPONENT TESTING

Check Outdoor Fan Motor Capacitor

Gain Access to the Power PCB (Power Board).

1. Remove front panel (Figure 501).

2. Remove User Interface (Figures 502 thru 504).

3. Open electrical Control Box (Figure 505).

⚠ 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.

NOTE: 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.

1. Disconnect leads to capacitor that you are checking.
2. Bleed down capacitor with 2 watt resistor.
3. Set multi-meter to diode check setting.
4. Check Resistance across capacitor terminals by placing the red lead on the run terminal and the black lead on the common terminal. (The meter will send a small charge into the capacitor)
5. The meter should show a certain amount of resistance initially and then increase in resistance as the charge in the capacitor dissipates until infinity is reached.
6. If the meter shows continuity, or does not bleed back down to infinity, the capacitor is shorted and should be replaced.
7. If the meter initially shows infinity the capacitor is open and should be replaced.

Check Capacitance values in micro Farads using capacitor analyzer.
1. Indoor fan capacitor should read 1.5 uf.
2. Outdoor fan capacitor should read 3.0 uf.

COMPONENT TESTING

Main PCB (logic) Board Connector Identification

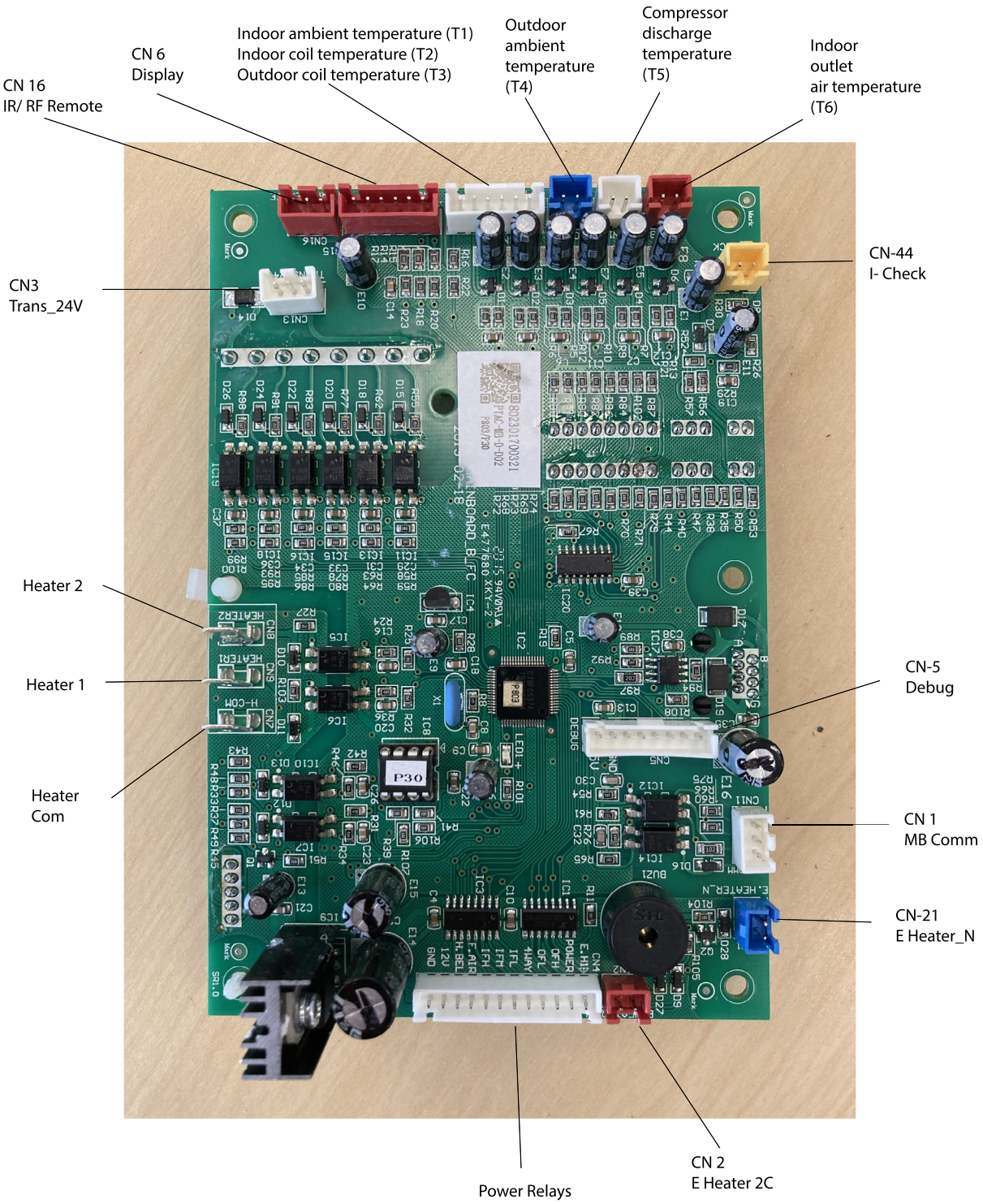


Figure 709 (Main PCB (logic) Board)

