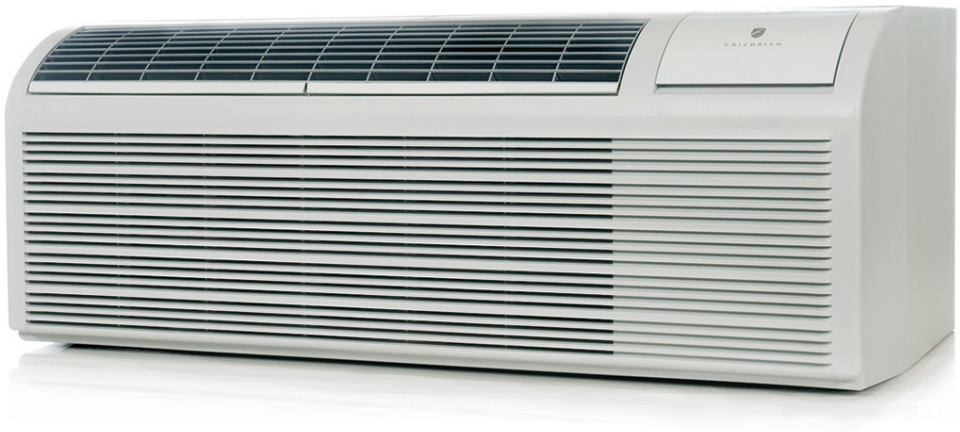
Service Manual

FRIEDRICH

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



Standard Chassis Models (R-32 Refrigerant)

PTAC With Electric Heat

230 Volt PDE07K3SGR3, PDE09K3SGR3, PDE12K3SGR3, PDE15K5SGR3
265 Volt PDE07R3SGR3, PDE09K3SGR3, PDE12R3SGR3, PDE15R5SGR3

PTAC With Heat Pump

230 Volt PDH07K3SGR3, PDH09K3SGR3, PDH12K3SGR3, PDH15K5SGR3
265 Volt PDH07R3SGR3, PDH09R3SGR3, PDH12R3SGR3, PDH15R5SGR3

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.
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.

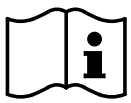
CAUTION Indicates a hazard which, if not avoided, can result in personal injury and damage to product or other property.

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

⚠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-32 Refrigerant

Refrigerant Safety Group A2L

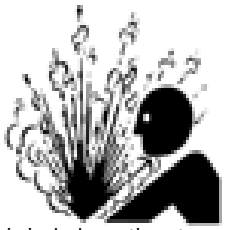
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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. R32 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.

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Personal injury or death hazards

	⚠ WARNING	⚠ AVERTISSEMENT	⚠ ADVERTENCIA
SAFETY FIRST	Do not remove, disable or bypass this unit's safety devices. 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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- **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 fireproof 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

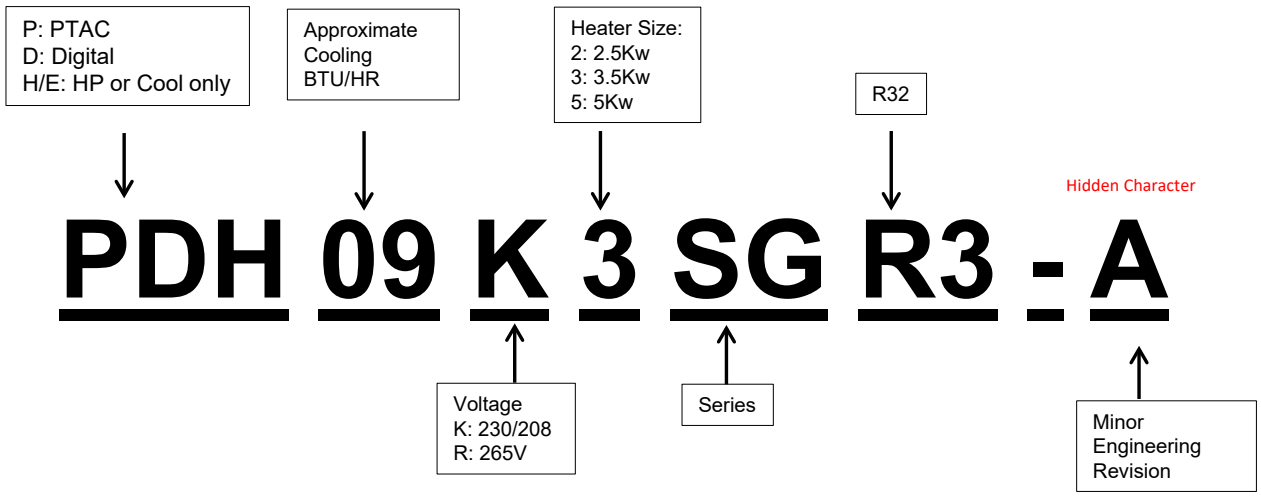
- **FIRE DAMAGE HAZARDS:**
- Read the Installation/Operation Manual for the air conditioning unit prior to operating.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Connect to a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not 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

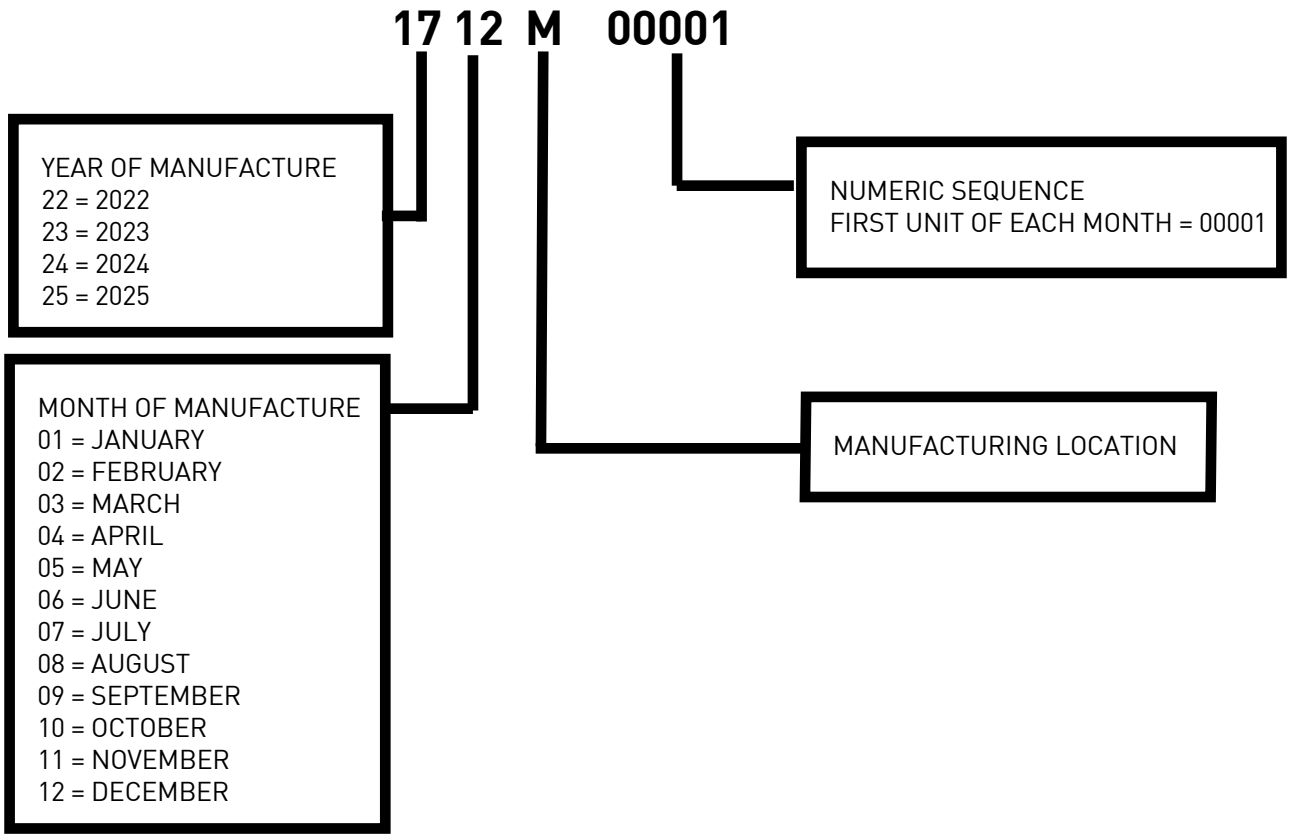
This service manual is designed to be used in conjunction with the installation and operation manuals provided with each air conditioning system.
This service manual was written to assist the professional service technician to quickly and accurately diagnose and repair malfunctions.
IMPORTANT: It will be necessary for you to accurately identify the unit you are servicing, so you can be certain of a proper diagnosis and repair.
Due to continuing research in new energy-saving technology, all information in this manual is subject to change without notice.

Installation procedures are not given in this manual. They are given in the Installation and Operation Manual which can be acquired on the website (www.friedrich.com).

Model Number Reference Guide



Serial Number Reference Guide



SPECIFICATIONS

PTAC W/ Electric Heat 7000-9000 BTU **Figure 201**

Model	**--**	**PDE07K3SGR3**	**PDE07R3SGR3**	**PDE09K3SGR3**	**PDE09R3SGR3**
Rated Voltage	V	230/208	265	230/208	265
Rated Frequency	Hz	60	60	60	60
Phases	--	1	1	1	1
Cooling Capacity	W	2168/2110	2198	2990/2900	2930
Cooling Capacity	Btu/h	7400/7200	7500	10200/9900	10000
Cooling Power Input	W	560/540	560	810/790	800
Electric Heating Power Input	W	3450/2830, 2450/2010	3450/2450	5000/4090, 3450/2830,2 450/2010	5000/3450/2450
Cooling Current Input	A	2.4/2.6	2.1	3.6/3.9	3.2
Electric Heating Current Input	A	15.0/13.6,10.7/9.7	13.1/9.3	21.8/19.7,15.0/ 13.6,10.7/9.7	18.9/13.1/9.3
Rated Input	W	680 3500/2860, 2500/2040	745 3500/2500	11905050/4130,3500/2860,2500/2040	1120 5050/3500/2500
Rated Current	A	3.3A: 15.2/13.8,10.9/9.8	:2.9A :13.3/9.5	5.0A: 22.0/19.9,1 5.2/ 13.8,10.9/9.8	3.9A: 19.1/13.3/9.5
EER	W/W	3.9	3.9	3.65	3.7
EER	(Btu/h)/W	13.3	13.3	12.5	12.5
Cross-sectional Area of Power Cable Conductor		AWG 12	AWG 12	AWG 12	AWG 12
Recommended Power Cable(Core)	N	3	3	3	3
Min/Max. Voltage	V	187/253	238/291	187/253	238/291
Air Flow Volume(H)	CFM	312	312	330	330
Dehumidifying Volume	Pint/h	1.7	1.7	2.1	2.1
Application Area	sq ft	250-300	250-300	350-400	350-400
Permissible Excessive Operating Pressure for the Discharge Side	psig	840	840	840	840
Permissible Excessive Operating Pressure for the Suction Side	psig	275	275	275	275
Maximum Allowable Pressure	psig	840	840	840	840
Metering Device	--	Capillary	Capillary	Capillary	Capillary
Dimension (W)	inch	42.1	42.1	42.1	42.1
Dimension (H)	inch	16.0	16.0	16.0	16.0
Dimension (D)	inch	21.5	21.5	21.5	21.5
Net Weight	lb	110.3	110.2	110.3	110.3
Refrigerant	--	R32	R32	R32	R32
Refrigerant Charge	oz	17.6	17.6	17.3	17.3
Stacked Layers		5	5	5	5
Fan Type	--	Cross-flow	Cross-flow	Cross-flow	Cross-flow
Fan Diameter Length(D×L)	inch	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28
Cooling Speed	r/min	990/880	1000/890	1060/940	1060/940
Heating Speed	r/min	990/880	1000/890	1060/940	1060/940
Fan Motor Power Output	W	18	10	21	21
Fan Motor RLA	A	0.1	0.1	0.2	0.2
Fan Motor Capacitor	μF	1	1	1.5	1.5

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PTAC W/ Electric Heat 7000-9000 BTU

Figure 201

Model	--	PDE07K3SGR3	PDE07R3SGR3	PDE09K3SGR3	PDE09R3SGR3
Evaporator Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Evaporator Pipe Diameter	inch	0.3	0.3	0.3	0.3
Evaporator Row-fin Gap	inch	3-1/18	3-1/18	3-1/18	3-1/18
Evaporator Coil Length (L×D×W)	inch	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)
Fuse Current	A	3.2	3.2	3.2	3.2
Set Temperature Range	˚F	61-86	61-86	61-86	61-86
Sound Pressure Level (H)	dB (A)	50	50	50	50
Sound Pressure Level (L)	dB (A)	46	46	46	46
Sound Power Level (H)	dB (A)	60	60	60	60
Sound Power Level (L)	dB (A)	56	56	56	56
Compressor Oil	--	FW68DA or equivalent	FW68DA or equivalent	68SL or equivalent	68SL or equivalent
Compressor Type	--	Rotary	Rotary	Rotary	Rotary
Compressor LRA.	A	13	12	17	15
Compressor RLA	A	2.2	2.2	3.1	3.4
Compressor Power Input	W	495	486	689	682
Compressor Overload Protector	--	UP3-042	HPA-112L	HPA-318	HPA-512
Fan Type	--	Axial-flow	Axial-flow	Axial-flow	Axial-flow
Fan Diameter	inch	14	14	14	14
Fan Motor Speed	rpm	1340/1120	1340/1120	1340/1120	1340/1120
Fan Motor Power Output	W	20	20	20	20
Fan Motor RLA	A	0.2	0.3	0.3	0.3
Fan Motor Capacitor	μF	2	1.5	2	1.5
Outdoor Unit Air Flow Volume	CFM	470.8	471	471	471
Condenser Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Condenser Pipe Diameter	inch	12/61	12/61	12/61	12/61
Condenser Rows-fin Gap	inch	3-1/18	3-1/18	3-1/18	3-1/18
Condenser Coil Length (L×D×W)	inch	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8
Cooling Operation Ambient Temperature Range	˚F	64.4-115.0	64.4-115.0	64.4-115.0	64.4-115.0
Heating Operation Ambient Temperature Range	˚F	-19.4-77	-19.4—75	-19.4-77	-19.4-77
Sound Pressure Level (H)	dB (A)	62	62	62	62
Sound Pressure Level (L)	dB (A)	57	58	57	57
Sound Power Level (H)	dB (A)	72	72	72	72
Sound Power Level (L)	dB (A)	67	68	67	67

SPECIFICATIONS

PTAC W/ Electric Heat 12000-15000 BTU

Figure 202

Model	--	PDE12K3SGR3	PDE12R3SGR3	PDE15K5SGR3	PDE15R5SGR3
Rated Voltage	V	230/208	265	230/208	265
Rated Frequency	Hz	60	60	60	60
Phases	--	1	1	1	1
Cooling Capacity	W	3605/3546	3605	4309/4220	4339
Cooling Capacity	Btu/h	12300/12100	12300	14700/14400	14800
Cooling Power Input	W	1060/1020	1060	1420/1380	1400
Electric Heating Power Input	W	5000/4090, 3450/2830, 2450/2010	5000/3450/2450	5000/4090, 3450/2820, 2450/2000	5000/3450/2450
Cooling Current Input	A	4.7/5.0	4	6.0/6.5	5.3
Electric Heating Current Input	A	21.8/19.7,15.0/ 13.6,10.7/9.7	18.9/13.1/9.3	21.8 19.7, 15.0 13.6, 10.7 9.7	18.9/13.1/9.3
Rated Input	W	1270:5050/4130,3500/2860,2500/2040	1270 5050/3500/2500	1890 5050/4130, 3500/2860, 2500/2040	1890 5050/ 3500/2500
Rated Current	A	6.2 22.0/19.9/, 15.2/13.8/, 10.9/9.8	4.8:19.1/13.3/9.5	22.0/19.9/,15.2 /13.8/,10.9/9.8/	2:7A 19.1/13.3/9.5
EER	W/W	3.4/3.46	3.4	3.05/3.1	3.1
EER	(Btu/h)/W	11.6/11.8	11.6	10.4/10.6	10.6
Cross-sectional Area of Power Cable Conductor		AWG 12	AWG 12	AWG 12	AWG 12
Recommended Power Cable(Core)	N	3	3	3	3
Min/Max. Voltage	V	187.2/253	238.5/291.5	187.2/253	249/291.5
Air Flow Volume(H)	CFM	341.3	341.3	341	341.3
Air Flow Volume(L)	CFM	306.0	306.0	306	306.0
Dehumidifying Volume	Pint/h	2.7	2.7	3.2	3.2
Application Area	sq ft	450-550	450-550	550-800	550-800
Permissible Excessive Operating Pressure for the Discharge Side	psig	840	840	840	840
Permissible Excessive Operating Pressure for the Suction Side	psig	275	275	275	275
Maximum Allowable Pressure	psig	840	840	840	840
Metering Device	--	Capillary	Capillary	Capillary	Capillary
Dimension (W)	inch	42	42	42	42
Dimension (H)	inch	16.0	16.0	16	16
Dimension (D)	inch	21 1/2	21 1/2	21 1/2	21 1/2
Net Weight	lb	114.7	114.7	114.7	114.7
Refrigerant	--	R-32	R-32	R-32	R-32
Refrigerant Charge	oz	21.2	21.2	19.8	18.0
Stacked Layers		5	5	5	5
Fan Type	--	Cross-flow	Cross-flow	Cross-flow	Cross-flow
Fan Diameter Length(D×L)	inch	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28
Fan Speed	r/min	1130/970	1130/950	1130/970	1130/970
Fan Motor Power Output	W	23	20	23	23
Fan Motor RLA	A	0.2	0.2	0.2	0.2

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PTAC W/ Electric Heat 12000-15000 BTU

Model	--	PDE12K3SGR3	PDE12R3SGR3	PDE15K5SGR3	PDE15R5SGR3
Fan Motor Capacitor	μF	1	1.5	1	1.5
Evaporator Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Evaporator Pipe Diameter	inch	0.3	0.3	0.3	0.3
Evaporator Row-fin Gap	inch	3-1/18	3-1/18	3-1/18	3-1/18
Evaporator Coil Length (L×D×W)	inch	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)
Fuse Current	A	3.2	3.2	3.2	3.2
Set Temperature Range	˚F	61-86	61-86	61-86	61-86
Sound Pressure Level (H)	dB (A)	53	53	53	53
Sound Pressure Level (L)	dB (A)	50	50	50	50
Sound Power Level (H)	dB (A)	63	63	63	63
Sound Power Level (L)	dB (A)	60	60	60	60
Compressor Oil	--	FW68DA or equivalent	FW68DA or equivalent	FW68DA or equivalent	FW68DA or equivalent
Compressor Type	--	Rotary	Rotary	Rotary	Rotary
Compressor LRA.	A	30	21	35.2	26
Compressor RLA	A	4	3.3	5	6.4
Compressor Power Input	W	872	855	1180	1120
Compressor Overload Protector	--	HPA-425	HPA-518	HPA-535L	HPA-422H
Fan Type	--	Axial-flow	Axial-flow	Axial-flow	Axial-flow
Fan Diameter	inch	14	14	14	14
Fan Motor Speed	rpm	1550/1390	1550/1380	1550/1390	1550/1390
Fan Motor Power Output	W	65	45	65	45
Fan Motor RLA	A	0.5	0.4	0.5	0.4
Fan Motor Capacitor	μF	2.5	2.5	2.5	2.5
Outdoor Unit Air Flow Volume	CFM	565.0	565.0	565	565
Condenser Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Condenser Pipe Diameter	inch	12/61	12/61	12/61	12/61
Condenser Rows-fin Gap	inch	3-1/18	3-1/18	3-1/18	3-1/18
Condenser Coil Length (L×D×W)	inch	(30 7/10)×13 1/2×1 9/26	(30 7/10)×13 1/2×1 9/26	(30 7/10)×13 1/2×1 9/26	(30 7/10)×13 1/2×1 9/26
Cooling Operation Ambient Temperature Range	˚F	64.4-115.0	64.4-115.0	64.4-115.0	55-83
Heating Operation Ambient Temperature Range	˚F	-19.4-77	-19.4-77	-19.4-77	-19.4-77
Sound Pressure Level (H)	dB (A)	66	66	66	66
Sound Pressure Level (L)	dB (A)	63	63	63	63
Sound Power Level (H)	dB (A)	76	76	76	76
Sound Power Level (L)	dB (A)	73	73	73	73

