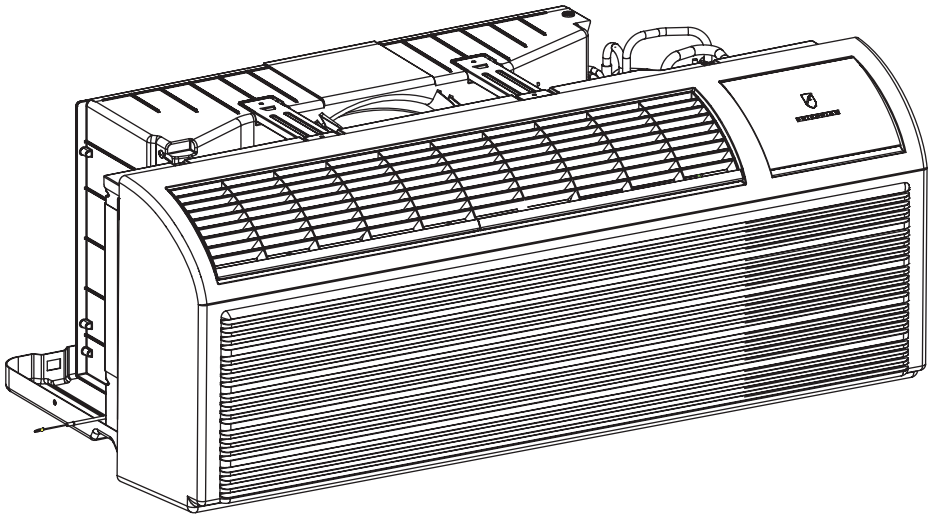
Service Manual

FRIEDRICH

PTAC
ZONEAIRE® PREMIER



Standard Chassis Models (R-410A Refrigerant)

7K	**PDE07K3SG, PDE07R3SG** **PDH07K3SG, PDH07R3SG**
9K	**PDE09K3SG, PDE09R3SG** **PDH09K3SG, PDH09R3SG**
12K	**PDE12K3SG, PDE12R3SG** **PDH12K3SG, PDH12R3SG**
15K	**PDE15K5SG, PDE15R5SG** **PDH15K5SG, PDH15R5SG**

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TABLE OF CONTENTS

INTRODUCTION 4
- Important Safety Information 4
- Personal Injury Or Death Hazards 5
- Operation of Equipment in During Construction 7
- Model Number Reference Guide 8
- Serial Number Reference Guide 9

SPECIFICATIONS 10
- General Specifications 7-9k Electric Heat 10
- General Specifications 7-9k Heat Pump Models 11
- General Specifications 12-15k Electric Heat 12
- General Specifications 12-15k Heat Pump 13
- Electrical Data 15

OPERATION 17
- Function and Control 17
- Dip Switch Function #1 21
- Dip Switch Function #2 22
- Dip Switch Function #3&4 23
- Dip Switch Function #5&6 24
- Dip Switch Function #7 25
- Refrigeration Sequence Of Operation 26
- Refrigerant System Diagram 27
- Routine Maintenance 28

REMOVAL PROCEDURE 29
- Remove The Chassis 29
- Remove The Chassis 31

UNIT DISASSEMBLY 39
- Indoor Motor, Wheel, & Heating Element Assembly 39
- Outdoor Motor, Blade, & Shroud Assembly 48
- Electronic Board & Electrical Component Replacement 50

INSTALLATION 60
- PTAC Installation Recommendations 60
- Wall Sleeve Installation Instructions (PDXWS) 61
- Alternate Wall Installations 62
- PXDR10 Drain Kit Installation 65
- External Drain 66
- PXGA Standard Grille 67
- Electrical Wiring for 265 Volt Models 68
- Chassis Install Preparation 70
- Chassis Installation 72
- How To Connect 73
- Thermostat 74
- Final Inspection & Start-up Checklist 76

R-410A SEALED SYSTEM REPAIR 77
- Refrigerant Charging 78
- Undercharged Refrigerant Systems 79
- Overcharged Refrigerant Systems 80
- Restricted Refrigerant System 81
- Sealed System Method of Charging/ Repairs 82

COMPONENT TESTING 83
- Hermetic Components Check 83
- Reversing Valve Description And Operation 84
- Testing The Reversing Valve Solenoid Coil 85
- Checking The Reversing Valve 86
- Touch Test Chart : To Service Reversing Valves 88
- Compressor Checks 89
- Compressor Replacement -Special Procedure in Case of Compressor Burnout 92
- PCB Printed Diagram Board 1 93
- PCB Printed Diagram Board 2 94
- Testing Component Voltage at Electronic Control Board 95

TABLE OF CONTENTS

Testing Line Voltage 96
TROUBLESHOOTING 97
Basic Troubleshooting 97
Error Codes 99
Malfunction of Temperature Sensor 102
Maintenance Method for Normal Malfunction 103
WIRING DIAGRAMS 106
PDE07 106
PDH07 107
PDE09, PDE12, PDE15 108
PDH09, PDH12, PDH15 109
PARTS CATALOG 110
PDE07K, PDE07R, PDE09K, PDE09R, PDE12K, PDE12R, PDE15K, PDE15R 111
PDH07K, PDH07R, PDH09K, PDH09R, PDH12K, PDH12R, PDH15K, PDH15R 117
ACCESSORIES 123
APPENDIX 125
Reference Sheet of Celsius and Fahrenheit 125
Resistance Table of Indoor Ambient Temperature Sensor (15K) 126
Resistance Table of Tube Temperature Sensors (Indoor and Outdoor) and Discharge Temperature Sensor (20K) 127
WARRANTY 128
FRIEDRICH AUTHORIZED PARTS DEPOTS 129

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.

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

Your safety and the safety of others is very important.

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

This is a safety Alert symbol.
This symbol alerts you to potential hazards that can kill or hurt you and others.All safety messages will follow the safety alert symbol with the word "WARNING"or "CAUTION". These words mean:

⚠ 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.

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.

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

⚠ WARNING

Refrigeration system under high pressure

Do not puncture, heat, expose to flame or incinerate.

Only certified refrigeration technicians should service this equipment.

R410A systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practices must be used.

Only use gauge sets designed for use with R410A.
Do not use standard R22 gauge sets.

INTRODUCTION

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, 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.
- 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.

INTRODUCTION

Personal Injury Or Death Hazards

- **REFRIGERATION SYSTEM REPAIR HAZARDS:**
- Use EPA approved standard refrigerant recovering procedures and equipment to relieve high pressure before opening system for repair.
- Do not allow liquid refrigerant to contact skin. Direct contact with liquid refrigerant can result in minor to moderate injury.
- Be extremely careful when using an oxy-acetylene torch. Direct contact with the torch's flame or hot surfaces can cause serious burns.
- Make certain to protect personal and surrounding property with fire proof materials and have a fire extinguisher at hand while using a torch.
- Provide adequate ventilation to vent off toxic fumes, and work with a qualified assistant whenever possible.
- Always use a pressure regulator when using dry nitrogen to test the sealed refrigeration system for leaks, flushing etc.
- **MECHANICAL HAZARDS:**
- Extreme care, proper judgment and all safety procedures must be followed when testing, troubleshooting, handling, or working around unit with moving and/or rotating parts.
- Be careful when, handling and working around exposed edges and corners of the sleeve, chassis, and other unit components especially the sharp fins of the indoor and outdoor coils.
- Use proper and adequate protective aids such as: gloves, clothing, safety glasses etc.
- Failure to follow proper safety procedures and/or these warnings can result in serious injury or death.

• PROPERTY DAMAGE HAZARDS

- **FIRE DAMAGE HAZARDS:**
- Read the Installation/Operation Manual for the air conditioning unit prior to operating.
- Use air conditioner on a single dedicated circuit within the specified amperage rating.
- Connect to a properly grounded outlet only.
- Do not remove ground prong of plug.
- Do not cut or modify the power supply cord.
- Do not use extension cords with the unit.
- Be extremely careful when using acetylene torch and protect surrounding property.
- Failure to follow these instructions can result in fire and minor to serious property damage.
- **WATER DAMAGE HAZARDS:**
- Improper installation, maintenance or servicing of the air conditioner unit can result in water damage to personal items or property.
- Insure that the unit has a sufficient pitch to the outside to allow water to drain from the unit.
- Do not drill holes in the bottom of the drain pan or the underside of the unit.
- Failure to follow these instructions can result in damage to the unit and/or minor to serious property damage.

INTRODUCTION

Operation of Equipment in During Construction

- **OPERATION OF EQUIPMENT MUST BE AVOIDED DURING CONSTRUCTION PHASES WHICH WILL PRODUCE AIRBORNE DUST OR CONTAMINTES NEAR OR AROUND AIR INTAKE OPENINGS:**
- Wood or metal framing;
- Drywalling or sheathing,
- Spackling or applying joint compound.
- Sanding or grinding.
- Moulding or trimwork.

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

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

Model Number Reference Guide

PTAC/PTHP Model Identification Guide

MODEL NUMBER PD | H | 07 | K | 3 | S | G | A

Series
PD = Friedrich Digital PTAC

System
X = Accessory
E = Cooling with or without Electric Heat
H = Heat Pump with Auxiliary Electric Heat

Nominal Capacity
07 = 7,000 Btuh 12 = 12,000 Btuh
09 = 9,000 Btuh 15 = 15,000 Btuh

Voltage
K = 230/208V - 1 Ph. - 60 Hz.
R = 265V - 1 Ph. - 60 Hz.

Engineering Digit

Design Series
Note: All PTAC models with a C design series or later come standard with Diamonblue seacost protection and digital controls.

Chassis
S = Standard

Nominal Heater Size (230V or 265V)

2 = 2.5 KW 3 = 3.5 KW 5 = 5.0 KW*

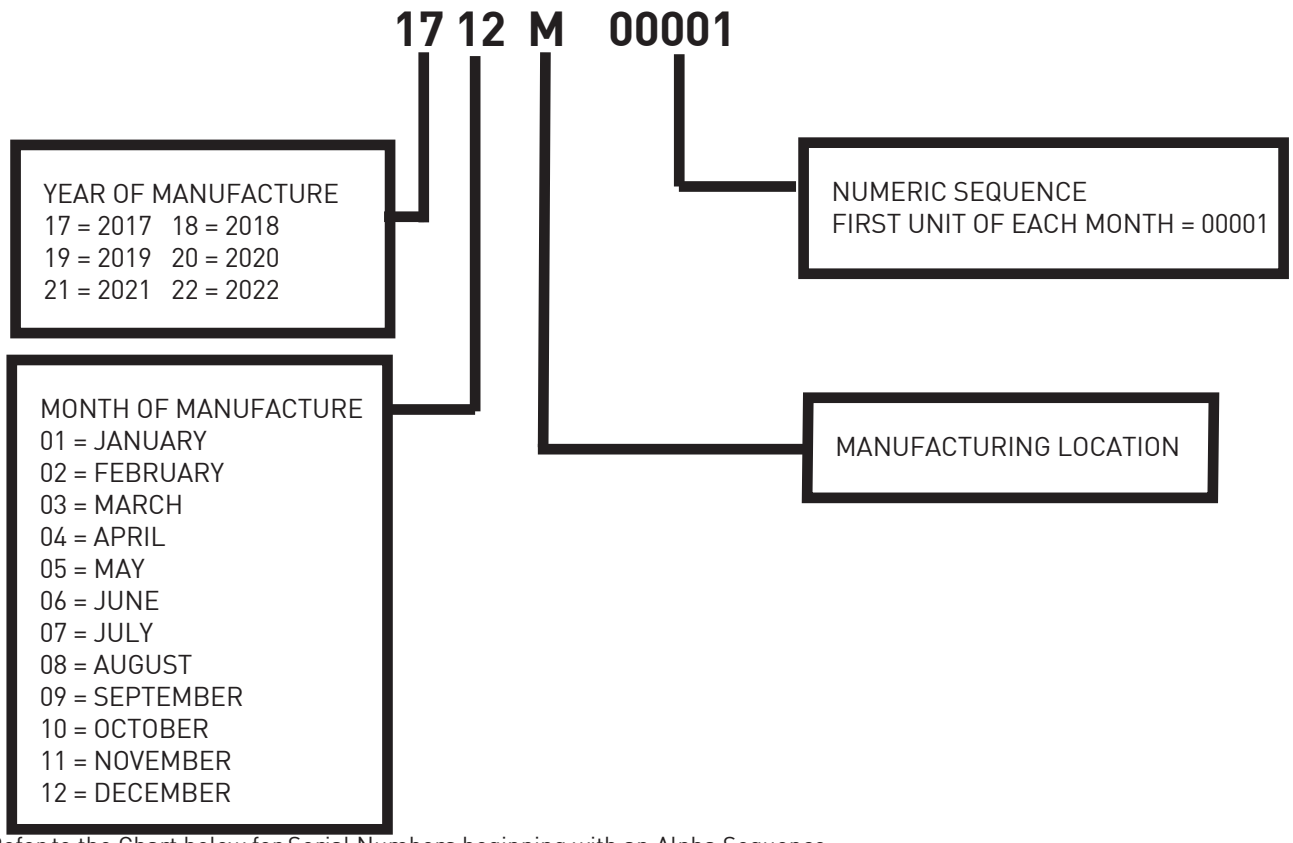
* 5.0 kw only available on 9,000 12,000 and 15,000 BTU models

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

Figure 103

INTRODUCTION

Serial Number Reference Guide



Refer to the Chart below for Serial Numbers beginning with an Alpha Sequence

PTAC Serial Number Identification Guide

SERIAL NUMBER	A	K	A	M	00001

YEAR MANUFACTURED

LJ = 2009 AE = 2015
AK = 2010 AF = 2016
AA = 2011 AG = 2017
AB = 2012
AC = 2013
AD = 2014

PRODUCTION RUN NUMBER

PRODUCT LINE
M = PRODUCT CODE

MONTH MANUFACTURED

A = Jan	D = Apr	G = Jul	K = Oct
B = Feb	E = May	H = Aug	L = Nov
C = Mar	F = Jun	J = Sep	M = Dec

Figure 104

SPECIFICATIONS

General Specifications 7-9k Electric Heat

PTAC Electric Heat models				
	PDE07K	PDE07R	PDE09K	PDE09R
PERFORMANCE DATA:				
Cooling Btu	7200/7000	7200	9400/9200	9400
Cooling Watts	550/535	550	775/760	775
Energy Efficiency Ratio, EER	13.0/13.0	13.0	12.1/12.1	12.1
Moisture Removal (pints/hr.)	1.7	1.7	2.1	2.1
Sensible Heat Ratio	0.86	0.86	0.85	0.85
ELECTRICAL DATA:				
Voltage (1 PHASE, 60 Hz)	230/208	265	230/208	265
Volt Range	253-187	292-239	253-187	292-239
Current (Amps)	2.7/2.9	2.4	3.7/3.9	3.3
Power factor	0.97	0.97	0.97	0.97
Compressor LRA	13.0	12.5	19.5	13.5
Compressor RLA	2.5	2.2	3.5	3.0
Outdoor Fan Motor, HP	0.080	0.080	0.080	0.080
AIRFLOW DATA:				
Indoor CFM, HIGH	345/315	345	355/325	355
Indoor CFM, LOW	270/255	270	300/275	300
Vent CFM	75	75	75	75
PHYSICAL DATA:				
Sleeve Dimensions (H x W x D)	16" x 42" x 13 3/4" (all models)			
Dimensions with Front (H x W x D)	16"x 42"x 21 1/2" (all models)			
Cut Out Dimensions (H x W x D)	16 1/4"x 42 1/4" (all models)			
Net Weight (lbs.)	106	107	115	115
Shipping Weight (lbs.)	126	127	135	135
R-410A CHARGE (oz.)	23	23	24	24

Figure 201 (General Specs)

SPECIFICATIONS

General Specifications 7-9k Heat Pump Models

PTAC Heat Pump models				
	PDH07K	PDH07R	PDH09K	PDH09R
PERFORMANCE DATA:				
Cooling Btu	7200/7000	7200	9400/9200	9400
Cooling Watts	550/535	550	775/760	775
Energy Efficient Ratio, Eer	13.0/13.0	13.0	12.1/12.1	12.1
Reverse Heating Btu	6000/5800	6000	8300/8100	8300
Heating Watts	485/470	485	695/675	695
Cop	3.6/3.6	3.6	3.5/3.5	3.5
Moisture Removal (Pints/Hr.)	1.7	1.7	2.1	2.1
Sensible Heat Ratio	0.86	0.86	0.85	0.85
ELECTRICAL DATA:				
Voltage(1 PHASE, 60 Hz)	230/208	265	230/208	265
Volt Range	253-187	292-239	253-187	292-239
Current (Amps)	2.7/2.9	2.4	3.7/3.9	3.3
Reverse Heat. Amps	2.4/2.6	2.2	3.4/3.2	3.1
Power Factor	0.97	0.97	0.97	0.97
Compressor LRA	13.0	12.5	19.5	13.5
Compressor RLA	2.5	2.2	3.5	3.0
Outdoor Fan Motor, HP	0.080	0.080	0.080	0.080
AIRFLOW DATA:				
Indoor CFM, HIGH	345/315	345	355/325	355
Indoor CFM, LOW	270/255	270	300/275	300
VENT CFM	75	75	75	75
PHYSICAL DATA				
Sleeve Dimensions (H x W x D)	16" x 42" x 13 3/4" (all models)			
Dimensions with Front (H x W x D)	16"x 42"x 21 1/2" (all models)			
Cut Out Dimensions (H x W x D)	16 1/4"x 42 1/4" (all models)			
Net Weight (lbs.)	113	112	119	119
Shipping Weight (lbs.)	133	132	139	139
R-410A CHARGE (oz.)	34	34	34	34
Dimensions with Packaging (inches)	17 7/8" x 45" x 25 1/4" (all models)			

Figure 202 (General Specs)

SPECIFICATIONS

General Specifications 12-15k Electric Heat

PTAC Electric Heat models				
	PDE12K	PDE12R	PDE15K	PDE15R
PERFORMANCE DATA:				
Cooling Btu	11800/11600	11800	14500/14200	14500
Cooling Watts	1015/1000	1015	1390/1365	1390
Energy Efficiency Ratio, EER	11.6/11.6	11.6	10.4/10.4	10.4
Moisture Removal (pints/hr.)	2.7	2.7	3.1	3.1
Sensible Heat Ratio	0.75	0.75	0.67	0.67
ELECTRICAL DATA:				
Voltage (1 PHASE, 60 Hz)	230/208	265	230/208	265
Volt Range	253-187	292-239	253-187	292-239
Current (Amps)	4.9/5.1	4.2	6.2/6.7	5.4
Power factor	0.97	0.97	0.97	0.97
Compressor LRA	21.5	19.0	28.9	21.6
Compressor RLA	4.7	3.9	5.9	5.05
Outdoor Fan Motor, HP	0.086	0.086	0.086	0.086
AIRFLOW DATA:				
Indoor CFM, HIGH	400/390	400	400/390	400
Indoor CFM, LOW	325/310	325	325/310	325
Vent CFM	75	75	75	75
PHYSICAL DATA:				
Sleeve Dimensions (H x W x D)	16" x 42" x 13 3/4" (all models)			
Dimensions with Front (H x W x D)	16"x 42"x 21 1/2" (all models)			
Cut Out Dimensions (H x W x D)	16 1/4"x 42 1/4" (all models)			
Net Weight (lbs.)	119	118	121	121
Shipping Weight (lbs.)	139	138	140	140
R-410A CHARGE (oz.)	36	36	36	36

Figure 203 (General Specs)

SPECIFICATIONS

General Specifications 12-15k Heat Pump

PTAC Heat Pump models				
	PDH12K	PDH12R	PDH15K	PDH15R
PERFORMANCE DATA:				
Cooling Btu	11800/11600	11800	14500/14200	14500
Cooling Watts	1015/1000	1015	1390/1365	1390
Energy Efficient Ratio, Eer	11.6/11.6	11.6	10.4/10.4	10.4
Reverse Heating Btu	10600/10400	10600	13300/13000	13300
Heating Watts	910/895	910	1255/1225	1255
Cop	3.4/3.4	3.4	3.1/3.1	3.1
Moisture Removal (Pints/Hr.)	2.7	2.7	3.1	3.1
Sensible Heat Ratio	0.75	0.75	0.67	0.67
ELECTRICAL DATA:				
Voltage(1 PHASE, 60 Hz)	230/208	265	230/208	265
Volt Range	253-187	292-239	253-187	292-239
Current (Amps)	4.9/5.1	4.2	6.2/6.7	5.4
Reverse Heat. Amps	4.2/4.7	3.7	6.2/6.7	5.0
Power Factor	0.97	0.97	0.97	0.97
Compressor LRA	21.5	19.0	28.9	21.6
Compressor RLA	4.7	3.9	5.9	5.05
Outdoor Fan Motor, HP	0.086	0.086	0.086	0.086
AIRFLOW DATA:				
Indoor CFM, HIGH	400/390	400	400/390	400
Indoor CFM, LOW	325/310	325	325/310	325
VENT CFM	75	75	75	75
PHYSICAL DATA				
Sleeve Dimensions (H x W x D)	16" x 42" x 13 3/4" (all models)			
Dimensions with Front (H x W x D)	16"x 42"x 21 1/2" (all models)			
Cut Out Dimensions (H x W x D)	16 1/4"x 42 1/4" (all models)			
Net Weight (lbs.)	122	119	124	122
Shipping Weight (lbs.)	141	139	144	144
R-410A CHARGE (oz.)	36	36	39	39
Dimensions with Packaging (inches)	17 7/8" x 45" x 25 1/4" (all models)			

Figure 204 (General Specs)

SPECIFICATIONS

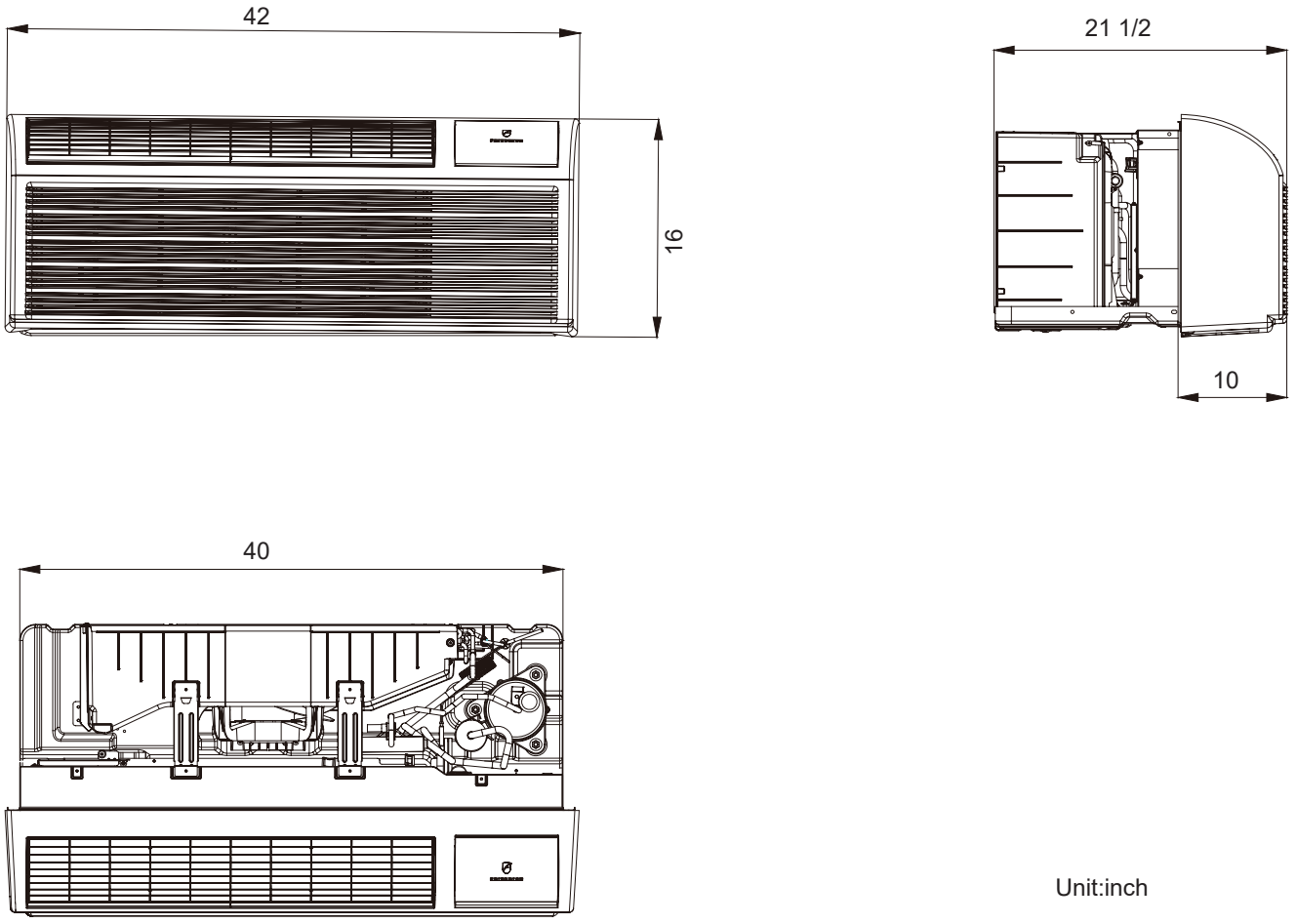
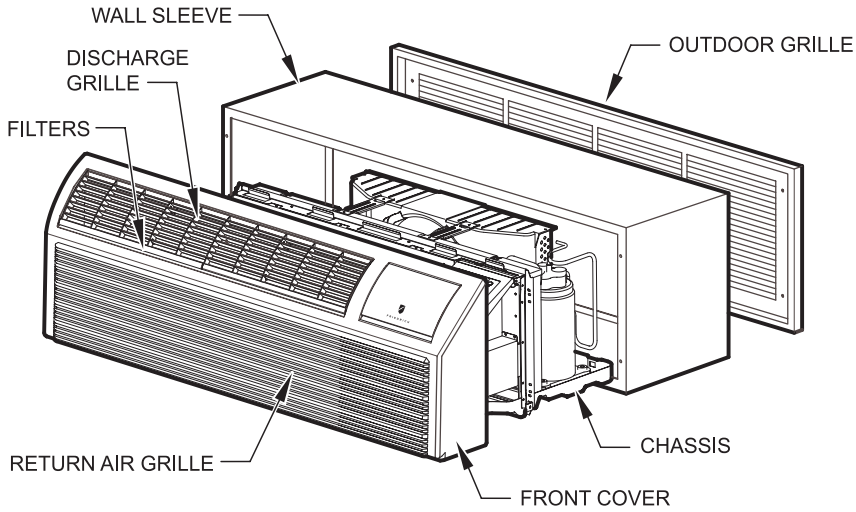