Return to Error Codes and Solutons

COMPONENT TESTING

Power PCB (Power Board) Connector Identification

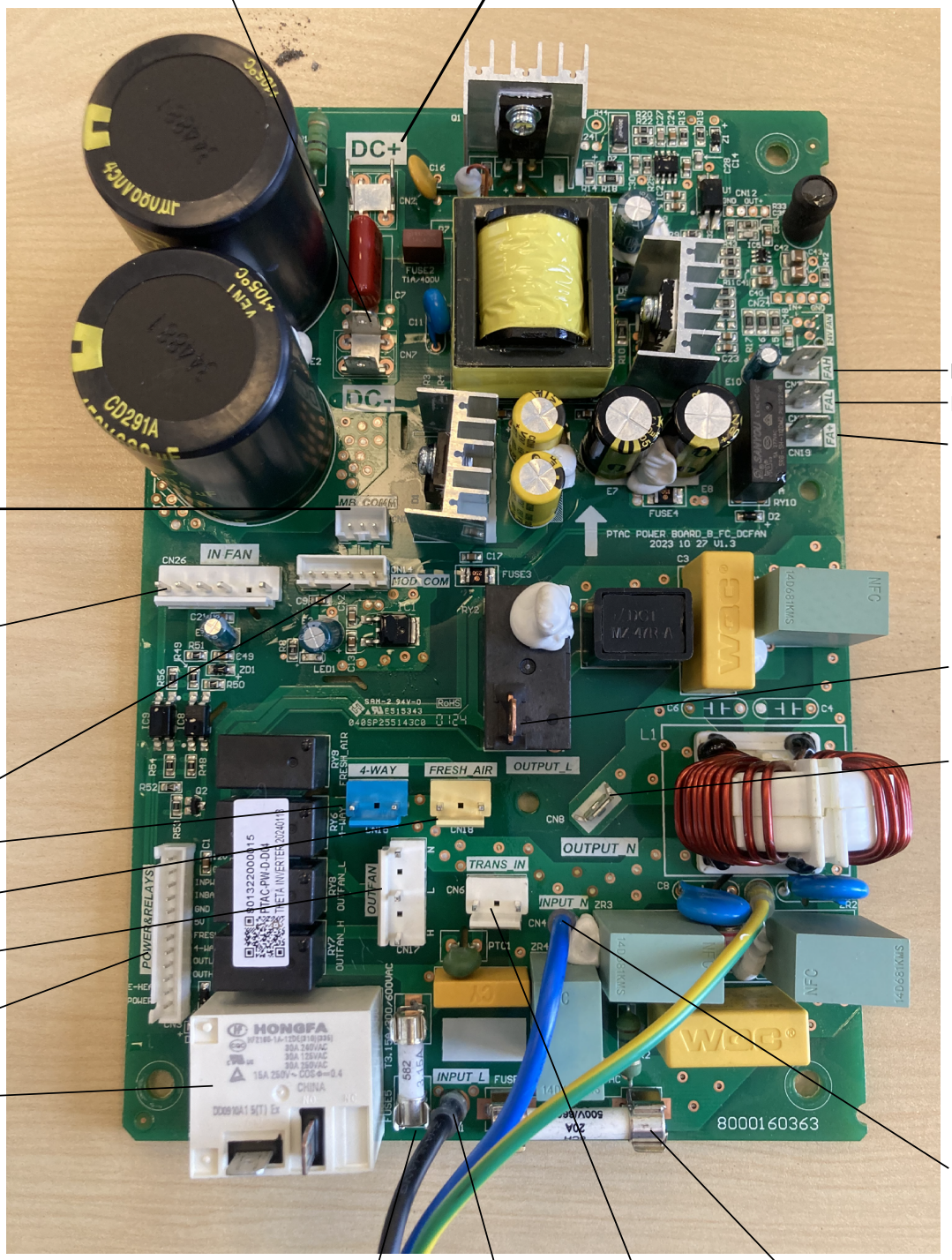


Figure 710 (Power PCB (Power Board)

R-32 SEALED SYSTEM REPAIR

General Information

⚠WARNING: Electrical Shock Hazard

Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to all codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: This Product uses R-32 Refrigerant

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

When not installed, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

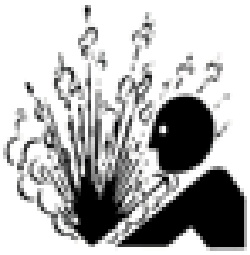
Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

Refrigerant Safety Group A2L

⚠WARNING: Refrigeration System under High pressure

Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R-32 systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.



⚠ **Warning:** Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized.

NOTICE: Individuals working on these units must be EPA 608 Certified along with A2L Refrigerant Training.

⚠ **Warning:** Refrigerant 32 cannot be used as a retrofit for R-410A refrigerant. The mixing of refrigerant across classes is prohibited. R-32 Is not a drop in replacement for R-410A.

General Work Area: All maintenance staff and others working in the installation area shall be instructed on the nature of work being carried out. Work in confined spaces as defined by the Occupational Safety And Health Administration shall be avoided.

⚠ **Warning:** Job site should be examined for safety hazards such as flammable vapors, ignition sources, ventilation and confined spaces. Create a safe perimeter with barriers and signs designating a flammable area.

⚠ **Warning:** Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.

Check for presence of refrigerant:

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
- The following leak detection methods are deemed acceptable for all refrigerant systems:

  1. Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. 2. Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

  If a leak is suspected, all flame sources shall be removed/extinguished.

  If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system per EPA guidelines.

Presence of fire extinguisher: If any hot work is to be conducted on the refrigerating equipment or any associated parts, a class ABC Rated fire extinguishing equipment shall be available to hand. Have a class ABC Rated fire extinguisher adjacent to the charging area.

R-32 SEALED SYSTEM REPAIR

General Information

⚠ Warning:

No ignition sources: No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.

Ventilated Area: Ensure that the area is in the open or that it is adequately ventilated before accessing the refrigerant in the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant away from the work area or external to building envelope.

During Repairs To Sealed Components: All power must be removed from the equipment being worked on prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a constant leak detector shall be located at the most critical point to warn of a potentially hazardous situation.

Checks And Repairs To Electrical Devices:

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected remove power supply to unit. **DO NOT OPERATE.**
- Initial safety checks shall include:
  - ·That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
  - ·That no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - ·Verify unit is properly grounded.
- Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.
- Ensure that the apparatus is mounted securely.
- Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.
-

The following is a list of important considerations when working with R-32 equipment:

- R-32 pressure is similar to R-410A and approximately 60% higher than R-22 pressure.
- R-32 cylinders must not be allowed to exceed 125°F, they may leak or rupture.
- R-32 must never be pressurized with a mixture of compressed air, it may become MORE flammable.
- Servicing equipment and components must be specifically designed for use with R-32 and dedicated to prevent contamination.
- Manifold sets must be equipped with gauges capable of reading 750 psig (high side) and 200 psig (low side), with a 500-psig low-side retard.
- Gauge hoses must have a minimum 750-psig service pressure rating.
- Recovery cylinders must have a minimum service pressure rating of 400 psig, (DOT 4BA400 and DOT BW400 approved cylinders).
- POE (Polyol-Ester) lubricants must be used with R-32 equipment.
- To prevent moisture absorption and lubricant contamination, do not leave the refrigeration system open to the atmosphere for extended periods of time.
- If unit refrigerant is low, recover the refrigerant, evacuate, and recharge unit to nameplate amount.
- If there is any amount of refrigerant in the system charge from the low side.
- Always charge by liquid inverted.