SPECIFICATIONS

PTAC W/ Heat Pump 7000 -9000 BTU

Model	--	PDH07K3SGR3	PDH07R3SGR3	PDH09K3SGR3	PDH09R3SGR3
Rated Voltage	V	230/208	265	230/208	265
Rated Frequency	Hz	60	60	60	60
Phases	--	1	1	1	1
Cooling Capacity	W	2172/2110	2140	2843/2755	2875
Cooling Capacity	Btu/h	7400/7200	7300	9700/9400	9800
Heating Capacity	W	1755/1700	1755	2491/2403	2520
Heating Capacity	Btu/h	6000/5800	6000	8500/8200	8600
Cooling Power Input	W	570/560	560	800/780	810
Heating Power Input	W	490/470	490	690/670	690
Electric Heating Power Input	W	3450/2830, 2450/2010	3450/2450	5000/4090,3450/ 2830,2450/2010	5000/3450 /2450
Cooling Current Input	A	2.4/2.6	2.1	3.6/3.9	3.1
Heating Current Input	A	2.1/2.3	1.8	3.1/3.2	2.6
Electric Heating Current Input	A	15.0/13.6,10.7/9.7	13.1/9.3	21.8/19.7,15.0/ 13.6,10.7/9.7	18.9/13.1/9.3
Rated Input	W	680 570 3500/ 2860,2500/2040	745: 565 3500/2500	1070 930 5050/ 4130,3500/2860, 2500/2040	1220 920 5050/3500/2500
Rated Current	A	3.3A : 2.7A 15.2/ 13.8,10.9/9.8	2.9A, 2.2A 13.3/9.5	5.1A 3.9A 22.0/19.9, 15.2/13.8,10.9/9.8	3.6 3.3 19.1/13.3/9.5
EER	W/W	3.81/3.81	3.8	3.55/3.55	3.6
EER	(Btu/ h)/W	13.0/13.0	13	12.1/12.1	12.1
COP	W/W	3.6/3.6	3.6	3.6/3.6	3.7
COP	(Btu/ h)/W	12.3/12.3	12.3	12.3/12.3	12.5
Cross-sectional Area of Power Cable Conductor		AWG 12	AWG 12	AWG 12	AWG 12
Recommended Power Cable(Core)	N	3	3	3	3
Min/Max. Voltage	V	187.2/253	238.5/291.5	187.2/253	238.5/291.5
Air Flow Volume(H)	CFM	311.9	311.9	330	330
Air Flow Volume(L)	CFM	282.5	282.5	282	282
Dehumidifying Volume	Pint/h	1.7	1.7	2.1	2.1
Application Area	sq ft	250-300	250-300	350-400	350-400
Permissible Excessive Operating Pressure for the Discharge Side	psig	840	840	840	840
Permissible Excessive Operating Pressure for the Suction Side	psig	275	275	275	275
Maximum Allowable Pressure	psig	840	840	840	840
Metering Device	--	Capillary	Capillary	Capillary	Capillary
Dimension (W)	mm	1069	1069	1069	1069
Dimension (W)	inch	42.1	42.1	42.1	42.1
Dimension (H)	mm	406	406	406	406
Dimension (H)	inch	16	16	16	16
Dimension (D)	mm	546	546	546	546
Dimension (D)	inch	21.5	21.5	21.5	21.5
Net Weight	kg	51	51	52	52
Net Weight	lb	112.5	112.5	114.7	114.7
Refrigerant	--	R32	R32	R32	R32

SPECIFICATIONS

PTAC W/ Heat Pump 7000 -9000 BTU

Model	--	PDH07K3SGR3	PDH07R3SGR3	PDH09K3SGR3	PDH09R3SGR3
Refrigerant Charge	oz	27.5	27.5	24.7	24.7
Stacked Layers		5	5	5	5
Fan Type	--	Cross-flow	Cross-flow	Cross-flow	Cross-flow
Fan Diameter Length(D×L)	inch	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28
Fan Speed	r/min	1000/890	1000/890	1060/940	1060/940
Fan Motor Power Output	W	18	10	21	21
Fan Motor RLA	A	0.1	0.1	0.2	0.2
Fan Motor Capacitor	μF	1	1	1.5	1.5
Evaporator Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Evaporator Pipe Diameter	inch	0.3	0.3	0.3	0.3
Evaporator Row-fin Gap	inch	3.1	3.1	3.1	3.1
Evaporator Coil Length (L×D×W)	inch	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (1/2)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)	27 (1/2)/9 (3/4)/1 (1/2)
Fuse Current	A	3.2	3.2	3.2	3.2
Set Temperature Range	˚C	16-30	16-30	16-30	16-30
Set Temperature Range	˚F	61-86	61-86	61-86	61-86
Sound Pressure Level (H)	dB (A)	50	50	50	50
Sound Pressure Level (L)	dB (A)	46	46	46	46
Sound Power Level (H)	dB (A)	60	60	60	60
Sound Power Level (L)	dB (A)	56	56	56	56
Compressor Oil	--	FW68DA or equivalent	FW68DA or equivalent	68SL or equivalent	68SL or equivalent
Compressor Type	--	Rotary	Rotary	Rotary	Rotary
Compressor LRA.	A	13	12	17	15
Compressor RLA	A	2.2	2.2	3.1	3.4
Compressor Power Input	W	495	486	689	682
Compressor Overload Protector	--	UP3-042	HPA-112L	HPA-318	HPA-512
Fan Type	--	Axial-flow	Axial-flow	Axial-flow	Axial-flow
Fan Diameter	inch	14	14	14	14
Fan Motor Speed	rpm	1340/1120	1340/1120	1340/1120	1340/1120
Fan Motor Power Output	W	20	20	20	20
Fan Motor RLA	A	0.2	0.3	0.3	0.3
Fan Motor Capacitor	μF	2	1.5	2	1.5
Outdoor Unit Air Flow Volume	CFM	470.8	471	471	471
Condenser Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Condenser Pipe Diameter	inch	0.3	0.3	0.3	.3
Condenser Rows-fin Gap	inch	3.1	3.1	3.1	3.1
Condenser Coil Length (L×D×W)	inch	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8	30 3/4×13 1/2×1 3/8
Cooling Operation Ambient Temperature Range	°F	64.4-115.0	64.4-115.0	64.4-115.0	64.4-115.0
Heating Operation Ambient Temperature Range	°F	-19.4-77	-19.4—75	-19.4-77	-19.4-77
Sound Pressure Level (H)	dB (A)	62	62	62	62
Sound Pressure Level (L)	dB (A)	58	58	58	58
Sound Power Level (H)	dB (A)	72	72	72	72
Sound Power Level (L)	dB (A)	68	68	68	68

SPECIFICATIONS

PTAC W/ Heat Pump 12000 - 15000 BTU

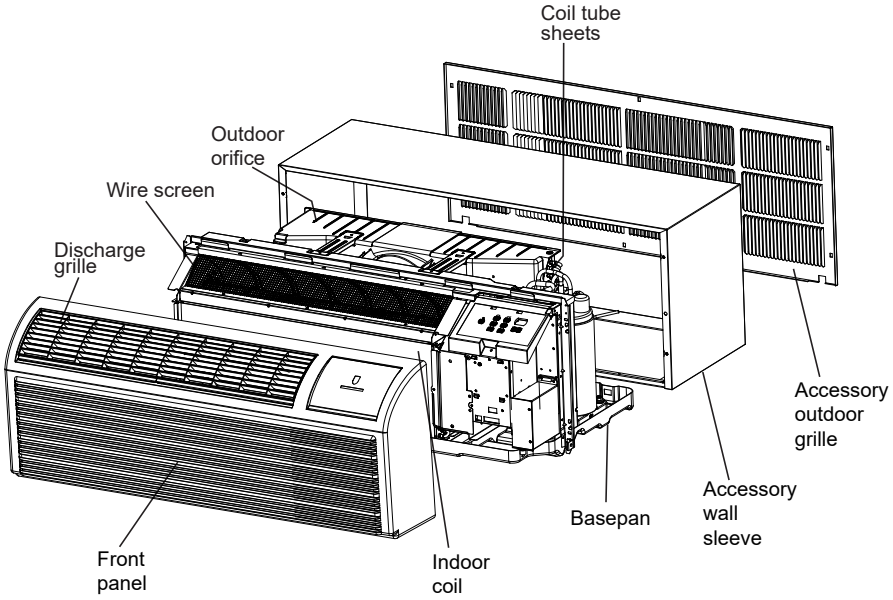
Model	--	PDH12K3SGR3	PDH12R3SGR3	PDH15K5SGR3	PDH15R5SGR3
Rated Voltage	V	230/208	265	230/208	265
Rated Frequency	Hz	60	60	60	60
Phases	--	1	1	1	1
Cooling Capacity	W	3546/3488	3517	4279/4162	4250
Cooling Capacity	Btu/h	12100/11900	12000	14600/14200	14500
Heating Capacity	W	3195/3136	3135	4018/3957	3898
Heating Capacity	Btu/h	10900/10700	10700	13800/13300	13300
Cooling Power Input	W	1040/1000	1030	1400/1360	1390
Heating Power Input	W	940/900	920	1310/1250	1250
Electric Heating Power Input	W	5000/4090,3450 /2830,2450/2010	5000/3450/2450	5000/4090,3450 /2820,2450/2000	5000/3450/2450
Cooling Current Input	A	4.6/4.9	4	6.0/6.5	5.3
Heating Current Input	A	4.1/4.3	3.5	5.6/5.9	4.7
Electric Heating Current Input	A	21.8/19.7,15.0 /13.6,10.7/9.7	18.9/13.1/9.3	21.8 19.7 ,15.0 13.6 , 10.7 9.7	18.9/13.1/9.3
Rated Input	W	1270 1130 5050/4130, 3500/2860,2500/2040	1270 1100 5050/3500/2500	1890 1650 5050/ 4130,3500/2860,2500/2040	1890 1650 5050 /3500/2500
Rated Current	A	6.2 5.3 22.0/ 19.9/,15.2/13.8/,10.9/9.8	4.8 4.2 19.1/13.3/9.5	8.2 7.9 22.0/ 19.9/,15.2/13.8/,10.9/9.8/	7A, 6.2A 19.1/13.3/9.5
EER	W/W	3.4/3.46	3.4	3.05/3.05	3.1
EER	(Btu/ h)/W	11.6/11.8	11.6	10.4/10.4	10.4
COP	W/W	3.4/3.46	3.4	3.1/3.1	3.1
COP	(Btu/ h)/W	11.6/11.8	11.6	10.6/10.6	10.6
Cross-sectional Area of Power Cable Conductor		AWG 12	AWG 12	AWG 12	AWG 12
Recommended Power Cable(Core)	N	3	3	3	3
Min/Max. Voltage	V	187.2/253	238.5/291.5	187.2/253	249/291.5
Air Flow Volume(H)	CFM	341.3	341.3	341	341.3
Air Flow Volume(L)	CFM	306.0	306.0	306	306.0
Dehumidifying Volume	Pint/h	2.7	2.8	3.2	3.2
Application Area	sq ft	450-550	450-550	550-800	550-800
Permissible Excessive Operating Pressure for the Discharge Side	psig	840	840	840	840
Permissible Excessive Operating Pressure for the Suction Side	psig	275	275	275	275
Maximum Allowable Pressure	psig	840	840	840	840
Metering Device	--	Capillary	Capillary	Capillary	Capillary
Dimension (W)	inch	42.1	42.1	42.1	42.1
Dimension (H)	inch	16	16	16	16
Dimension (D)	inch	21.5	21.5	21.5	21.5
Net Weight	lb	119.1	119.1	120.2	120.2
Refrigerant	--	R32	R32	R32	R32
Refrigerant Charge	oz	28.9	28.9	29.6	28.6
Stacked Layers		5	5	5	5

SPECIFICATIONS

PTAC W/ Heat Pump 12000 - 15000 BTU

Model	--	PDH12K3SGR3	PDH12R3SGR3	PDH15K5SGR3	PDH15R5SGR3
Fan Type	--	Cross-flow	Cross-flow	Cross-flow	Cross-flow
Fan Diameter Length(D×L)	inch	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28	4 3/4 ×28
Fan Speed	r/min	1130/970	1130/950	1130/970	1130/970
Fan Motor Power Output	W	23	20	23	23
Fan Motor RLA	A	0.2	0.2	0.2	0.2
Fan Motor Capacitor	μF	1	1.5	1	1.5
Evaporator Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Evaporator Pipe Diameter	inch	0.3	0.3	0.3	0.3
Evaporator Row-fin Gap	inch	3.1	3.1	3.1	3.1
Evaporator Coil Length (L×D×W)	inch	27 (1/2)/ 9 (1/2)/1 (1/2)	27 (1/2)/ 9 (1/2)/1 (1/2)	27 (1/2)/ 9 (1/2)/1 (1/2)	27 (1/2)/ 9 (1/2)/1 (1/2)
Fuse Current	A	3.2	3.2	3.2	3.2
Set Temperature Range	°F	61-86	61-86	61-86	61-86
Sound Pressure Level (H)	dB (A)	53	53	53	53
Sound Pressure Level (L)	dB (A)	50	50	50	50
Sound Power Level (H)	dB (A)	63	63	63	63
Sound Power Level (L)	dB (A)	60	60	60	60
Compressor Oil	--	FW68DA or equivalent	FW68DA or equivalent	FW68DA or equivalent	FW68DA or equivalent
Compressor Type	--	Rotary	Rotary	Rotary	Rotary
Compressor LRA.	A	30	21	35.2	26
Compressor RLA	A	4	4.5	5	6.4
Compressor Power Input	W	872	855	1180	1120
Compressor Overload Protector	--	HPA-425	HPA-518	HPA-535L	HPA-422H
Fan Type	--	Axial-flow	Axial-flow	Axial-flow	Axial-flow
Fan Diameter	inch	14	14	14	14
Fan Motor Speed	rpm	1550/1390	1550/1380	1550/1390	1550/1390
Fan Motor Power Output	W	65	45	65	45
Fan Motor RLA	A	0.5	0.4	0.5	0.4
Fan Motor Capacitor	μF	2.5	2.5	2.5	2.5
Outdoor Unit Air Flow Volume	m3/h	960	960	1000	1000
Outdoor Unit Air Flow Volume	CFM	565.0	565.0	588	588
Condenser Form	--	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube	Aluminum Fin-copper Tube
Condenser Pipe Diameter	inch	0.3	0.3	0.3	0.3
Condenser Rows-fin Gap	mm	3-1.3	3-1.3	3-1.3	3-1.3
Condenser Rows-fin Gap	inch	3.1	3.1	3.1	3.1
Condenser Coil Length (L×D×W)	inch	(30 3/4)× 13 1/2 ×(1 1/2)	(30 3/4)× 13 1/2 ×(1 1/2)	(30 3/4)× 13 1/2 ×(1 1/2)	(30 3/4)× 13 1/2 ×(1 1/2)
Cooling Operation Ambient Temperature Range	°F	64.4-115.0	64.4-115.0	64.4-115.0	55-83
Heating Operation Ambient Temperature Range	°F	-19.4-77	-19.4-77	-19.4-77	-19.4-77
Sound Pressure Level (H)	dB (A)	66	66	66	66
Sound Pressure Level (L)	dB (A)	63	63	63	63
Sound Power Level (H)	dB (A)	76	76	76	76
Sound Power Level (L)	dB (A)	73	73	73	73

SPECIFICATIONS



PDXWS Wall Sleeve Dimensions
16″ H x 42″ x W x 13 3/4″ D

Front Cover Dimensions
16″ H x 42″ x W x 7 3/4″ D

Cut-out Dimensions
16 1/4 x 42 1/4

Figure 202 (Typical Unit Components and Dimensions)

SPECIFICATIONS

Electrical Data

Make sure the wiring is adequate for your unit.

If you have fuses, they should be of the time delay type. Before you install or relocate this unit, be sure that the amperage rating of the circuit breaker or time delay fuse does not exceed the amp rating listed in Figure E.1.1. Must be installed on a single circuit with designated receptacle.

⚠WARNING

Electrical Shock Hazard

Make sure your electrical receptacle has the same configuration as your air conditioner's plug. If different, consult a Licensed Electrician.

Do not use plug adapters.
Do not use an extension cord.
Do not remove ground prong.

Always plug into a grounded 3 prong outlet. Failure to follow these instructions can result in death, fire, or electrical shock.

DO NOT use an extension cord.

The cord provided will carry the proper amount of electrical power to the unit; an extension cord may not.

Make sure that the receptacle is compatible with the air conditioner cord

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. Specification of fuse on the main board: T3.15AH250V(unit: 208/230V) T3.15A 350VAC(unit: 265V)
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.

Table 1	Receptacles and Fuse Types					
Voltage	230V			265V		
Amps	**15**	**20**	**30**	**15**	**20**	**30**
Heater Size	1.5/2.5kw	3.5kw	5kw	1.5/2.5kw	3.5kw	5kw
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

Figure 203 (Receptacles and Fuses)

Power Cord LCDI Test (208/230v)

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.

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
    a. Listen for click; Reset button latches and remains in.
    b. Check that the green indicator light is on once reset.
    c. 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.

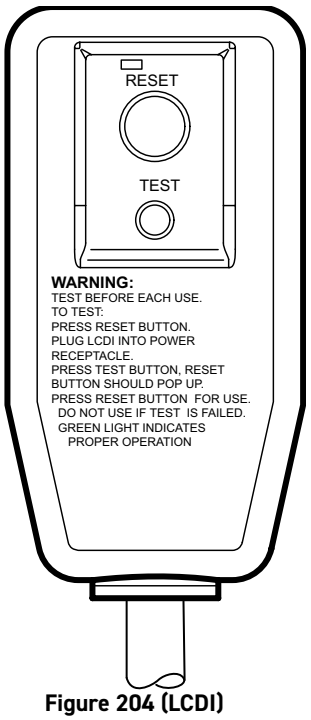


Figure 204 (LCDI)

SPECIFICATIONS

Electrical Data

MODEL	HEATER Kw	POWER CORD KIT	VOLTAGE	AMPERAGE	RECEPTACLE
PDH07K, PDH09K, PDH12K, PDH15K	2.5	PXPC23015A	208/230	15	NEMA 6-15r
PDH07K, PDH09K, PDH12K, PDH15K	3.5	PXPC23020A (STD)	208/230	20	NEMA 6-20r
PDH09K, PDH12K, PDH15K	5.0	PXPC23030	208/230	30	NEMA 6-30r
PDH07R, PDH09R, PDH12R, PDH15R	2.5	PXPC26515	265	15	NEMA 7-15r
PDH07R, PDH09R, PDH12R, PDH15R	3.5	PXPC26520A (STD)	265	20	NEMA 7-20r
PDH09R, PDH12R, PDH15R	5.0	PXPC26530	265	30	NEMA 7-30r

Power Cord Installation (265v)

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 sub-base assembly, the PXCJA conduit kit (or equivalent) be installed on all hardwired units. If installing a flush-floor mounted unit, make sure the chassis can be removed from the sleeve for service and maintenance.

POWER CONNECTION OPTIONS

Appropriate power cord accessory kit is determined by the voltage,and amperage of the branch circuit. If the unit is to be hard wired, an accessory hard wire kit must be ordered.

IMPORTANT: For 265V units, if power cord accessory option is selected, the cord is only 18" long and must plug into the accessory electrical 265V subbase. Be sure that your outlet matches the appropriate blade configuration of the plug and that it is within reach of the service cord.

Electrical Wiring

All wiring,including installation of the receptacle, must be in accordance with the NEC and local codes, ordinances and regulations. National codes require the use of an arc fault or leakage current detection device on all 208/230V power cords. Be sure to select the correct cord for your installation.

Wire Size

Install a single branch circuit. All wiring must comply with local and national codes. All units are designed to operate off ONE single branch circuits only.

NOTE: Use copper conductors only. Prepare the 265V (or 230V) power cord for connection to the chassis' power cord connector by cutting the cord to the appropriate length.

Grounding

For safety and protection, the unit is grounded through the service cord plug or through separate ground wire provided on hard wired units. Be sure that the branch circuit or general purpose outlet is grounded.

VOLTAGE SUPPLY

Check voltage supply at outlet. For satisfactory results, the voltage range must always be within the ranges found on the data information plate.

Cord-connected Units

The 250V- field supplied outlet must match the plug for the standard 208/ 230V- units and be within reach of the service cord. The standard cord-connected 265V- units require an accessory electrical subbase for operation. Refer to Figure 203 for proper receptacle and fuse type.

Power Cord Protection

The power cord for 230/ 208V units provide power cord fire protection. Unit power automatically disconnects when unsafe conditions are detected. Power to the unit can be restored by pressing the reset button on plug head.

Upon completion of unit installation for 230/ 208V models,an operational check should be performed using the TEST/RESET buttons on the plug head.

NOTE: The 265V models do not incorporate this feature as they require use of the electrical subbase accessory To install the line voltage power leads and conduit to chassis, refer to the Installation and Operation Manual.

⚠WARNING

Electrical Shock Hazard

Make sure your electrical receptacle has the same configuration as your air conditioner's plug. If different, consult a Licensed Electrician.

Do not use plug adapters.
Do not use an extension cord.
Do not remove ground prong.

Always plug into a grounded 3 prong outlet. Failure to follow these instructions can result in death, fire, or electrical shock.

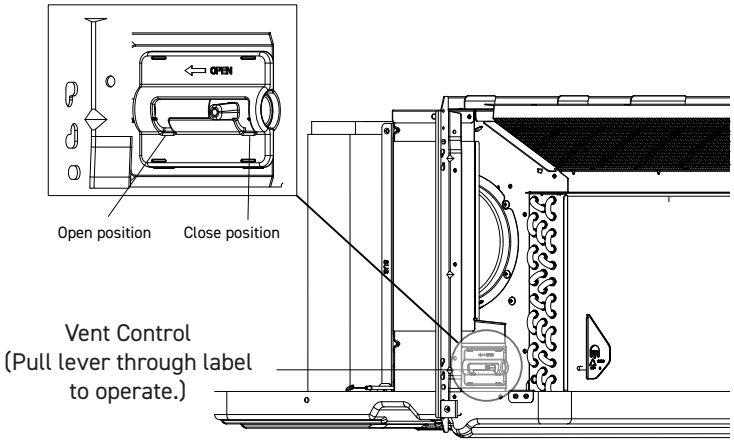
OPERATION

Air Flow Selection and Adjustment

VENTILATION CONTROL

The ventilation control lever is located at left side of unit, behind front panel.
NOTE:The vent door shipping hardware must be removed before using vent control lever. See Installation Instructions.
When set at close POSITION, only the air inside the room is circulated and filtered.

When set at open POSITION, some outdoor air will be drawn into room. This will reduce heating or cooling efficiency.
Energy Tip : Keep the vent control at POSITION. Room air will be filtered and circulated.



(Ventilation Control Location)

ADJUSTING AIR DIRECTION

To adjust air direction:

1.Remove front panel.

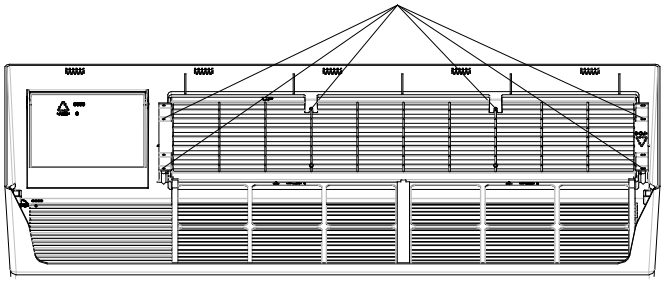
2.Remove louver screws that hold louver insert in place (from back side of front panel).