Figure 205 (Chassis Specs)



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

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

Cut-Out Dimensions:
16-¼" x 42-¼"

Figure 206 (Typical Unit Components and Dimensions)

SPECIFICATIONS

Electrical Data

A. Electrical Rating Tables

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

NOTE: Use Copper Conductors ONLY. Wire sizes are per NEC, check local codes for overseas applications. Use on Single dedicated circuit within specified amperage rating

Table 1 RECEPTACLES AND FUSE TYPES

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

⚠WARNING

Electrical Shock Hazard

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

FUSE/CIRCUIT BREAKER	Use ONLY type and size fuse or HVAC/R circuit breaker indicated on unit's rating plate. Proper current protection to the unit is the responsibility of the owner. NOTE: A time delay fuse is provided with 265V units.
GROUNDING	Unit MUST be grounded from branch circuit through service cord to unit, or through separate ground wire provided on permanently connected units. Be sure that branch circuit or general purpose outlet is grounded. The field supplied outlet must match plug on service cord and be within reach of service cord. Refer to Table 1 for proper receptacle and fuse type. Do NOT alter the service cord or plug. Do NOT use an extension cord.
RECEPTACLE	The field supplied outlet must match plug on service cord and be within reach of service cord. Refer to Table 1 for proper receptacle and fuse type. Do NOT alter the service cord or plug. Do NOT use an extension cord.

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

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

To test your power supply cord:

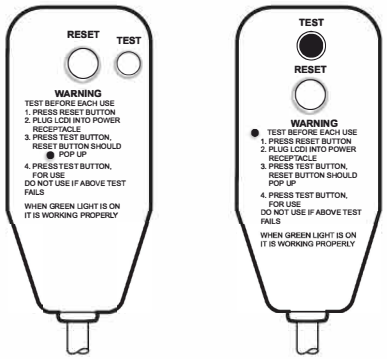
1. Plug power supply cord into a grounded 3 prong outlet.
2. Press RESET.
3. Press TEST (listen for click; Reset button trips and pops out).
4. Press and release RESET (listen for click; Reset button latches and remains in). The power supply cord is ready for operation.

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 14
Typical LCDI Devices



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

FRP014

SPECIFICATIONS

Electrical Data

Table 2					
Model	Heater kW	Power Cord Kit	Voltage	Amperage	Receptacle
PDE/PDH07K	2.5	PXPC23015A	230/208	15	NEMA 6-15r
	3.5	PXPC23020A (STD)	230/208	20	NEAM 6-20r
PDE/PDH09K	2.5	PXPC23015A	230/208	15	NEMA 6-15r
	3.5	PXPC23020A (STD)	230/208	20	NEMA 6-20r
	5.0	PXPC23030	230/208	30	NEMA 6-30r
PDE/PDH12K	2.5	PXPC23015A	230/208	15	NEMA 6-15r
	3.5	PXPC23020A(STD)	230/208	20	NEMA 6-20r
	5.0	PXPC23030	230/208	30	NEMA 6-30r
PDE/PDH15K	2.5	PXPC23015A	230/208	15	NEMA 6-15r
	3.5	PXPC23020A	230/208	20	NEMA 6-20r
	5.0	PXPC23030 (STD)	230/208	30	NEMA 6-30r
PDE/PDH07R	2.5	PXPC26515A	265	15	NEMA 7-15r
	3.5	PXPC26520A (STD)	265	20	NEMA 7-20r
PDE/PDH09R	2.5	PXPC26515	265	15	NEMA 7-15r
	3.5	PXPC26520A (STD)	265	20	NEMA 7-20r
	5.0	PXPC26530	265	30	NEMA 7-30r
PDE/PDH12R	2.5	PXPC26515A	265	15	NEMA 7-15r
	3.5	PXPC26520A (STD)	265	20	NEMA 7-20r
	5.0	PXPC26530	265	30	NEMA 7-30r
PDE/PDH15R	2.5	PXPC26515A	265	15	NEMA 7-15r
	3.5	PXPC26520A	265	20	NEMA 7-0r
	5.0	PXPC26530 (STD)	265	30	NEMA 7-30r

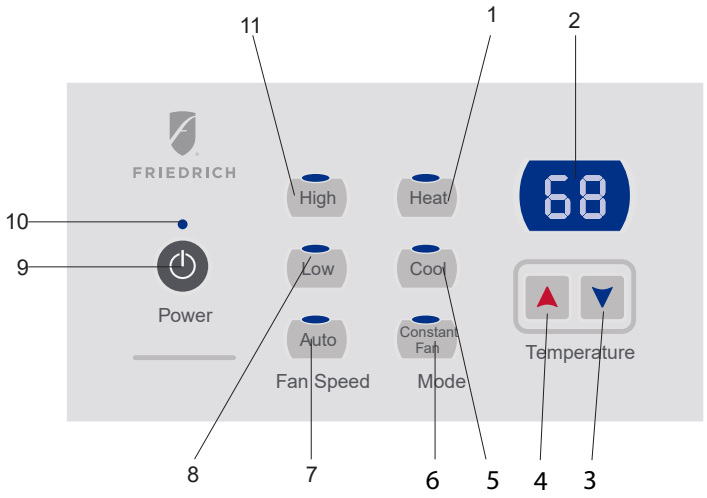
OPERATION

Function and Control

1.Summary

When the unit is turned on, power indicator is displayed in green. In this case, you can operate the unit through control panel.

2.Operation interface and buttons



1. Heating mode button
2. Display window
3. Temp decrease
4. Temp increase
5. Cooling mode button
6. Constant fan mode button
7. Auto fan speed button
8. Low fan speed button
9. Power button
10. Power indicator
11. High fan speed button

Button function:

1.In OFF mode, press Power button to turn on the unit: If pressing ▲ or ▼ button in OFF mode, dual 8 will be turned off after displaying indoor temperature for 15s; if pressing the Mode button in OFF mode, the controller will resume to the corresponding operation status. Operation indicator will be on (Mode button includes Cool button and Heat button).

2.In ON status, each button is valid.

① Power: After pressing the Power button, the unit can be switched between ON and OFF mode.

② Cool button: In ON status, the unit will operate in cooling mode. In OFF mode, after pressing the Cool button, the controller will operate according to cooling mode. Other functions will operate according to the status before turning off the unit.

③ Heat button: In ON status, the unit will operate in heating mode. In OFF mode, after pressing the Heat button, the controller will operate according to heating mode. Other functions will operate according to the status before turning off the unit.

④ Constant Fan button: 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. The fan speed is controlled by the fan speed button (If wired controller is connected, the fan speed follows the command of the wired controller. The controller will control if the fan shall operate or not).

⑤ Auto button: When the unit is on, press Auto button to select auto fan speed.

⑥ Low button: When the unit is on, press Low button to select low fan speed.

⑦ High button: When the unit is on, press High button to select high fan speed.

⑧ ▲ or ▼ button: Press ▲ or ▼ button to adjust set temperature within 61~86°F(16~30°C) and you can also select other set temperature range through configuration.

OPERATION

Function and Control

Dual 8 Display and LED Display:

Two 8 segment nixie tube and 8 LED indicators (they are Auto, High, Low, Heat, Cool, Constant Fan, Power, STATUS(status indicator on main board)).

1.Mode LED display: when the unit is running in a certain kind of mode, the corresponding LED is bight.

2.Power LED: In ON status, the power LED is on; In OFF status, the power LED is off.

3.Fan speed display: when the unit is running at auto, high or low fan speed, the corresponding LED is bright.

4.Dual 8 display: In cooling and heating mode, it defaults to display set temperature (In fan mode, it displays indoor ambient temperature).

5.When the display data has three digit, the dual 8 is rolling to display. Display the “decimal” + “unit’s place” at first, and then display “BLANK”+ “hundred’s place”.

6.Error display

After energization, STATUS LED is always on. When there is error or protection, STATUS LED blinks. Detailed display is as below:In OFF mode, dual 8 won’t display the error code (except the low temperature protection). In OFF status, number 8, 9 and 10 protection marks will be eliminated.When multiple protections are overlapped, they will be displayed circularly without priority.

No.	Error Name	Display Way
1	Indoor ambient temperature sensor is open circuit and short circuit	Dual 8 displays "F1", STATUS LED blinks once and goes out for 3s circularly
2	Indoor tube temperature sensor is open circuit and short circuit	Dual 8 displays "F2", STATUS LED blinks twice and goes out for 3s circularly
3	Outdoor tube temperature sensor is open circuit and short circuit	Dual 8 displays "F4", STATUS LED blinks four times and goes out for 3s circularly
4	FJ error of air outlet temperature sensor	Dual 8 displays "FJ"
5	Low temperature protection	Dual 8 displays "FP"
6	Wrong wire connection for wired controller	STATUS LED blinks 9 times and goes out for 3s circularly
7	High temperature protection for evaporator	STATUS LED blinks 8 times and goes out for 3s circularly
8	High temperature protection for outdoor condenser	STATUS LED blinks 6 times and goes out for 3s circularly
9	Freeze protection for evaporator	STATUS LED blinks 5 times and goes out for 3s circularly
10	Frost protection(heat pump)	STATUS LED blinks 7 times and goes out for 3s circularly
11	Refrigerant lacking protection	Dual 8 displays "F0"
12	Overload detection protection	Dual 8 displays "H3"
13	Compressor over-current protection	Dual 8 displays "E5"
14	Protection for electric heater error	Dual 8 displays "A2"

If there is an error of a temperature sensor, only the indoor fan will respond in cooling mode, other loads will not respond, but the buttons are still valid.

6.2 Function Introduction

1.Cooling mode

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

Working condition and process for cooling

① When $T_{indoor\ amb.}+T_{indoor\ amb.\ compensation}\geq T_{preset+2^{\circ}F(1^{\circ}C)}$, 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.

② $T_{indoor\ amb.}+T_{indoor\ amb.\ compensation}\leq T_{preset-2^{\circ}F(1^{\circ}C)}$, 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.

③ $T_{preset-2^{\circ}F(1^{\circ}C)}<T_{indoor\ amb.}+T_{indoor\ amb.\ compensation}<T_{preset+2^{\circ}F(1^{\circ}C)}$, the unit keeps previous operation status.

④ When the indoor fan is set at high speed, outdoor fan operates according to high speed.

⑤ When the indoor fan is set at low speed, outdoor fan operates according to low speed.

⑥ 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 3.5min and outdoor tube temperature is below 140°F(60°C), outdoor fan turns to low speed. First time of 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.

⑦ During cooling mode and there is no outdoor condenser high temperature protection, unit stops as reaching temperature point, unit stops

OPERATION

Function and Control

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 3s 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 condition of outdoor fan in heating mode is met, outdoor fan will operate at high fan speed for 3s and then turn to set fan speed. When the indoor fan starts operation, indoor fan will operate at high fan speed for 3s and then turn to set fan speed.

⑧ 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 if memory chip is broken, it defaults to off.

2. 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

a. General type HEAT PUMP TYPE

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

① When $T_{preset-5^{\circ}F(3^{\circ}C)}<T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}\leq T_{preset-2^{\circ}F(1^{\circ}C)}$, compressor operates at heating mode. Meanwhile, 4-way valve, indoor fan and outdoor fan start operation at set speed. Compressor can operate after 10s. If compressor operates and it satisfies $T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}\leq T_{preset-5^{\circ}F(3^{\circ}C)}$ and the minimum operation time for compressor, compressor and outdoor fan stop operation immediately. 1s later, electric heater will start. Once the electric heater operates, it will quite until condition b 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 $T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}\leq T_{preset-5^{\circ}F(3^{\circ}C)}$, the electric heater operates. Indoor fan operates at set fan speed.

② When $T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}\geq T_{preset+2^{\circ}F(1^{\circ}C)}$, 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.

③ When $T_{preset-2^{\circ}F(1^{\circ}C)}<T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}<T_{preset+2^{\circ}F(1^{\circ}C)}$ the unit keeps previous operation status.

b.Pure electric heating type HEAT COOL TYPE

Operation condition and process

① When $T_{indoor\ amb}-T_{indoor\ amb.\ compensation}\leq T_{preset-2^{\circ}F(1^{\circ}C)}$, the electric heater starts operation and indoor fan operates at set fan speed;

② When $T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}\geq T_{preset+2^{\circ}F(1^{\circ}C),}$ the 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.

③ When $T_{preset-2^{\circ}F(1^{\circ}C)}<T_{indoor\ amb.}-T_{indoor\ amb.\ compensation}<T_{preset+2^{\circ}F(1^{\circ}C),}$ the unit will keep previous operation status.

3.Auto fan speed mode

a.Auto fan speed in cooling mode

① High speed:$T_{amb.}+T_{indoor\ amb.\ compensation}\geq T_{preset+4^{\circ}F(2^{\circ}C)}$

② Low speed:$T_{amb.}+T_{indoor\ amb.\ compensation}\leq T_{preset}$

③ Not change:$T_{preset}< T_{amb.}+T_{indoor\ amb.\ compensation}< T_{preset+4^{\circ}F(2^{\circ}C)}$

When entering auto fan speed mode, it will operate according to auto high speed

b.Auto fan speed in heating mode

① High speed:$T_{amb.}-T_{indoor\ amb.\ compensation}\leq T_{preset-4^{\circ}F(2^{\circ}C)}$

② Low speed:$T_{amb.}-T_{indoor\ amb.\ compensation}\geq T_{preset}$

③ Not change:$T_{preset-4^{\circ}F(2^{\circ}C)}<T_{amb.}-T_{indoor\ amb.\ compensation}< T_{preset}$

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 3.5min in minimum when switching the speed of indoor fan(there is no delay of 3.5min when switching mode).

4.Additional function setting

After the unit is turned on for 30s, press Low button and ▼ button for 5s, the configuration mode will be started up. After entering configuration mode, if adjusting the temperature compensation value by buttons to turn to unit on or off condition, the load will be activated after 3s. While if entering unit on or off condition due to the change of the ambient temperature, it can be activated only after quitting the configuration mode.

OPERATION

Function and Control

In the configuration mode, the four configuration modes as below can be selected by Low button.

Mode one: Fahrenheit/Centigrade display mode

Fahrenheit and Centigrade display mode can be switched by pressing ▲ or ▼ button.

F indicates Fahrenheit display mode

C indicates Centigrade display mode

Mode two: Adjusting mode for cooling temperature compensation value

▲ button can increase compensation temperature by 1°F(°C), while ▼ button can decrease compensation temperature by 1°F(°C). The adjusting range of indoor ambient temperature compensation value is -6°F to 6°F(-3°C to 3°C) (cooling mode LED is on).

Mode three: Adjusting mode for heating temperature compensation value

▲ button can increase compensation temperature by 1°F(°C), while ▼ button can decrease compensation temperature by 1°F(°C). The adjusting range of indoor ambient temperature compensation value is -6°F to 6°F(-3°C to 3°C) (heating mode LED is on).

The compensation temperature defaults to 0 in cooling and heating mode. They can allocate different compensation temperature in cooling and heating mode respectively.

Mode four: Display switchover between set temperature and ambient temperature in heating and cooling mode

Press ▲ button or ▼ button to switch displaying set temperature or ambient temperature.

Set temperature display: the dual 8 displays SP. After quitting configuration mode, set temperature is displayed constantly in heating mode and cooling mode;

Ambient temperature display: the dual 8 displays AA. After quitting configuration mode, ambient temperature is displayed constantly in heating mode and cooling mode;

For circumstances below, it will display set temperature for 10s and then turn to display ambient temperature.

① Press mode button (mode button includes Cool button and Heat button)

② Energization after power failure

③ Restart the unit

④ Turn on the unit after shutdown.

⑤ Adjust the set temperature by ▲ button or ▼ button

Quitting configuration mode: The configuration modes mentioned above will be quitted when mode button is pressed or no button is pressed within 30s.

5.Resetting timer

Hold on pressing ▲ button and ▼ button simultaneously for 3s under the protection for compressor and electric heater minimum stop time or the protection for compressor minimum operation time, the protection time will be reduced.

6.Memory function

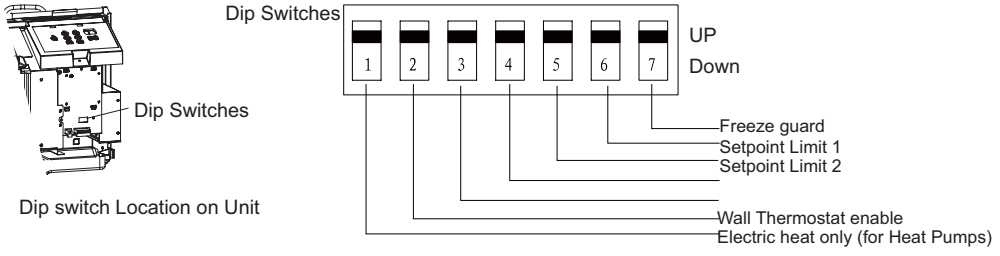
Energizing after power failure, the controller is running according to the mode before power failure. The operation mode, set fan speed, set temperature, T value in minimum stop time of compressor, Fahrenheit/Centigrade display mode, cooling compensation temperature, heating compensation temperature, temperature display mode set in configuration mode before power failure is memorized after power recovers. The unit operates in default fan mode when there is no memory. Fan speed is high with T value of zero and Fahrenheit display mode. Cooling compensation temperature is zero and heating compensation temperature is zero. Default set temperature is 71°F(22°C). Dual 8 displays set temperature under cooling and heating mode.

7.Restore factory settings

In standby and OFF status, after pressing Low button and ▲ button for 3s and the dual 8 displays “00” for 3s (do not display others), which shows that the factory settings have been restored. Meanwhile, the configuration information defaults to display Fahrenheit, heating compensation temperature of 0, cooling compensation temperature of 0 and displaying set temperature. T value is zero, fan speed is high and set temperature is 71°F(22°C).

8.DIP SWITCHES

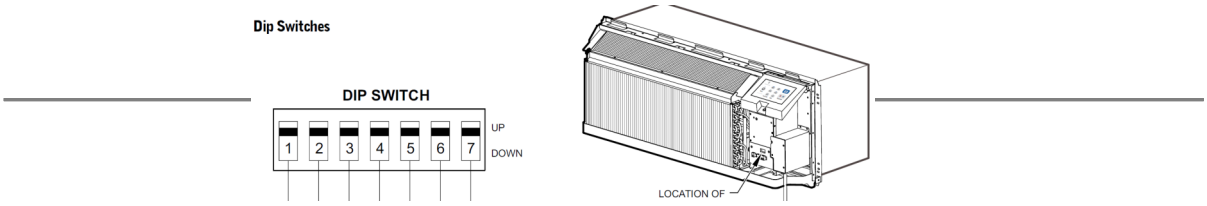
Auxiliary dip switch controls are located behind front panel,through an opening below the control panel. To access,remove front panel. Dip switches area is accessible without opening the control box. Unit must be powered OFF to effectively change their status. Factory settings for dip switches will be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



OPERATION

Dip Switch Function #1

Dip Switch Functions



Dip Switch # 1 Emergency Heat Override (PDH Heat Pump Models)

- Enables electric heat operation only, in the event of compressor failure

Factory position: Down - normal operation

Up position: Disables compressor operation

IF ANY DIP SWITCH IS MODIFIED THE POWER TO THE UNIT NEEDS TO BE CYCLED ON / OFF IN ORDER TO SAVE NEW SETTING.

Dip Switch Functions & Settings

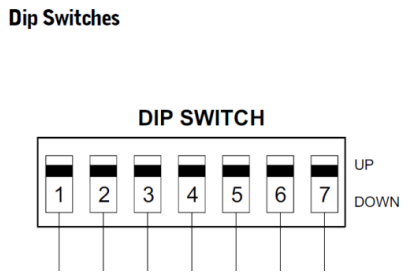
Dip Switch # 2 Wall Thermostat Switch

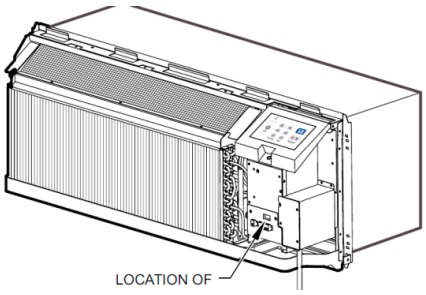
Disconnect power to unit before changing DIP switch

- Enables unit to be controlled by a wall thermostat

Factory position: Down - unit controls operation

Up position: Wall thermostat controls operation





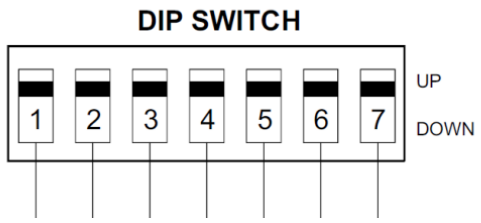
Dip Switch Function #3&4

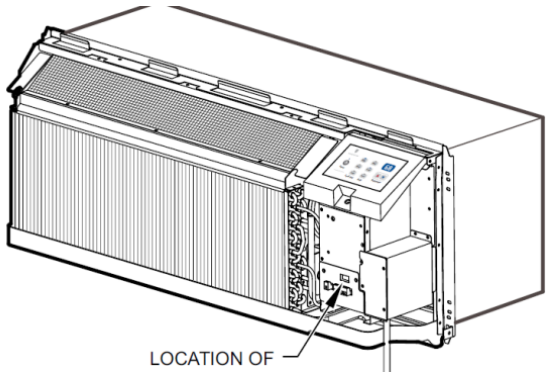
Dip Switch Functions & Settings

Dip Switch # 3 and # 4

Disable No Function.