NOTE: Sealed system repairs to cool-only models require the installation of a liquid line drier.
NOTE: Sealed system repairs to models with a heat pump require the installation of a suction side drier.

Verify with tool manufacturers that all tools used during this repair are non-sparking and can be used with A2L Refrigerants.
No halide torches for leak testing.
Refrigerant monitors or detectors must be used to detect refrigerant in the work area.

- R-32 A2L Refrigerant Recovery System.
- Vacuum Pump rated for A2L refrigerant (capable of 300 microns or less vacuum.)
- Nitrogen bottle with purging and pressurizing capabilities up to 550 psi.
- Oxy/ Acetylene torch or similar equipment utilized for brazing.
- Non-Sparking (Not Halide)Electronic Leak Detector rated for detecting A2L refrigerant.
- Digital refrigerant scale

R-32 SEALED SYSTEM REPAIR

Required Equipment

- Refrigeration Gauges rated for A2L Refrigerants with temp scales for R-32 refrigerant.
- Gauge Manifold (Right handed threads).
- A2L compatible Vacuum Gauge capable of 300 microns or less.
- Nitrogen regulator for purging and testing, rated to 800 psi. (Capable of low psi flow)
- Pipe tubing cutter.
- Refrigerant recovery cylinder. (Flammable A2L label)
- Ventilation fan.
- Class ABC fire extinguisher.
- Process Tube adapter kit
- Recovery access tool.
- Purge hose fittings
- Pinch off and opening tools

ABC Fire Extinguisher

Recovery Machine

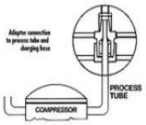
Vaccum Pump

Nitrogen

Guage Manifold

Nitrogen Regulator

Vaccum Guage



Recovery access tool

Process tube adapter kit

Purge hose fittings

Pinch off and opening tools

R-32 SEALED SYSTEM REPAIR

Refrigerant Removal, Recovery, and Evacuation

NOTE: When accessing the refrigerant in the system to make repairs or for any other purpose, conventional procedures shall be used. However, for FLAMMABLE REFRIGERANTS (R-32 is classified in the A2L group for mildly flammable refrigerants) it is important that best practice is followed since flammability is a consideration. Follow all EPA 608 regulations and procedures along with AHRI 15 Best Practices for A2L refrigerants.

⚠ **Warning:** Ensure sufficient ventilation at the repair place.

⚠ **Warning:** Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

⚠ **Warning:** Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.

NOTICE: Ensure that the following precautions are taken prior to opening the sealed system.

- Verify Recovery machine is rated for A2L refrigerants.
- Mark the Job site inspection area as flammable work zone using appropriate signs.
- Utilize a Refrigerant leak detector or refrigerant monitor to sense the area for the presence of refrigerants.
- Disconnect all power supply to unit.
- Properly ground all equipment and hoses along with tank to prevent a static build up .
- Ensure adequate ventilation is provided for the job site.
- Do not mix A2L refrigerant Gages and hoses with other refrigerants.
- Keep exposure of refrigerant to Air to as minimum as possible (creates a dangerous condition).
- Under no circumstances is the mixing of refrigerants in the recovery cylinders allowed and should be strictly avoided at all times. Do not introduce oxygen into any recovery cylinders.

1. Install a piercing valve to recover refrigerant from the sealed system. (Piercing valve must be removed from the system before recharging.)
2. Recover refrigerant to EPA sec. 608 standards. If a low charge is suspected weigh recovered refrigerant and compare to unit nameplate.

NOTE: DO NOT RECOVER TO A VACUUM PRIOR TO FLUSHING WITH NITROGEN. STOP RECOVERY AT 0-5 PSI.

3. Flush refrigerant out of system with a dry nitrogen purge, make sure you energize and de-energize all reversing valves and solenoid valves to release any trapped refrigerant.(3-5 minutes).

4. Perform an evacuation to 29.9 in. hg. and break vacuum with Dry Nitrogen.
5. Re-purge the unit for 3-5 mins or until the nitrogen flows out both process tubes.
6. Re-evacuate unit to 29.9 in. hg. and break vacuum with Dry Nitrogen.
8. Open the refrigerant circuit by cutting out components.
9. Cut off the crimp on the process tubes and install a 5/16 copper access fitting to the process tube.

Transportation

Be aware that local, state, and national codes exist that regulate the transportation of flammable gases. Be sure to become informed of the regulations and always stay compliant.

R-32 SEALED SYSTEM REPAIR

Component Replacement/Brazing

·⚠ **Warning:** Ensure sufficient ventilation at the repair place.

⚠ **Warning:** Presence of fire extinguisher. If any hot work is to be conducted on the refrigerating equipment or any associated parts, have a ABC class fire extinguisher available to hand.

⚠ **Warning:** No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks.

⚠ **Warning:** Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

NOTE: When brazing is required, the following procedures shall be carried out in the right order:

1. Remove and recover refrigerant, and evacuate the system. Refer to the refrigerant removal, recovery, and evacuation section of this manual.

⚠ **Warning:** Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.
2. Perform a check of the work area for the presence of flammable refrigerant prior to brazing or performing any hot work. Use a non-Sparking (Not Halide) A2L certified Electronic Leak Detector rated for detecting R-32 refrigerant.
3. Re-pipe all repairs and install all components to sealed system.