3.Turn louver insert and rotate 180 °

4.Replace louver insert.

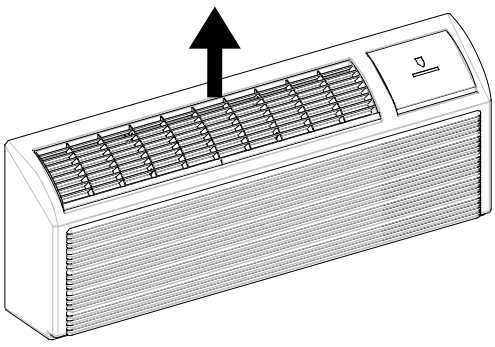
5.Replace screws and front panel.

Louver screws

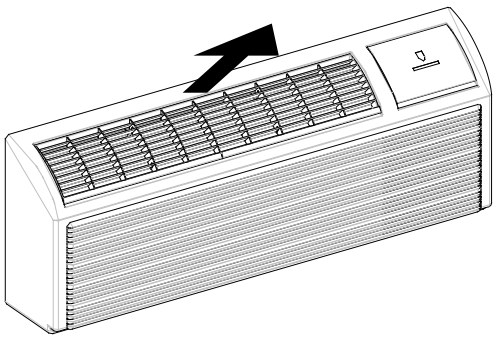


(Backside of Front Panel)

Air discharge upward



Air discharge outward (Default)



OPERATION

Function and Control

Auxiliary dip switch controls are located behind front panel, through an opening below the control panel. To access, remove front panel.
Dip switches are accessible without opening the control box. Unit must be powered OFF to effectively change their status.
Factory settings for dip switches will be in the DOWN position. See Table 5-Dip Switch Functions for functions of each dip switch position.

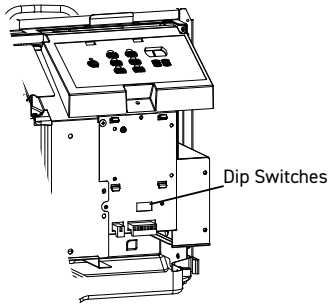


Figure 304 (Dipswitch Location on Unit)

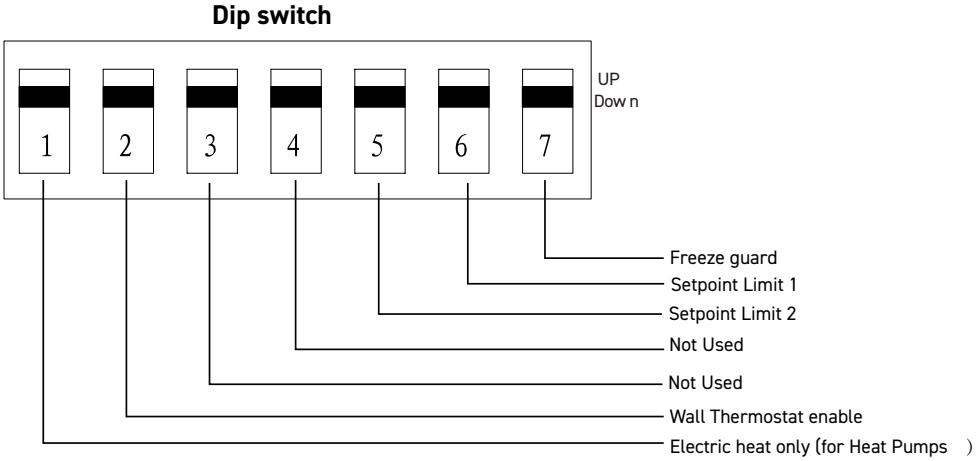


Figure 305 (Dip Switches)

Table 306 (DIP SWITCH FUNCTIONS)

No.	UP		DOWN		REMARKS	DEFAULT
1	Electric Heat Only		Heat Pump		For Heat Pump unit only.	DOWN
2	Wall Thermostat Enable		Control Panel Enable			DOWN
6* 5	UP* UP 68 – 75°F	UP* DOWN 63 – 80°F	DOWN* UP 65 – 78°F	DOWN* DOWN 61 – 86°F (full range)	Two configurations (5* 6) combine to select set point range. When set point limit set, display always shows full range.	DOWN* DOWN 61 – 86°F
7	Freeze Guard Disable		Freeze Guard Enable			DOWN

Electric Heating Only/Emergency Heat (For Heat Pump Units Only)

This setting is typically used for Emergency Heating.

Wall Thermostat Enable

A wired wall thermostat can be connected to the unit. If it is, this dipswitch must be moved to the Wall Thermostat Enable Position, before the wall thermostat will begin control.

Setpoint Temperature Limits

Provides a restricted range of temperature control.

Room Freeze Protection

If unit senses a room temperature below 40°F, the fan motor and electric strip heat will turn on and warm the room to 50°F. The fan stops a short time after the temperature is satisfied.

OPERATION

Function and Control

IMPORTANT : When unit is first started, high humidity conditions can cause condensation to form on discharge grill. .Keep doors and windows closed. Room humidity will decrease and moisture will evaporate.

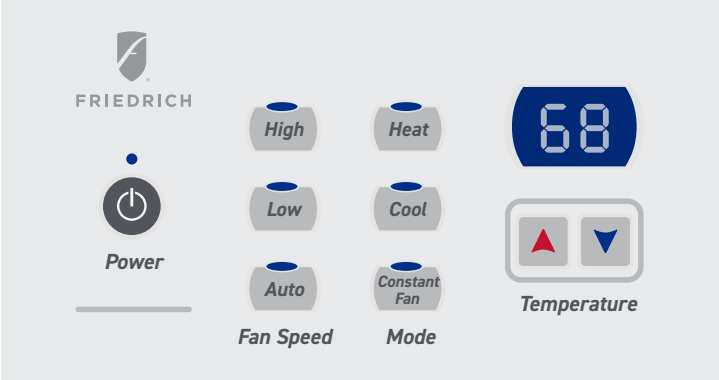


Figure 307 (Display)

ABOUT THE CONTROLS ON YOUR UNIT

NOTE: In case of a power failure, the unit will remember the last programmed settings and will restart to those settings.
1. When the unit is in off mode, turn on the unit by Power; if pressing up/down button, dual-8 display will turn off after indoor temperature displays for 15 sec; if pressing mode button, controller will resume to related state, and operation indication lamp will turn on (mode button including cooling mode button, heating mode button and fan mode button)

2. Every button is enabled when the unit is on.
- Power: Turns the unit on and off.
- Cooling mode button: when the unit is on, press the Cool button, and the unit will run under cooling mode.
- Heating mode button: when the unit is on, press the Heat button, and the unit will run under heating mode.
- Constant Fan button: when the unit is on, press the Constant Fan Button, and the unit will run under fan mode.
- Low speed button: when the unit is on, press the low fan button, and thin unit will run at low fan speed.
- High speed button: when the unit is on, press the high fan button, and thin unit will run at high fan speed.
- Auto speed button: When the unit is on, press Auto button, and the unit fan speeds will be automatically adjusted according to ambient temperature and demand for cooling and heating.
- UP/DOWN: Adjust preset temperature 61-86°F 16-30°C by UP/DOWN.

Allocation mode will be started up if pressing the buttons of low speed and Set-point down for 5 Sec.. when the unit is on in 30 Sec.. . After entering into allocation mode, adjust temperature compensation by buttons which leads the unit in on/off condition, and it acts after it overloads 3 Sec..; if ambient temperature changing leads the unit in on/off condition, it will act after exit allocation mode.
Under allocation mode: Choose below 4 allocation modes by low speed button.
First Mode: Fahrenheit/Celsius display mode
The Fahrenheit/Celsius display mode will be shifted if pressing Set-point up or Set-point down.
F means Fahrenheit display mode C means Celsius display mode.
Second Mode: Adjust cooling temperature compensation value mode.
Press Set-point up/ Set-point down will increase/decrease compensation temperature 1°F(or °C).
The adjustment range of indoor ambient temperature compensation value is -6°F~+6°F(-3°C~+3°C) (cooling mode LED is on.)
Third Mode: Adjust heating temperature compensation value mode.
Press Set-point up/Set-point down will increase/decrease compensation temperature 1°F (or °C)
The adjustment range of indoor ambient temperature compensation value is -6°F~+6°F(-3°C~+3°C) (heating mode LED is on.)
The temperature compensation is default 0 and allocates different compensation value under cooling and heating mode, the compensation value can not be adjusted under fan mode.
Forth Mode: Display shift of preset temperature and ambient temperature under heating and cooling mode. Display of preset temperature and ambient temperature can be shifted if pressing Set-point up or Set-point down. Preset temperature display: dual-8 displays SP, after exiting allocation mode, preset temperature will display under heating and cooling mode.
Ambient temperature display: dual-8 displays AA, after exit allocation mode, ambient temperature will display under heating and cooling mode.
In below situation: preset temperature will display 10 Sec.., then display ambient temperature.
1. Press mode button. (mode button includes: cooling mode button, heating mode button)
2. Energization after power off.
3. Turn off the unit after turn on unit.

OPERATION

Function and Control

4. EM off after on.
5. Adjust preset temperature by Set-point up and Set-point down.

Exiting measure of allocation mode: for above allocation mode, there is no button action if pressing mode button (including cooling mode button, fan mode button and heating mode button) or in 30 Sec., the unit will exit allocation mode.

Electric Heating Only/Emergency Heat

This setting is typically used for Emergency Heating.

Wall Thermostat Enable

A wired wall thermostat can be connected to the unit. If it is,this dip switch must be moved to the Wall Thermostat Enable Position, before the wall thermostat will begin control.

Set-point Temperature Limits

Provides a restricted range of temperature control.

Room Freeze Protection

If unit senses a room temperature below 40°F,the fan motor and electric strip heat will turn on and warm the room to 50°F. The fan stops a short time after the temperature is satisfied.

Cooling mode Sequence of Operation

Under cooling mode, cooling mode indicator is on and the set fan speed indicator is on. Dual 8 displays set temperature.

When $T_{indoor\ amb}$.+$T_{indoor\ amb.\ compensation}$≥$T_{preset}$+ 2˚F(1˚C), the unit operates under cooling. Outdoor fan and indoor fan operates in set speed. When the starting condition of compressor is reached, outdoor fan will operate and compressor will operate 10s later.

$T_{indoor\ amb.}$+$T_{indoor\ amb.\ compensation}$≤$T_{preset}$- 2˚F(1˚C), the unit sops operation. In this case, compressor and outdoor fan stop operation. Under indoor fan cycle mode, indoor fan will stop operation after operating at set fan speed for 60s (except requiring the indoor fan to operate in protection mode); if fan cycle mode is not selected, indoor fan will operate at set fan speed.

T_{preset} - 2˚F(1˚C)<$T_{indoor\ amb.}$+$T_{indoor\ amb.\ compensation}$<$T_{preset}$+ 2˚F(1˚C), the unit keeps previous operation status.

When the indoor fan is set at high speed, outdoor fan operates according to high speed.

When the indoor fan is set at low speed, outdoor fan operates according to low speed.

When the unit starts cooling mode for the first time and indoor fan is set at low speed, outdoor fan will start at high speed. After operating for 3.5 min. and outdoor tube temperature is below 140˚F(60˚C), outdoor fan turns to low speed. First time start-up includes: switch to low speed cooling from non-cooling mode; the unit starts low speed cooling for the first time or enters low speed cooling after power failure. During cooling mode and there is no outdoor condenser high temperature protection, unit stops when reaching temperature point, unit stops for temperature sensor error, or unit stops for freeze protection previously, when the start-up condition of outdoor fan is met, indoor fan will operate at high fan speed for 3 sec. and then turn to set fan speed. If high temperature protection occurs during cooling mode, outdoor fan is forced to operate at high speed. When the start-up conditions of outdoor fan in heating mode are met, outdoor fan will operate at high fan speed for 3 sec. and then turn to set fan speed. When the indoor fan starts operation, indoor fan will operate at high fan speed for 3 sec. and then turn to set fan speed.

Constant fan: Press this button under cooling or heating mode to turn on or turn off constant fan function. (It is invalid in wired controller mode) If constant fan mode is on, the fan motor will operate constantly. If constant mode is off, the fan will stop as the load stops. Fan speed is controlled by fan speed button (If wired controller is connected, fan speed follows the command of wired controller. The controller will control if the fan shall operate or not). The status will not change when switching modes, turning on unit, turning off unit, switching to wired controller mode, switching to panel mode, energizing after power failure; if operating for the first time or memory chip is broken, it defaults to off.

OPERATION

Function and Control

Heating mode

Under heating mode, heating mode LED and set fan speed LED is on. Dual 8 displays set temperature. If select displaying ambient temperature in additional function setting, the dual 8 will display as the display way described in this mode. The set temperature and fan speed will keep the same when switching modes.

Working condition and process for heating

Operation condition and process (electric heater and compressor can't operate at the same time)

When T_{preset} - 5°F(3°C)<T indoor amb. -$T_{indoor\ amb.\ compensation}$≤$T_{preset}$-2°F(1°C), compressor operates at heating mode. Meanwhile, the 4-way valve, indoor fan and outdoor fan start operation at set speed. Compressor can operate after 10 sec. If compressor operates and it satisfies $T_{indoor\ amb.}$ -$T_{indoor\ amb.\ compensation}$ ≤ T_{preset} - 5°F(3°C) and the minimum operation time for compressor and outdoor fan stop operation immediately. 1 sec. later, electric heater will start. Once the electric heater operates, it will quit until condition is satisfied (entering protection function is excluded).

When compressor needs to heat, if compressor can't be started up due to protection function, electric heater will start heating instead of compressor 15s later. It will stop operation until satisfying the temperature point (customized requirement); When $T_{indoor\ amb.}$ - $T_{indoor\ amb.\ compensation}$ ≤T_{preset} - 5°F(3°C),the electric heater operates. Indoor fan operates at set fan speed.

When Tindoor amb. - Tindoor amb. compensation â ‰¥ T preset + 2 °F(1°C), compressor or electric heater stops operation. Under fan cycle mode, indoor fan operates at the condition of blowing residual heat; if fan cycle mode is not selected, indoor fan will operate at set fan speed.

When T_{preset} - 2°F(1°C)<$T_{indoor\ amb.}$-$T_{indoor\ amb.\ compensation}$<$T_{preset}$ + 2°F(1°C) the unit keeps previous operation status.

Auto fan speed mode

a. Auto fan speed in cooling mode

High speed:$T_{AMB.}$ +$T_{indoor\ amb.\ compensation}$≥$T_{preset}$ + 4°F(2°C)

Low speed:$T_{amb.}$ +$T_{indoor\ amb.\ compensation}$≤$T_{preset}$

Not change:T_{preset} < Tamb.+$T_{indoor\ amb.\ compensation}$ < T_{preset} + 4°F(2°C). When entering auto fan speed mode, it will operate according to auto high speed.

b. Auto fan speed in heating mode

High speed: $T_{amb.}$-$T_{indoor\ amb.\ compensation}$ ≤ T_{preset} - 4°F(2°C)

Low speed: $T_{amb.}$ -$T_{indoor\ amb.\ compensation}$ ≥ T_{preset}

Not change: T_{preset} - 4°F(2°C)<Tamb.-$T_{indoor\ amb.\ compensation}$ < T_{preset} When entering auto fan speed mode, it will operate according to auto high speed.

Note: a. Under auto fan speed control in any mode, there will be a delay of 3.5 min. minimum when switching the speed of indoor fan(there is no delay of 3.5 min. when switching mode).

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. It next will pass through the refrigerant drier (if equipped). It is the function of the drier to trap any moisture present in the system, contaminants, and large particulate matter.

The liquid refrigerant next enters the metering device. The metering device is 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.

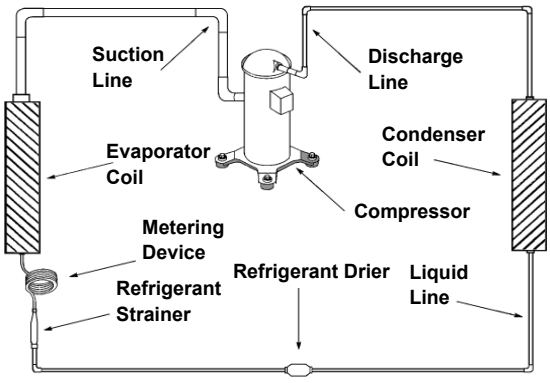
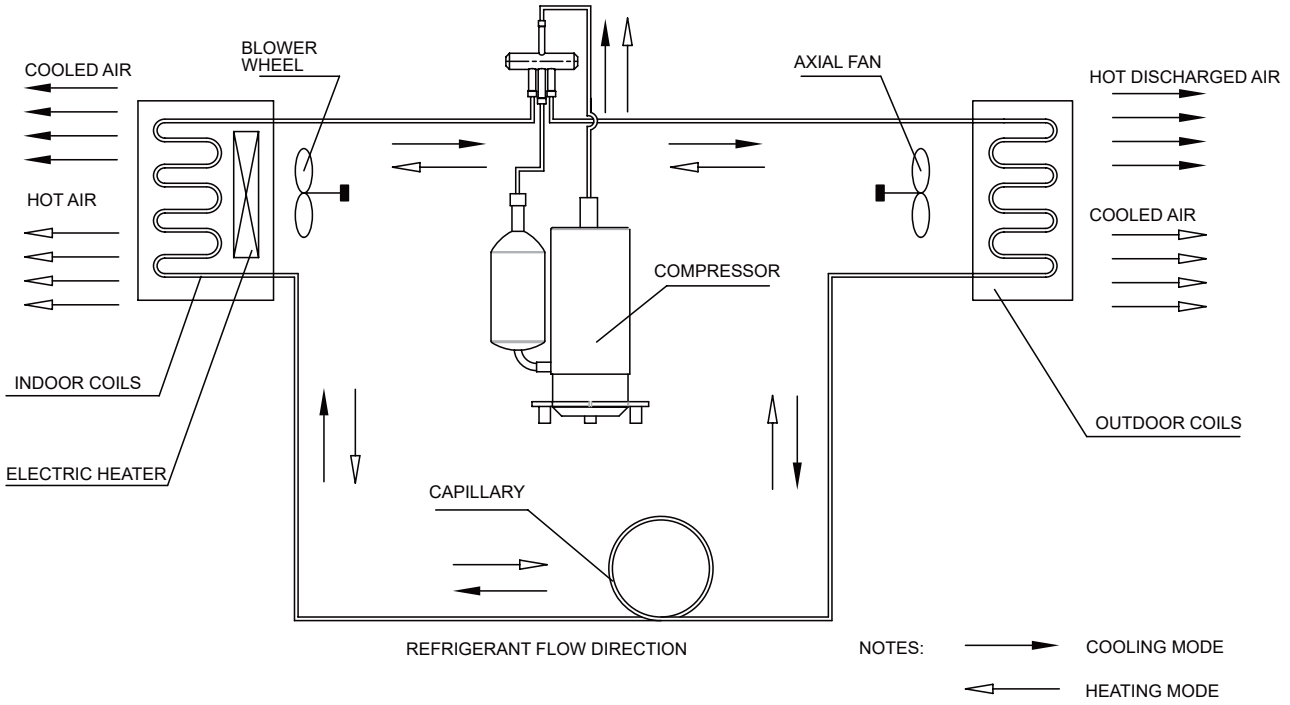


Figure 308 (Sequence of Operation)

OPERATION

Refrigerant System Diagram

(1)Cooling + Heat Pump + Auxiliary Electric Heater



(2) Cooling + Electric Heater

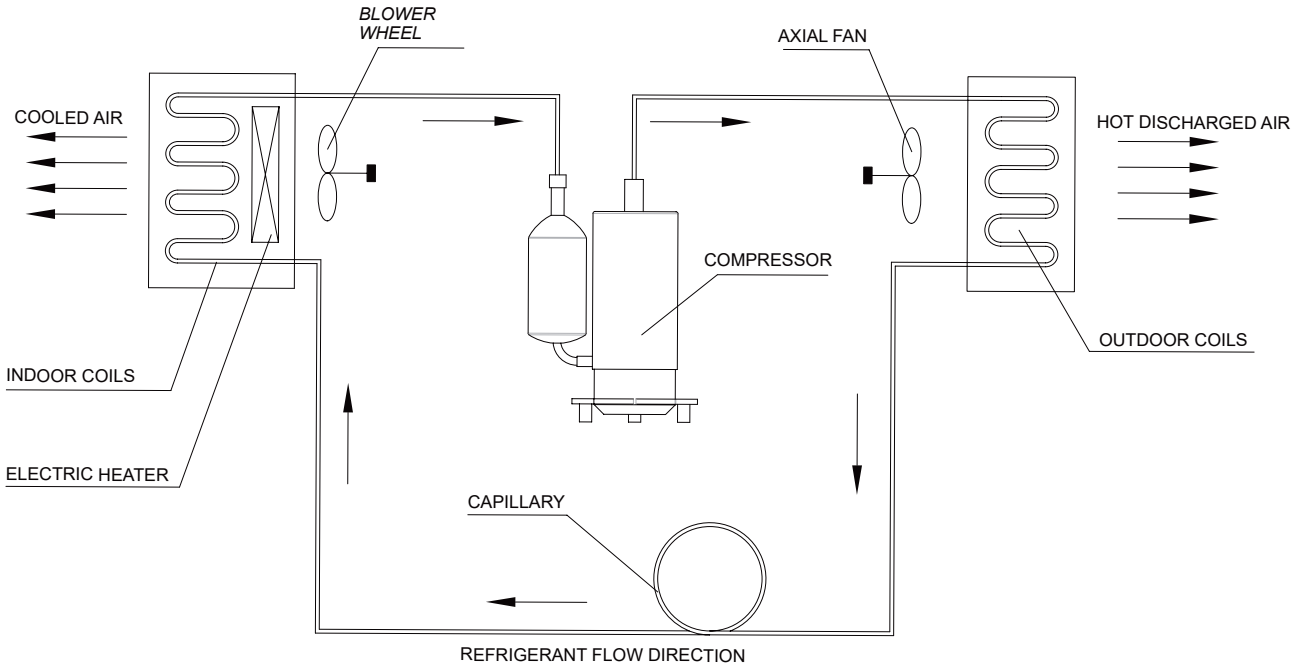


Figure 309 (Sequence of Operation)

Auxiliary Controls

Install Thermostat

All PDH 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.
ALL PDH Models require a single stage cool, dual stage heat thermostat with an O reversing valve control. The Freidrich RT7 or RT7P thermostats are applicable.