Dip Switches





Dip Switch Functions & Settings

Dip Switches # 5 & 6

- Allows the set point range to be adjusted

Factory Setting: Down - Down = 61º - 86º F

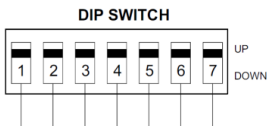
Options:

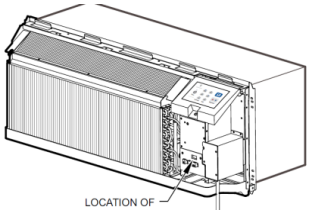
Up - Down = 63º - 80º F

Down – Up = 65º - 78º F

Up – Up = 68º - 75º F

Dip Switches



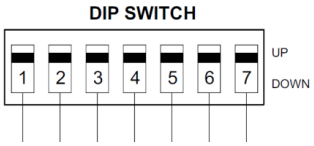


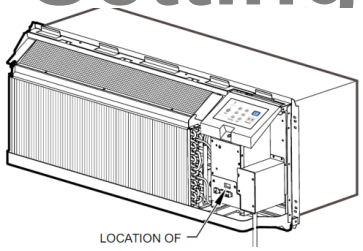
OPERATION

Dip Switch Function #7

Dip Switch Settings

Dip Switches





Dip Switch # 7 **Room Freeze Guard Protection**

- **Allows the unit to ensure the indoor room temperature does not fall below 40º F even when turned off.**
  - **If unit senses a room temperature below 40° F, the fan motor and electric heat will turn on and warm the room to 50° F. And turn off.**

Factory position: Down- Freeze protection enabled

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.

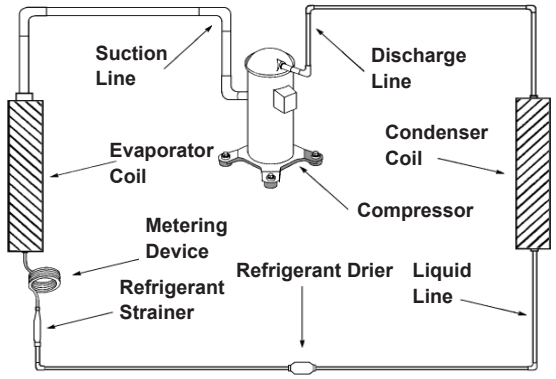


Figure 301 (Sequence of Operation)

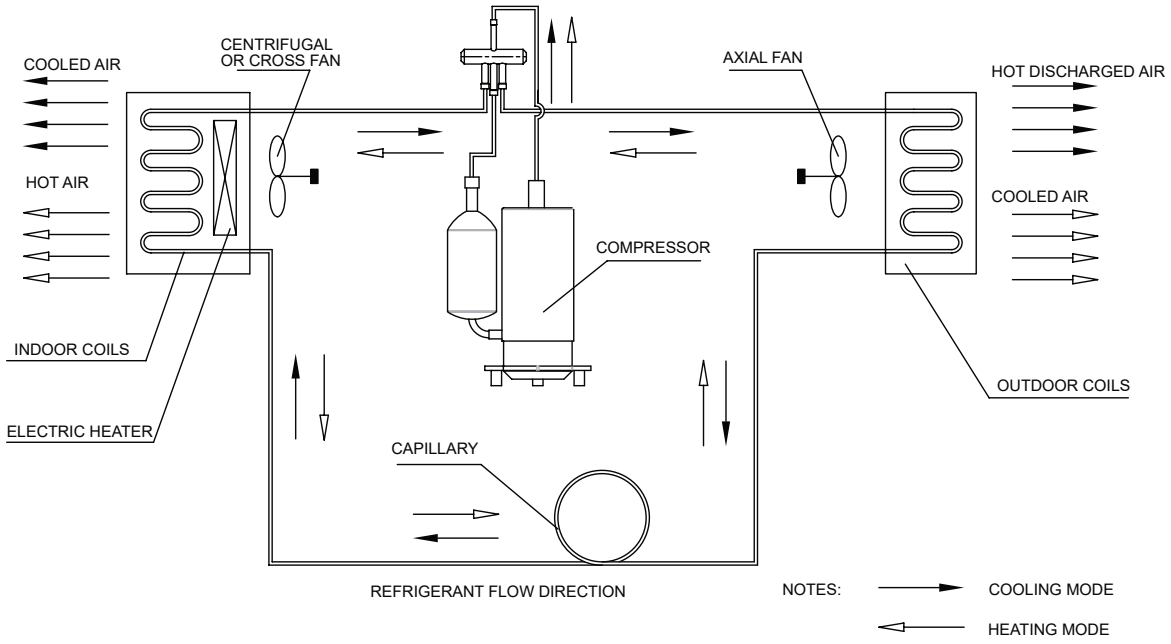
The particular system design determines at exactly what point (in the evaporator) the change of state (i.e. liquid to a gas) takes place. In all cases, however, the refrigerant must be totally evaporated (changed) to a gas before leaving the evaporator coil.

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

OPERATION

Refrigerant System Diagram

(1)Cooling + Heat Pump + Auxiliary Electric Heater



(2) Cooling + Electric Heater

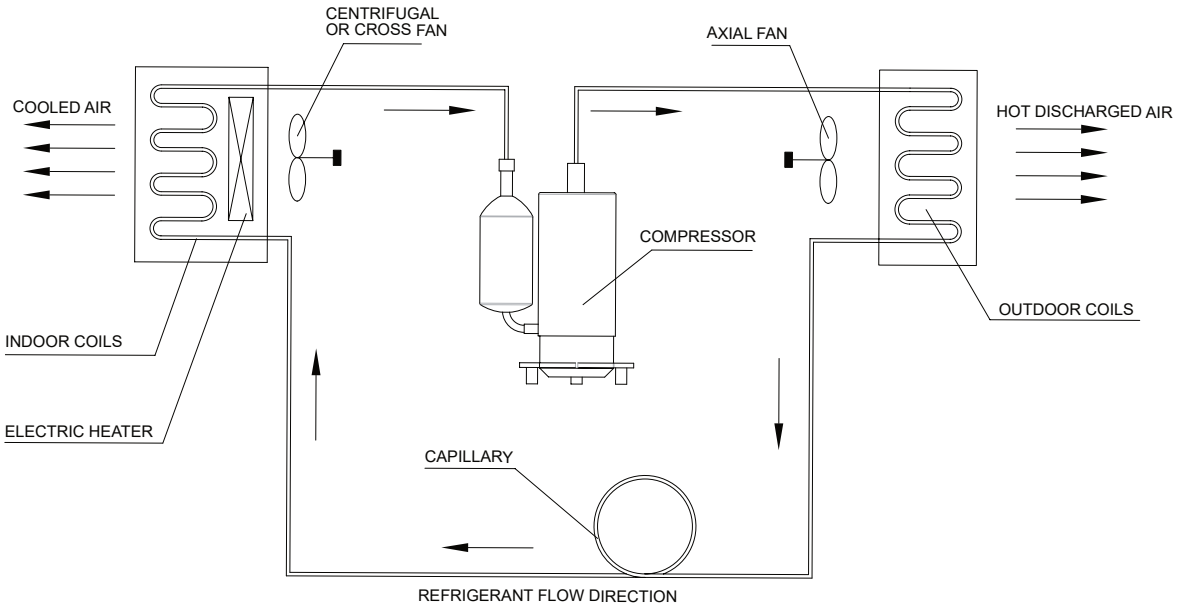


Figure 301 (Sequence of Operation)

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 / Condensor Fan / Shroud

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

Electrical / Electronic

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

Air Filter

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

REMOVAL PROCEDURE

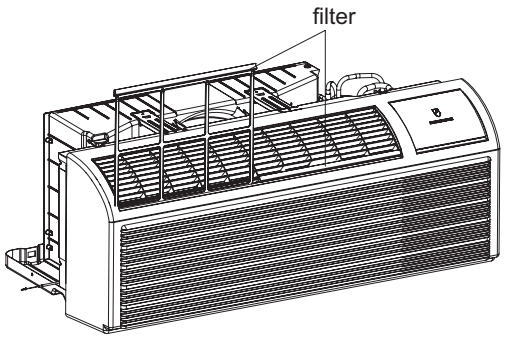
Remove The Chassis

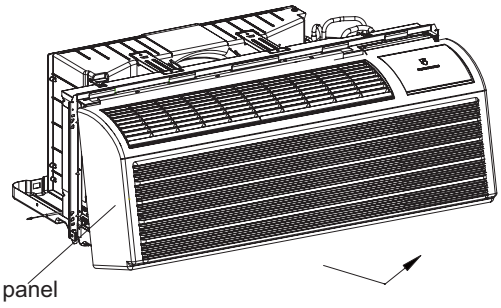
⚠ Caution: pull out the power,discharge the refrigerant completely before removal.

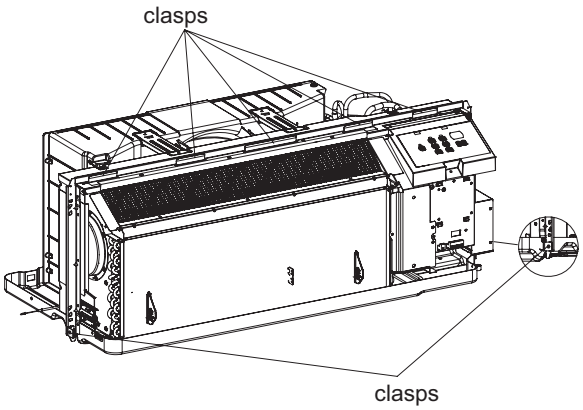
Note: Take heat pump+electric heating unit as example for the disassemly; cooling only+electric heating is a little different

1.Remove panel

a	Hold front end of filter with hand and then pull the filter upwards to remove it.
b	Drag the lower part of panel, pull it outwards and upwards to left separate from clasps, and then remove the front panel.

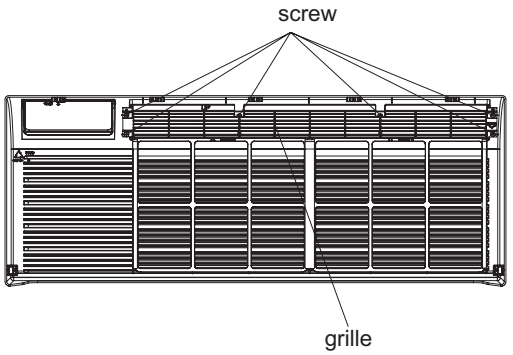
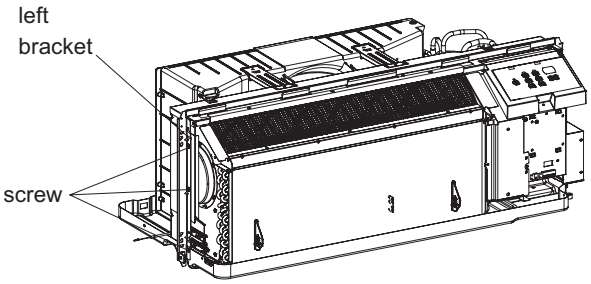
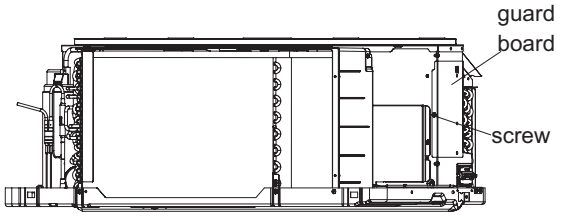
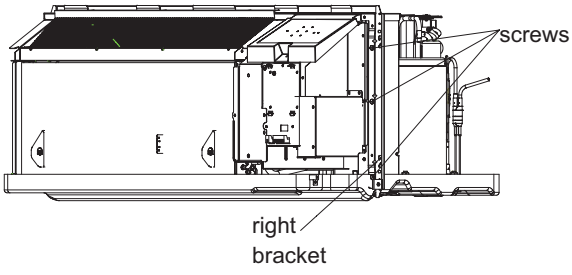






REMOVAL PROCEDURE

Remove The Chassis

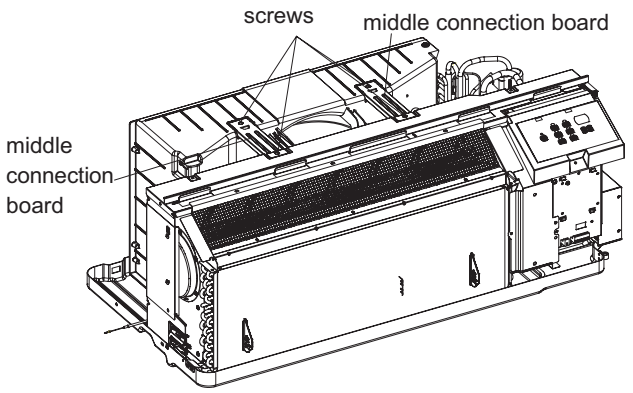
c	Remove 7 screws fixing the grille and then remove the grille.	
2.Remove left and right brackets and guard board		
a	Remove 3 screws fixing left bracket and then remove the left bracket.	
b	Remove screw fixing the guard board, and then pull it upwards slightly to remove the guard board.	
c	Remove 3 screws fixing right bracket and then remove the right bracket.	

REMOVAL PROCEDURE

Remove The Chassis

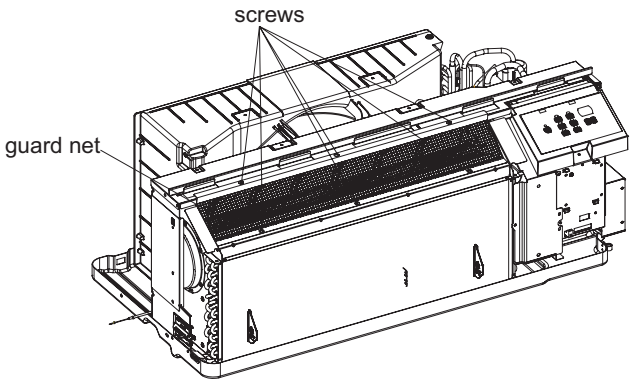
3.Remove middle connection board

Remove 4 screws fixing the middle connection board and then remove the middle connection board.



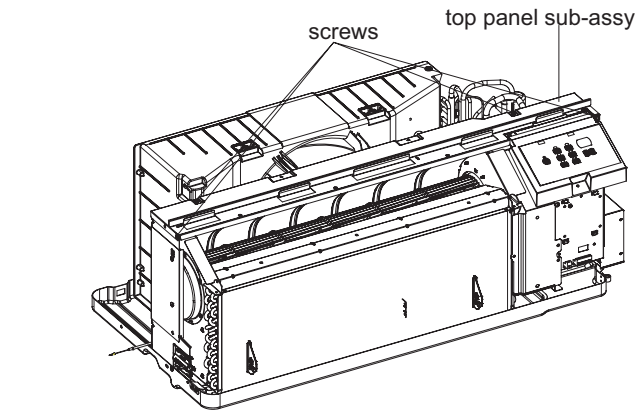
4.Remove guard net

Remove 6 screws fixing the guard net and then remove the guard net.



5.Remove top panel sub-assy

Remove 4 screws fixing the top panel sub-assy and then remove the top panel sub-assy.

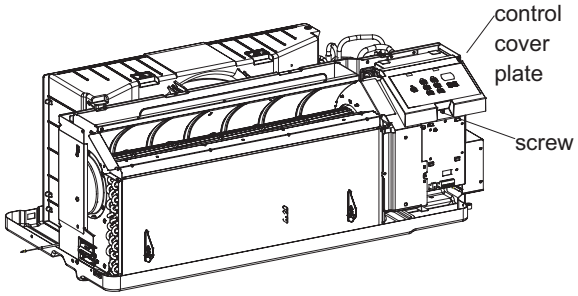


REMOVAL PROCEDURE

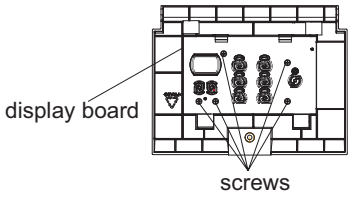
Remove The Chassis

6.Remove electric box

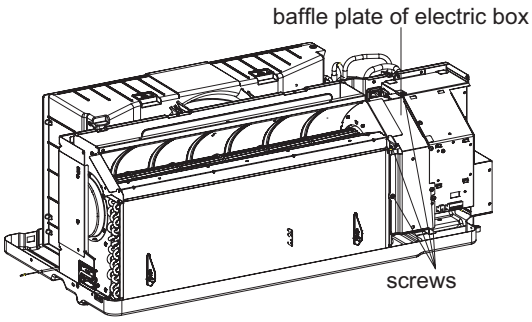
a Remove one screw fixing the control cover plate, pull out the wiring terminal connecting control cover plate and electric box and then remove the control cover plate.



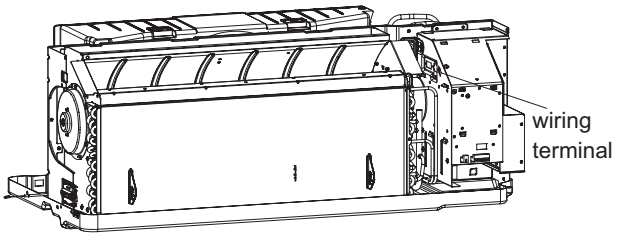
b Remove 4 screws fixing display board and then remove the display board.



c Remove 4 screws fixing baffle plate of electric box and then remove the baffle plate of electric box.

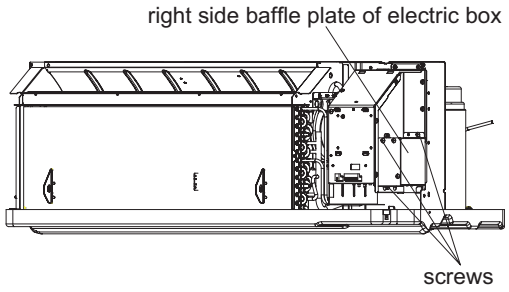
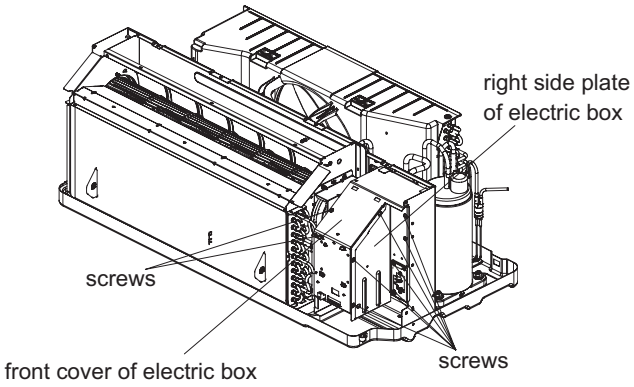
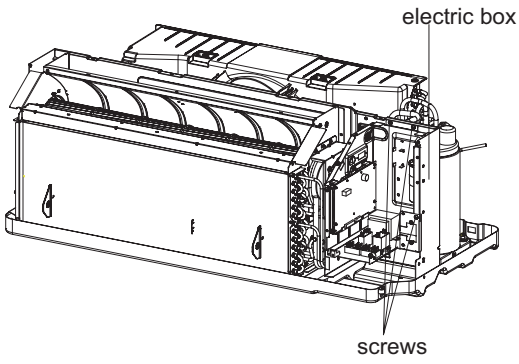


d Pull out the motor wiring terminal.



REMOVAL PROCEDURE

Remove The Chassis

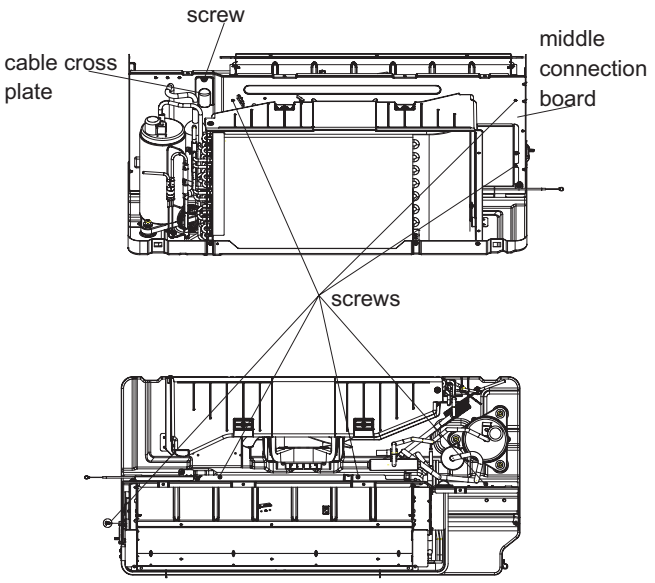
e	Remove 4 screws fixing right side baffle plate of electric box and then remove the right side baffle plate of electric box.	
f	(1) Remove 7 screws fixing right side plate of electric box and then remove the right side plate of electric box. (2) Remove 2 screws fixing front cover of electric box and then remove the front cover of electric box.	
g	Remove 3 screws fixing electric box and then remove the electric box.	

REMOVAL PROCEDURE

Remove The Chassis

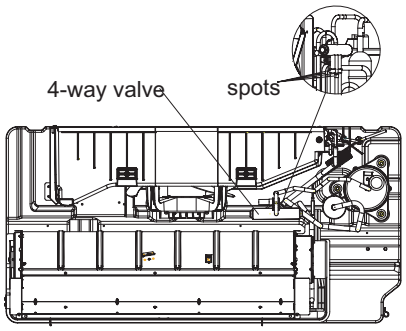
7.Remove middle connection board

a	Remove 7 screws fixing the middle connection board and then remove the middle connection board.
b	Remove one screw fixing the cable cross plate and then remove the cable cross plate.



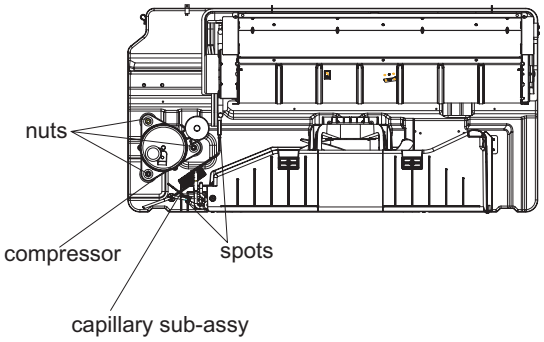
8.Remove 4-way valve

	Unsolder spot weld between 4-way valve and compressor, condenser and evaporator, and then remove 4-way valve.



9.Remove compressor and capillary sub-assy

a	Remove 3 nuts fixing compressor and then remove compressor.
b	Unsolder spot weld between capillary sub-assy compressor and condenser and then remove capillary sub-assy.

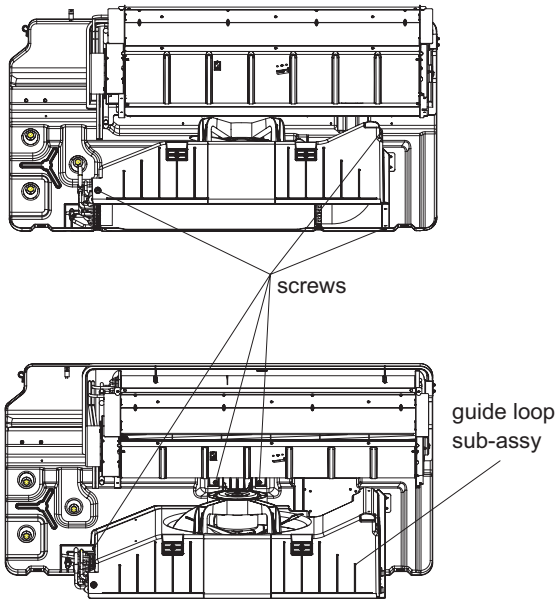


REMOVAL PROCEDURE

Remove The Chassis

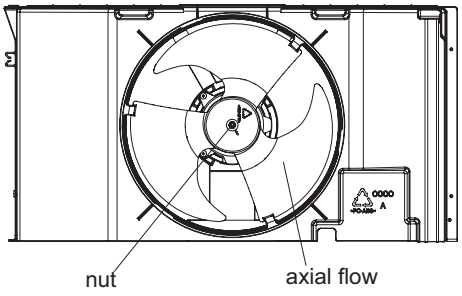
10.Remove guide loop sub-assy

Remove 6 screws fixing the guide loop sub-assy, and then pull the guide loop upwards to remove it.



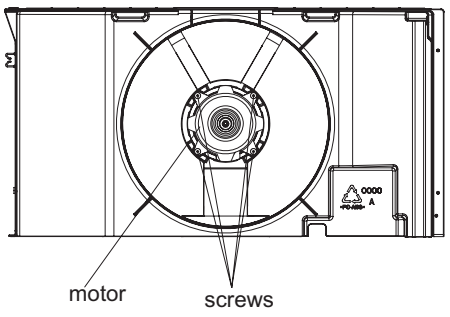
11.Remove axial flow

Remove nuts fixing axial flow blade and then pull the axial flow blade outwards to remove it.



12.Remove outdoor motor

Remove 4 screws fixing motor and then remove the motor.