4. Purge nitrogen through the unit. at approximately 2-3 psi through the duration of the brazing process. (Nitrogen must be purging through the unit while any brazing is being performed.)
5. Pressure test unit to 550 psi minimum and hold pressure for 30 minutes minimum. Inspect for any leaks with a leak detection fluid and repair as required. Repeat as required until system passes leak test.
6. Triple evacuate the unit to achieve a 500 micron level.
7. Pressurize nitrogen to 550 psi and leak test all connections with a leak detection fluid. Repair any leaks found.
8. Reassemble sealed enclosures accurately. If seals are worn, replace them.
9. Charge the system with the amount of refrigerant specified on the model nameplate. Refer to the refrigerant charging section of this manual for charging procedures.

R-32 SEALED SYSTEM REPAIRS

Refrigerant Charging

⚠WARNING: Electrical Shock Hazard

Disconnect all power to the unit before starting maintenance. All electrical connections and wiring MUST be installed by a qualified electrician and conform to all codes which have jurisdiction. Failure to do so can result in property damage, severe electrical shock or death.

⚠WARNING: This Product uses R-32 Refrigerant

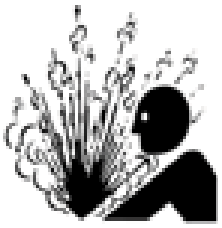
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

When not installed, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.

Do not pierce or burn.

Be aware that refrigerants may not contain an odor.

⚠WARNING: Refrigeration System under High pressure



Do not puncture, heat, expose to flame or incinerate. Only certified refrigeration technicians should service this equipment. R32 systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

⚠WARNING: Freeze Hazard

Proper safety procedures must be followed, and all PPE must be utilized when working with liquid refrigerant. Failure to comply could result in minor to moderate injury.

NOTE: Always weigh in refrigerant based on the model nameplate.

⚠Warning:

- Ensure that contamination of different refrigerants does not occur when using charging equipment.
- Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Charge unit with refrigerant cylinder in the inverted position to obtain liquid refrigerant.
- Charge the unit according to the amount on the name plate matching the unit.
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.
- Prior to recharging a system, it shall be pressure-tested with the dry nitrogen.

NOTE: Because the refrigerant system is a sealed system, service process tubes will have to be installed. First install a line tap and recover refrigerant from system. Refer to the Refrigerant removal section of this manual for procedures.

The acceptable method for charging the sealed 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:

⚠**Warning:** Ensure sufficient ventilation at the repair place.

⚠**Warning:** Ensure there are no open flame sources or hot surfaces that exceed 1200˚F in the work area.

1. Recover Refrigerant in accordance with EPA regulations. (Refer to Refrigerant Removal, Recovery, and Evacuation Section).

NOTE: If a low charge is suspected weigh recovered refrigerant and compare to unit nameplate.
NOTE: Access valves must be removed after charging is complete to return this unit to a sealed system.

2. Weigh in the refrigerant charge with the proper quantity of R-32 refrigerant per model nameplate.
3. Crimp the process tube and solder the end shut.
4. Start unit, and verify performance.

NOTE: EPA Section 608 regulations require that if a system is charged with flammable refrigerant it must have red markings on the access ports (Process tube).

R-32 SEALED SYSTEM REPAIRS

Compressor Replacement

⚠ 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 PPE must be utilized
when working with refrigerants.

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

⚠ WARNING

EXPLOSION HAZARD
The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.

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

⚠ 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.

⚠ WARNING

NEVER, under any circumstances, liquid charge a rotary-compressor through the LOW side. Doing so would cause permanent damage to the new compressor. Use a charging adapter.

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

2. Recover all refrigerant from the system though the process tubes. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual).

PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.

3. After all refrigerant has been recovered, cut 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, refer to Compressor Replacement -Special Procedure in Case of Compressor Burnout.

7. Install the replacement compressor.

CAUTION: Seal all openings on the defective compressor immediately. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

8. Braze all connections. Refer to the Component Replacement/ Brazing section of this manual.

9. Charge system with proper amount of refrigerant per the model nameplate. Refer to the Refrigerant charging section of this manual.

R-32 SEALED SYSTEM REPAIRS

Compressor Replacement -Special Procedure in Case of Compressor Burnout

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

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

⚠ 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

EXPLOSION HAZARD

The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.

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

⚠ WARNING

NEVER, under any circumstances, liquid charge a rotary-compressor through the LOW side. Doing so would cause permanent damage to the new compressor. Use a charging adapter.

1. Recover all refrigerant and oil from the system. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual.

2. Cut and remove compressor and capillary tube from the system.

CAUTION: Seal all openings on the defective compressor immediately. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

3. Flush evaporator condenser and all connecting tubing with dry nitrogen or equivalent. Use A2L 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 a new capillary tube assembly and strainers.

5. Install a dual port suction line drier on the common suction line and remove when the pressure differential across the drier ports reaches 3 psi. or greater.

6. Braze all connections. Refer to the Brazing section of this manual.

7. Charge system with proper amount of refrigerant per the model nameplate. Refer to the refrigerant charging section of this manual.

R-32 SEALED SYSTEM REPAIR

Replace The Reversing Valve

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and PPE must be utilized when working with refrigerants.

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

⚠ WARNING

EXPLOSION HAZARD

The use of nitrogen requires a pressure regulator. Follow all safety procedures and wear protective safety clothing etc.

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

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. Recover all refrigerant from the system though the process tubes. Refer to Refrigerant Removal, Recovery, and Evacuation Section of this manual).

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.

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.

3. Cut all lines from reversing valve. Refer to the Brazing section of this manual.

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.

8. Braze all connections. Refer to the Brazing section of this manual.

9. Pressurize with nitrogen to 550 psi and leak test all connections with a leak detection fluid. Repair any leaks found.

10. Once the sealed system is leak free, install solenoid coil on new valve.

11. Charge system with proper amount of refrigerant per the model nameplate. Refer to the refrigerant charging section of this manual.