Install thermostat Approximately 5 ft. from the floor.
Install thermostat close to or in a frequently used room, preferably on an inside wall.
The Thermostat should NOT be mounted:
Close to a window, on an outside wall, or next to a door leading outside.
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.
Close to or in the direct airflow of supply registers and/or return air grilles.
Any areas with poor air circulation, such as a corner, behind a door, or an alcove.

WALL THERMOSTAT TERMINAL

I**MPORTANT:** Only trained,qualified personnel should access electrical panel on unit and install electrical accessories. Please contact your local electrical contractor,dealer,or distributor for assistance.
Thermostat Wire Routing
Thermostat wire is field supplied. Recommended wire gauge is 18 to 20 gauge solid thermostat wire.

⚠WARNING

Electrical Shock Hazard

Make sure your electrical receptacle has the same configuration as your air conditioner's plug. If different, consult a Licensed Electrician.

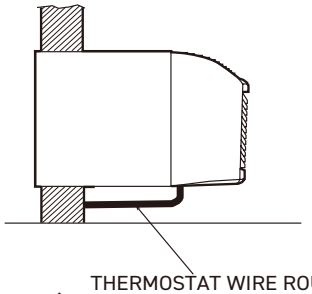
Do not use plug adapters.
Do not use an extension cord.
Do not remove ground prong.

Always plug into a grounded 3 prong outlet. Failure to follow these instructions can result in death, fire, or electrical shock.

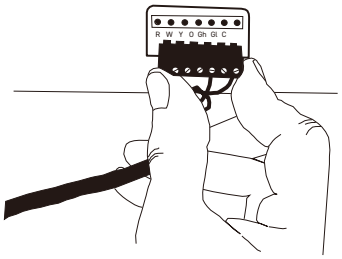
NOTE: It is recommended that extra wires are run to unit in case any are damaged during installation. Thermostat wire should always be routed around or under, NEVER through,the wall sleeve. The wire should then be routed behind the front panel to the easily accessible terminal connector.

Figure 401(Wiring Thermostat To Unit)

1. Wire wall thermostat input.
   NOTE: Terminal connector can be removed and replaced to simplify the wiring.
   NOTE: For heat pump models, anytime there is a second-stage call for heating from the wall thermostat, the unit will automatically switch over to electric heating.
   Install Thermostat Wiring
2. Pull terminal connector to remove.
   NOTE: Terminal connector can be removed and replaced to simplify thermostat wiring.
3. Connect wires from the thermostat to terminals on unit terminal connector.
4. Reinstall terminal connector.



THERMOSTAT WIRE ROUTING
(UNDER SLEEVE, BEHIND FRONT PANEL)



5. Ensure that unit is configured for wall thermostat enable.
6. Replace control panel label with wall thermostat label (included).
7. Restore power to unit.
   NOTE: Refer to Table (Dip Switch Functions) to set the thermostat mode.
   NOTE: Refer to thermostat installation instructions for details on installing wall thermostat.
   NOTE: For thermostats that have only one fan speed output (on or auto), the fan speed is determined by how the terminal connector is wired. If Low fan is desired, wire the G output from the thermostat to GL on the unit's terminal block. If Hi fan is desired, wire the G output from the thermostat to GH on the unit's terminal block.
   NOTE: After proper installation, if your thermostat is not working properly, refer to the Trouble Shooting section.

Auxillary Controls

TERMINAL CONNECTIONS

The wall thermostat terminal block is located behind the front panel and is easily accessible on front of control panel.

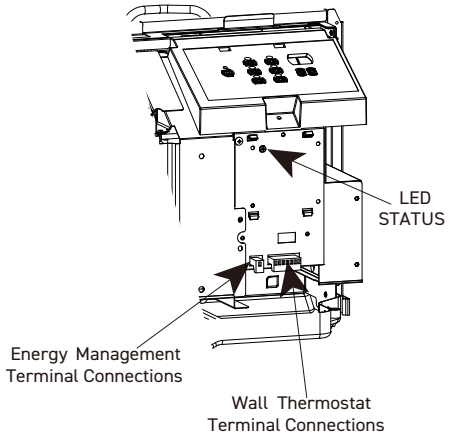


Fig. 402 –Terminal Connector and Status LED Location

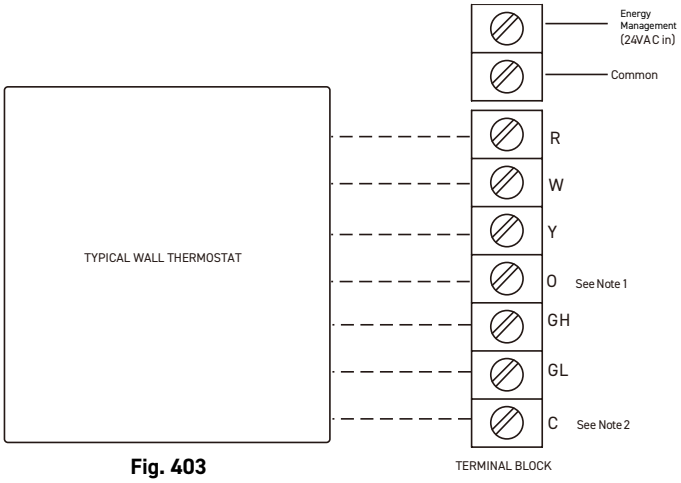


Fig. 403

NOTES:

1.Use terminal"O" for heat pump unit connection only.

2.Terminal"C"(common) is typically only required for digital thermostats.

⚠ CAUTION

UNIT DAMAGE HAZARD

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

Improper wiring may damage unit electronics. Common busing is not permitted.Damage or erratic operation may result.

TERMINAL	DESIGNATION
R	24VAC
W	Electric Heat
Y	Compressor
O (Energize for Heat)	Reversing Valve
GH	High Fan
GL	Low Fan
C	Common

NOTE: Any errant input combinations will be captured as thermostat wiring failures and will light the STATUS LED indicator on main board (see Intelligent Self---Checking Control section).

ENERGY MANAGEMENT INPUT (FRONT DESK CONTROL)

The controller can handle a switch signal from remote energy management input, called EM signal or front desk control. Input must be 24VAC. If system receives a 24VAC signal,it will turn unit off; otherwise, the unit runs in normal control.This function will be disabled under Freeze Guard protection. See Fig. 402 and Fig. 403 for terminal connections.

Routine Maintenance

Coils & Chassis

NOTE: Do not use a caustic 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 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 / Condenser 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.

TROUBLESHOOTING

Basic Troubleshooting

SYMPTOM	POSSIBLE CAUSES	SOLUTIONS
Unit Does Not Start	• Unit may have become unplugged. • Fuse may have blown. • Circuit breaker may have been tripped. • Unit may be off or in wall thermostat mode. • Check section on dip switch settings to verify dip switches are set properly. • Unit may be in a protection or diagnostic failure mode. See section on Intelligent Self- checking Control.	• Check that plug is plugged securely in wall receptacle. • Note : Plug has a test/reset button on it. Make sure that the plug has not tripped. • Replace the fuse. See Note 1. • Reset circuit breaker. See Note 1. • Turn unit on (bottom right button on keypad). • Note: If the unit turns on, the LED will be green. If the unit is off, the LED will be red. If there is no LED on, there is a problem with power or damage to the control.
Unit Not Cooling/ Heating Room	• Unit air discharge section is blocked • Temperature setting is not high or low enough Note: Set-point limits may not allow the unit to heat or cool the room to the temperature desired. • Check section on dip switch settings. • Unit air filters are dirty. • Room is excessively hot or cold when unit is started. • Vent door left open • Unit may be in a protection or diagnostic failure mode. Check section on Intelligent Self---checking Control. • Compressor is in time delay. There is a protective time delay (approx. 3 minutes) on starting the compressor after a power outage (or restarting after it has been turned off), to prevent tripping of the compressor overload.	• Make sure that curtains, blinds or furniture are not restricting or blocking unit airflow. • Reset to a lower or higher temperature setting. • Remove and clean filters. • Allow sufficient amount of time for unit to heat or cool the room. • Start heating or cooling early before outdoor temperature, cooking, heat or gatherings of people make room uncomfortable. • Close vent door. • Check dip switch settings for desired comfort. • Wait approximately 3 minutes for compressor to start
Display Has Strange Numbers/ Characters On It	• The unit may be in a diagnostic condition. • The unit may be set for C (instead of F).	• Check Intelligent Self - checking Control section to determine if unit has had a failure. • See the keypad configuration section.
Unit Making Noises	• Clicking, gurgling and whooshing noises are normal during operation of unit.	
Water Dripping Outside	• If a drain kit has not been installed, condensation runoff during very hot and humid weather is normal. See Note 2. If a drain kit has been installed and is connected to a drain system, check gaskets and fittings around drain for leaks and plugs.	
Water Dripping Inside	• Wall sleeve is not installed level	• Wall sleeve must be installed level for proper drainage of condensation. Check that installation is level and make any necessary adjustments.
Ice Or Frost Forms On Indoor Coil	• Low outdoor temperature • Dirty filters	• When outdoor temperature is approximately 55 °F or below, frost may form on the indoor coil when unit is in Cooling mode. Switch unit to FAN operation until ice or frost melts. • Remove and clean filters.
COMPRESSOR PROTECTION	• Power may have cycled, so compressor is in a restart protection.	• Random Compress or restart - Whenever the unit is plugged in, or power has been restarted, a random compressor restart will occur. After a power outage, the compressor will restart after approximately 3 minutes. • Compress or Protection -To prevent short cycling of the compressor, there is a random startup delay of 3 minutes and a minimum compressor run time of 3 minutes.
NOTES: 1. If circuit breaker is tripped or fuse is blown more than once,contact a qualified electrician. 2. If unit is installed where condensation drainage could drip in an undesirable location,an accessory drain kit should be installed and connected to drain system		

TROUBLESHOOTING

Diagnostic Codes

STATUS LED Indicator Definitions

INTELLIGENT SELF--CHECKING CONTROL

Your PTAC has a computer board that continuously checks key components of the unit to ensure they are operating properly. Under normal operation, unit status indicator (STATUS,on main PCB), light is steadily ON. If there is a major problem,the unit will shut down and display a diagnostic failure code on the unit's display. If it is only a minor failure and unit is correcting the fault by itself, the diagnostic code will be flashed on the status LED that can easily be seen when the front panel is removed. Failure STATUS codes are defined in the table below.

Diag Code	Status Indicator	Description	Possible Causes	Solutions
F1	Dual-8 displays "f1" and status indicator will flash once with a 3 sec. pause.	Indoor ambient temperature sensor is open circuited or short-circuited.	1. The wiring terminal between indoor ambient temperature sensor and controller is loose or poorly connected. 2. Logic PCB has malfunctioned. 3. Indoor ambient temperature sensor is damaged.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (15k at 77°f) 3. Replace logic PCB.
F2	Dual-8 displays "f2" and status indicator will flash twice with a 3 sec. pause.	Indoor coil temperature sensor is open circuited or short-circuited.	1. The wiring terminal between indoor evaporator temperature sensor and controller is loose or poorly connected. 2. Logic pcb has malfunctioned. 3. Indoor evaporator temperature sensor is damaged.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (20k ohms at 77°f). 3. Replace logic PCB.
F3	Dual-8 displays"f3".	Outdoor ambient temperature sensor is open circuited or short-circuited.	1. The wiring terminal between outdoor ambient temperature sensor and controller is loose or poorly connected. 2. Outdoor ambient sensor is damaged 3. Logic PCB has malfunctioned.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (20k ohms at 77°f). 3. Replace logic PCB.
F4	Dual-8 displays"f4" and status indicator will flash four times with a 3s pause.	Condenser coil temperature sensor is open circuited or short-circuited.	1. The wiring terminal between condenser coil temperature sensor and controller is loose or poorly connected. 2. Condenser sensor is damaged. 3. Logic PCB has malfunctioned.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (20k ohms at 77°f). 3. Replace logic PCB.
FJ	Dual-8 displays "fj".	Malfunction of discharge air temperature sensor. Unit will not operate. Evaporator high temperature above 136°f for 1 min. Will reset at 126°f.	1. Temperature sensor terminal at air discharge is loose. 2. Logic PCB has malfunctioned. 3. Air outlet temperature sensor is damaged. 4. Dirty coil. 6. Outdoor fan motor failure.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (20k ohms at 77°f). 3. Check outdoor fan motor. Replace if faulty. 4. Clean coil and chassis if dirty. 5. Replace logic PCB.

TROUBLESHOOTING

Diagnostic Codes

Diag Code	Status Indicator	Description	Possible Causes	Solutions
FP	Dual-8 displays “fp”.	Low temperature prevention protection. Unit will operate in electric heat only, until the room temperature reaches 50° f.	1. Indoor ambient temperature is lower than 40°f (5°c) continuously. 2. Indoor ambient temperature sensor is damaged. 3. Logic PCB has malfunctioned.	1. Check wiring connections. 2. Check sensor resistance. (See appendix for temperature sensor resistance table) (15k at 77°f) 3. Replace logic PCB.
	Status indicator will flash nine times with a 3 sec. pause.	Wrong wire connection indication for wired thermostat.	1. Thermostat wiring is incorrect. 2. Thermostat is faulty.	1. Correct wiring sequence. 2. Replace thermostat. 3. Replace logic PCB.
	Status indicator will flash eight times with a 3 sec. pause.	High temperature prevention protection for evaporator. Compressor & outdoor fan shut down. Indoor fan remains operational. Electric heat is enabled after 15 sec. When the indoor coil temperature sensor detects 126°F for less for two consecutive minutes, the compressor will return to operation.	Normal Operation for Heating.	
	Status indicator will flash six times with a 3 sec. pause.	Indoor fan operates; compressor stops operation, while outdoor fan operates or stop operation according to the tube temperature of condenser.	Normal Operation for Cooling.	
	Status indicator will flash five times with a 3 sec. pause.	Freeze prevention protection for evaporator. (Cooling mode) compressor & outdoor fan shut down. Indoor fan runs continuously. When the indoor coil temperature sensor detects 40°F or more for two consecutive minutes, the compressor & outdoor fan will return to normal operation.	Normal Operation for Cooling.	

TROUBLESHOOTING

Diagnostic Codes

Diag Code	Status Indicator	Description	Possible Causes	Solutions
	Status indicator will flash seven times with a 3 sec. pause.	Frost prevention (heat pump). The compressor & outdoor fan will stop. The indoor fan will operate normally. If calling for heat; 15 seconds later the electric heaters will be energized. When the sensor detects 40° f or above for 10 consecutive minutes, the compressor will be available again to provide heating. Risk of outdoor fan damage due to ice build-up.	Normal Operation for Heating.	
F0	Dual-8 displays “f0”.	Low refrigerant. The unit will not operate, check indoor coil thermistor location.	1. Evaporator coil sensor not reading properly or loose. 2. Logic PCB damaged.	1. See F0 troubleshooting Flow Chart
H3	Dual-8 displays “h3”.	Overload detection protection.	1. The outdoor temperature is higher than the operation temperature allowed for this unit. 2. The voltage of power source is too low. 3. The air flow volume of condenser is too low.	1. Check outdoor fan operation. 2. Clean coil and chassis if dirty. 3. Check compressor.
E5	Dual-8 displays “e5”.	Over-current protection of compressor.	1. Overload overheated. 2. Dirty condenser. 3. Faulty compressor. 4. Inadequate power supply. 5. Wire improperly routed around CT loop on power PCB. 6. Low refrigerant.	1. Allow unit to cool. Disconnect power from unit, by unplugging, then plug back in. 2. Check for dirty condenser or faulty compressor. 3. Check power supply. 4. Check refrigeration circuit. 5. Repair any wiring issues.
A2	Dual-8 displays “a2”.	Malfunction protection for electric heating relay for compressor or heater is broken.	1. Open heater coil. 2. Defective logic PCB. 3. Indoor fan damage. 4. Power PCB detects current leak. 5. Loose wiring on board or heater harness. 6. A2 protection might also be triggered by interference. 7. Wire improperly routed around ct loop on power PCB.	1. Disconnect plug for a few minutes to reset and clear a2 protection. 2. Check heater elements. 3. Check indoor fan operation. 4. Repair any wiring issues.

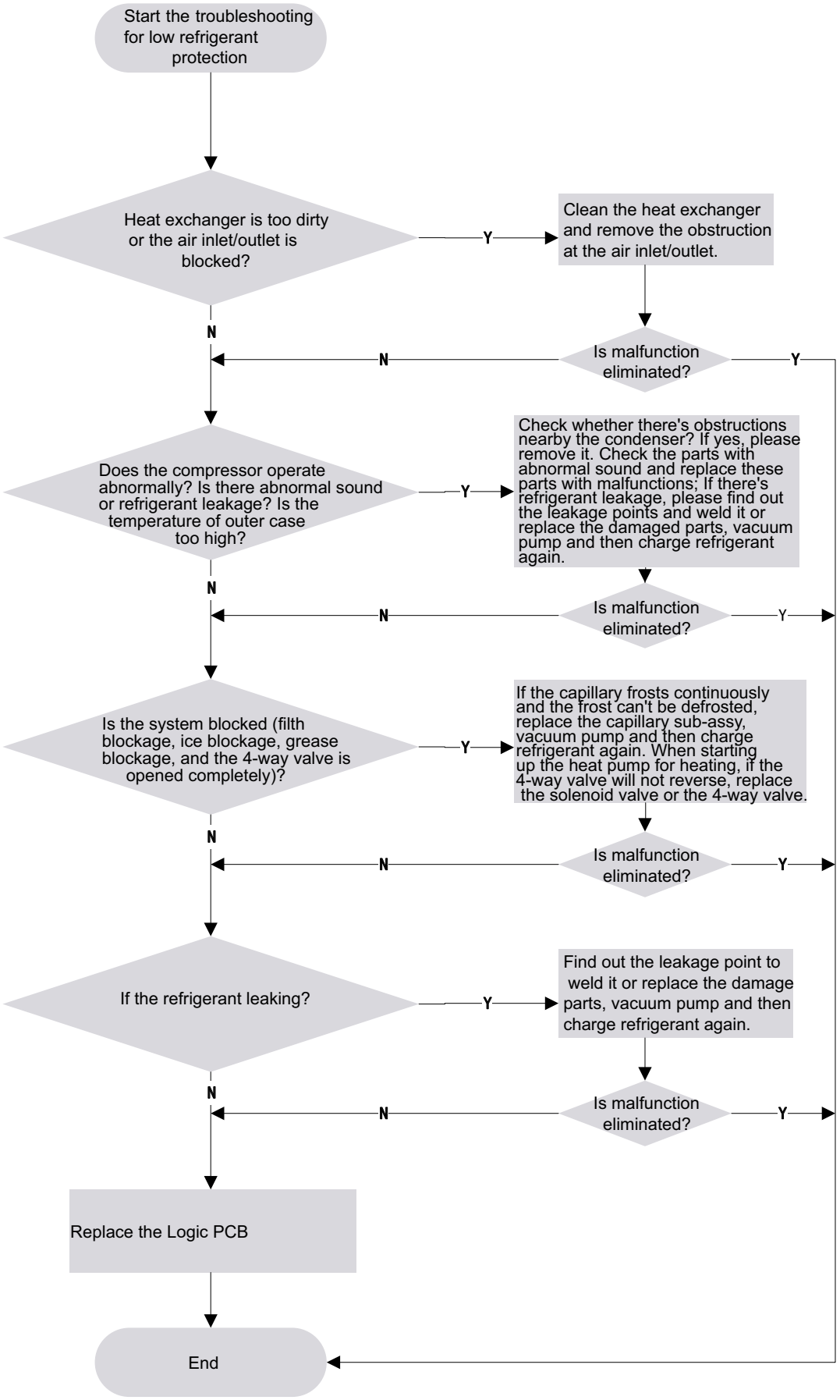
TROUBLESHOOTING

Diagnostic Codes

Diag Code	Status Indicator	Description	Possible Causes	Solutions
U5	Dual-8 displays “U5”.	Unbalanced Electric Current detected between Null line and live line. CT loops on Power PCB detecting an unbalance load condition between L1 current and L2 current.	1. Abnormal operation of compressor or fan motors. 2. Transformer damaged. 3. Heater shorted out. 4. Damaged Power PCB. 5. Damaged Logic PCB. 6. Restriction in refrigeration system.	1. Check for proper operation of compressor and fan motors. 2. Check transformers. 3. Check heater elements. 4. Replace Logic PCB 5. Replace Power PCB. 6. Check refrigeration system.
A0		Electric heater combination wrong.	Power cord plug damaged or miswired at connector.	1. Check heater element. 2. Inspect wiring. 3. Inspect power cord connection.
A4		Electric heater current abnormal.	1. Heater element damaged. 2. Wiring damaged or loose.	1. Check heater element. 2. Inspect wiring
C7		Electric Heater temperature limiter switch open too long	1. Heater element damaged. 2. Wiring damaged or loose.	1. Check heater element. 2. Inspect wiring.