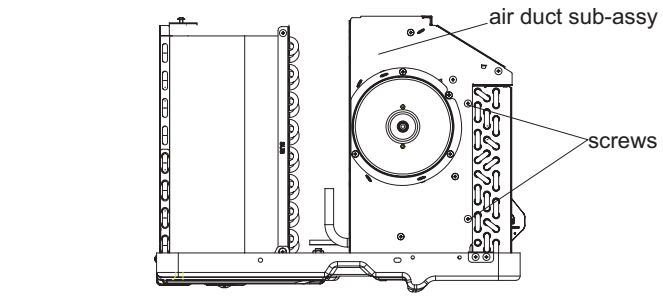


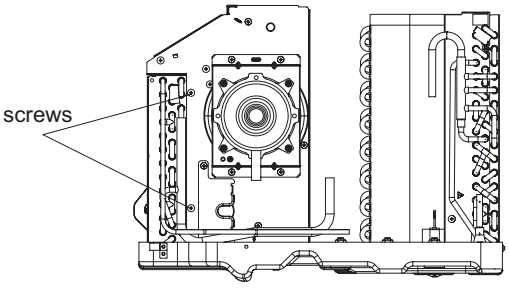
REMOVAL PROCEDURE

Remove The Chassis

13.Remove air duct sub-assy

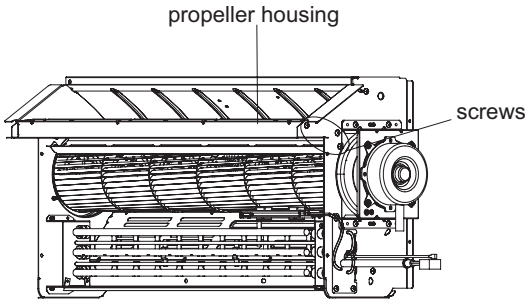
Remove 4 screws fixing the middle connection board and then remove the middle connection board.

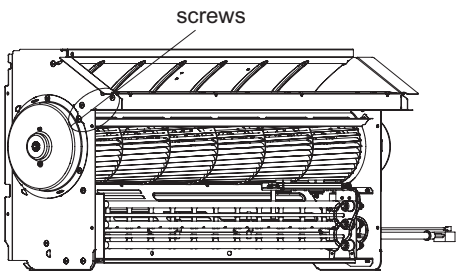




14.Remove propeller housing

Remove 4 screws fixing the propeller housing and then remove the propeller housing.



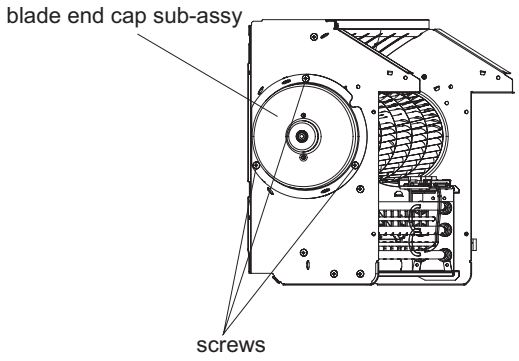


REMOVAL PROCEDURE

Remove The Chassis

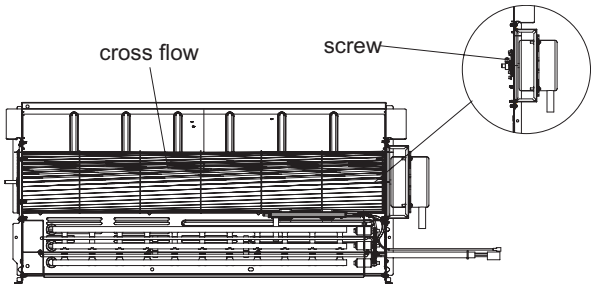
15.Remove blade end cap sub-assy

Remove 3 screws fixing the blade end cap sub-assy and then remove the Blade end cap sub-assy.



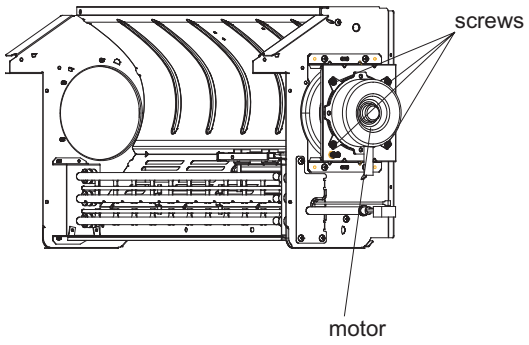
16.Remove guard net

Remove one screw fixing cross flow blade and then remove the cross flow blade.



17.Remove indoor motor

Remove 4 screws fixing motor and then remove the motor.

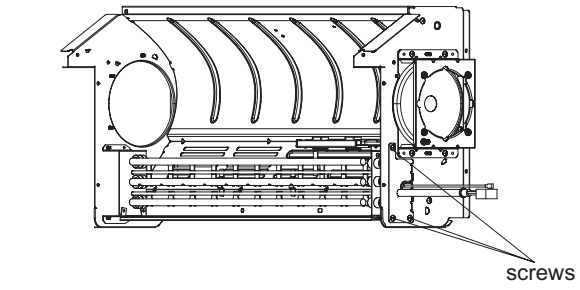


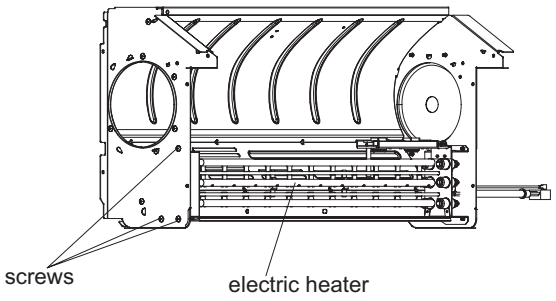
REMOVAL PROCEDURE

Remove The Chassis

18.Remove electric heater

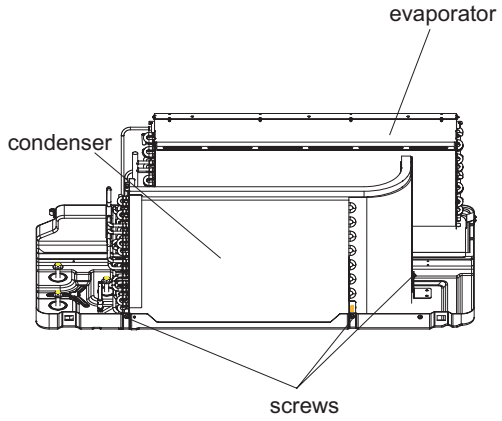
Remove 6 screws fixing electric heater, and then pull the electric heater vertically to remove it.





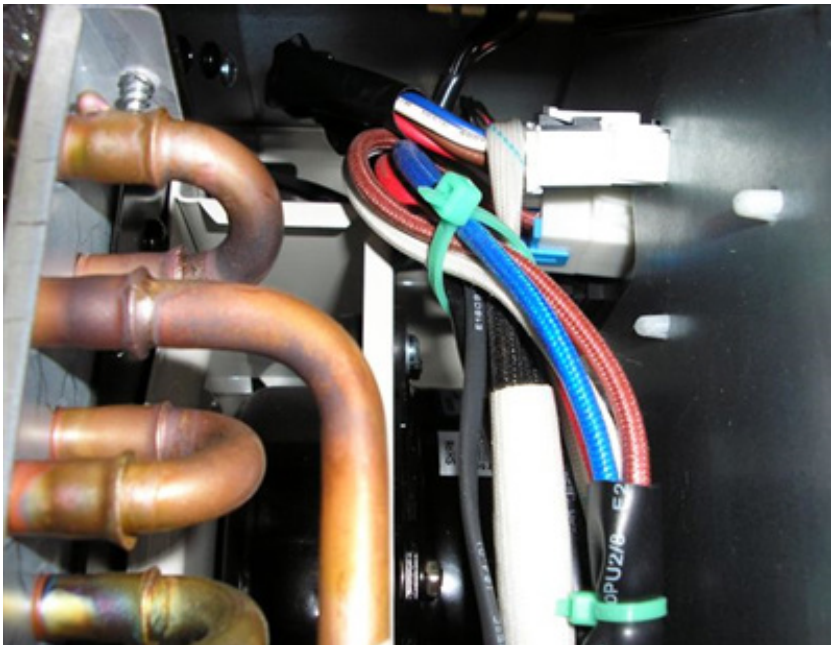
19.Remove evaporator and condenser

Pull the evaporator upwards to remove it. Remove 3 screws fixing condenser and then pull the condenser upwards to remove it.



UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly



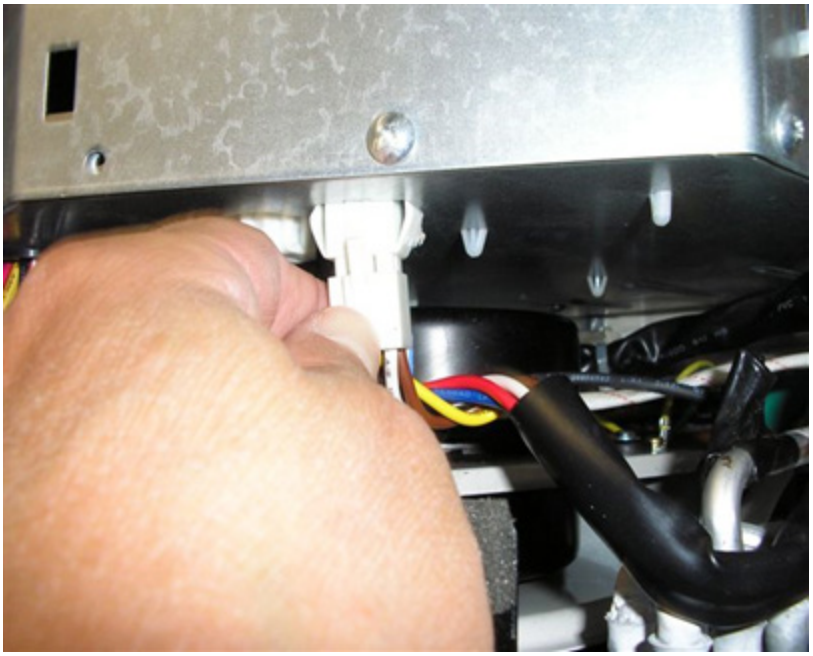


FIGURE 401 (Removal of Indoor Fan Wire Harness)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

FIGURE 402 (Removal of Indoor Fan Blower Assembly)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

FIGURE 403 (Removal of Indoor Fan Grommet)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

Figure 404 (Left side Bushing & Bushing Housing)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

Figure 405 (Removal of Indoor Fan Blower Assembly)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

Figure 406 (Removal of Indoor Fan Housing Assembly)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

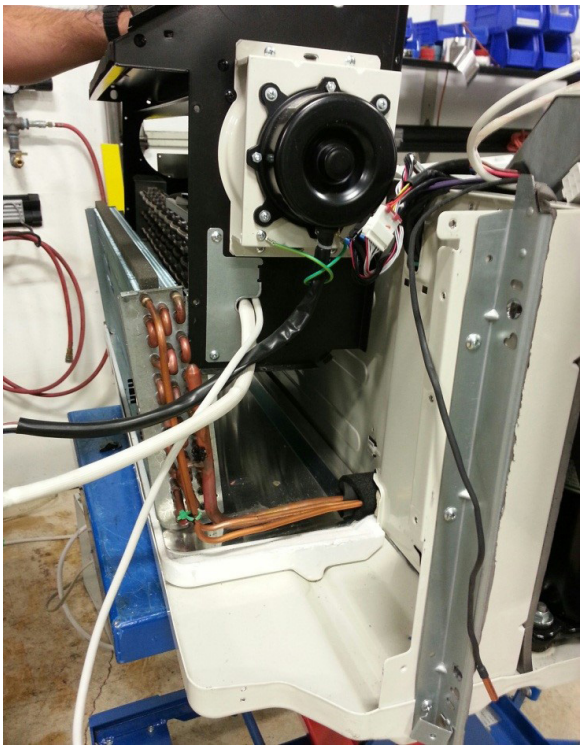


Figure 407 (Remove Housing, Indoor Motor and Heater)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

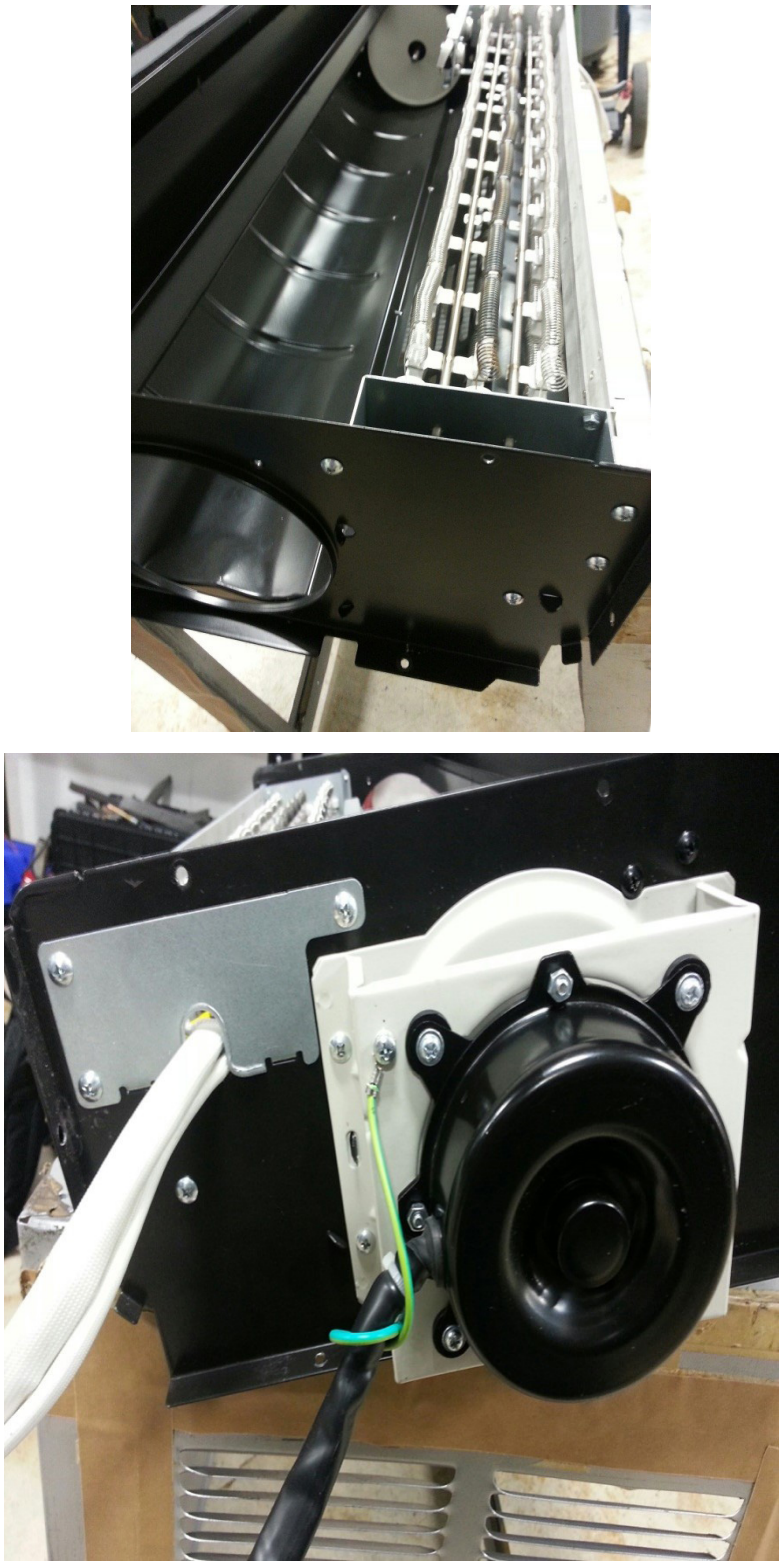


Figure 408 (Heater Element Removal, 3 screws on each side)

UNIT DISASSEMBLY

Indoor Motor, Wheel, & Heating Element Assembly

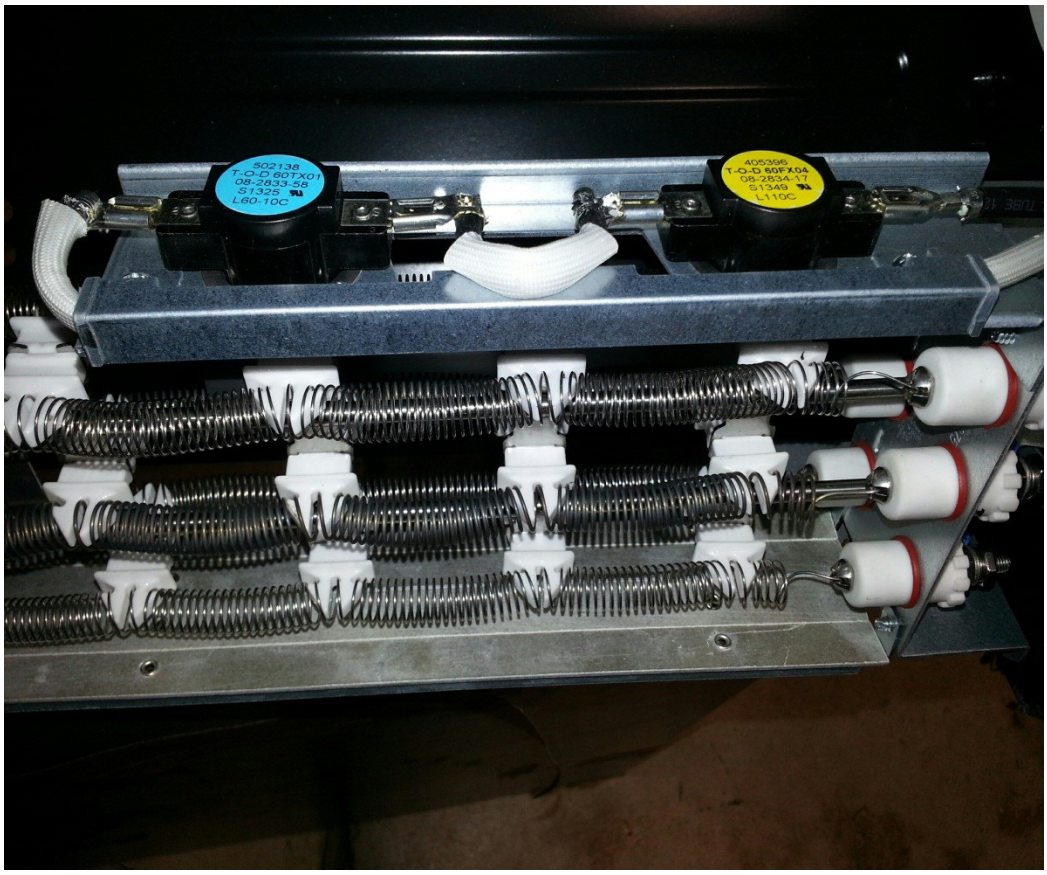


Figure 409 (Primary & Secondary Limits)

UNIT DISASSEMBLY

Outdoor Motor, Blade, & Shroud Assembly

Figure 410 (Remove Gussets and Fan Shroud)

UNIT DISASSEMBLY

Outdoor Motor, Blade, & Shroud Assembly

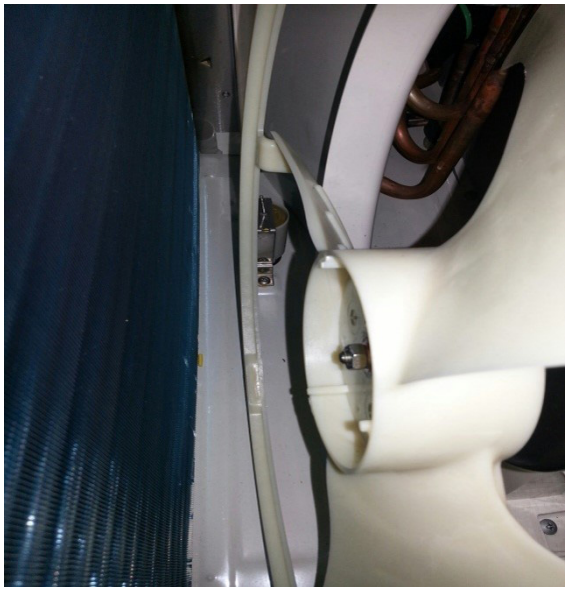


Figure 411 (Loosen Fan Shroud and Bellows Drain Valve Located inside Shroud)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

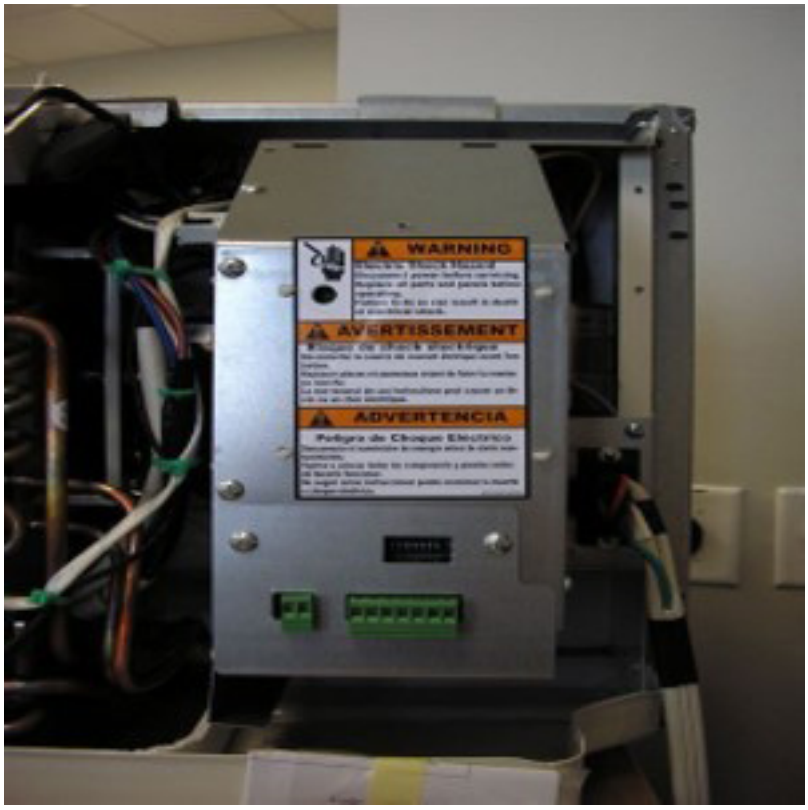


Figure 412 (Remove User Interface)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

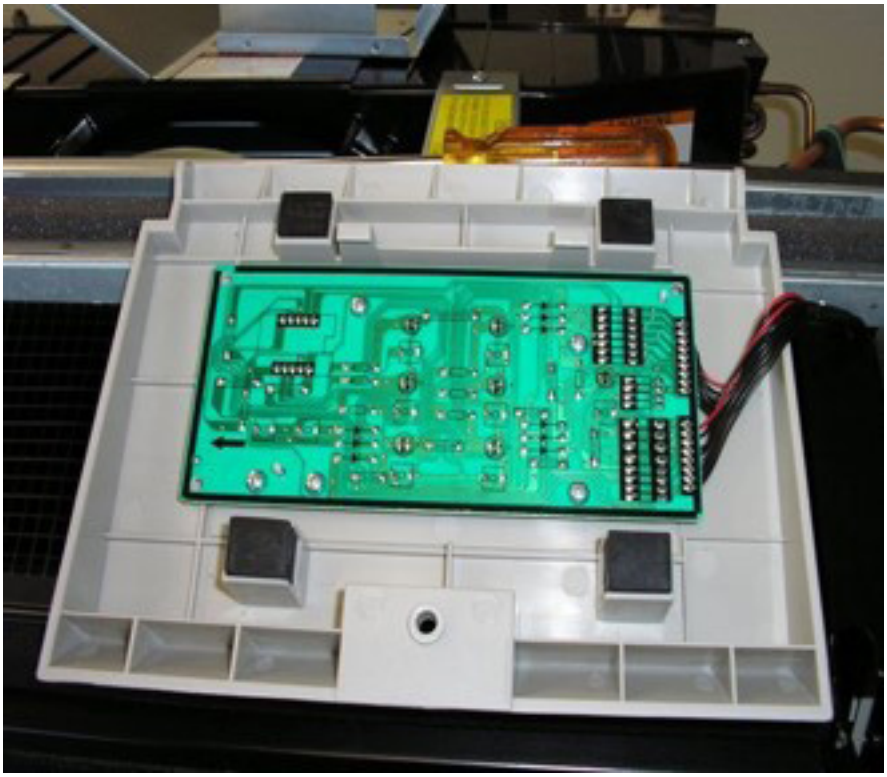


Figure 413 (Remove User Interface)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