WIRING DIAGRAM

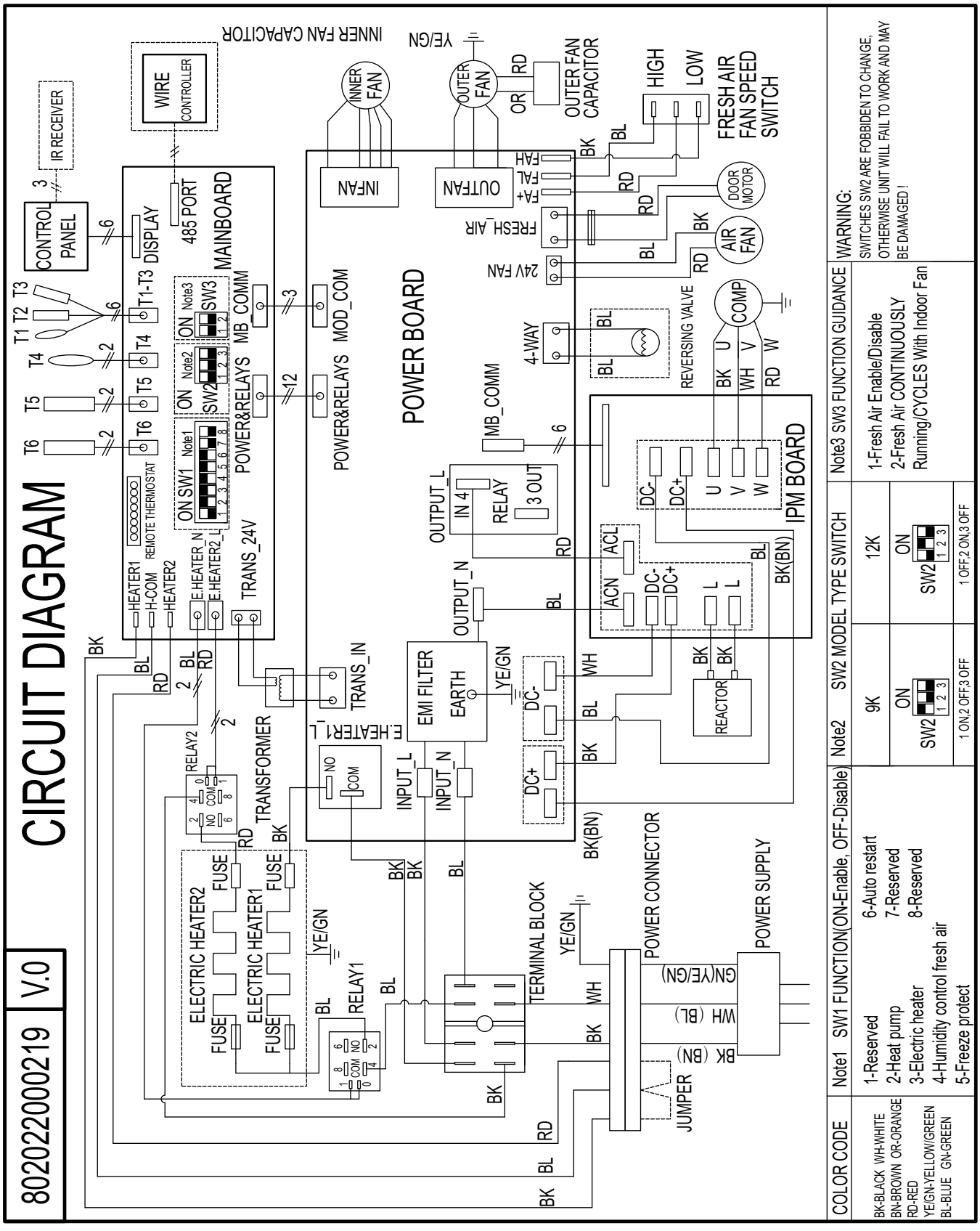


Figure 801

APPENDIX

Interactive Parts Viewer

All Friedrich Service Parts can be found on our online interactive parts viewer.

Please click on the link below:

Interactive Parts Viewer

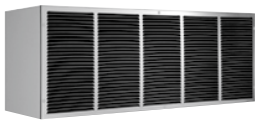
For Further Assistance contact Friedrich customer service at **(1-800-541-6645)**.

Limited Warranty

Current warranty information can be obtained by referring to https://www.friedrich.com/professional/support/product-resources

APPENDIX

ACCESSORIES

New Construction Accessories		
PDXWSA	**WALL SLEEVE** Galvanized zinc coated steel is prepared in an 11-step process, then powder coated with a polyester finish and cured in an oven for exceptional durability. The wall sleeve is insulated for sound absorption and thermal efficiency, 16" H x 42" W x 13 3/4" D.	PDXWSA 
PDXWSEXT18	**DEEP WALL SLEEVE** For walls up to 17 1/2" deep.	
PDXWSEXT24	**DEEP WALL SLEEVE** For walls up to 23 1/2" deep.	
PDXWSEXT	**CUSTOM DEEP WALL SLEEVE** One piece extended wall sleeve for walls from 13 1/4" to 25 1/2" deep are available by special order.	Deep wall sleeve PDXWSEXT18 shown with weather panel
PXGA	**GRILLE** Standard, stamped aluminium, anodized to resist chalking and oxidation.	PXGA 
PXAA PXBG PXSC	**ARCHITECTURAL GRILLES** Consist of heavy-gauge 6063-T5 aluminum alloy: 42" W x 16" H x 1 1/8" D PXAA – Clear, extruded aluminum PXBG – Beige acrylic enamel PXSC – Also available in custom colors.	PXAA 
PXDR10	**CONDENSATE DRAIN KIT** Attaches to the bottom of the wall sleeve for internal draining of condensate or to the rear wall sleeve flange for external draining. Recommended on all units to remove excess condensate. Packaged in quantities of ten.	
PXCJA	**CONDUIT KIT WITH JUNCTION BOX** Hard wire conduit kit with junction box for 208/230V and 265V units (subbase not required). Kit includes a means of quick disconnect for easy removal of the chassis. *Required for 265V installations.	
PDXDAA	**LATERAL DUCT ADAPTER** Attaches to the Friedrich PTAC/PTHP unit to direct up to 35% of the total airflow to a second room. The unit-mounted duct plenum features a front-mounted aluminum grille that has two positions to provide the most optimal air direction. The air may be directed to either the left or the right of the unit through the supplied 3 1/2" H x 7" W x 47" L plenum. Plenum may be cut to length by the installer. Kit includes duct plenum, front grille, 47" duct extension, duct discharge grille, duct end cap and all necessary mounting hardware.	
PDXDEA	**LATERAL DUCT EXTENSION** Additional 3 1/2" H x 7" W x 47" L plenum for use with the LATERAL DUCT ADAPTER. A maximum of 3 duct extensions total may be used. Note: Ducted airflow is reduced as duct length is increased.	