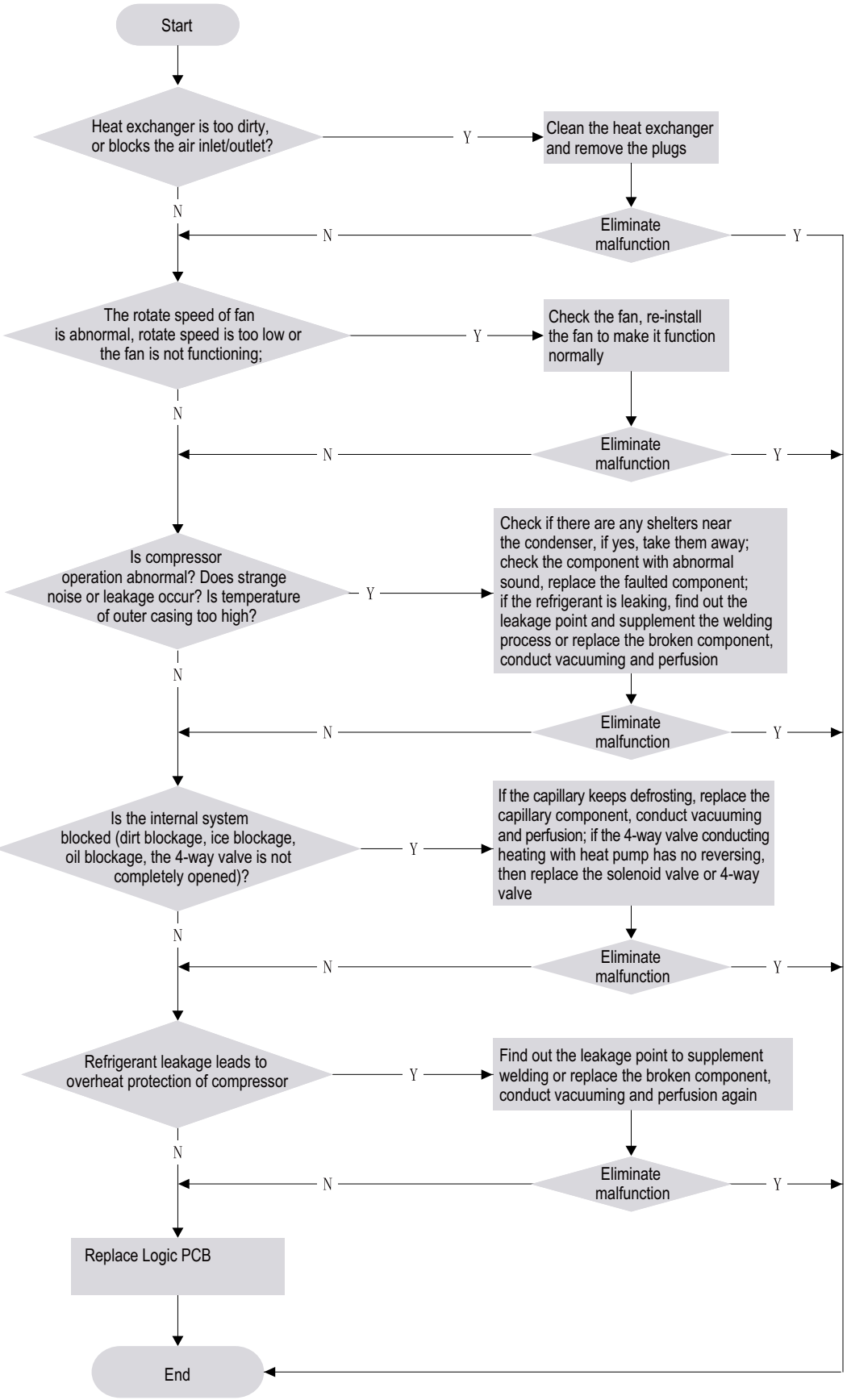
TROUBLESHOOTING

F0 Diagnostic Code Flow Chart



TROUBLESHOOTING

H3 Diagnosic Code Flow Chart



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 through 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.

CHECK VALVE OPERATION

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

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

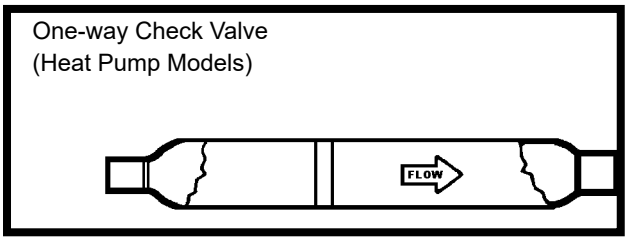


Figure 701 (Check Valve)

COOLING MODE

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

HEATING MODE

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

COMPONENT TESTING

Reversing Valve Description And Operation

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

The single tube on one side of the main valve body is the high-pressure inlet to the valve from the compressor. The center tube on the opposite side is connected to the low pressure (suction) side of the system. The other two are connected to the indoor and outdoor coils. Small capillary tubes connect each end of the main valve cylinder to the "A" and "B" ports of the pilot valve. A third capillary is a common return line from these ports to the suction tube on the main valve body. Four-way reversing valves also have a capillary tube from the compressor discharge tube to the pilot valve.

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

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

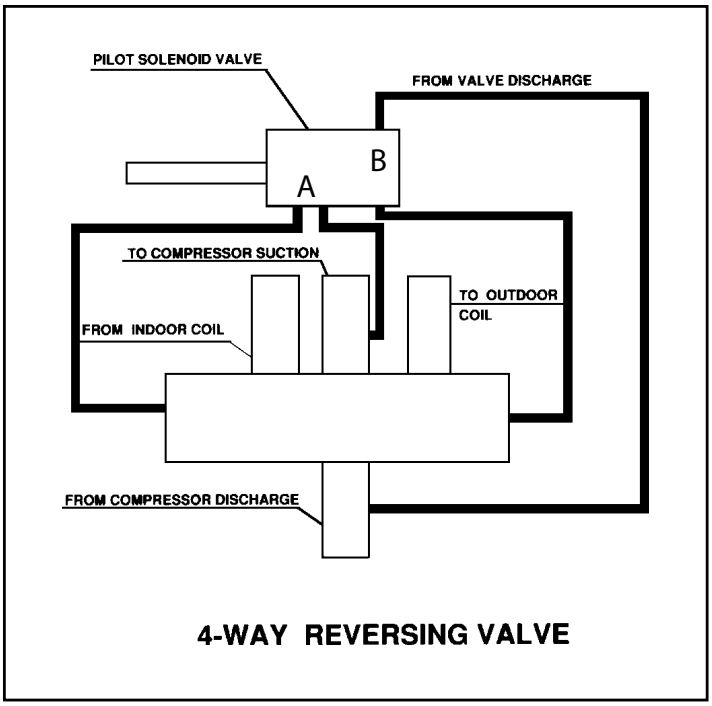


Figure 702 (Reversing Valve)

COMPONENT TESTING

Testing The Reversing Valve Solenoid Coil

⚠ WARNING

ELECTRIC SHOCK HAZARD

Disconnect power to the unit before servicing. Failure to follow this warning could result in serious injury or death.

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

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

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

Touch Test in Heating/Cooling Cycle

⚠ WARNING

BURN HAZARD

Certain unit components operate at temperatures hot enough to cause burns.

Proper safety procedures must be followed, and proper protective clothing must be worn.

Failure to follow these procedures could result in minor to moderate injury.

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

NOTE: If both tubes shown as hot or cool are not the same corresponding temperature, refer to figure 703, then the reversing valve is not shifting properly.

COMPONENT TESTING

Checking 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.

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

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

Occasionally, the reversing valve may stick in the heating or cooling position or in the mid-position.
When sluggish or stuck in the mid-position, part of the discharge gas from the compressor is directed back to the suction side, resulting in excessively high suction pressure.

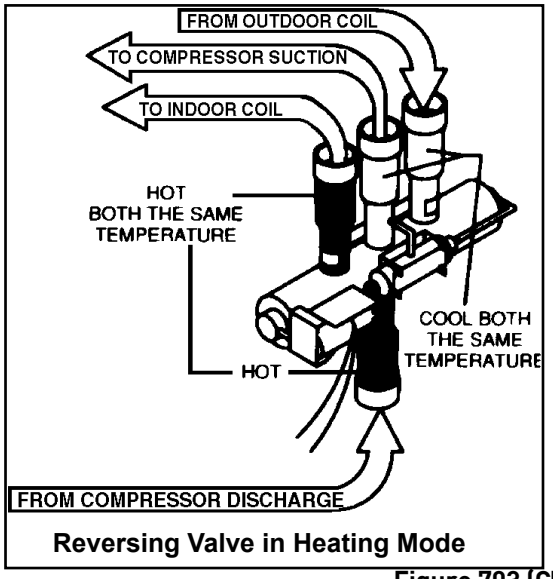
Should the valve fail to shift from cooling to heating, block the air flow through the outdoor coil and allow the discharge pressure to build in the system. Then switch the system from heating to cooling.

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

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

Dented or damaged valve body or capillary tubes can prevent the main slide in the valve body from shifting.
If you determine this is the problem, replace the reversing valve.

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



Reversing Valve in Heating Mode

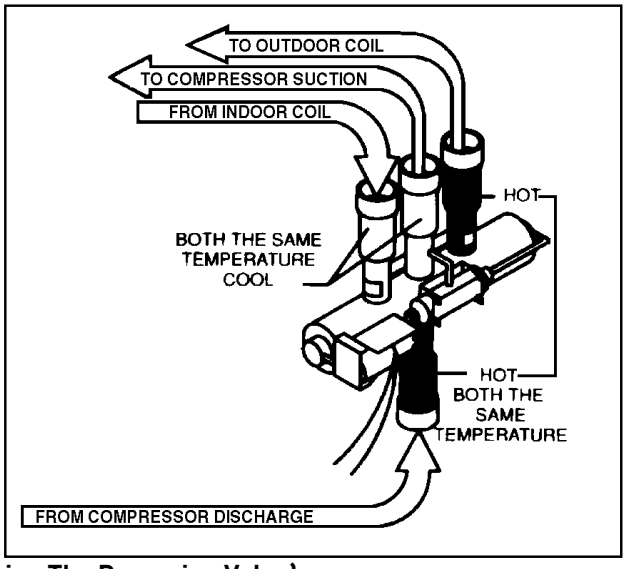


Figure 703 (Checking The Reversing Valve)

COMPONENT TESTING

Touch Test Chart : To Service Reversing Valves

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

Figure 704 (Touch Test Chart)

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.

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

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

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

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

Single Phase Running and L.R.A. Test
NOTE: Consult the specification and performance section for running amperage. The L.R.A. can also be found on the rating plate.
Select the proper amperage scale and clamp the meter probe around the wire to the "C" terminal of the compressor.
Turn on the unit and read the running amperage on the meter. If the compressor does not start, the reading will indicate the locked rotor amperage (L.R.A.).

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.

NOTE: The overload will automatically reset, but may require several hours before the heat is dissipated. Ensure that compressor overload switch has been rechecked after it cools down, before replacing compressor.

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, and the compressor is not hot to the touch, the compressor overload is open, and the compressor should 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 PPE must be utilized when working with refrigerants.

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

Single Phase Resistance Test

Remove the leads from the compressor terminals and set the ohmmeter on the lowest scale (R x 1).
Touch the leads of the ohmmeter from terminals common to start ("C" to "S"). Next, touch the leads of the ohmmeter from terminals common to run ("C" to "R").
Add values "C" to "S" and "C" to "R" together and check resistance from start to run terminals ("S" to "R"). Resistance "S" to "R" should equal the total of "C" to "S" and "C" to "R."
In a single phase PSC compressor motor, the highest value will be from the start to the run connections ("S" to "R"). The next highest resistance is from the start to the common connections ("S" to "C"). The lowest resistance is from the run to common. ("C" to "R") Before replacing a compressor, check to be sure it is defective.

GROUND TEST

Use an ohmmeter set on its highest scale. Touch one lead to the compressor body (clean point of contact as a good connection is a must) and the other probe in turn to each compressor terminal. If a reading is obtained the compressor is grounded and must be replaced.
Check the complete electrical system to the compressor and compressor internal electrical system, check to be certain that compressor is not out on internal overload.
Complete evaluation of the system must be made whenever you suspect the compressor is defective. If the compressor has been operating for sometime, a careful examination must be made to determine why the compressor failed. Many compressor failures are caused by the following conditions:

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

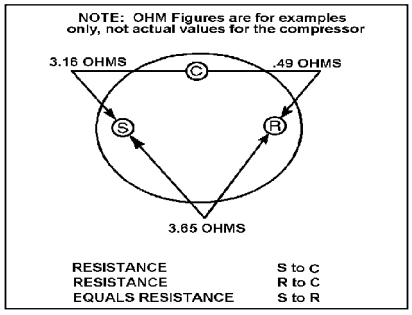


Figure 705 (Resistance Chart)

CHECKING COMPRESSOR EFFICIENCY

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

NOTE: Before installing valves and gauges, check the compressor discharge temperature and compressor current, Low compressor amperage combined with low discharge temperature is an indication that the compressor might be faulty,

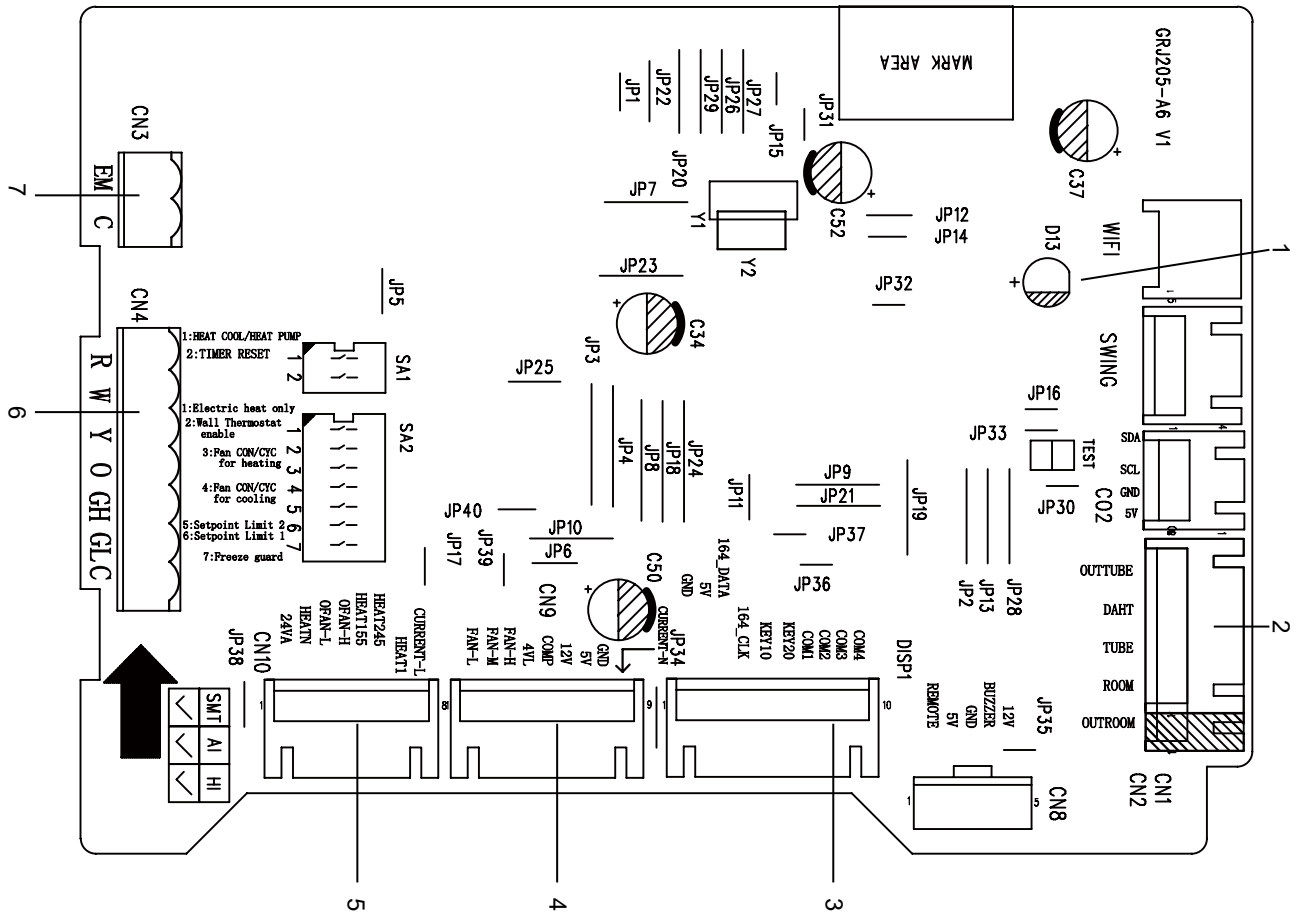
This condition can be checked as follows:

1. Install a piercing valve on the suction and discharge or liquid process tube.
2. Attach gauges to the high and low sides of the system.
3. Start the system and run a "cooling or heating performance test." If test shows:
   - A. Below normal high side pressure
   - B. Above normal low side pressure
   - C. Low temperature difference across coil

The compressor valves are faulty - replace the compressor.

COMPONENTS TESTING

Logic PCB Identification and Testing

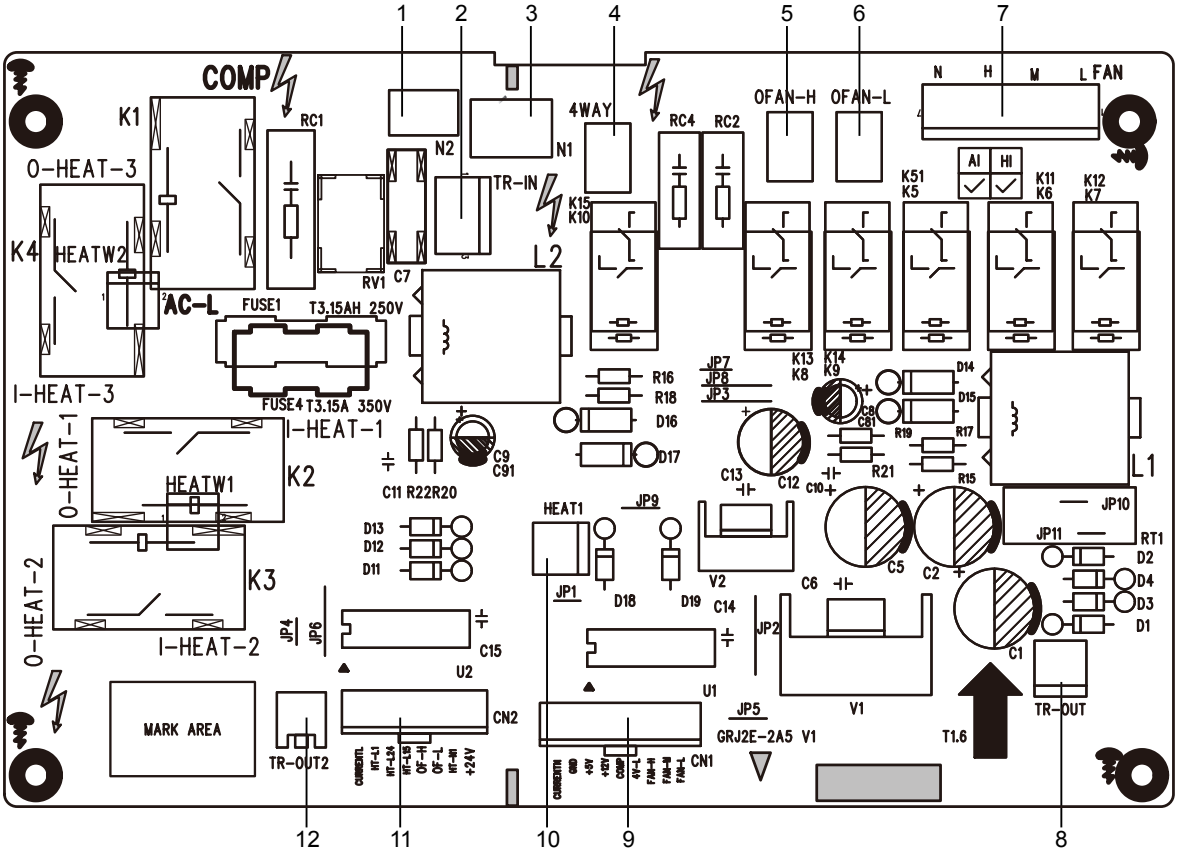


No	Name	Voltage	No	Name	Voltage
1	Diagnostic Code Status Indicator		4	Compressor. and Indoor Fan Control Voltage	
2	Temp Sensors	**Constant 2.8 vdc**		5v	**Constant 5vdc**
3	Display	**Constant 5 vdc**		12v	**Constant 12vdc**
6	Wired wall Controller			Compressor	**3vdc signal**
7	Energy Management			4 way valve - energized for heat	**3vdc signal**
				Fan H	**3vdc signal**
				Fan L	**3vdc signal**
			5	Heater and Outdoor Fan Control Voltage	
				+24	**Constant 24vdc**
				Across Heat 245 and heat 155	**3vdc signal**
				OF-H	**3vdc signal**
				OF-L	**3vdc signal**

Figure 706 (Logic PCB)

COMPONENTS TESTING

Power PCB Identification and Testing



No	Name	Voltage	No	Name	Voltage
1	Neutral wire interface		9	Compressor. and Indoor Fan Control Voltage	
2	Transformer AC input	Constant Unit Power Supply		5v	**Constant 5vdc**
3	Neutral wire interface			12v	**Constant 12vdc**
4	Four-way valve terminal (Energized for Heat)	Constant Unit Power Supply		Compressor	**3vdc signal**
5	Outdoor Fan- High	Unit Power Supply when called for		4 way valve - energized for heat	**3vdc signal**
6	Outdoor Fan- Low	Unit Power Supply when called for		Fan H	**3vdc signal**
7	Indoor Fan	Unit Power Supply Constant		Fan L	**3vdc signal**
8	Transformer AC output	**12 VAC**	11	Heater and Outdoor Fan Control Voltage	
10	Heat 1 Relay control			+24	**Constant 24vdc**
12	Transformer AC output 2	**Constant 24 VAC**		Across Heat 245 and heat1 55	**3vdc signal**
				OF-H	**3vdc signal**
				OF-L	**3vdc signal**

Figure 709 (Power PCB Voltage Checks)

COMPONENTS TESTING

Testing Electric Heat

1. Check Heater power at Molex Plug
Use 4 terminal on heat 1 relay should =Unit Power Supply VAC on red white and black wires depending on configuration.