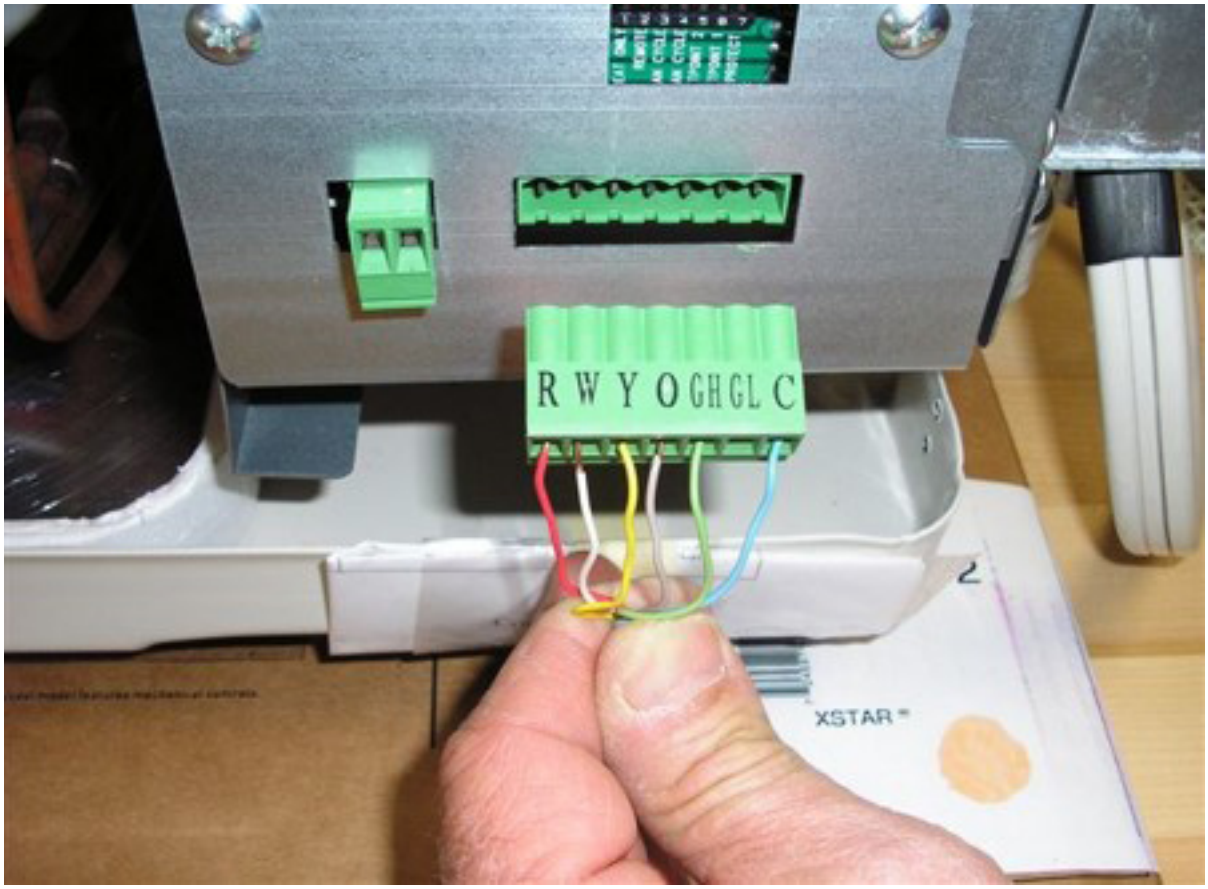


FIGURE 414 (Low Voltage Connections)

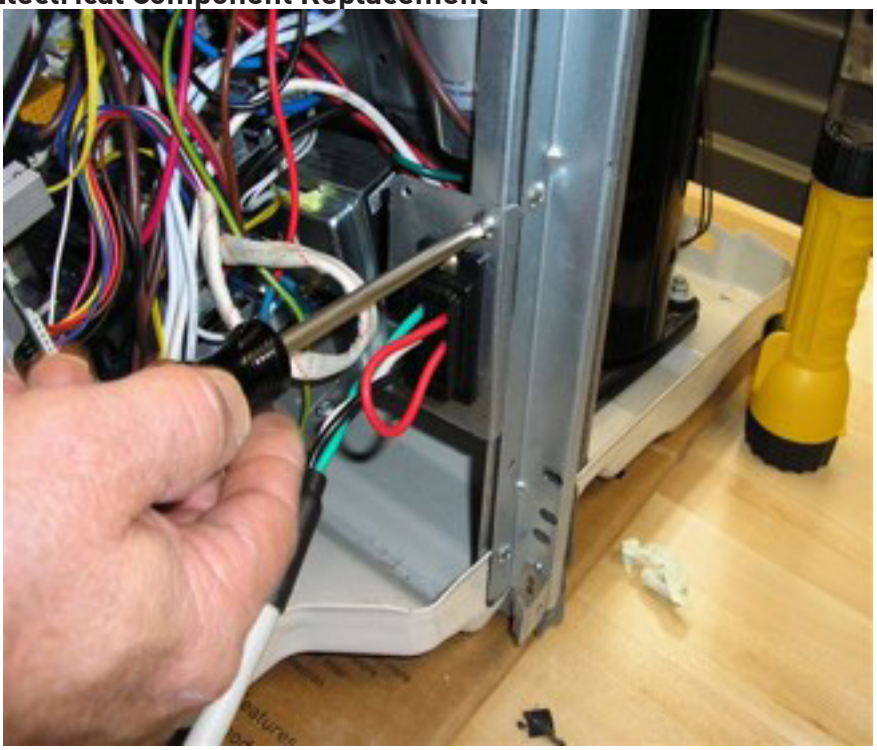
UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

Figure 415 (Power Cord and Housing)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement



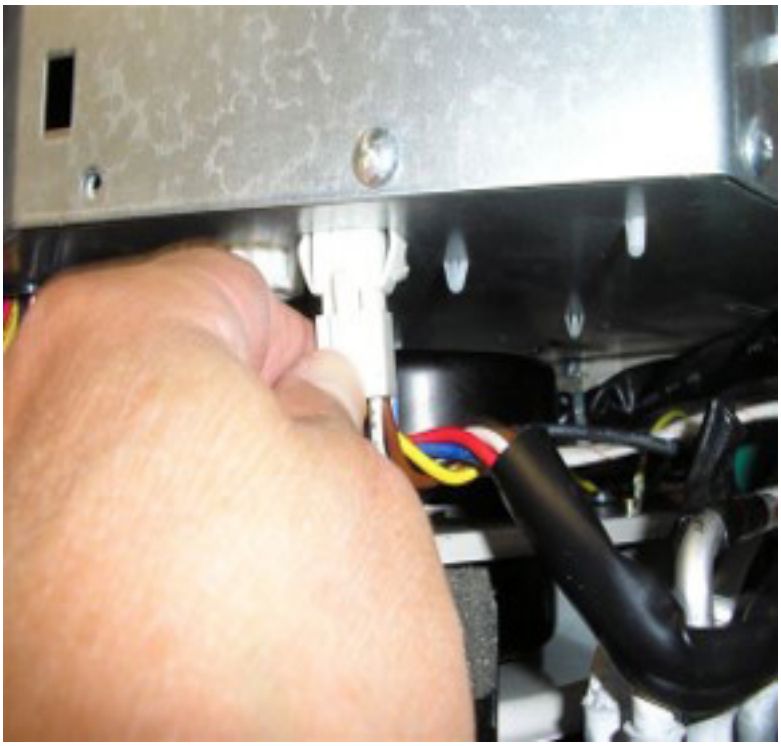


Figure 416 (Power Cord, Indoor Motor, and Heater Connections)

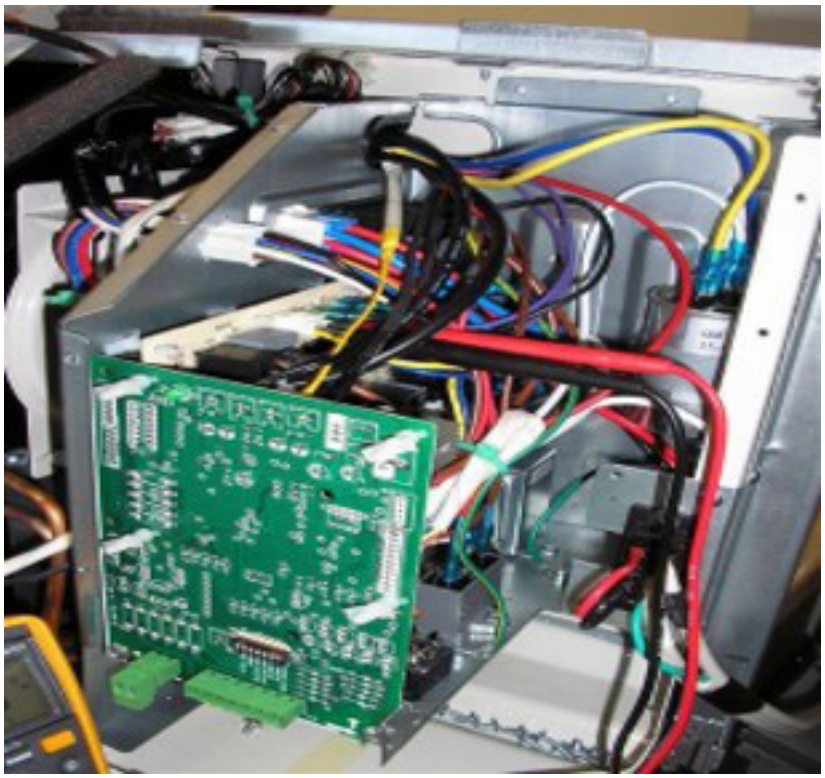
UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

Figure 417 (Removal of Control Compartment)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement



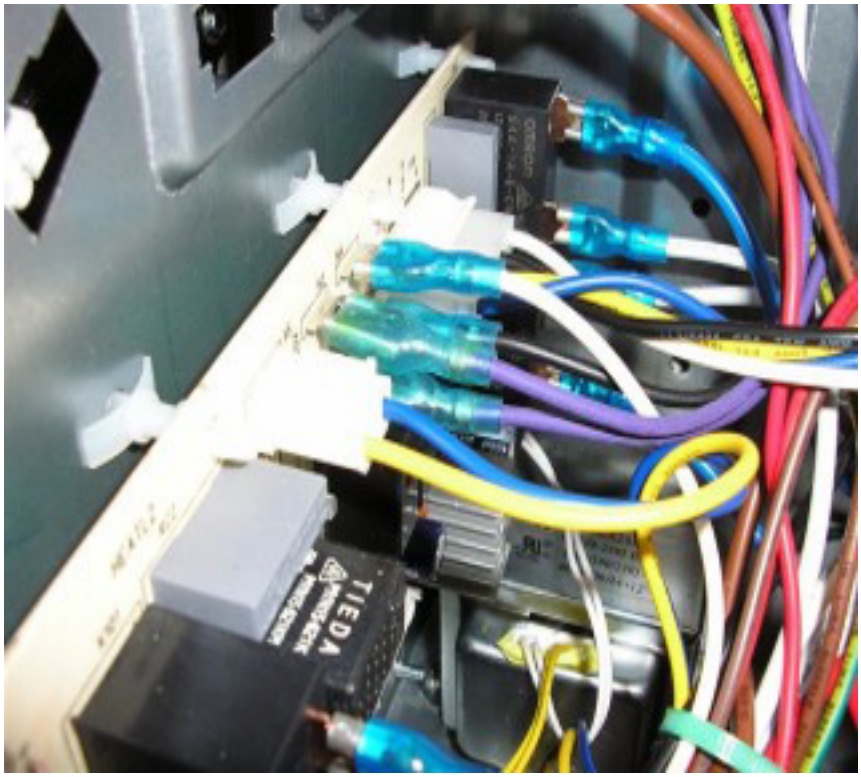


Figure 418 (Main Board & Relay Board)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

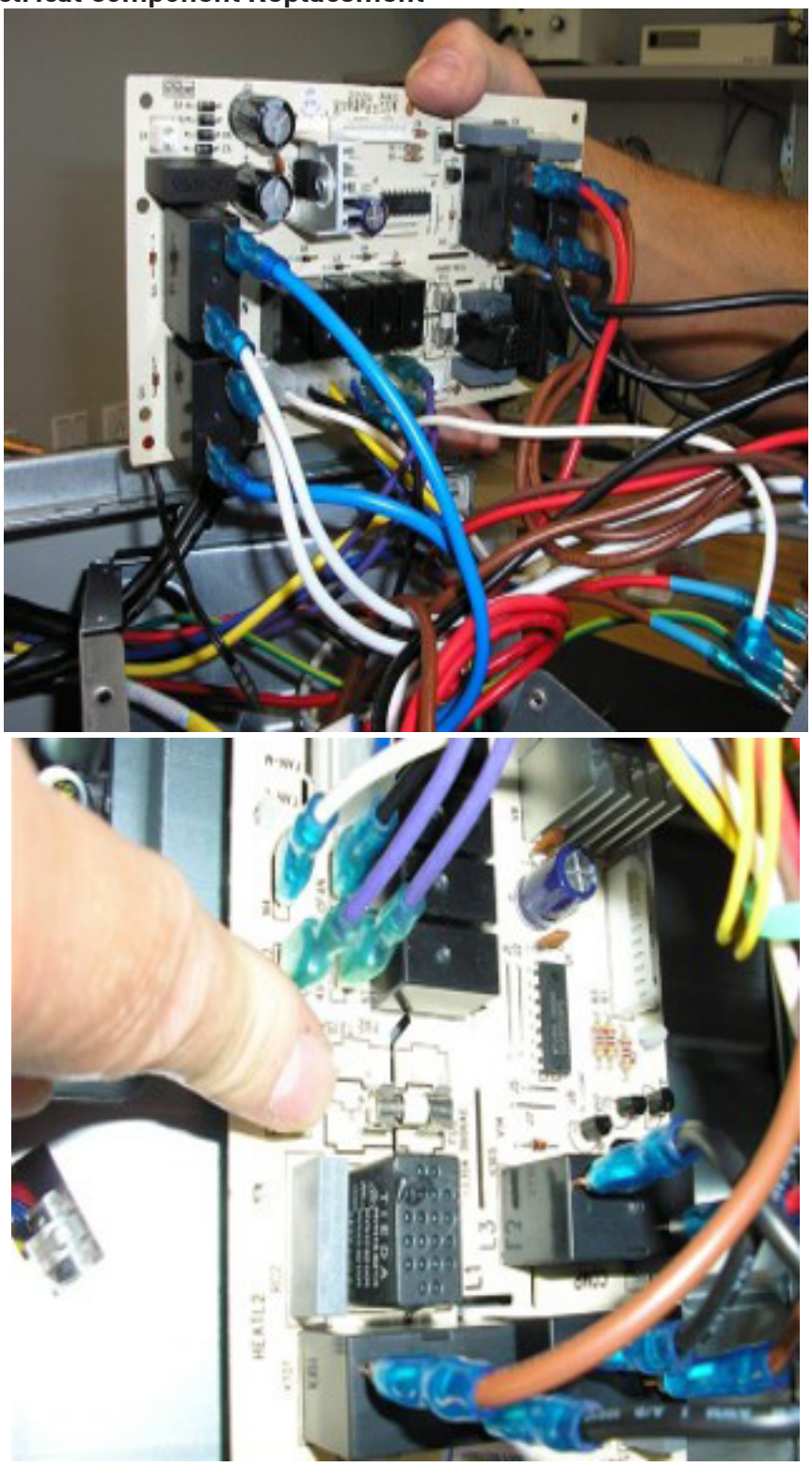
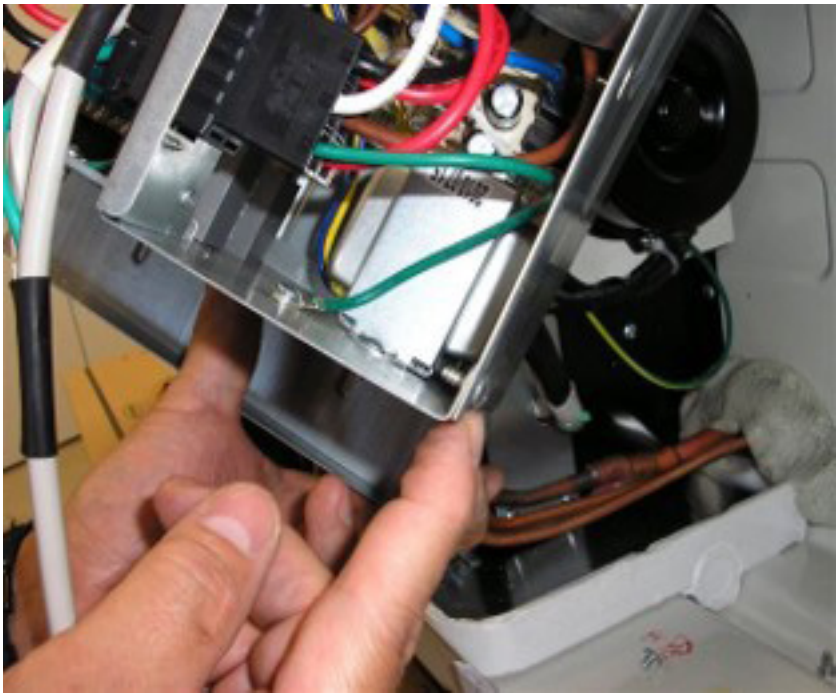


Figure 419 (Relay Board and Replaceable Fuse)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement



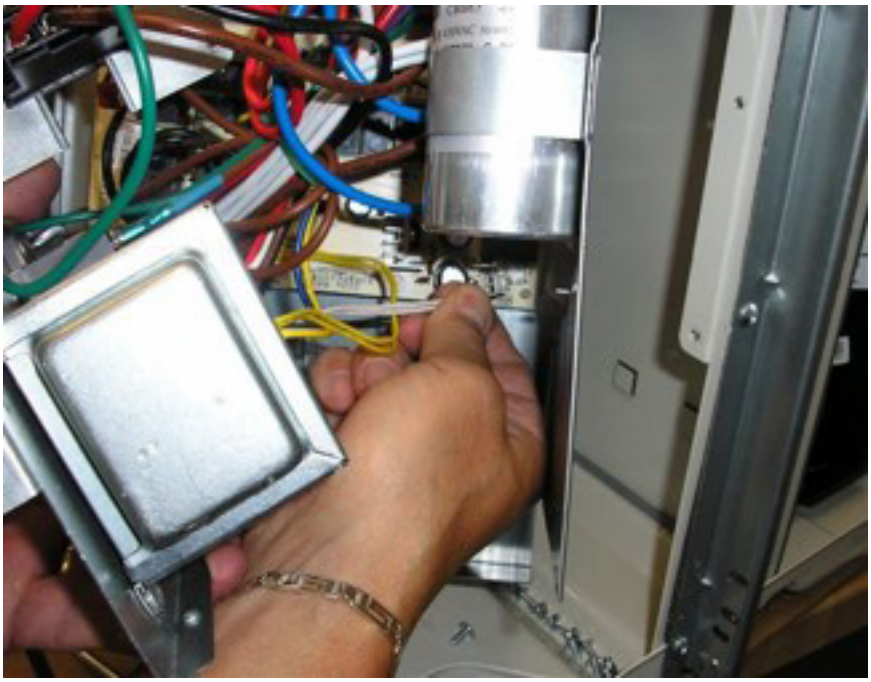


Figure 420 (Transformer)

UNIT DISASSEMBLY

Electronic Board & Electrical Component Replacement

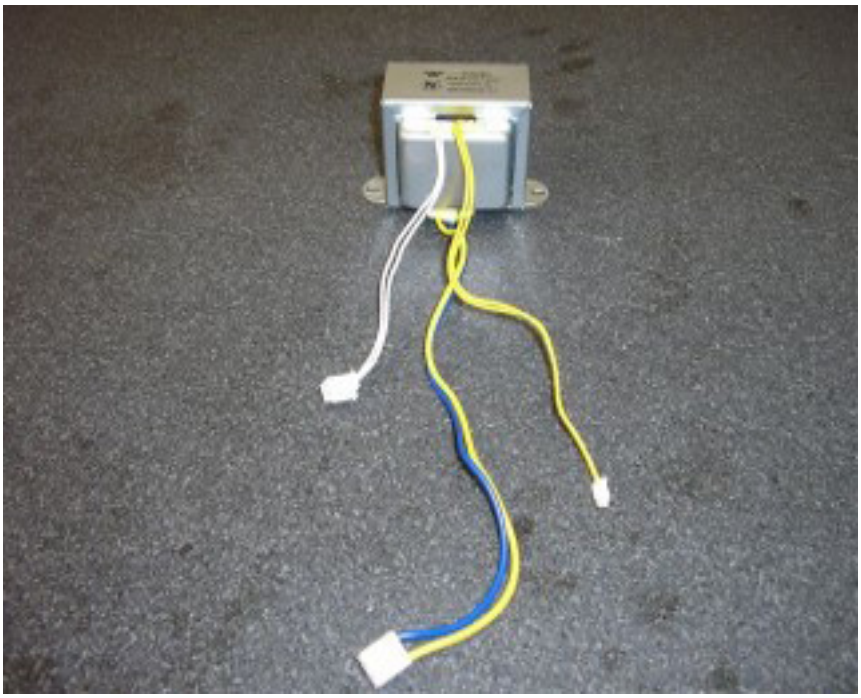


Figure 421 (Transformer Removed)

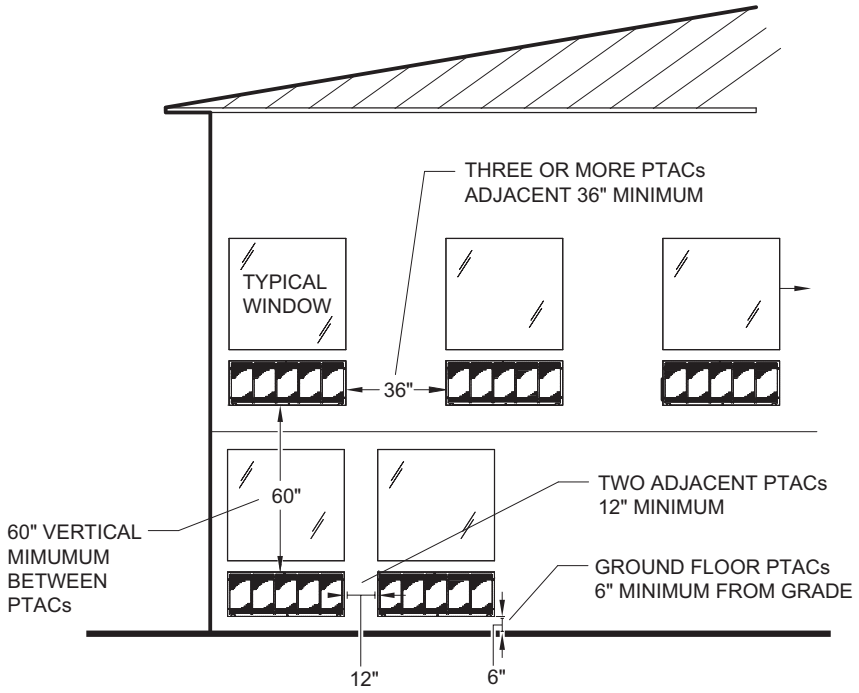
INSTALLATION

PTAC Installation Recommendations

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

Figure 1

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



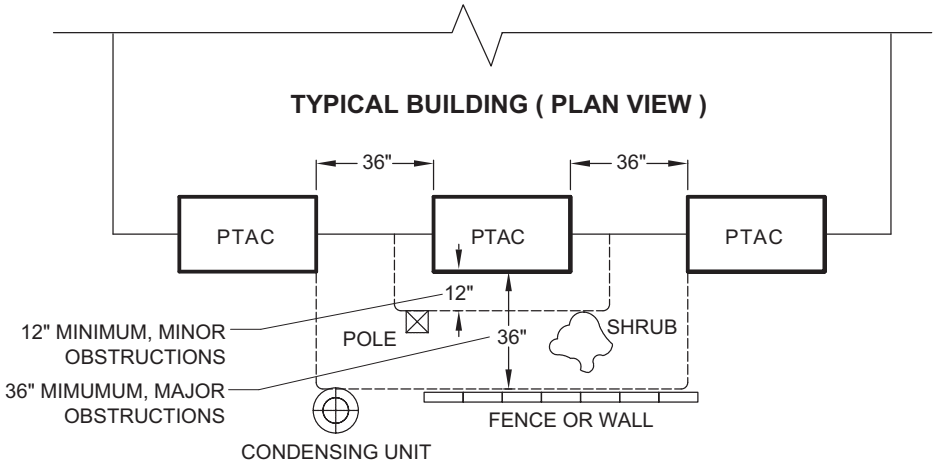
VIEW: OUTSIDE BUILDING ELEVATION

FRP001

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

Figure 2

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



FRP002

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

INSTALLATION

Wall Sleeve Installation Instructions (PDXWS)

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

⚠WARNING

Falling Object Hazard

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

NOTICE

DO NOT allow any pitch toward the inside.