APPENDIX

ACCESSORIES

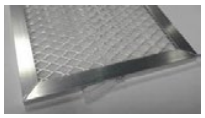
New Construction Accessories

PXFTA

REPLACEMENT FILTER PACK These are original equipment return air filters. They are reusable and can be cleaned by vacuuming, washing, or blowing out, and are sold in convenient ten-packs. (Two filters per chassis).

PXFAFT10

REPLACEMENT FILTER PACK Merv 8 filters. 10 pack. Each PTAC requires 1 filter.



PXSBA

DECORATIVE SUBBASE Provides unit support for walls less than six inches thick. Includes leveling legs, side filler panels and mounting brackets for electrical accessories. Accepts circuit breaker, power disconnect switch, or conduit kit.

PXSB

ELECTRICAL SUBBASE Provides unit support for walls less than six inches thick. Includes leveling legs, side filler panels, mounting brackets, a plug-in receptacle and field-wiring access. The subbase also includes electrical knockouts for a power disconnect switch or circuit breaker.

PXSB23020	Electrical Subbase - 230V 15 & 20A
PXSB23030	Electrical Subbase - 230V 30A
PXSB26515	Electrical Subbase - 265V 15A
PXSB26520	Electrical Subbase - 265V 20A
PXSB26530	Electrical Subbase - 265V 30A

PXPCFA

POWER CORDS

Universal power cords enable properties to select the appropriate heater size. Reference the adjacent table for power cord options

*Cannot be used on PVH09K3FA.

		Length
PXPCFA23015	LCDI 230V 15A Cord - 2.5 kW	67 in.
PXPCFA23020	LCDI 230V 20A Cord - 3.5 kW	67 in.
PXPCFA23030*	LCDI 230V 30A Cord - 5.0 kW	67 in.
PXPCFA26515	Non-LCDI 265V 15A Cord - 2.5 kW	27 1/2 in.
PXPCFA26520	Non-LCDI 265V 20A Cord - 3.5 kW	27 1/2 in.
PXPCFA26530*	Non-LCDI 265V 30A Cord - 5.0 kW	27 1/2 in.

RT7
RT7P

DIGITAL REMOTE THERMOSTATS

RT7 Wired single stage cool, single stage heat for PDE models or single stage cool, dual stage heat for PDH model thermostat features high/low fan speed switch. Thermostat is hard wired and can be battery powered or unit powered. Features backlit display and multiple configuration modes. For use on Friedrich PTACs and Vert-I-Paks.

RT7P Wired, programmable single stage cool, single stage heat for PDE models or single stage cool, dual stage heat for PDH model thermostat features high/low fan speed switch. Thermostat is hard wired and can be battery powered or unit powered. Features backlit display and multiple configuration modes. For use on Friedrich PTACs and Vert-I-Paks.

APPENDIX

ACCESSORIES

New Construction Accessories		
WRT2	**WIRELESS DIGITAL REMOTE THERMOSTAT** Single stage cool, single stage heat for PDE models or single stage cool, dual stage heat for PDH model thermostat features high/low fan speed switch. Thermostat is wireless and is battery powered. Features backlit display and multiple configuration modes. For use on Friedrich PTACs and Vert-I-Paks.	
PDXRTB	**REMOTE THERMOSTAT ESCUTCHEON KIT** This kit contains ten escutcheons that can be placed over the factory control buttons when a remote wall mounted thermostat is used. The escutcheon directs the guest to the wall thermostat for operation and retains the LED window to display error codes and diagnostic information.	
EMRT2 EMWRT2	ENERGY MANAGEMENT THERMOSTATS EMRT2 Wired thermostat with occupancy sensor. EMWRT2 Wireless thermostat with occupancy sensor. EMOCT Online connection kit. EMRAF Remote access fee. EMRHCF Remote humidity control fee.	
VRPXEMRT2 (Preferred FreshAire Thermostat) VRPXEMWRT2	Wired and wireless thermostat and occupancy sensor 12v. Full inverter control. Designed to maximize features and benefits of FreshAire system. Wireless wall controller and occupancy sensor-12v. Full inverter control. Designed to maximize features and benefits of FreshAire system.	

*NOTE: The FreshAire PTAC must be paired with wall controller **VRPXEMRT2** or **VRPXEMWRT2** to operate as a fully variable speed unit. When used with other compatible thermostats, the unit will operate at multiple speeds in either cooling or heating mode.

APPENDIX

ACCESSORIES

Friedrich PTAC with FreshAire® IAQ

The COVID-19 global pandemic transformed the way the lodging industry meets the comfort and safety needs for guests. As your room air experts, Friedrich remains committed to improving guest comfort and safety with our newest innovation, FreshAire® IAQ solutions - a suite of indoor air quality accessories for use with Friedrich Air Conditioners, all with one dedicated purpose - healthy indoor air. FreshAire® IAQ solutions incorporate ASHRAE-recommended protocol* to address indoor air quality and airborne transmissions.