White 1.55 kw
Red 2.45 kw
Black 1 kw

2. Heater resistance checks
Check resistance from terminal on heat 1 relay to complete circuit. An open reading indicates faulty wiring, a broken element, or the thermal fuse has blown.

Black 54.1 ohms
Red 21.4 OHMS
White 34.5 OHMS

Check resistance from Black, red and white wires at molex plug to ground. If heater element is shorted to ground, correct wiring or replace heater element.

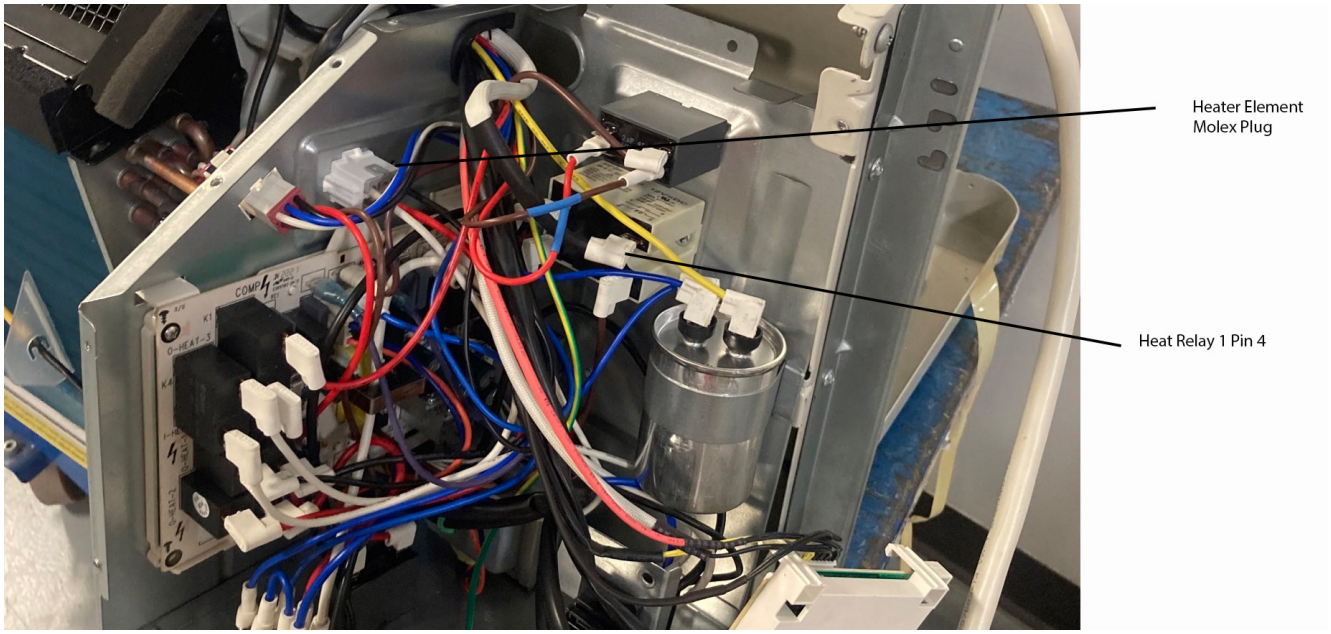


Figure 710 (Heater Element Checks)

UNIT DISASSEMBLY

Remove Unit Front Cover

1. Hold front end of filter with hand and then pull the filter upwards to remove it. See figure 501.

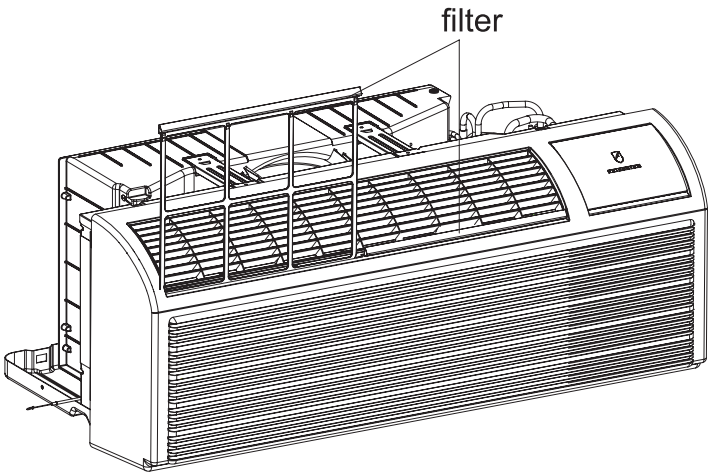
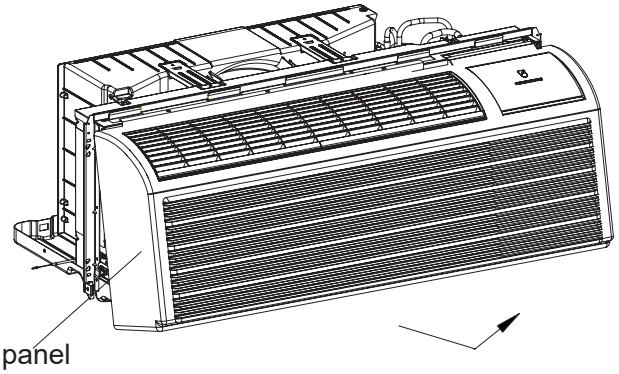


Figure 501

2. Drag the lower part of panel, pull it outwards and upwards to left, separate from clasps, and then remove the front panel. See Figure 502.



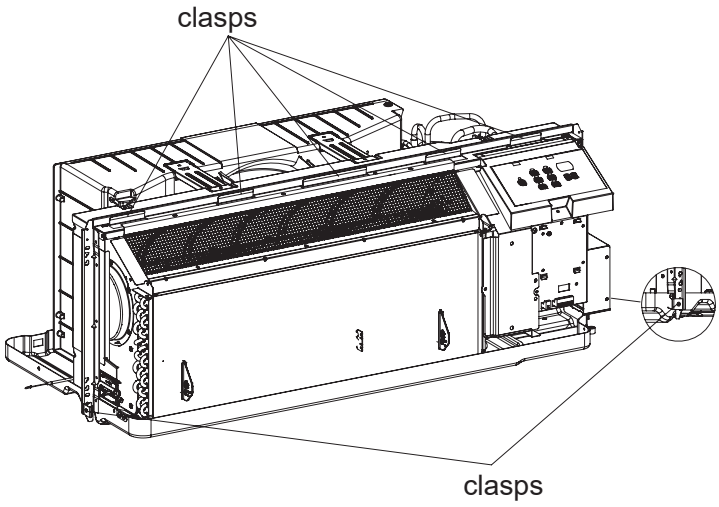


Figure 502

Unit Disassembly and Component Replacement

Replace Display PCB

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.

1. Remove display cover screw. See figure 503.

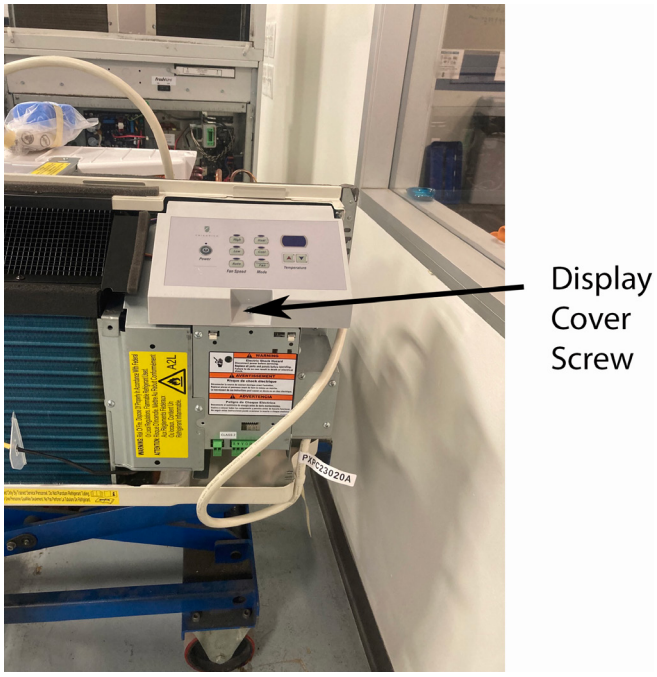


Figure 503

2. Remove 5 screws attaching display PCB to cover. See figure 504.

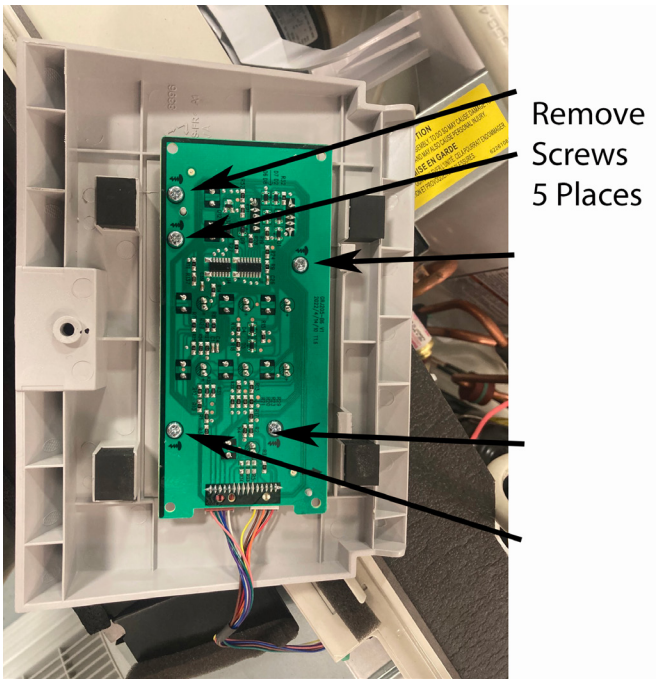


Figure 504

3. Remove Connectors. See figure 505.

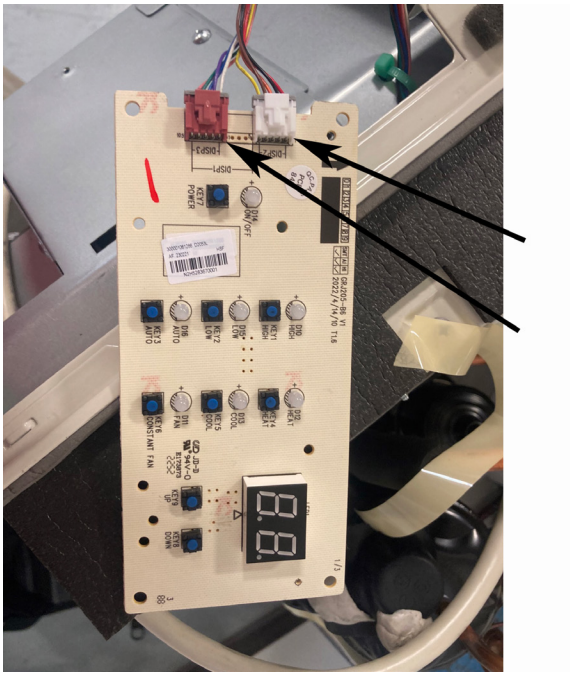


Figure 505

Unit Disassembly and Component Replacement

Replace Logic PCB

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.

1. Remove Unit Cover. See Remove Unit Front Cover.

2. Remove Display PCB. See Replace Display PCB.

3. Remove left access panel (3 screws and a wire tie.) See Figure 506.

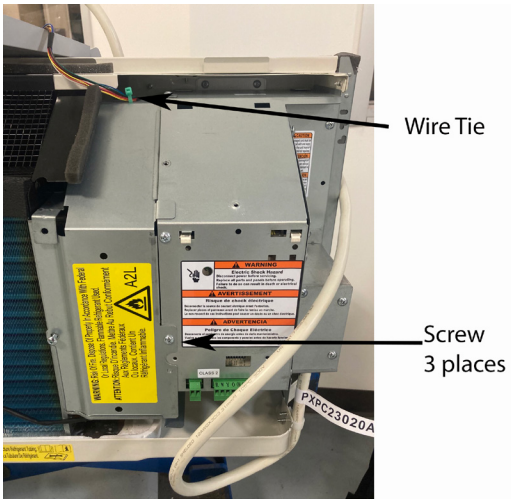


Figure 506

4. Remove PCB Access Panel. See Figure 507.
   a. Unplug thermostat connectors.
   b. Remove top screws (2 places).
   c. Remove lower screws (5 places).

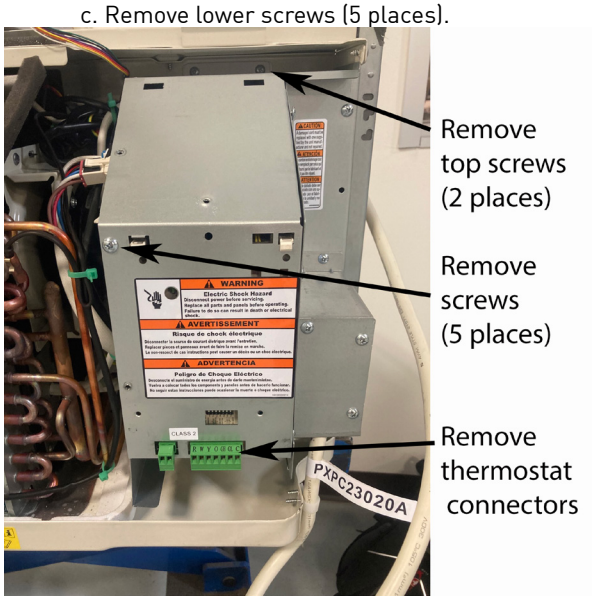


Figure 507

5. Remove Logic PCB cover. See figure 508.

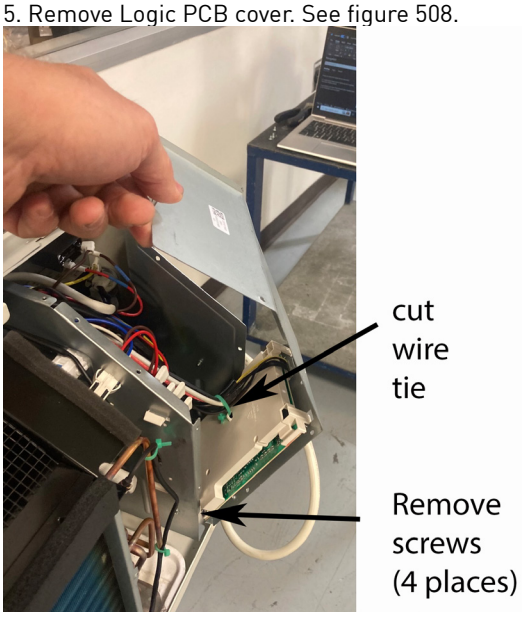


Figure 508

6. Unplug connectors. See Figure 509.

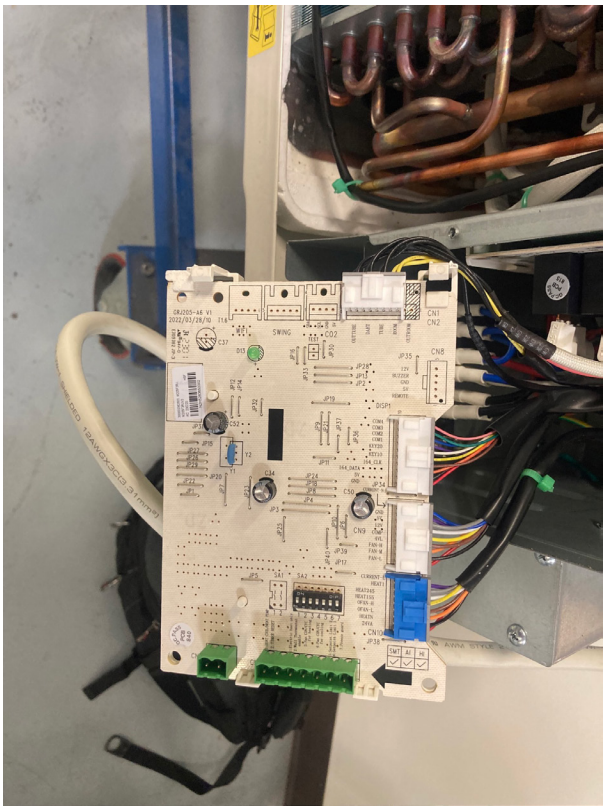


Figure 509

Unit Disassembly and Component Replacement

Replace Capacitor

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.

1. Remove Unit Cover. See Remove Unit Front Cover.

2. Remove Display PCB. See Replace Display PCB.

3. Remove left access panel (3 screws and a wire tie.) See Figure 506.

4. Remove PCB Access Panel. See Figure 507.
   a. Unplug thermostat connectors.
   b. Remove top screws (2 places.)
   c. Remove lower screws (5 places.)

5. Remove Power Cord Connector cover (3 screws.) See figure 510.

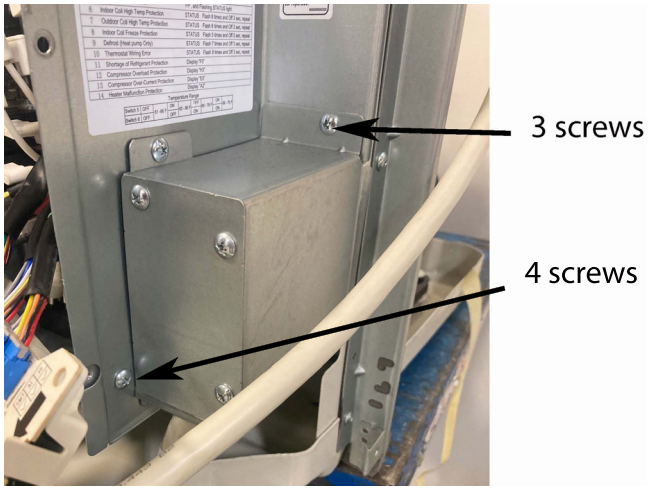


Figure 510

6. Remove right side access panel (4 screws, see figure 510.)

7. Remove from capacitor strap and disconnect terminals. See Figure 511.

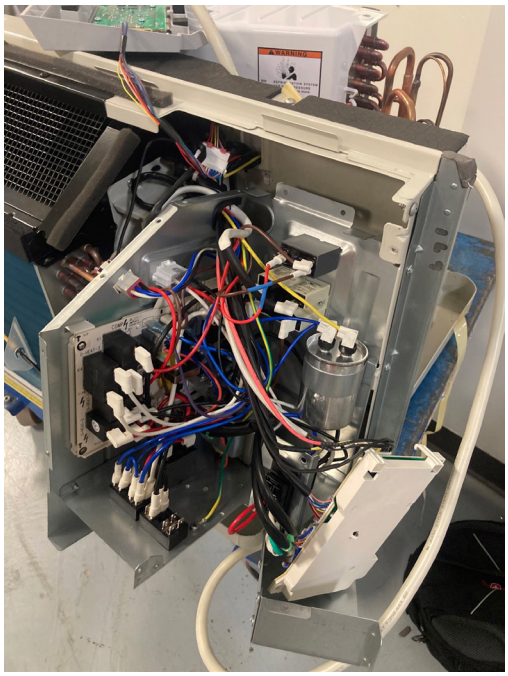


Figure 511

Unit Disassembly and Component Replacement

Replace Power PCB

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.

1. Remove Unit Cover. See Remove Unit Front Cover.

2. Remove Display PCB. See Replace Display PCB.

3. Remove left access panel (3 screws and a wire tie.) See Figure 506.

4. Remove PCB Access Panel. See Figure 507.
   a. Unplug thermostat connectors.
   b. Remove top screws (2 places.)
   c. Remove lower screws (5 places.)

5. Remove Power Cord Connector cover (3 screws.) See Figure 510).

6. Remove right side access panel (4 screws.) See figure 510.

7. Cut ties (2 places.)

8. Remove electrical box from chassis by sliding up and out.

9. Remove lower panel (2 screws.) See figure 512.

10. Disconnect 2 Molex Connectors See figure 512.

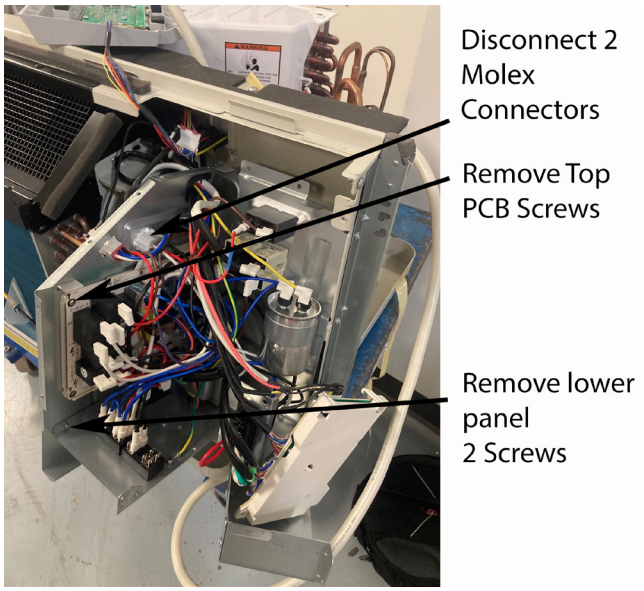


Figure 512

11. Rotate Power PCB and separate from electrical box. See figure 513.

12. Remove 2 top screws from Power Board and separate from supporting board. See figure 512.

13. Disconnect all connectors on power PCB and reconnect on new board.

14. Screw new Power PCB to the supporting board.

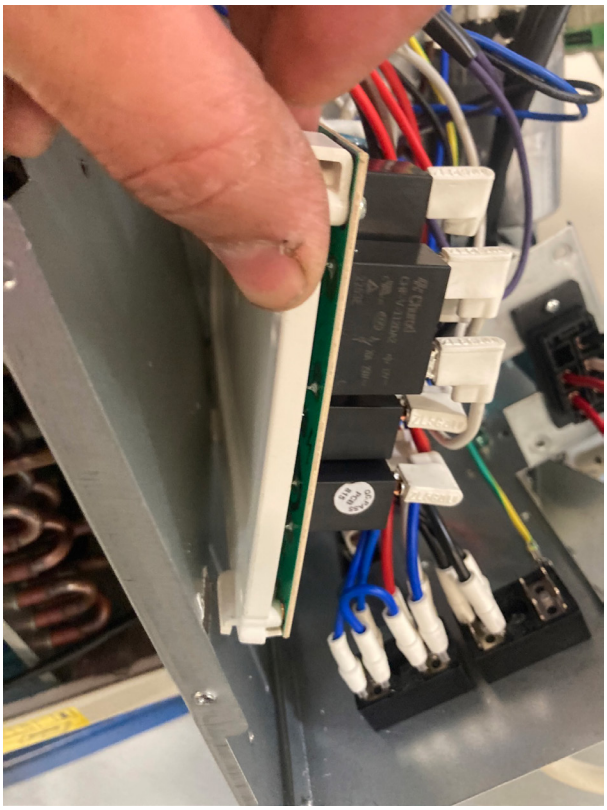


Figure 513

Unit Disassembly and Component Replacement

Replace Indoor Blower, Motor, and Heater Element.