Flashing on all 4 sides of the opening is recommended.

Potential property damage can occur if instructions are not followed.

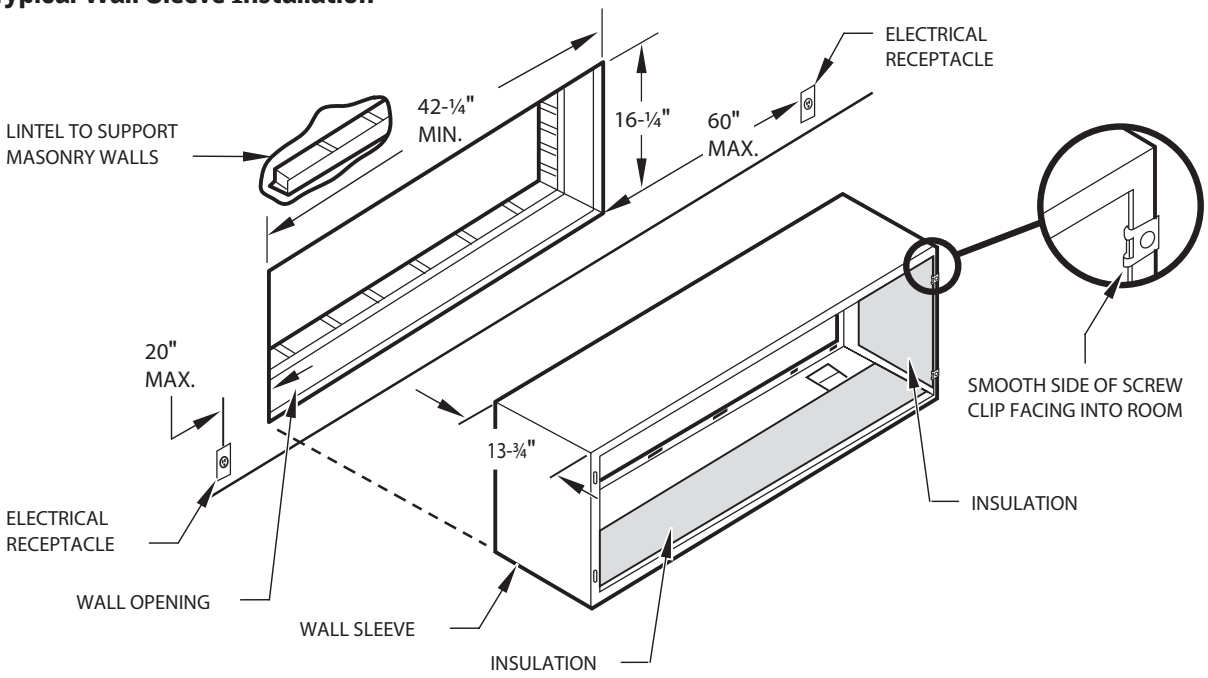
For Deep Wall Installation (Greater than 13 1/4") See Page 9

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

1. The PXDR10 Drain Kit (optional for new construction) see page 10 if applicable, must be installed before the wall sleeve is installed into the wall.
2. The External Drain (for new construction or unit replacement) see page 11, if applicable, must be installed before the wall sleeve is installed into the wall.
3. From inside the building, position the wall sleeve in the opening and push it into the wall until it protrudes at least ¼" on the outside. Do not allow sleeve to be pulled. (See Figure 11, Page 10).
4. Position the wall sleeve with a slight tilt towards the outside to facilitate condensate drainage. It should be level side-to-side and the front should be ¼ bubble higher than the back.

Figure 3

Typical Wall Sleeve Installation



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

FRP008

INSTALLATION

Alternate Wall Installations

Figure 4
Panel Wall

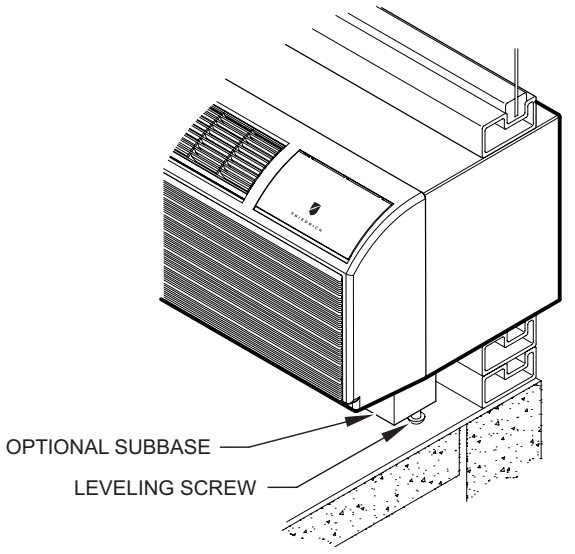


Figure 5
Frame and Brick Veneer

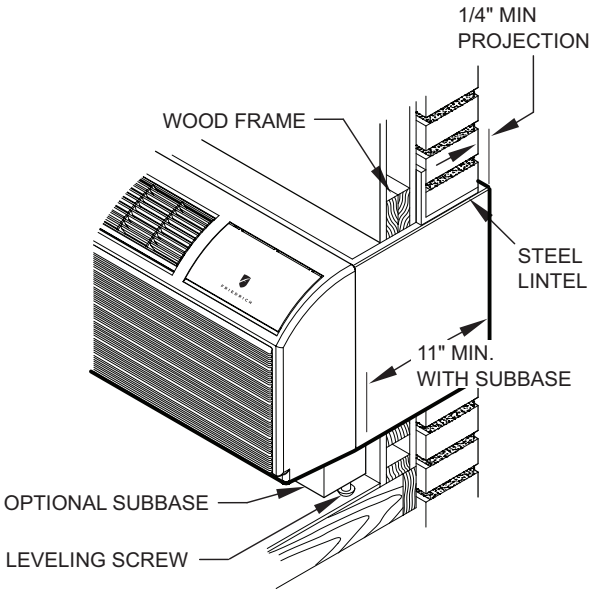


Figure 6
Curtain Wall

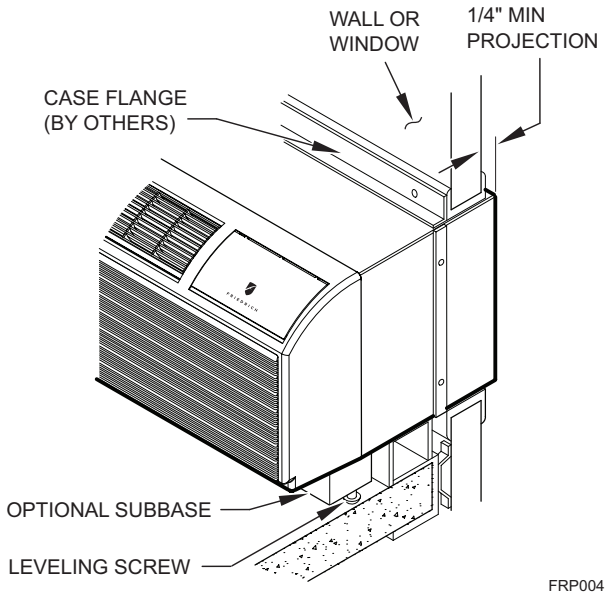
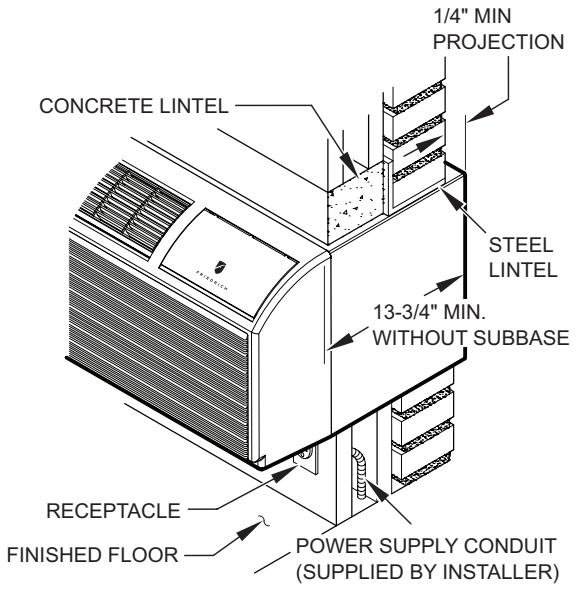


Figure 7
Block and Brick Veneer



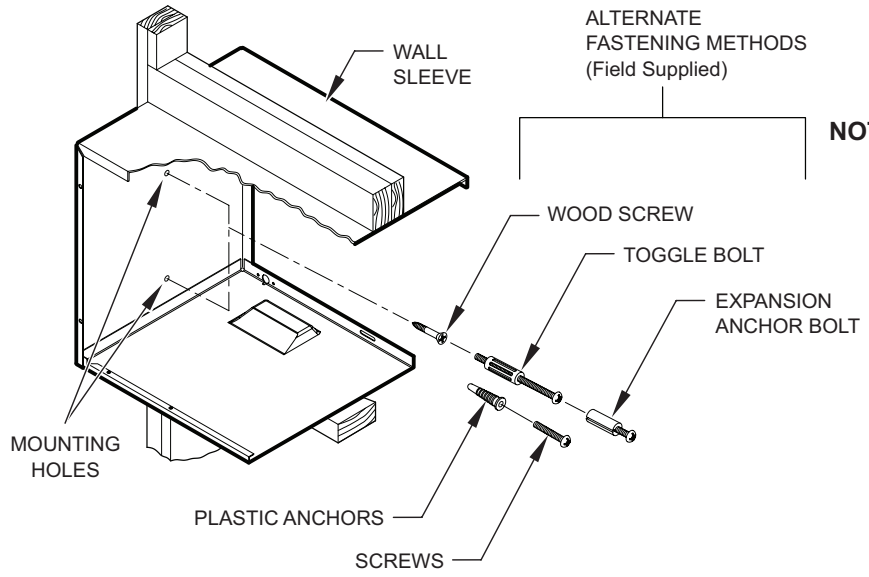
NOTE: Follow all wall system manufacturer installation instructions. For sunrooms and modular buildings, adhere to their installation instructions for supporting and sealing sleeve to their frames. All wall and window/wall installations must provide for proper drainage. In applications where the drain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

INSTALLATION

Alternate Wall Installations

Figure 8

Wall Sleeve Attachment

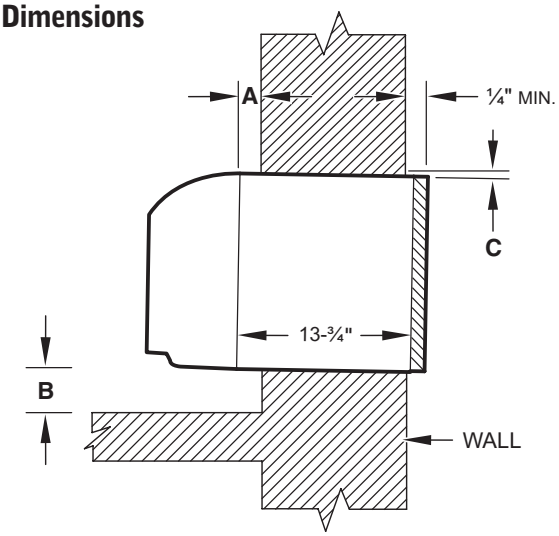


NOTE: The Wall Sleeve must be horizontally level (side-to-side) and pitched 1/4 bubble to the outside when installed in an opening.
The mounting hole location should be approximately 2-4" from the top and bottom of the sleeve.

FRP007

Figure 9

Dimensions



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

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

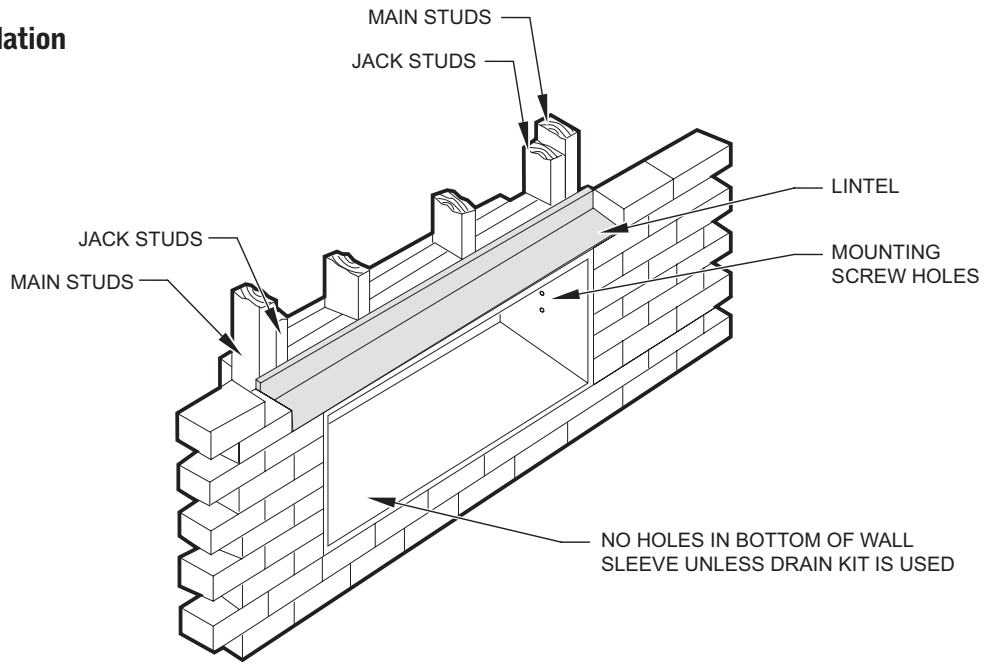
FRP009

INSTALLATION

Alternate Wall Installations

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

Figure 10
Lintel Installation



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

FRP010

One-Piece Deep Wall Sleeve Installation (PDXWSEXT)

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

INSTALLATION

PXDR10 Drain Kit Installation Instructions (optional for new construction)

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

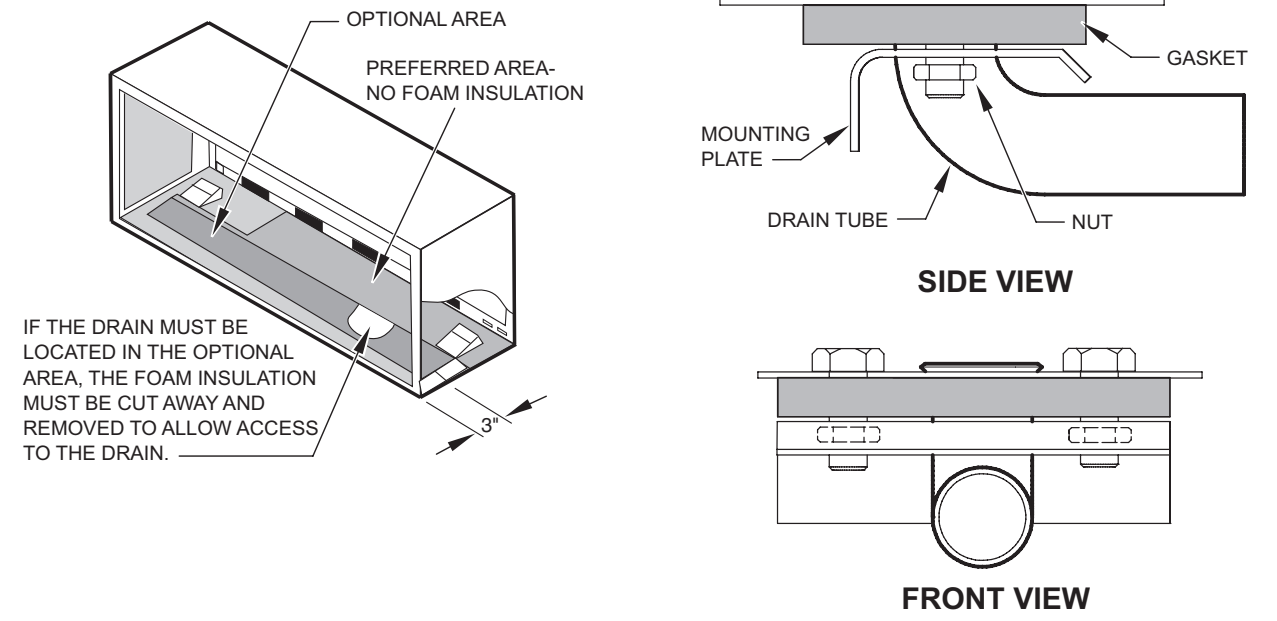
Internal Drain

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

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

Figure 11

Drain Kit Location and Installation



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

INSTALLATION

External Drain

External Drain (for new construction or unit replacement)

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

Drain Tube Installation (See Figure 12)

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

Cover Plate Installation

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

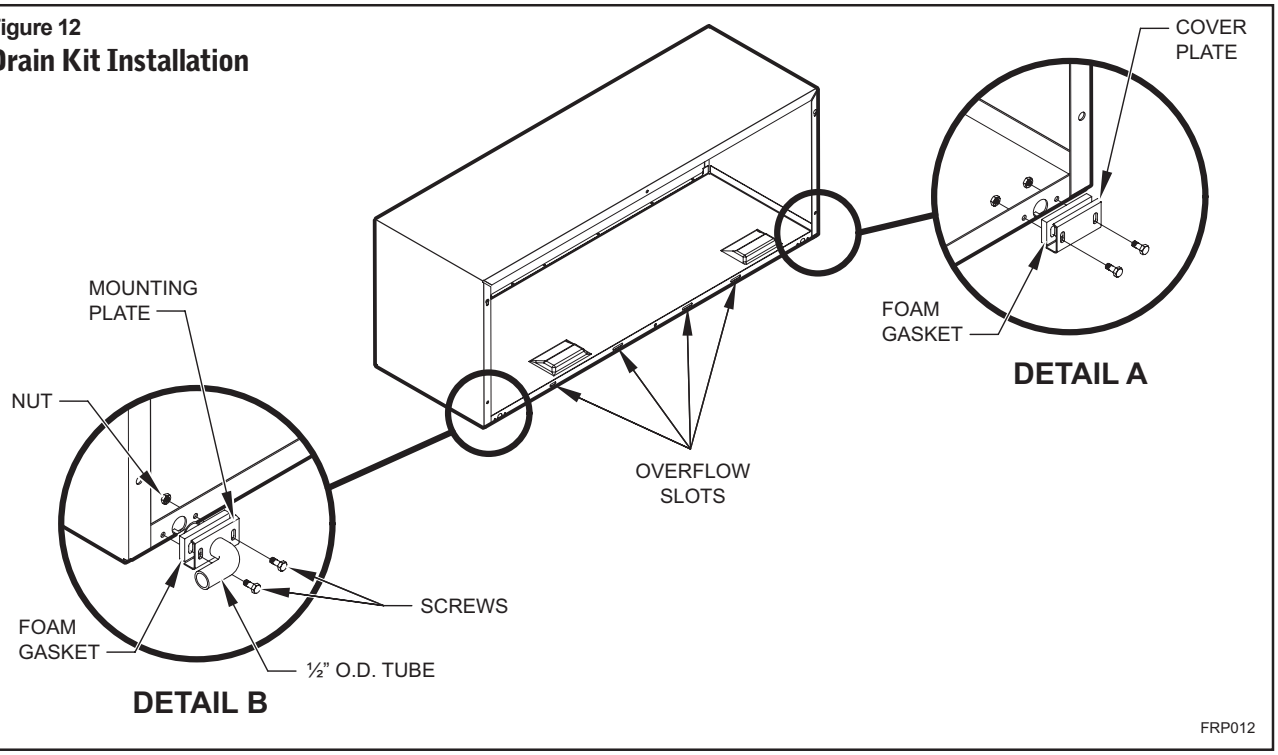
NOTICE

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

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

Potential property damage can occur if instructions are not followed.

Figure 12
Drain Kit Installation



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

INSTALLATION

PXGA Standard Grille

PXGA Standard Grille Installation Instructions

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

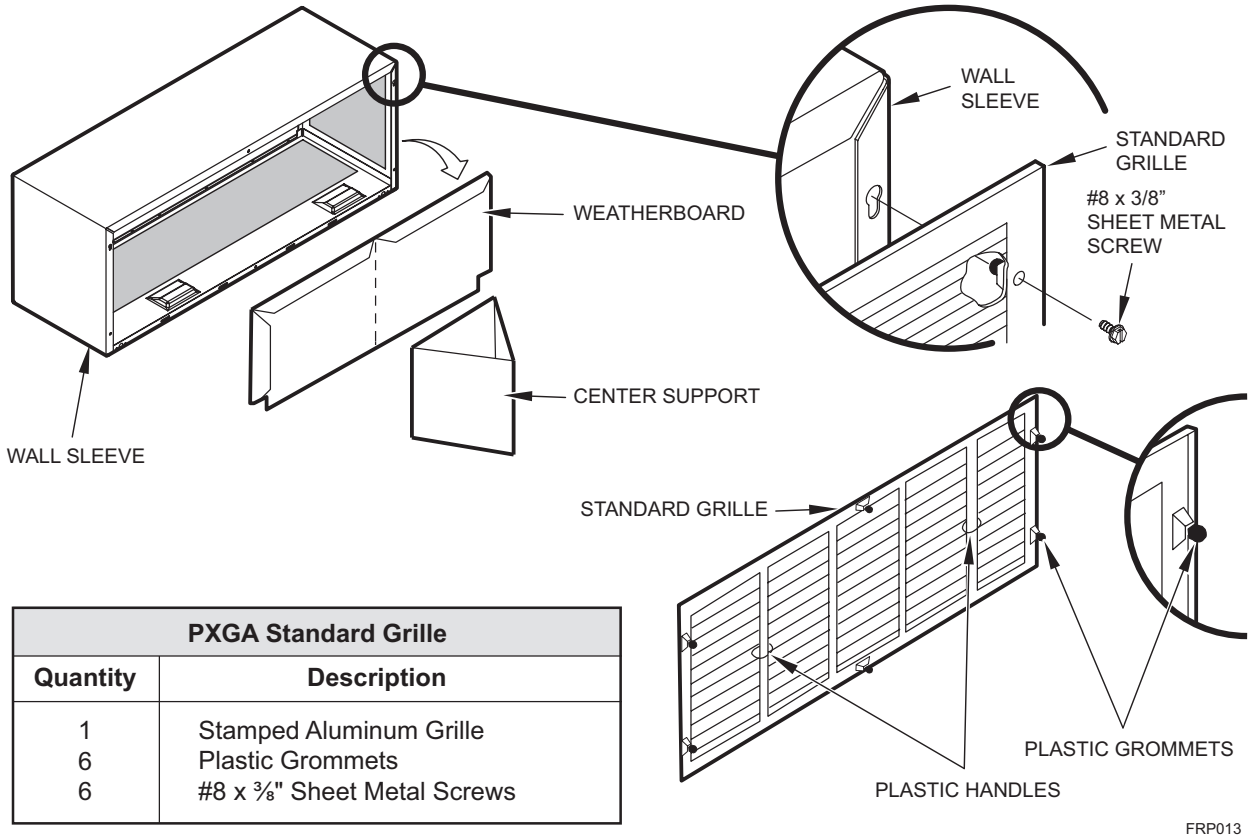
   From inside the building, maneuver the grille through the wall sleeve and pull toward you until the screw heads are inserted into the keyhole slots at the top of the wall sleeve. Tighten the two screws completely.
5. Insert the remaining screws into the remaining holes and tighten securely.