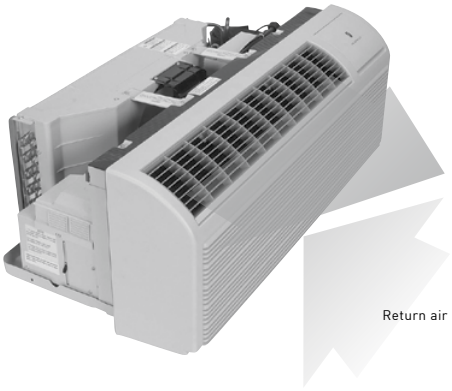
This suite of products include industry-leading air quality technologies such as MERV 13 filtration,UV germicidal light and bi-polar ionization. Together, they represent a major leap forward in integrated HVAC air purification and rebuilding confidence for indoor environments.

*Based on ASHRAE Guidance for Building Operations During the COVID-19 Pandemic

FreshAire® Make Up Air (MUA) & Filtration

Award-winning FreshAire MUA system helps achieve ASHRAE 62.1-2013 requirements, and brings up to 52 CFM of conditioned, MERV 8 filtered, outside air into the space. Patented FreshAire technology uses the Precision Inverter compressor and main cooling system to optimize temperature and humidity level of incoming air while MERV 8 filtration traps particles and pollutants.

Standard on FreshAire PTAC



FreshAire® Purifier APWM1

FreshAire Purifier by iWaves features needlepoint bi-polar ionization to address any mold, bacteria, virus, allergens, and VOC's that may be in your air stream to ensure delivery of healthy, clean, purified air.

Friedrich® UV UVT1

Germicidal UV light kits have been tested and certified for use on Friedrich PTACs. The UV kit can be installed on the fan coil and is designed to disinfect surfaces and the air as it circulates through the ventilation system. UV light can kill airborne bacteria, viruses, mold, reduce maintenance costs and extend the life of an HVAC system

APPENDIX

Appendix 1 Reference Sheet of Celsius and Fahrenheit

Conversion formula for Fahrenheit degree and Celsius degree: Tf=Tcx1.8+32

Set temperature

Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)		Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)		Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius (°C)
61	60.8	16		69/70	69.8	21		78/79	78.8	26
62/63	62.6	17		71/72	71.6	22		80/81	80.6	27
64/65	64.4	18		73/74	73.4	23		82/83	82.4	28
66/67	66.2	19		75/76	75.2	24		84/85	84.2	29
68	68	20		77	77	25		86	86	30

Ambient temperature

Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)		Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)		Fahrenheit display temperature (°F)	Fahrenheit (°F)	Celsius(°C)
32/33	32	0		55/56	55.4	13		79/80	78.8	26
34/35	33.8	1		57/58	57.2	14		81	80.6	27
36	35.6	2		59/60	59	15		82/83	82.4	28
37/38	37.4	3		61/62	60.8	16		84/85	84.2	29
39/40	39.2	4		63	62.6	17		86/87	86	30
41/42	41	5		64/65	64.4	18		88/89	87.8	31
43/44	42.8	6		66/67	66.2	19		90	89.6	32
45	44.6	7		68/69	68	20		91/92	91.4	33
46/47	46.4	8		70/71	69.8	21		93/94	93.2	34
48/49	48.2	9		72	71.6	22		95/96	95	35
50/51	50	10		73/74	73.4	23		97/98	96.8	36
52/53	51.8	11		75/76	75.2	24		99	98.6	37
54	53.6	12		77/78	77	25				

APPENDIX

Appendix 2 Resistance Table of Thermistors (5K)

Temp	Resis	Temp	Resis	Temp	Resis	Temp	Resis	Temp	Resis
-33	130100	7	34252	47	10785	57	8275	97	3119
-32	125518	8	33209	48	10499	58	8063	98	3048
-31	121114	9	32202	49	10221	59	7857	99	2980
-30	116881	10	31228	50	9952	60	7657	100	2913
-29	112811	11	30288	51	9690	61	7462	101	2848
-28	108898	12	29378	52	9437	62	7273	102	2785
-27	105131	13	28499	53	9190	63	7090	103	2723
-26	101511	14	27650	54	8952	64	6911	104	2662
-25	98029	15	26828	55	8720	65	6738	105	2604
-24	94676	16	26034	56	8494	66	6569	106	2546
-23	91453	17	25266	57	8275	67	6406	107	2491
-22	88349	18	24523	58	8063	68	6247	108	2436
-21	85362	19	23805	59	7857	69	6092	109	2383
-20	82486	20	23110	60	7657	70	5942	110	2331
-19	79719	21	22437	61	7462	71	5796	111	2281
-18	77052	22	21787	62	7273	72	5654	112	2231
-17	74486	23	21158	63	7090	73	5515	113	2183
-16	72014	24	20548	64	6911	74	5381	114	2137
-15	69633	25	19959	65	6738	75	5251	115	2091
-14	67338	26	19388	66	6569	76	5124	116	2046
-13	65127	27	18836	67	6406	77	5000	117	2003
-12	62996	28	18301	68	6247	78	4880	118	1960
-11	60943	29	17783	69	6092	79	4763	119	1919
-10	58965	30	17282	70	5942	80	4649	120	1878
-9	57055	31	16796	71	5796	81	4538	121	1839
-8	55216	32	16325	72	5654	82	4431	122	1800
-7	53442	33	15870	73	5515	83	4326	123	1763
-6	51732	34	15428	74	5381	84	4224	124	1726
-5	50082	35	15001	75	5251	85	4125	125	1690
-4	48490	36	14586	76	5124	86	4028	126	1655
-3	46955	37	14184	77	5000	87	3934	127	1621
-2	45473	38	13795	48	10499	88	3842	128	1588
-1	44044	39	13418	49	10221	89	3753	129	1555
0	42664	40	13052	50	9952	90	3666	130	1524
1	41332	41	12698	51	9690	91	3582	131	1493
2	40047	42	12354	52	9437	92	3499	132	1462
3	38805	43	12021	53	9190	93	3419	133	1433
4	37607	44	11698	54	8952	94	3341	134	1404
5	36450	45	11384	55	8720	95	3265	135	1375
6	35332	46	11080	56	8494	96	3191	136	1348
137	1321	162	812	187	517	212	339	237	229
138	1294	163	797	188	508	213	334	238	226
139	1269	164	782	189	499	214	329	239	222
140	1244	165	768	190	491	215	323	240	219