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.

1. Remove Unit cover.
2. Remove Display Board (See Figure 504), and separate Electrical Box from unit by removing top 2 screws (See Figure 507), disconnecting 2 molex connectors (See Figure 512), and sliding box up and out.
3. Remove screen (See Figure 513.)

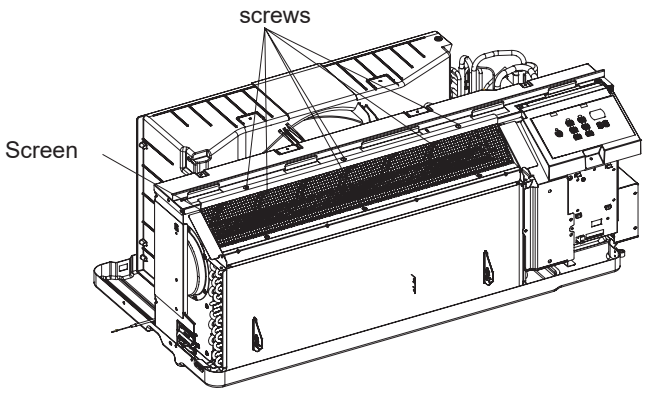


Figure 513

4, Remove outer support (see Figure 514.)

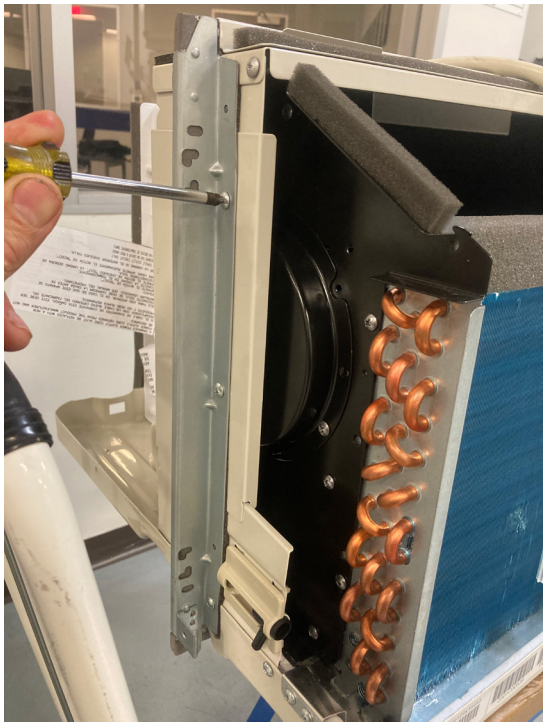


Figure 514

5. Remove baffle plate (See Figure 515.)

Figure 515

6. Remove bearing holder (See Figure 516.)

Figure 516

Unit Disassembly and Component Replacement

Replace Indoor Blower, Motor, and Heater Element.

7. Loosen blower wheel set screw through slot as shown, and slide blower wheel out. See Figure 517.

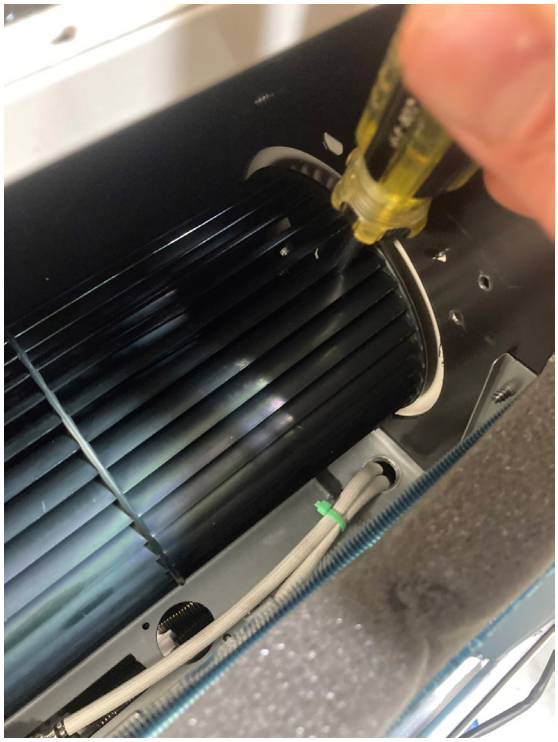


Figure 517

8. Remove Indoor Blower Motor.
   - 8.1 Disconnect molex connector. See Figure 518.
   - 8.2 Remove 4 Phillips screws. See Figure 519.

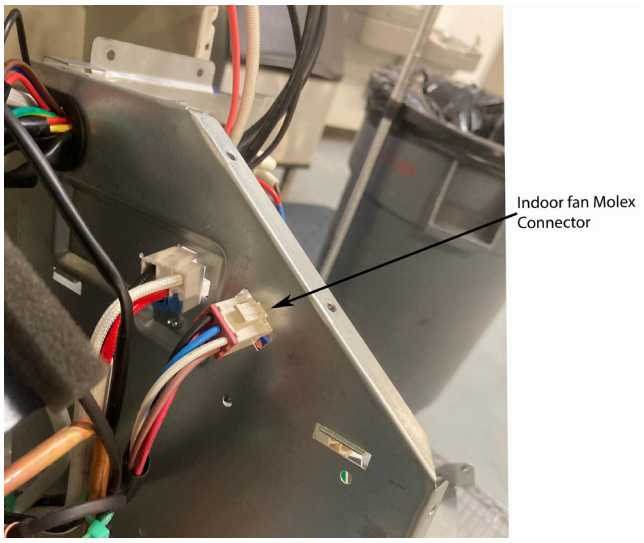


Figure 518

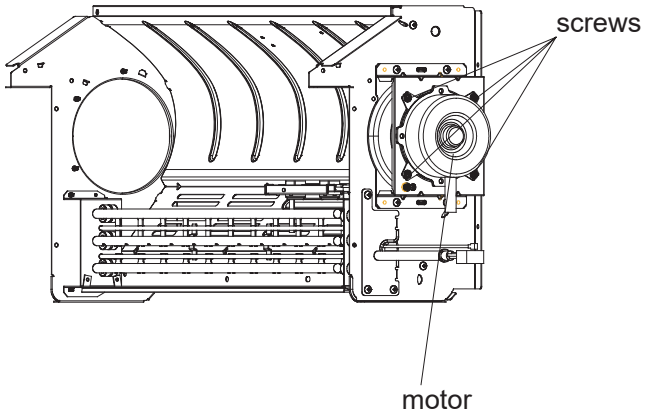


Figure 519

8. Remove top panel sub assy. See Figure 520.

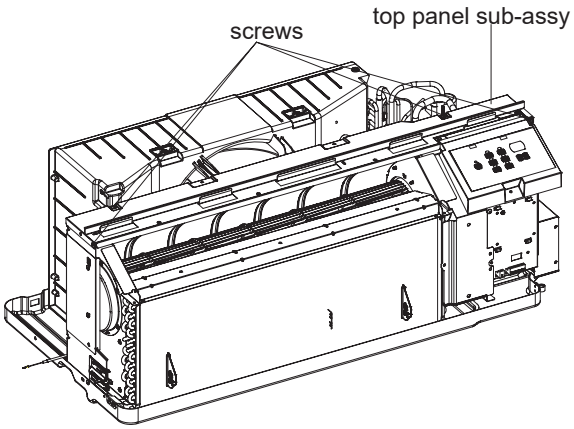
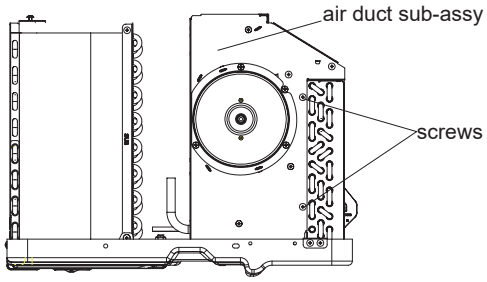


Figure 520

9. Remove air duct sub assembly.



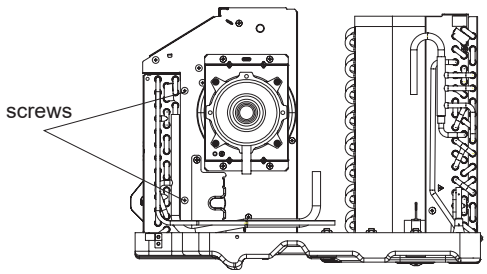


Figure 521

Unit Disassembly and Component Replacement

Replace Indoor Blower, Motor, and Heater Element.

10. Remove air duct sub assembly. See Figure 522.

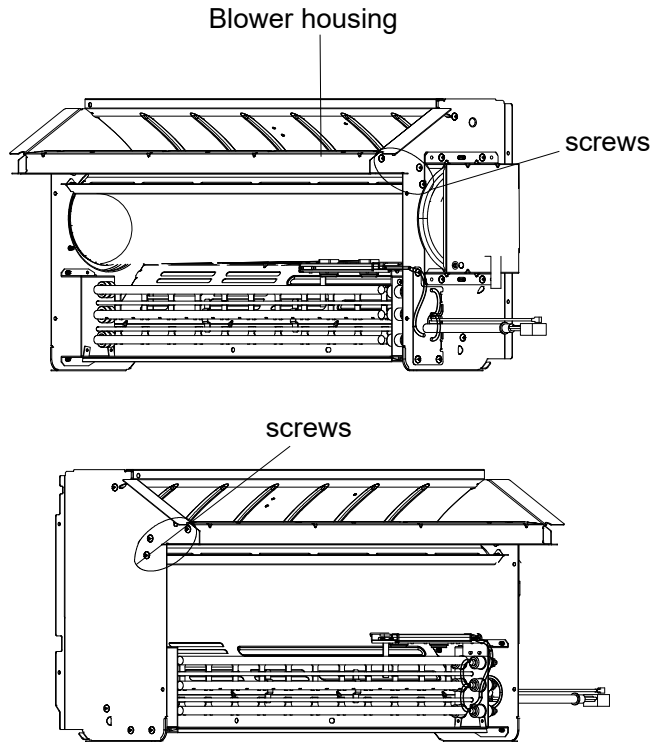


Figure 522

11. Remove Electric heater. See Figure 523.

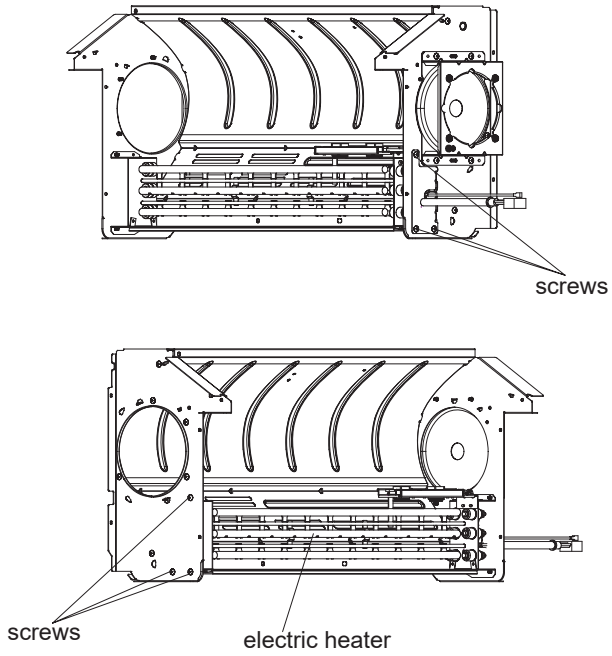


Figure 523

Unit Disassembly and Component Replacement

Replace Outdoor Fan blade and motor

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.

1. Remove Front panel.
2. Open electrical box and disconnect wiring to outdoor fan. See Figures 503 thru 507.
3. Remove middle connection brackets. See Figure 524.

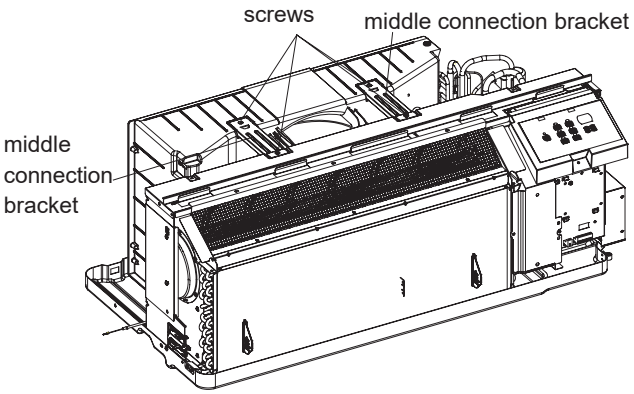


Figure 524

4. Remove outdoor fan shroud. See Figure 525.

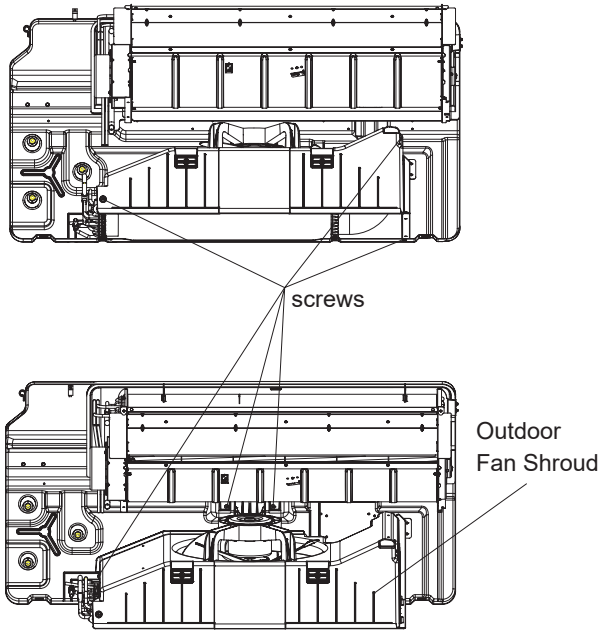
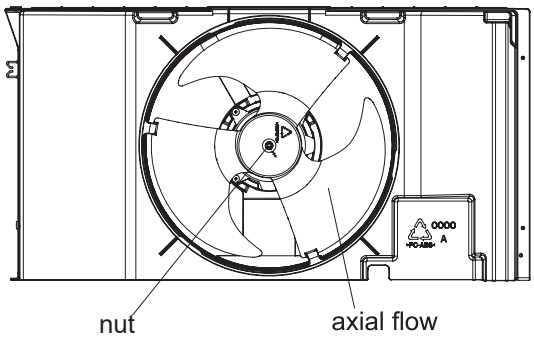


Figure 525

5. Remove nut on fan blade. See Figure 526.
6. Remove Outdoor Fan screws. See Figure 526.



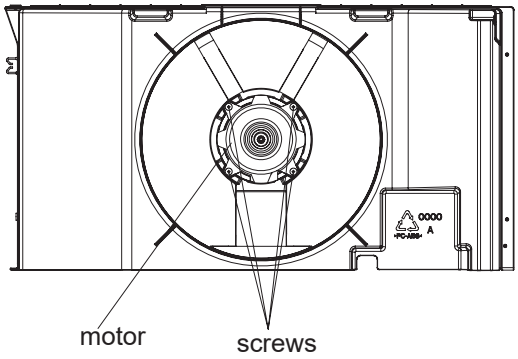


Figure 526

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.

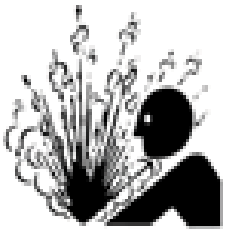
Do not pierce or burn.

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. R32 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. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
  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, or isolated (by means of shut off valves) in a part of the system remote from the leak.

R-32 SEALED SYSTEM REPAIR

General Information

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.

⚠ 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 the system is void of refrigerant, weigh-in the refrigerant charge into the high side of the system.
- If there is any amount of refrigerant in the system charge from the low side.
- Always charge by liquid inverted.
- For low side pressure charging of R-32, use a charging adaptor.

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 E.P.A. Approved Refrigerant Recovery System.

R-32 SEALED SYSTEM REPAIR

Required Equipment

- Vacuum Pump rated for A2L refrigerant (capable of 300 microns or less vacuum.)
- Nitrogen bottle.
- Oxy/ Acetylene torch or similar equipment utilized for brazing.
- Non-Sparking (Not Halide)Electronic Leak Detector rated for detecting A2L refrigerant.
- Digital refrigerant scale
- 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

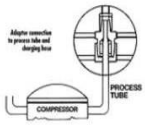
Vaccum Pump

Nitrogen

Guage Manifold

Nitrogen Regulator

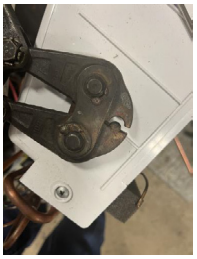
Vaccum Guage



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). May have to cut out parts if refrigerant is trapped.

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 450 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 300 micron level.
7. Pressurize nitrogen to 500 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

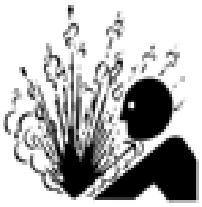
Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

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.
- Ensure that the REFRIGERATING SYSTEM is grounded prior to charging the system with refrigerant.
- 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 property 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 charge 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 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 3-5 psi.

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 REPAIRS

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.

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.

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

⚠ 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.