⚠WARNING

Falling Object Hazard

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

Figure 13
Standard Grille



PXGA Standard Grille	
Quantity	**Description**
1	Stamped Aluminum Grille
6	Plastic Grommets
6	#8 x ⅜" Sheet Metal Screws

Electrical Wiring for 265 Volt Models

Power Cord Installation

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

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

⚠WARNING

Electrical Shock Hazard

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

14

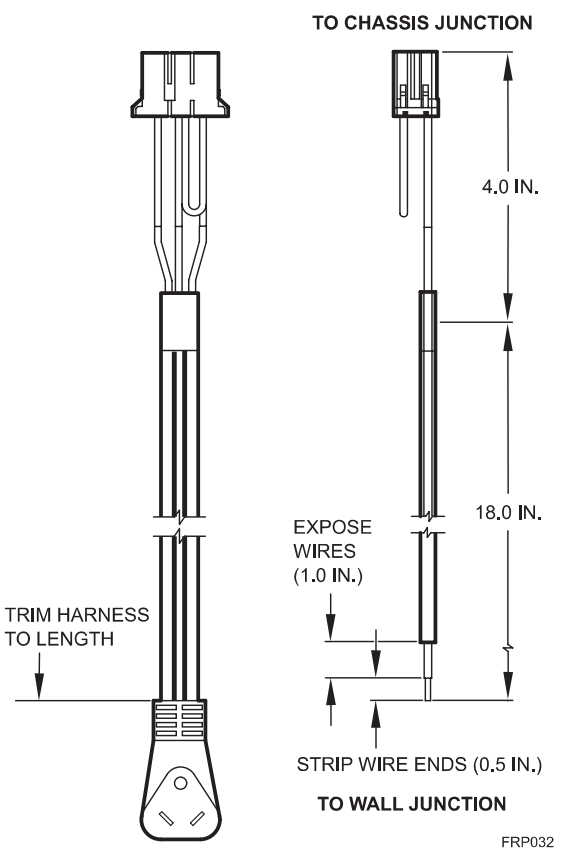
To install the line voltage power leads and conduit to chassis, follow the instructions below and refer to Figures 25-27 on page 19. PXCJA Conduit Kit is required with this setup.

1. Follow the removal process of the chassis's junction box (Figure 25, step 2, page 19).
2. Prepare the 265V (or 230V) power cord for connection to the chassis' power cord connector by cutting the cord to the appropriate length (refer to Figure 26 and follow Figure 15). Power cord harness selection shown on Table 2 on page 14.

INSTALLATION

Electrical Wiring for 265 Volt Models

Figure 15



3. Route the cut ends of harness through the conduit connector assembly and flex conduit sleeve. Be sure to use the supplied conduit bushing to prevent damage to the cord by the conduit.

   The cord should pass through the Locknut, Spacer, Chassis Junction Box, Conduit Connector, Bushing, then the Conduit Sleeve. See Figure 17.

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

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

6. Follow steps 4-6 on page 19 and refer to Figure 27.

Figure 16

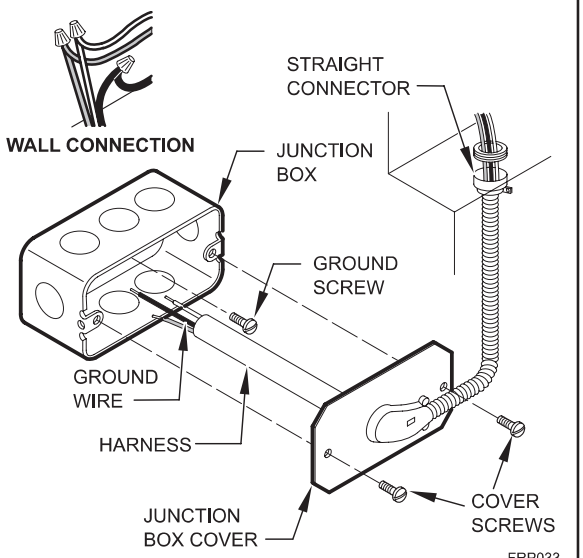
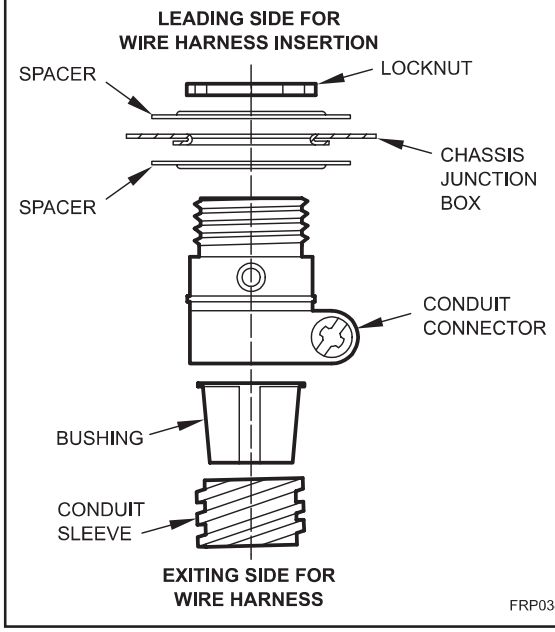


Figure 17



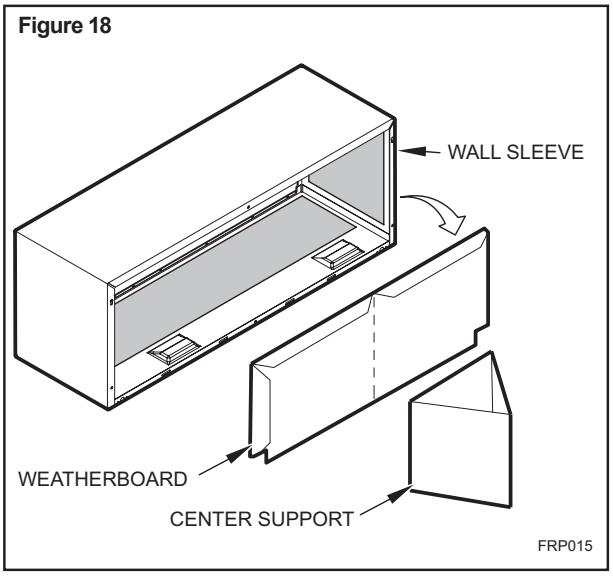
INSTALLATION

Chassis Install Preparation

Check to be sure the wall sleeve, extension (if used), grille, and drain kit are installed properly before chassis installation.

1. Remove the weatherboard and center support from the sleeve (if still in place). Be sure an outdoor grille is attached.

Figure 18



NOTE: Use a wall sleeve adapter kit (PXSE) if installing a P-Series chassis in a T-Series sleeve.

⚠WARNING

Suffocation Hazards

Keep bag away from babies and children.

Do NOT use in cribs, beds or playpens. Destroy immediately after opening. This bag is NOT a toy.

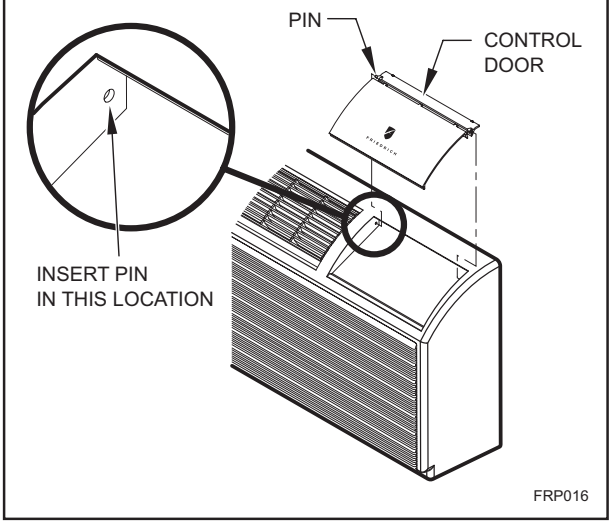
Failure to do so can result in personal injury and/or death.

2. Remove the front cover contained in a protective plastic bag from chassis. Remove the bag and dispose of it properly.

   If the control door is not installed, follow these steps:
   a. From the front cover, slide the right control door pin into the hole on the right side of the front cover.
   b. Slide the left door pin into the hole on the left side of the front cover opening.
   c. Snap cover into place.

NOTE: To avoid breaking the door or hinge pins, do not apply excessive force when installing.

Figure 19



IMPORTANT: When installing a Friedrich PTAC into an existing sleeve, it is important to ensure that the unit is installed completely. Inspection of the air seal between the condenser air baffles and around the indoor mounting flange is recommended.

In some cases additional gaskets or baffling may be required.

INSTALLATION

Chassis Install Preparation

CAUTION

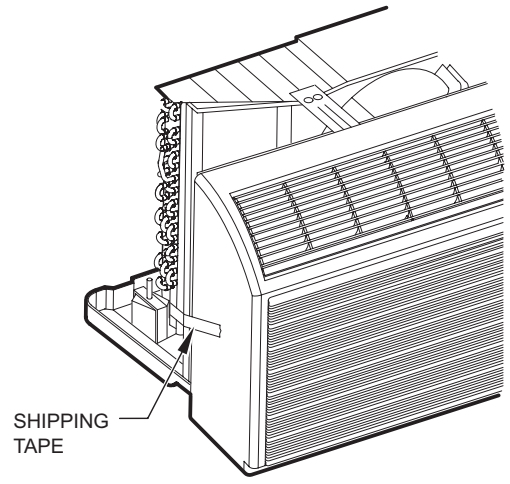
Unit Damage Hazard

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

Failure to remove shipping tape and screw will prevent fresh air vent door from opening and may result in damage to vent door cable.

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

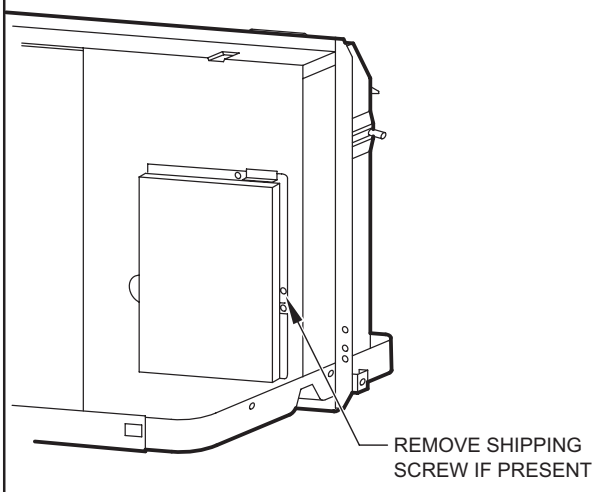
Figure 20
Shipping Tape Location



FRP020

4. Remove shipping screw from the vent door, if present. See Fig 21.

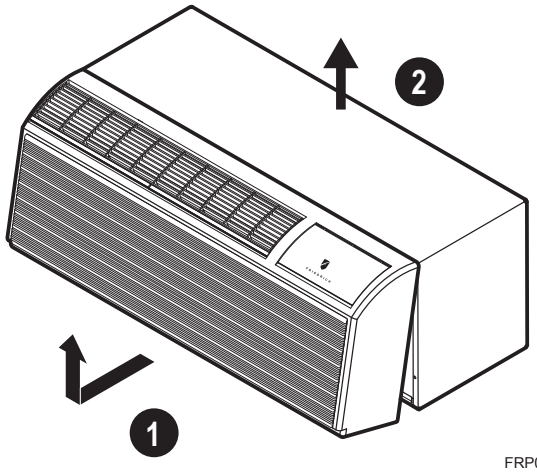
Figure 21
Shipping Screw Location



FRP021

5. Remove front panel. See Figure 22.

Figure 22
Removing Front Panel



FRP022

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

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

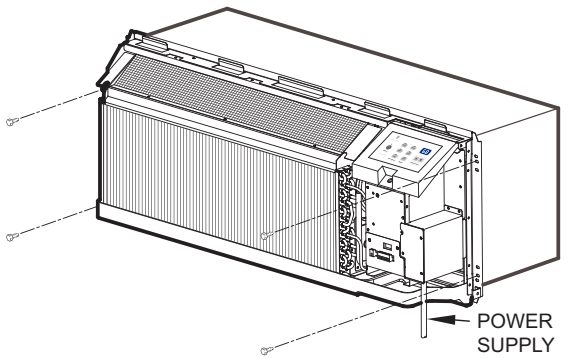
INSTALLATION

Chassis Installation

Chassis Installation

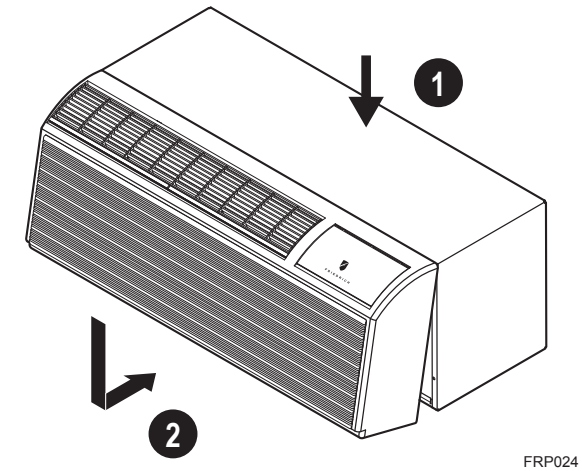
1. Lift unit level and slide unit into wall sleeve until from seal rests firmly against front of wall sleeve.

Figure 23
Securing Unit



2. Locate the four supplied chassis mounting screws. Insert the screws through the chassis mounting flange holes that are aligned with the speed nuts in the wall sleeve. Tighten all four screws (two per side).

Figure 24
Replacing Front Panel



3. Place tabs over top rail (1). Push inward at bottom until panel snaps into place (2).
4. Reinstall front panel. See Figure 24.

⚠ CAUTION

Excessive Weight Hazard

Use two or more people when installing your air conditioner.

Failure to do so can result in back or other injury.

NOTICE

Copper refrigerant tubes are NOT handles.
Do NOT use tubing to lift or move chassis.

To remove the front cover, pull the bottom end forward and lift it up to clear the L bracket across the top of the chassis.

5. Plug the cord (if applicable) into the appropriate receptacle. Restore power to the unit.

INSTALLATION

How To Connect

IMPORTANT: Please read following electrical safety data carefully.

⚠WARNING

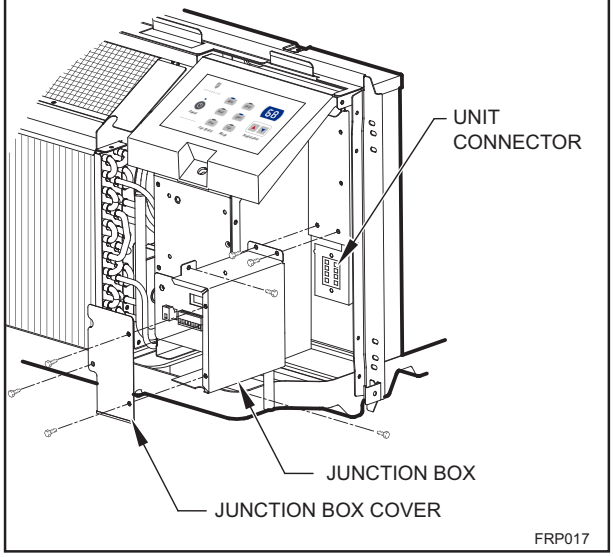
Electrical Shock and/or Unit Operation and Damage Hazard

Failure to follow this warning could result in personal injury or death and/or unit damage.

- Follow the National Electrical Code (NEC) or local codes and ordinances.
- For personal safety, this unit **MUST BE** properly grounded.
- Protective devices (fuses or circuit breakers) acceptable for unit installations are specified on the nameplate of each unit.
- **Do not** use an extension cord with this unit.
- Aluminum wiring in the building may present special problems - consult a qualified electrician.
- **When unit is in STOP position, there is still voltage to the electrical controls.**
- Disconnect power to unit before servicing by:
  1. Removing power cord (if it has one) from wall receptacle.
  2. Removing branch circuit fuses or turning circuit breakers off at panel.

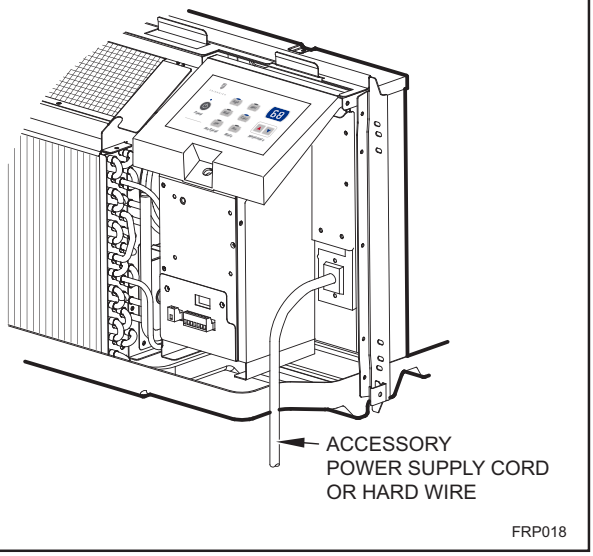
1. Remove front panel. See Figure 22.
2. Remove junction box.
   - Remove junction box cover by removing three screws from front. Remove junction box by taking out top, rear and side screws. See Figure 25.

Figure 25
Junction Box Location



3. Connect accessory power supply cord or hard wire connector to unit connector. See Figure 26.
   - Units must be installed using the appropriate power supply kit. See Table 2 --POWER CONNECTION CHART. These connections must be followed.

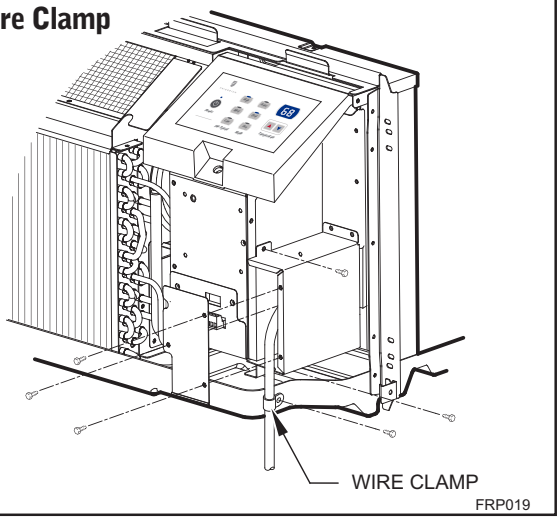
Figure 26
Power Connection



See Table 2 on page 14 for power cord accessory options and ratings.

4. Reinstall junction box and cover.
   - Use wire clamp to attach power cord to basepan. Secure with screws (included) See Figure 27.
   - Replace junction box and cover with screws removed from Step 2. Tighten securely.
5. Replace front panel. See Figure 24.
6. Connect power to unit.

Figure 27
Wire Clamp



INSTALLATION

Thermostat

Remote Control Thermostat Installation

Install Thermostat

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

The Thermostat should NOT be mounted:

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

Remote Thermostat and Low Voltage Control Connections

Remote Thermostat

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

NOTE: All PDE models require a single stage cool, single stage heat thermostat. All PDH models require a single stage cool, dual stage heat thermostat with an O reversing valve control. The Friedrich RT6 or RT7 thermostats can be configured for either model.

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

1. Unplug the unit before doing any work.
2. With the front cover removed locate the dip switches located below the Smart Center control panel. See page 23. Switch Dip switch 2 to the up on 'ON' position.
3. Remove the low voltage terminal block from the unit.
4. Connect the corresponding terminals from the wall thermostat to the terminal block.
5. Replace the terminal block on the unit.
6. Restore power to the unit.
7. The unit is now controlled by the wall thermostat only.
8. If the accessory escutcheon kit (PDXRTA) is to be used, install it over the existing control panel.

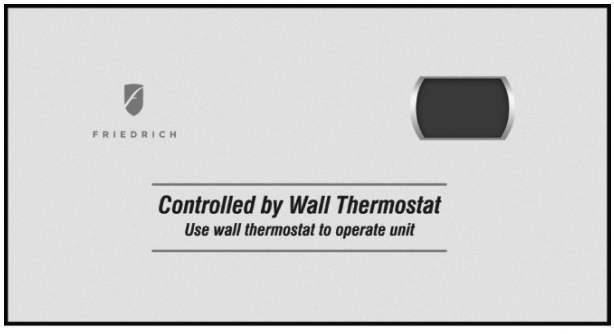
NOTE: The unit mounted controls no longer control the unit. To restore the unit mounted controls move dip switch 2 to the down or 'OFF' position.

Thermostat Connections

R = 24V Power from Unit
Y = Call for Cooling
W = Call for Heating
O = Reversing Valve Energized in cooling mode (PDH Models Only)
GL = Call for Low Fan
GH = Call for High Fan
C = Common Ground

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

Figure 33
Control board with optional PDXRT escutcheon kit installed



FRP029

INSTALLATION

Thermostat

Desk Control Terminals

The Friedrich PD model PTAC has built-in provisions for connection to an external switch to control power to the unit. The switch can be a central desk control system or even a normally open door switch.

For desk control operation connect one side of the switch to the D1 terminal and the other to the D2 terminal (See Figure 31, Page 23). Whenever the switch closes the unit operation will stop.

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

Energy Management

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

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

⚠WARNING

Electrical Shock Hazard

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

INSTALLATION

Final Inspection & Start-up Checklist

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

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

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

Routine Maintenance

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

⚠WARNING

Electrical Shock Hazard

Unplug Unit or turn off electrical power to unit prior to performing maintenance procedures.

Failure to do so can result in electrical shock or death.

Air Filter

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

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

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

Coils & Chassis

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

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

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

Decorative Front

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

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

Fan Motor & Compressor

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

Wall Sleeve

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

Under extreme conditions, more frequent cleaning may be necessary. Clean both of these areas with an antibacterial and antifungal cleaner. Rinse both items thoroughly with water and ensure that the drain outlets are operating correctly. Check the sealant around the sleeve and reseal areas as needed.

TROUBLESHOOTING

Basic Troubleshooting

COMPLAINT	CAUSE	SOLUTION
Unit does not operate.	• Unit turned off. • Thermostat is satisfied. • LCDI power cord is unplugged. • LCDI power cord has tripped. • Circuit breaker has tripped. • Supply circuit fuse has blown. • Local power failure.	• Turn unit on • Raise/Lower temperature setting. • Plug into a properly grounded 3 prong receptacle. See "Electrical Rating Tables" on page 13 for the proper receptacle type for your unit. • Press and release RESET (listen for click; Reset button latches and remains in) to resume operation. • Reset the circuit breaker. • Replace the fuse. • Unit will resume normal operation once power has been restored.
Unit trips circuit breaker or blows fuses.	• Other appliances being used on same circuit. • An extension cord is being used. • Circuit breaker or time-delay fuse isn't of the proper rating.	• The unit requires a single outlet circuit, not shared with other appliances. • Do NOT use an extension cord with this or any other air conditioner. • Replace circuit breaker or time-delay fuse for the proper rating. See "Electrical Rating Tables" on page 13. If problem continues contact a licensed electrician.
LCDI Power Cord Trips (Reset Button Pops Out) NOTE: A damaged power supply cord must be replaced with a new power supply cord obtained from the product manufacturer and must not be repaired.	• The LCDI Power cord can trip (Reset button POPS out) due to disturbances on your power supply line. • Electrical overload, overheating or cord pinching can trip (Reset button POPS out) the LCDI power cord.	• Press and release RESET (listen for click; Reset button latches and remains in) to resume normal operation. • Once the problem has been determined and corrected, press and release RESET (listen for click; Reset button latches and remains in) to resume normal operation.
Unit does not cool/heat room sufficiently, or cycles on and off too frequently	• The return/discharge air grille is blocked. • Windows or doors to the outside are open. • The temperature is not set at a cool enough/warm enough setting. • The filter is dirty or obstructed. • The indoor coil or outdoor coil is dirty or obstructed. • The temperature of the room you are trying to cool is extremely hot. • The outside temperature is below 60º F. • The digital control is set to fan cycling mode. • The air conditioner has insufficient cooling capacity to match the heat gain of the room.	• Ensure that the return and/or discharge air paths are not blocked by curtains, blinds, furniture, etc • Ensure that all windows and doors are closed. • Adjust the temperature control to a cooler or warmer setting as necessary. • Clean the filter, (See Recommended Maintenance) or remove obstruction. • Clean the coils, (See Recommended Maintenance) or remove obstruction. • Allow additional time too cool a very hot room • Do not try to operate your air conditioner in the cooling in the cooling mode when the outside temperature is below 60º F. The unit will not cool properly, and the unit may be damaged. • Since the fan does not circulate the room air continuously at this setting, the room air does not mix as well and hot (or cold) spots may result. Using the continuous fan setting is recommended to obtain optimum comfort levels. • Check the cooling capacity of your unit to ensure it is properly sized for the room in which it is installed. Room air conditioners are not designed to cool multiple rooms.