APPENDIX

Appendix 2 Resistance Table of Thermistors (5K) (Cont)

Temp	Resis	Temp	Resis	Temp	Resis	Temp	Resis	Temp	Resis
141	1219	166	754	191	482	216	318	241	216
142	1195	167	740	192	474	217	313	242	212
143	1171	168	727	193	466	218	308	243	209
144	1148	169	713	194	458	219	303	244	206
145	1126	170	700	195	450	220	298	245	203
146	1104	171	688	196	443	221	294	246	200
147	1083	172	675	197	435	222	289	247	197
148	1062	173	663	198	428	223	285	248	194
149	1041	174	651	199	421	224	280	249	191
150	1021	175	640	200	414	225	276	250	189
151	1001	176	628	201	407	226	271		
152	982	177	617	202	400	227	267		
153	964	178	606	203	394	228	263		
154	945	179	595	204	387	229	259		
155	927	180	585	205	381	230	255		
156	910	181	574	206	374	231	251		
157	893	182	564	207	368	232	247		
158	876	183	554	208	362	233	244		
159	859	184	545	209	356	234	240		
160	843	185	535	210	351	235	236		
161	828	186	526	211	345	236	233		

APPENDIX

Appendix 2 Resistance Table of Thermistors (50K)(Compressor Discharge Sensor)

Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance(kΩ)	Temp. (°F)	Resistance (kΩ)	Temp. (°F)	Resistance (kΩ)
-20.2	853.5	50	98	120.2	18.34	190.4	4.754
-18.4	799.8	51.8	93.42	122	17.65	192.2	4.609
-16.6	750	53.6	89.07	123.8	16.99	194	4.469
-14.8	703.8	55.4	84.95	125.6	16.36	195.8	4.334
-13	660.8	57.2	81.05	127.4	15.75	197.6	4.204
-11.2	620.8	59	77.35	129.2	15.17	199.4	4.079
-9.4	580.6	60.8	73.83	131	14.62	201.2	3.958
-7.6	548.9	62.6	70.5	132 4/5	14.09	203	3.841
-5.8	516.6	64.4	67.34	134.6	13.58	204.8	3.728
-4	486.5	66.2	64.33	136.4	13.09	206.6	3.619
-2.2	458.3	68	61.48	138.2	12.62	208.4	3.514
-0.4	432	69.8	58.77	140	12.17	210.2	3.413
1.4	407.4	71.6	56.19	141.8	11.74	212	3.315
3.2	384.5	73.4	53.74	143.6	11.32	213.8	3.22
5	362.9	75.2	51.41	145.4	10.93	215.6	3.129
6.8	342.8	77	49.19	147.2	10.54	217.4	3.04
8.6	323.9	78.8	47.08	149	10.18	219.2	2.955
10.4	306.2	80.6	45.07	150.8	9.827	221	2.872
12.2	289.6	82.4	43.16	152.6	9.489	222.8	2.792
14	274	84.2	41.34	154.4	9.165	224 3/5	2.715
15.8	259.3	86	39.61	156.2	8.854	226.4	2.64
17.6	245.6	87.8	37.96	158	8.555	228.2	2.568
19.4	232.6	89.6	36.38	159.8	8.268	230	2.498
21.2	220.5	91.4	34.88	161.6	7.991	231.8	2.431
23	209	93.2	33.45	163.4	7.726	233.6	2.365
24.8	198.3	95	32.09	165.2	7.47	235.4	2.302
26.6	199.1	96.8	30.79	167	7.224	237.2	2.241
28.4	178.5	98.6	29.54	168.8	6.998	239	2.182
30.2	169.5	100.4	28.36	170.6	6.761	240.8	2.124
32	161	102.2	27.23	172.4	6.542	242.6	2.069
33.8	153	104	26.15	174.2	6.331	244.4	2.015
35.6	145.4	105.8	25.11	176	6.129	246.2	1.963
37.4	138.3	107.6	24.13	177.8	5.933	248	1.912
39.2	131.5	109.4	23.19	179.6	5.746	249.8	1.863
41	125.1	111.2	22.29	181.4	5.565	251.6	1.816
42.8	119.1	113	21.43	183.2	5.39	253.4	1.77
44.6	113.4	114.8	20.6	185	5.222	255.2	1.725
46.4	108	116.6	19.81	186.8	5.06	257	1.682
48.2	102.8	118.4	19.06	188.6	4.904	258.8	1.64

APPENDIX

Friedrich Authorized Parts Depots

United Products Distributors Inc.
4030A Benson Ave
Halethorpe, MD 21227
888-907-9675
c.businsky@updinc.com

Shivani Refigeration & Air Conditioning Inc.
2259 Westchester Ave.
Bronx, NY 10462
sales@shivanionline.com

NEUCO Inc.
515 W Crossroads Parkway
Bolingbrook, IL 60440
312.809.1418
borr@neuco.com

The Gabbert Company
6868 Ardmore
Houston, Texas 77054

713-747-4110
800-458-4110

Johnstone Supply of Woodside
27-01 Brooklyn Queens Expway
Woodside, New York 11377

718-545-5464
800-431-1143

Reeve Air Conditioning, Inc.
2501 South Park Road
Hallandale, Florida 33009

954-962-0252
800-962-3383

Total Home Supply
26 Chapin Rd Ste 1109
Pine Brook, NJ 07058
877-847-0050
support@totalhomesupply.com
https://www.totalhomesupply.com/brands/Friedrich.html

FRIEDRICH

TECHNICAL SUPPORT CONTACT INFORMATION

Friedrich Air Conditioning Co.
10001 Reunion Place, Suite 500 • San Antonio, Texas 78216
1-800-541-6645
www.friedrich.com