WIRING DIAGRAMS

7K w/ Heat Pump

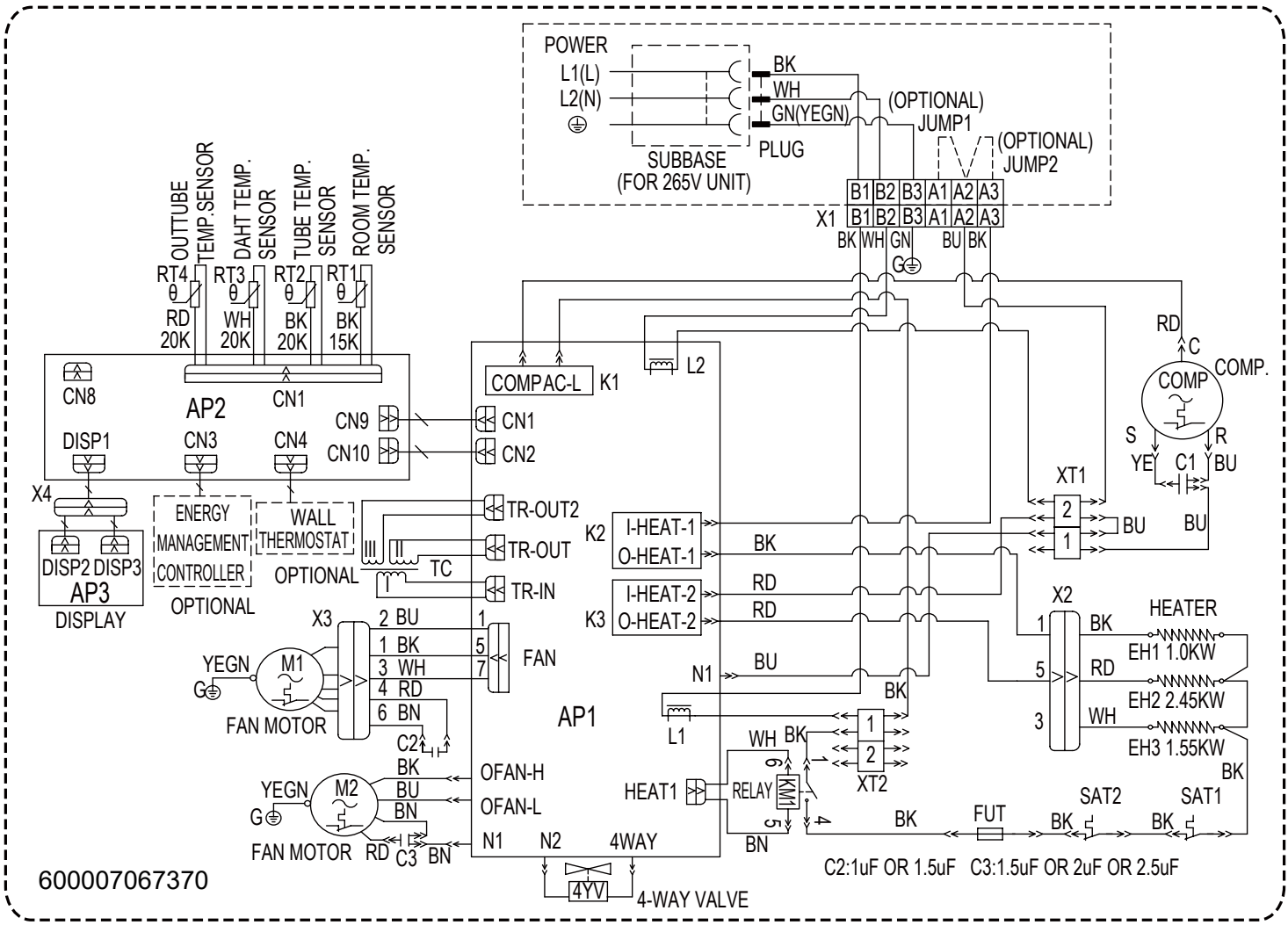


Figure 801

WIRING DIAGRAMS

9K-15K w/ Heat Pump

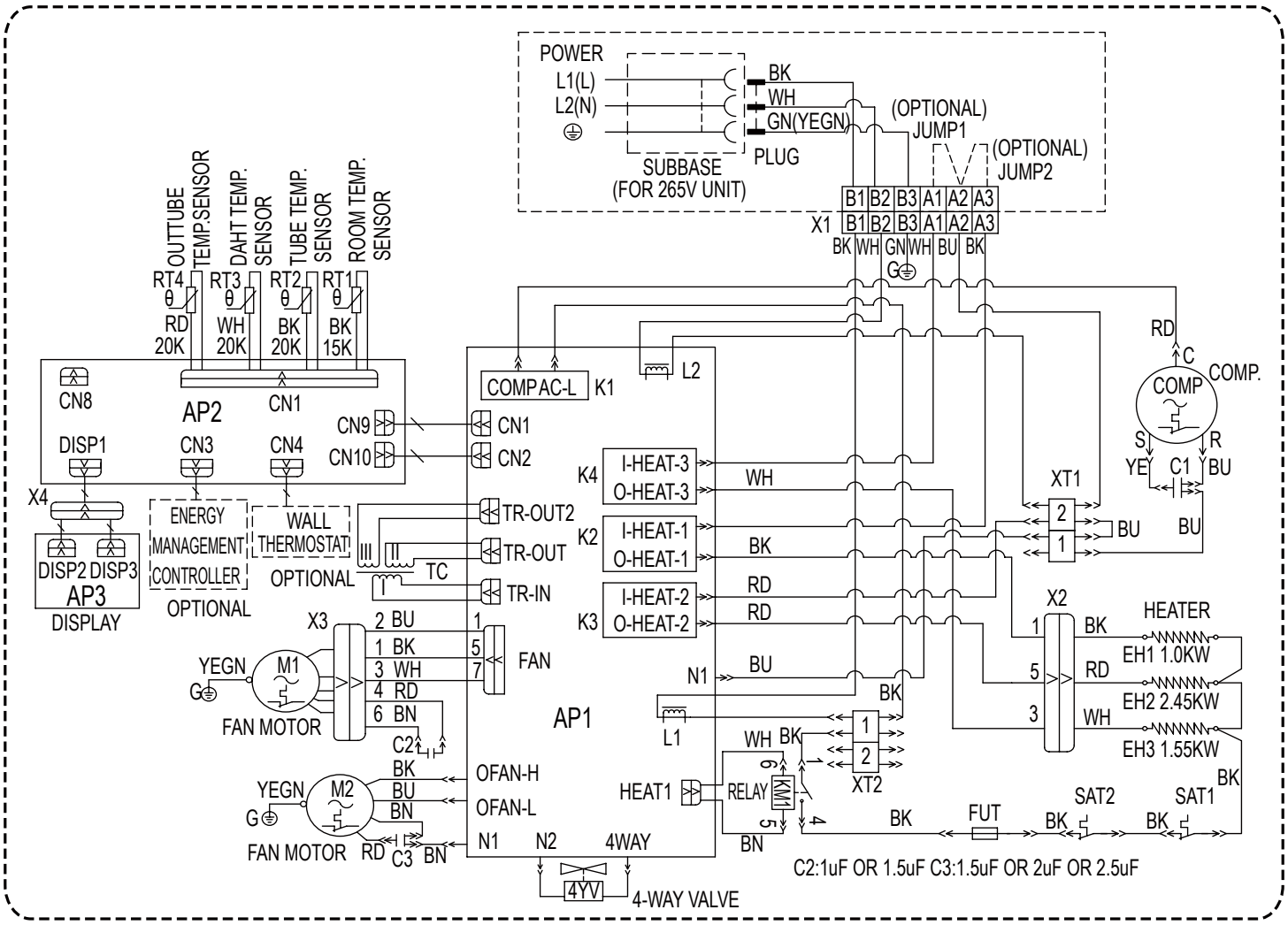


Figure 802

WIRING DIAGRAMS

7K w/ Electric Heat

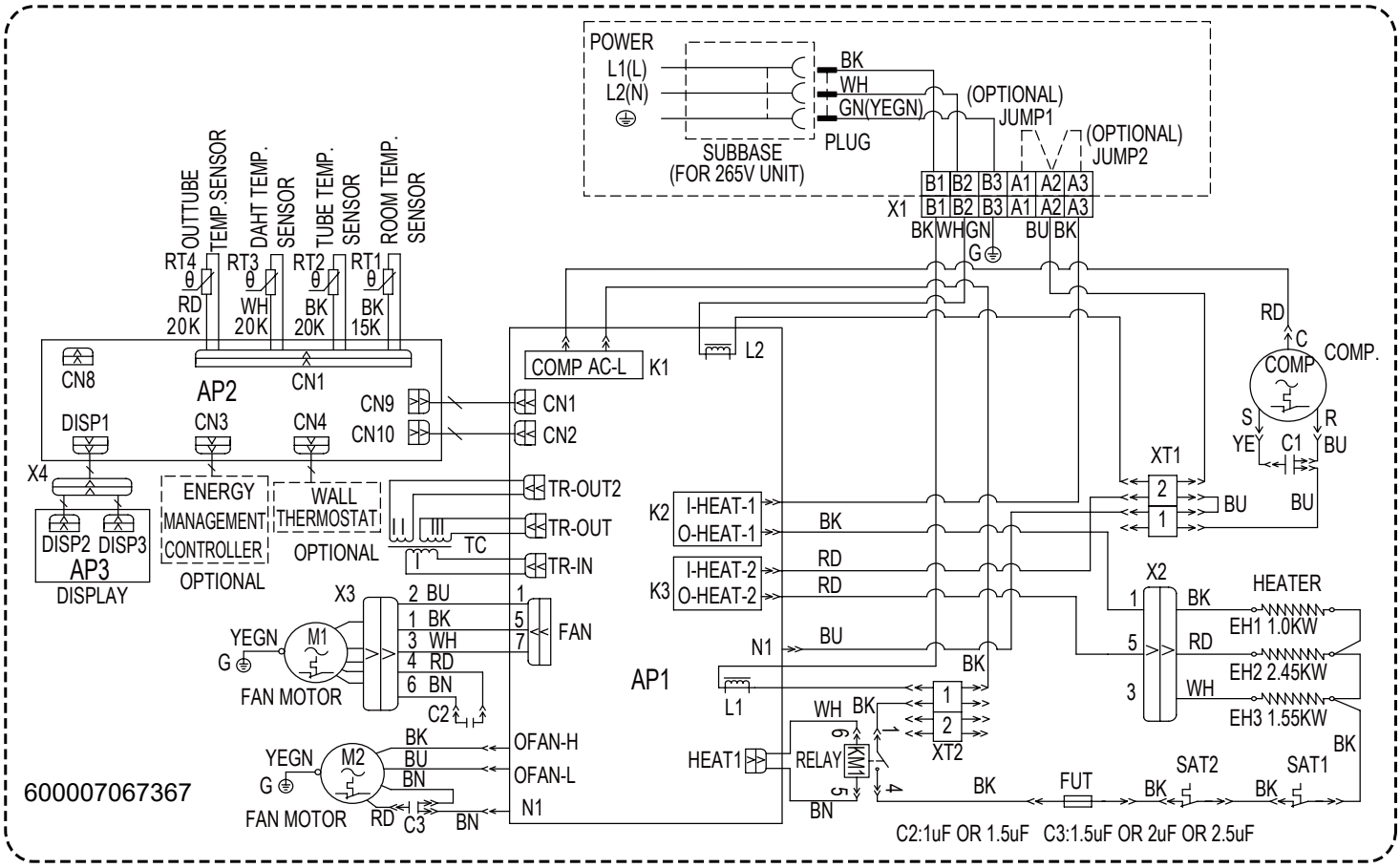


Figure 803

WIRING DIAGRAMS

9K-15K w/ Electric Heat

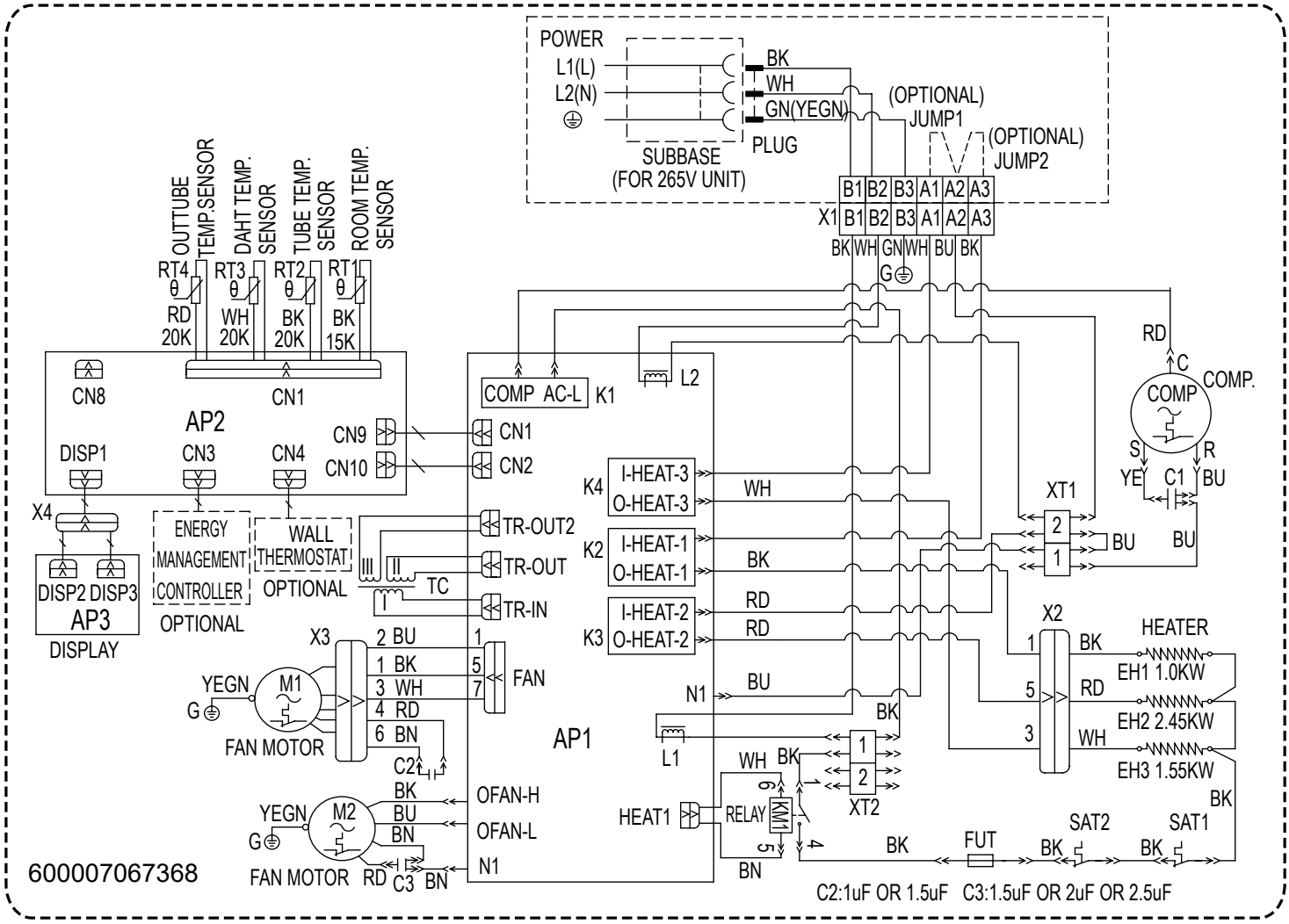


Figure 804

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

Decommissioning Of Units

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely and tested prior to re-use.

NOTE: When breaking into the refrigerant circuit 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.

⚠ **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.

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that:
    - mechanical handling equipment is available, if required, for handling refrigerant cylinders.
    - all personal protective equipment is available and being used correctly.
    - the recovery process is supervised at all times by a competent person.
    - recovery equipment and cylinders conform to the appropriate standards.
4. Install a piercing valve to remove refrigerant from the sealed system.
5. Safely remove refrigerant following local and national regulations. Refer to refrigerant removal, recovery, and evacuation section of this manual.

6. Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

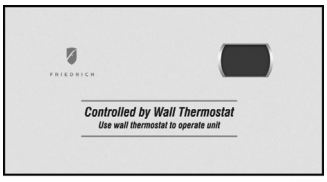
APPENDIX

Accessories

PDXWSA PDXWSEXT	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" High x 42" Wide x 13 3/4 " Deep DEEP WALL SLEEVE EXTENSION For use when the wall is thicker than 13 1/4' deep. The wall sleeve may be special ordered through your sales representative and will cut to your specific depth requirement.	
PDXWSEZ	WALL SLEEVE An easy and effortless snap together design. 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" High x 42" Wide x 13 3/4" Deep.	
PXAA PXBG PXSC PXAAHD	ARCHITECTURAL GRILLES consist of heavy gauge 6063-T5 aluminum alloy: PXAA - Clear extruded aluminum. PXBG - Beige acrylic enamel. PXSC- Custom color Hurricane louver with Miami Dade Certification. PXAAHD- Clear, extruded Aluminum Hurricane louver with Miami Dade Certification.	
PDXGA	GRILLE Standard, stamped aluminum, anodized to resist chalking and oxidation.	
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.	
	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 PXSB23020 - electrical subbase - 230v 30A PXSB26515 - electrical subbase - 265v 15A PXSB26520 - electrical subbase - 265v 20A PXSB26530 - electrical subbase - 265v 30A	
POWER CORDS	PXPC23015A LCDI 230V 15A Cord -2.5 kW 6 ft. length PXPC23020A LCDI 230V 20A Cord -3.5 kW 6 ft. length PXPC23030 LCDI 230V 30A Cord -5.0 kW 6 ft. length PXPC26515A Non-LCDI 265V 15A Cord -2.5kW 18 in. length PXPC26520A Non-LCDI 265V 20A Cord -3.5kW 18 in. length PXPC26530A Non-LCDI 265V 30A Cord -5.0 kW 18 in. length	
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.	

APPENDIX

Accessories

New Construction Accessories		
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 3.5 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 3.5 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.	
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).	
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.	
RT7 RT7P	DIGITAL REMOTE WALL 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 hard wired and can be battery powered or unit powered. Features backlit display and multiple configuration modes. For use on PD-series Friedrich PTACs and Vert-I-Paks.	
WRT2	DIGITAL THERMOSTAT Wireless, single stage, wall-mounted digital thermostat with two fan speeds. Features backlit display and multiple configuration modes.	
PDXRTA	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.	
	FRIEDRICHLINK® ENERGY MANAGEMENT THERMOSTAT Integrated occupancy sensor uses a combination of motion and thermal sensing technologies for accurate occupancy detection. Reliable occupancy detection allows saving energy when rooms are unoccupied. Energy saving presets eliminate the guesswork and make it easy to adjust the energy saving settings.	
EMWRT2	Wireless thermostat with occupancy sensor.	
EMRT2	Wired thermostat with occupancy sensor.	

APPENDIX

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

Resistance Table of Indoor Ambient Temperature Sensor (15K)

Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)
-2.2	138.1		68	18.75		138.2	3.848		208.4	1.071
-0.4	128.6		69.8	17.93		140	3.711		210.2	1.039
1.4	121.6		71.6	17.14		141.8	3.579		212	1.009
3.2	115		73.4	16.39		143.6	3.454		213.8	0.98
5	108.7		75.2	15.68		145.4	3.333		215.6	0.952
6.8	102.9		77	15		147.2	3.217		217.4	0.925
8.6	97.4		78.8	14.36		149	3.105		219.2	0.898
10.4	92.22		80.6	13.74		150.8	2.998		221	0.873
12.2	87.35		82.4	13.16		152.6	2.896		222.8	0.848
14	82.75		84.2	12.6		154.4	2.797		224.6	0.825
15.8	78.43		86	12.07		156.2	2.702		226.4	0.802
17.6	74.35		87.8	11.57		158	2.611		228.2	0.779
19.4	70.5		89.6	11.09		159.8	2.523		230	0.758
21.2	66.88		91.4	10.63		161.6	2.439		231.8	0.737
23	63.46		93.2	10.2		163.4	2.358		233.6	0.717
24.8	60.23		95	9.779		165.2	2.28		235.4	0.697
26.6	57.18		96.8	9.382		167	2.206		237.2	0.678
28.4	54.31		98.6	9.003		168.8	2.133		239	0.66
30.2	51.59		100.4	8.642		170.6	2.064		240.8	0.642
32	49.02		102.2	8.297		172.4	1.997		242.6	0.625
33.8	46.6		104	7.967		174.2	1.933		244.4	0.608
35.6	44.31		105.8	7.653		176	1.871		246.2	0.592
37.4	42.14		107.6	7.352		177.8	1.811		248	0.577
39.2	40.09		109.4	7.065		179.6	1.754		249.8	0.561
41	38.15		111.2	6.791		181.4	1.699		251.6	0.547
42.8	36.32		113	6.529		183.2	1.645		253.4	0.532
44.6	34.58		114.8	6.278		185	1.594		255.2	0.519
46.4	32.94		116.6	6.038		186.8	1.544		257	0.505
48.2	31.38		118.4	5.809		188.6	1.497		258.8	0.492
50	29.9		120.2	5.589		190.4	1.451		260.6	0.48
51.8	28.51		122	5.379		192.2	1.408		262.4	0.467
53.6	27.18		123.8	5.197		194	1.363		264.2	0.456
55.4	25.92		125.6	4.986		195.8	1.322		266	0.444
57.2	24.73		127.4	4.802		197.6	1.282		267.8	0.433
59	23.6		129.2	4.625		199.4	1.244		269.6	0.422
60.8	22.53		131	4.456		201.2	1.207		271.4	0.412
62.6	21.51		132.8	4.294		203	1.171		273.2	0.401
64.4	20.54		134.6	4.139		204.8	1.136		275	0.391
66.2	19.63		136.4	3.99		206.6	1.103		276.8	0.382

APPENDIX

Resistance Table of Coil Temperature Sensors (Indoor and Outdoor) and Discharge Temperature Sensor 20K)

Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)		Temp.(°F)	Resistance(kΩ)
-2.2	181.4		68	25.01		138.2	5.13		208.4	1.427
-0.4	171.4		69.8	23.9		140	4.948		210.2	1.386
1.4	162.1		71.6	22.85		141.8	4.773		212	1.346
3.2	153.3		73.4	21.85		143.6	4.605		213.8	1.307
5	145		75.2	20.9		145.4	4.443		215.6	1.269
6.8	137.2		77	20		147.2	4.289		217.4	1.233
8.6	129.9		78.8	19.14		149	4.14		219.2	1.198
10.4	123		80.6	18.13		150.8	3.998		221	1.164
12.2	116.5		82.4	17.55		152.6	3.861		222.8	1.131
14	110.3		84.2	16.8		154.4	3.729		224.6	1.099
15.8	104.6		86	16.1		156.2	3.603		226.4	1.069
17.6	99.13		87.8	15.43		158	3.481		228.2	1.039
19.4	94		89.6	14.79		159.8	3.364		230	1.01
21.2	89.17		91.4	14.18		161.6	3.252		231.8	0.983
23	84.61		93.2	13.59		163.4	3.144		233.6	0.956
24.8	80.31		95	13.04		165.2	3.04		235.4	0.93
26.6	76.24		96.8	12.51		167	2.94		237.2	0.904
28.4	72.41		98.6	12		168.8	2.844		239	0.88
30.2	68.79		100.4	11.52		170.6	2.752		240.8	0.856
32	65.37		102.2	11.06		172.4	2.663		242.6	0.833
33.8	62.13		104	10.62		174.2	2.577		244.4	0.811
35.6	59.08		105.8	10.2		176	2.495		246.2	0.77
37.4	56.19		107.6	9.803		177.8	2.415		248	0.769
39.2	53.46		109.4	9.42		179.6	2.339		249.8	0.746
41	50.87		111.2	9.054		181.4	2.265		251.6	0.729
42.8	48.42		113	8.705		183.2	2.194		253.4	0.71
44.6	46.11		114.8	8.37		185	2.125		255.2	0.692
46.4	43.92		116.6	8.051		186.8	2.059		257	0.674
48.2	41.84		118.4	7.745		188.6	1.996		258.8	0.658
50	39.87		120.2	7.453		190.4	1.934		260.6	0.64
51.8	38.01		122	7.173		192.2	1.875		262.4	0.623
53.6	36.24		123.8	6.905		194	1.818		264.2	0.607
55.4	34.57		125.6	6.648		195.8	1.736		266	0.592
57.2	32.98		127.4	6.403		197.6	1.71		267.8	0.577
59	31.47		129.2	6.167		199.4	1.658		269.6	0.563
60.8	30.04		131	5.942		201.2	1.609		271.4	0.549
62.6	28.68		132.8	5.726		203	1.561		273.2	0.535
64.4	27.39		134.6	5.519		204.8	1.515		275	0.521
66.2	26.17		136.4	5.32		206.6	1.47		276.8	0.509

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