TROUBLESHOOTING

Basic Troubleshooting

COMPLAINT	CAUSE	SOLUTION
Unit does not cool/heat room sufficiently, or cycles on and off too frequently	• The air conditioner has insufficient heating capacity to match the heat loss of the room.	• Check the heating capacity of your unit. Air conditioners are sized to meet the cooling load and heater size is then selected to meet the heating load. In extreme, northern climates, room air conditioners may not be able to be used as a primary source of heat.
Unit runs too much	• This may be due to an excessive heat load in the room. • This may be normal for higher efficiency (EER) air conditioners.	• If there are heat product appliances in use in the room, or if the room is heavily occupied, the unit will need to run loner to remove the additional heat. • Be sure to use exhaust vent fans while cooking or bathing and, if possible, try not to use heat producing appliances during the hottest part of the day. It may also be due to an improperly sized unit. • Depending upon the size of the room being cooled, a higher capacity air conditioner may be necessary • The use of higher efficiency components in your new air conditioner may result in the unit running longer than you feel it should . This may be more apparent, if it replaced an older, less efficient, model. The actual energy usage, however, will be significantly less when compared to older models. • Likewise, you may notice that the discharge air temperature of your new air conditioner may not seem as cold as you may be accustomed to from older units. This does not, however, indicate a reduction in the cooling capacity of the unit • The energy efficiency ratio (EER) and cooling rating (Btu/h) listed on the unit's rating plate are both agency certified.

TROUBLESHOOTING

Error Codes

No.	Malfunction Name	Error Code	A/C Status	Possible Causes
1	Indoor ambient temperature sensor is open/ shortcircuited	F1	The unit will not operate. The unit will stop operation as it reaches the temperature point.	1.The wiring terminal between indoor ambient temperature sensor and controller is loosened or poorly contacted; 2.There is a short circuit due to trip-over of the parts on controller; 3.Indoor ambient temperature sensor is damaged (Please check it by referring to the resistance table for temperature sensor)(15k at 77°F) 4.Main board is broken.
2	Indoor evaporator temperature sensor is open/ shortcircuited	F2	Up and down buttons will be locked. The unit will stop operation as it reaches the temperature point.	1.The wiring terminal between indoor evaporator temperature sensor and controller is loosened or poorly contacted. 2.There is a short circuit due to the trip-over of the parts on controller; 3.Indoor evaporator temperature sensor is damaged. (Please check it by referring to the resistance table for temperature sensor) (20k ohms at 77°F). 4.Main board is broken.
3	Outdoor tube temperature sensor is open/ shortcircuited	F4	Unit will not operate. Up and down buttons will be locked. The unit will stop operation as it reaches the temperature point.	1.The wiring terminal between outdoor tube temperature sensor and controller is loosened or poorly contacted; 2.There is a short circuit due to the trip-over of the parts on controller; 3.Outdoor tube sensor is damaged (Refer to the resistance table for temperature sensor) (20k ohms at 77°F). 4.Main board is broken.
4	low temperature prevention protection	FP	A/C enters into pure electric heating mode, and low temperature protection is started up.	1.Indoor ambient temperature is lower than 40°F(5°C) continuously.; 2.Indoor ambient temperature sensor is damaged; 3.Main board is broken. 4. (Refer to the resistance table for temperature sensor) Check thermistor resistance 15k ohms at 77°F
5	Air outlet temperature sensor	FJ	Panel control: The display displays error code (it is not displayed in unit off status, but error LED is displayed). All loads except indoor fan are turned off under cooling mode; all loads stop immediately under heating mode and indoor fan blows residual heat for 6s at set fan speed. Wired controller: no respond Unit will not operate. Evaporator High temperature above 136°F for 1 minute. Will reset at 126°F.	1. Temperature sensor terminal at air outlet is loose. 2. There is a foreign object on control board, which causes short circuit. 3. Temperature sensor at air outlet is broken. 4. Mainboard 1 is broken. 5. (Refer to the resistance table for temperature sensor) Check thermistor resistance 50k ohms at 77°F. 6. Dirty coil 7. Fan motor failure.

TROUBLESHOOTING

Error Codes

No.	Malfunction Name	Error Code	A/C Status	Possible Causes
6	Electric Heater Protection Error	A2	LOCKS OUT OPERATION The purpose of A2 protection is electric heater safety while PTAC's normal operation, so we reserved more buffer. Normal voltage fluctuation will usually not trigger A2 protection. 10% above or below Current range of single electric heater: 1.00 kW heater: 2.5A-7A 1.55kW heater: 4A-9A 2.45kW heater: 6A-14A Current range when electric heater combined: 3.45kW heaters: 9A-20A 5.00kW Heaters: 12.5A-29A If current over above range, A2 protection will be triggered. f the sensor detects current over 2A when electric heater is not working, or if the sensor detects current difference between L and N line are over 2.5A, A2 protection will be triggered.	1. Open heater 2. Defective logic board 3. Indoor fan damage 4. Main pcb detects current leak 5. Loose wireing on board or heater harness 6. A2 protection might also be triggered by intefer-ence, disconnect plug for a few minutes to reset and clear A2 protection.
7	Compressor Over current protection	E5	Over 17 amps through compressor for 3 seconds compressor and condenser fan will stop and indoor will operate	1. User need to reset unit by unplug and reconnect unit 2. Check for dirty condenser or open compressor 3. Check power supply
8	Overload detection protection	H3	The voltage of power source is too low. The air flow volume of condenser is too	1.Fan motor locked up. 2. Coil is dirty. 3. The outdoor temperature is higher than the operation temperature allowed for this unit.
9	Low Refrigerant protection	FO	The unit will not operate	1. Check indoor coil thermistor location 2. (Refer to the resistance table for temperature sensor) thermistor resistance 20k ohms at 77°F
10	The unit will "attempt" to provide heating or cooling, dependent upon the error in wiring and/ or configuration of the wired controller		Status light blinks 9 times, off for 3 seconds, then repeats	Improper connection and/or improper configuration of wired controller.

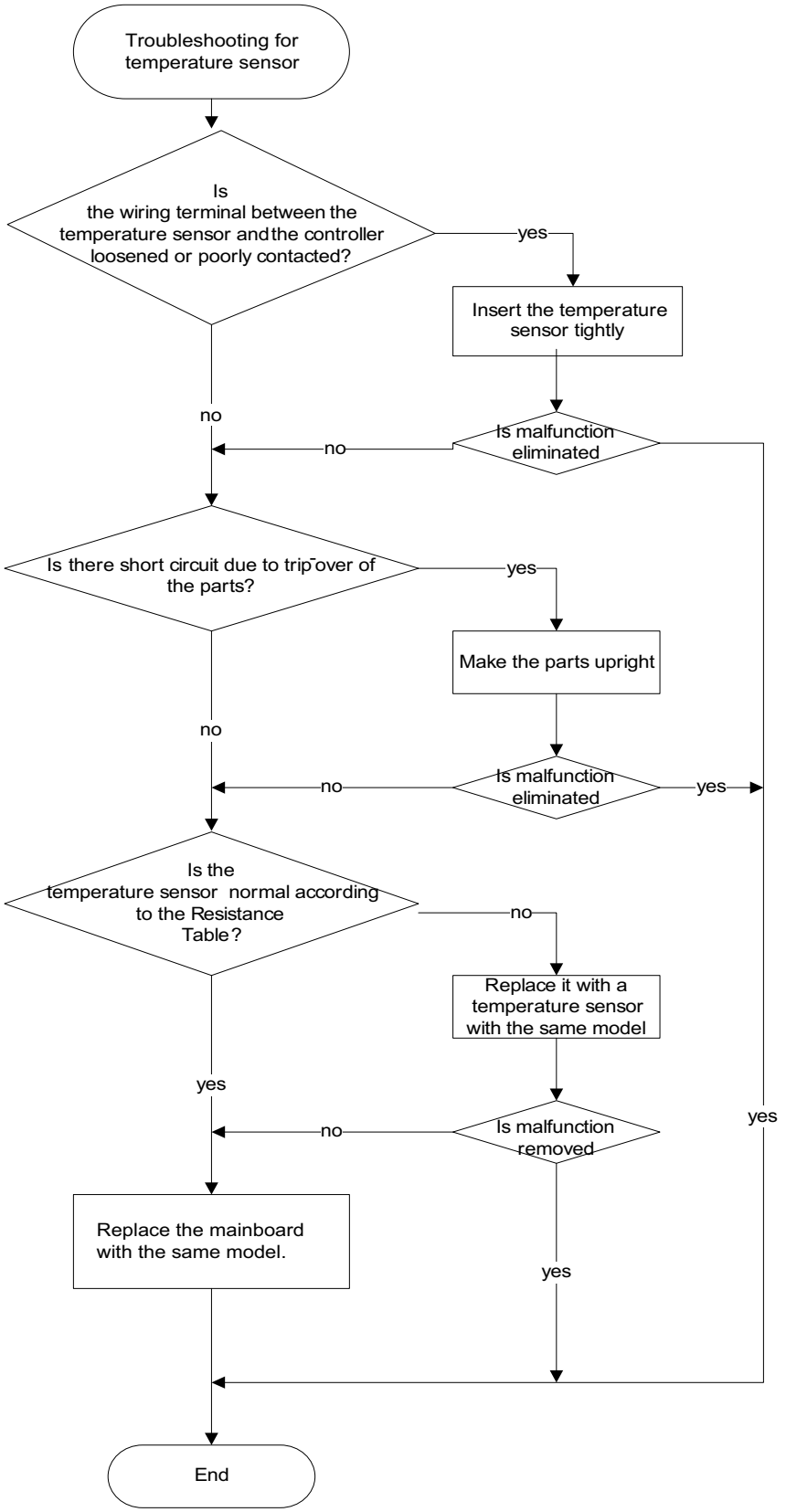
TROUBLESHOOTING

Error Codes

No.	Malfunction Name	Error Code	A/C Status	Possible Causes
11	High indoor coil temperature (HP)		Indoor coil temperature sensor detects 136º F or greater for 1 minute consecutive. Status light will blink 8 times, pause for 3 seconds, then repeat	Compressor & Outdoor fan shut down. Indoor fan remains operational. Electric heat is enabled after 15 seconds When the Indoor coil temperature sensor detects 126ºF for less for two consecutive minutes, the compressor will return to operation. Dirty Coil or Fan Failure.
12	High outdoor coil temperature		Outdoor Coil temperature sensor detects 149º F or greater for one minute consecutive Status light will blink 6 times, pause 3 seconds, then repeat	Compressor stops. Outdoor & Indoor fans remain operational. When the outdoor coil temperature sensor detects 131ºF or less for two consecutive minutes, the compressor will return to operation. Check thermistor resistance 20k ohms at 77°F
13	Evaporator Freeze Protection (Cool-ing		Indoor coil temperature sensor detects 28º F or less for 1 minute consecutive Status light will blink 5 times, pause for 3 seconds, then repeat	Compressor & Outdoor fan shut down. Indoor fan runs continuously. When the indoor coil temperature sensor detects 40ºF or more for two consecutive minutes, the compressor & outdoor fan will return to normal operation. Dirty coil or Fan Failure. Check thermistor resistance 20k ohms at 77°F
14	Outdoor Coil Frost Protection (HP)		Outdoor Coil temperature sensor detects 28º F or less for one min-ute consecutive Status light will blink 7 times, pause for 3 seconds, then repeat	The Compressor & outdoor fan will stop. The indoor fan will operate normally. If calling for heat; 15 seconds latter the electric heaters will be energized. When the sensor detects 40º F or above for 10 consecutive minutes, the compressor will be available again to provide heating. Risk of cond. Fan Damage due to Ice build-up. Check thermistor resistance 20k ohms at 77°F

TROUBLESHOOTING

Malfunction of Temperature Sensor



TROUBLESHOOTING

Maintenance Method for Normal Malfunction

1. Air Conditioner Can't be Started Up

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
No power supply, or poor connection for power plug	After energization, operation indicator isn't bright and the buzzer can't give out sound	Confirm whether it's due to power failure. If yes, wait for power recovery. If not, check power supply circuit and make sure the power plug is connected well.
Poor connection for wiring terminals	Under normal power supply circumstances, operation indicator isn't bright after energization	Check the circuit according to circuit diagram and connect wires correctly. Make sure all wiring terminals are connected firmly.
Electric leakage for air conditioner	After energization, room circuit breaker trips off at once	1.Make sure the air conditioner is grounded reliably. 2.Make sure wires of air conditioner is connected correctly. 3.Check the wiring inside air conditioner. Check whether the insulation layer of power cord is damaged; if yes, place the power cord.
Model selection for air switch is improper	After energization, air switch trips off	Select proper air switch

2.Poor Cooling for Air Conditioner

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Set temperature is improper	Observe the set temperature on remote controller or Membrane	Adjust the set temperature.
Rotation speed is set too low	Small wind blow	Set the fan speed at high or medium.
Filter is blocked	Check the filter to see it's blocked	Clean the filter.
Installation position for unit is improper	Check whether the installation postion is proper according to installation requirement for air conditioner	Adjust the installation position.
Refrigerant is leaking	Discharged air temperature during cooling is higher than normal discharged wind temperature; Discharged air temperature during heating is lower than normal discharged wind temperature; Unit's pressure is much lower than regulated range	Find out the leakage causes and deal with it. Add refrigerant.
Malfunction of capillary	Discharged air temperature during cooling is higher than normal discharged wind temperature; Discharged air temperature during heating is lower than normal discharged wind temperature; Unit't pressure is much lower than regulated range. If refrigerant isn't leaking, part of capillary is blocked	Replace the capillary.
Malfunction of fan motor	The fan motor can't operate	Refer to point 4 of maintenance method for details.
Malfunction of compressor	Compressor can't operate	Refer to point 5 of maintenance method for details.

3.Poor Heating for Electric Heater

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Electric heating relay on main board is damaged	Even heating condition is satisfied, electric heater can't be started up under heating mode	Replace the main board with the same model.
Connection needle stand between main board and display board is loose	Even heating condition is satisfied, electric heater can't be started up under heating mode	Insert the needle stand tightly.
Set temperature and ambient temperature are almost the same	Poor heating effect	Increase the set temperature.

TROUBLESHOOTING

Maintenance Method for Normal Malfunction

Tube temperature protection	When ambient temperature is high, the detected temperature by indoor tube temperature sensor is high. The detected temperature by temperature sensor at air outlet is also high	Increase the set fan speed. When indoor tube temperature decreases to a certain value, it will resume automatically.
Protection of temperature limiter	Check whether the air inlet is blocked by curtains, clothes, etc.	Clean the filter. Move curtains, clothes and other obstacles.
Malfunction of temperature limiter	When turning on the unit, the heating effect is poor. Use universal meter to measure the two contact points of temperature limiter. If the resistance value is too big, the temperature limiter is damaged	Replace the temperature limiter.
Thermal fuse is burnt out	When turning on the unit, the heating effect is poor. Use universal meter to measure the two contact points of temperature limiter. If the resistance value is too big, the temperature limiter is damaged	Replace the thermal fuse.

4.Fan Motor Can't Operate

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Wrong wire connection, or poor connection	Check the wiring status according to circuit diagram	Connect wires according to wiring diagram to make sure all wiring terminals are connected firmly.
Connection needle stand between main board and display board is loose	Check whether the needle stand is loose	Insert the needle stand tightly.
Fan capacitor is damaged	1. Discharge the capacitor at first, and then use universal meter to measure the resistance of fan capacitor. It displays 0 or very small 2. If the resistance is very big, measure the voltage at both ends of capacitor. If the voltage at both ends of capacitor is same with the power input voltage, the fan capacitor is damaged	Replace fan capacitor.
Power voltage is a little low or high	Use universal meter to measure the power supply voltage. The voltage is a little high or low	Suggest to equip with voltage regulator .
Motor of outdoor unit is damaged	When unit is on, cooling/heating performance is bad and ODU compressor generates a lot of noise and heat.	Change compressor oil and refrigerant. If no better, replace the compressor with a new one.

5.Compressor Can't Operate

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Wrong wire connection, or poor connection	Check the wiring status according to circuit diagram	Connect wires according to wiring diagram to make sure all wiring terminals are connected firmly.
Compressor relay on main board is damaged or needle stand of compressor is loose	Check whether relay can operate normally under cooling status	Replace the main board with the same model.
Capacitor of compressor is damaged	1. Discharge the capacitor at first, and then use universal meter to measure the resistance of fan capacitor. It displays 0 or very small 2. If the resistance is very big, measure the voltage at both ends of capacitor. If the voltage at both ends of capacitor is same with the power input voltage, the fan capacitor is damaged	Replace the capacitor of compressor.
Power voltage is low or high	After turning on the unit, poor cooling effect or the compressor is turned on or turned off frequently. Use universal meter to measure the power voltage	The fluctuation of the rate voltage is 10%. If the voltage is low or high, please equip with voltage regulator.
Coil of compressor is burnt out	Use universal meter to measure the resistance between compressor terminals and it's 0	Repair or replace compressor.
Cylinder of compressor is blocked	Compressor can't operate	Repair or replace compressor.

TROUBLESHOOTING

Maintenance Method for Normal Malfunction

6.Air Conditioner is Leaking

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
Drainage duct is blocked	There’s water leakage at indoors	Eliminate the obstacles inside the drainage duct.
Air conditioner isn’t inclined outwards	There’s water leakage at indoors	The complete unit should incline outwards about 3º.

7.Abnormal Sound and Vibration

Possible Causes	Discriminating Method (Air conditioner Status)	Troubleshooting
When turn on or turn off the unit, the panel and other parts will expand and there's abnormal sound	There's the sound of "PAPA"	Normal phenomenon. Abnormal sound will disappear after a few minutes.
When turn on or turn off the unit, there's abnormal sound due to flow of refrigerant inside air conditioner	Water-running sound can be heard	Normal phenomenon. Abnormal sound will disappear after a few minutes.
Foreign objects inside the unit or there're parts touching together inside the unit	There's abnormal sound fro the unit	Remove foreign objects. Adjust all parts' position of unit, tighten screws and stick damping plaster between connected parts.
Abnormal shake of compressor	Outdoor unit gives out abnormal sound	Adjust the support foot mat of compressor, tighten the bolts.
Abnormal sound inside the compressor	Abnormal sound inside the compressor	If add too much refrigerant during maintenance, please reduce refrigerant properly. Replace compressor for other circumstances.

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 a single filter drier and to the proper capillary tube during either the heating or cooling cycle.

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

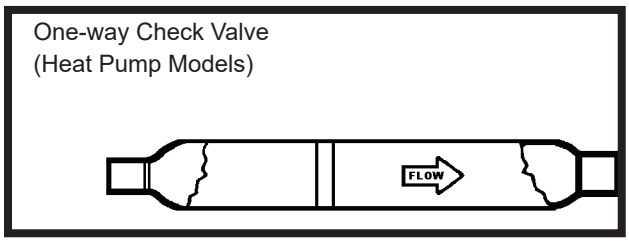


Figure 701 (Check Valve)

CHECK VALVE OPERATION

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

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

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

COOLING MODE

In the cooling mode of operation, liquid refrigerant from condenser (liquid line) enters the cooling check valve forcing the heating check valve shut. The liquid refrigerant is 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.

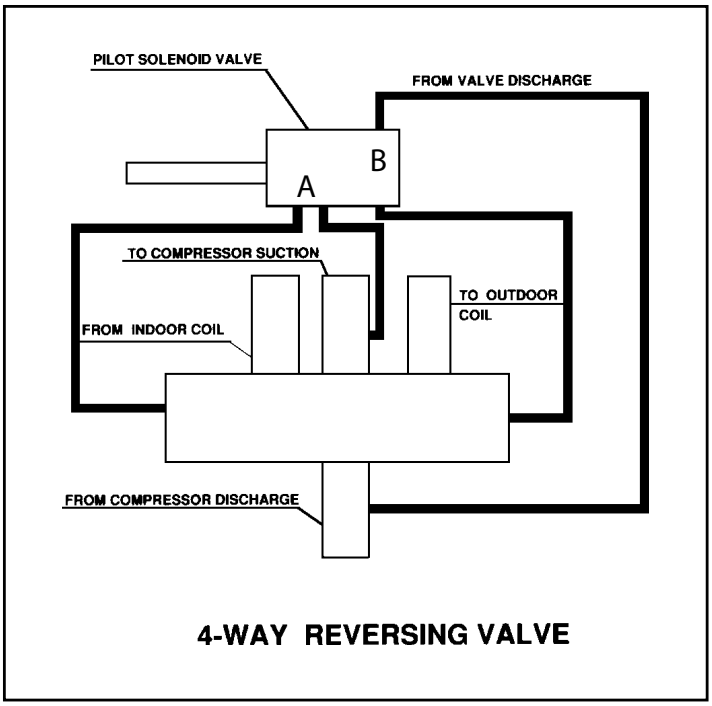


Figure 702 (Reversing Valve)

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 proper protective clothing must be worn 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.

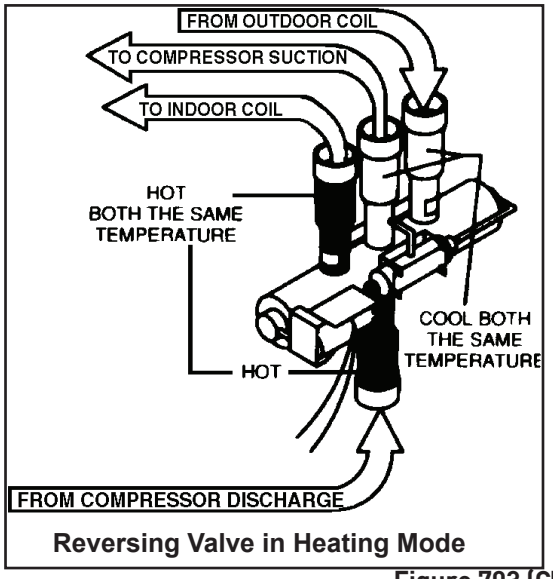
Should the valve fail to shift from cooling to heating, block the air flow through the outdoor coil and allow the discharge pressure to build in the system. Then switch the system from heating to cooling.

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 determing this is the problem, replace the reversing valve.

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



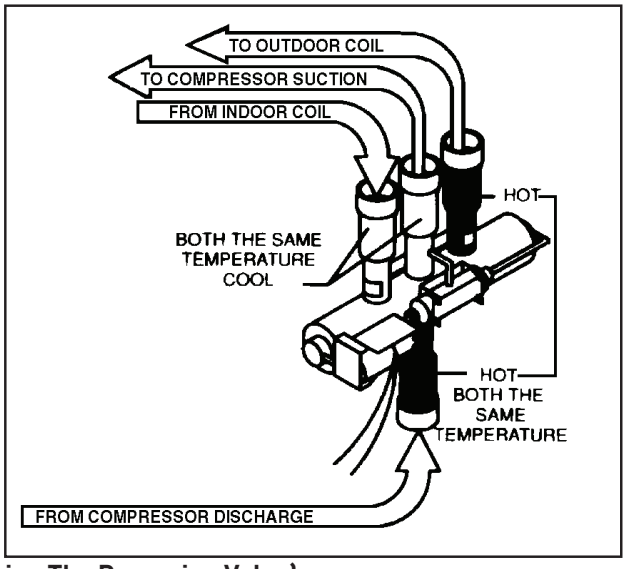


Figure 703 (Checking The Reversing Valve)

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 com-pressor. 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, the compressor overload is open and the compressor must be replaced.

COMPONENT TESTING

Compressor Checks

⚠ WARNING

ELECTRIC SHOCK HAZARD
Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.

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

⚠ WARNING

HIGH PRESSURE HAZARD
Sealed Refrigeration System contains refrigerant and oil under high pressure.

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

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

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.

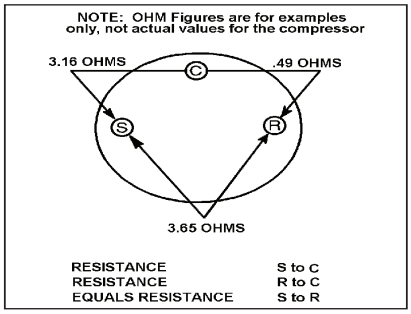


Figure 705 (Resistance Chart)

Complete evaluation of the system must be made whenever you suspect the compressor is defective. If the compressor has been operating for sometime, a careful examination must be made to determine why the compressor failed. Many compressor failures are caused by the following conditions:

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

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:

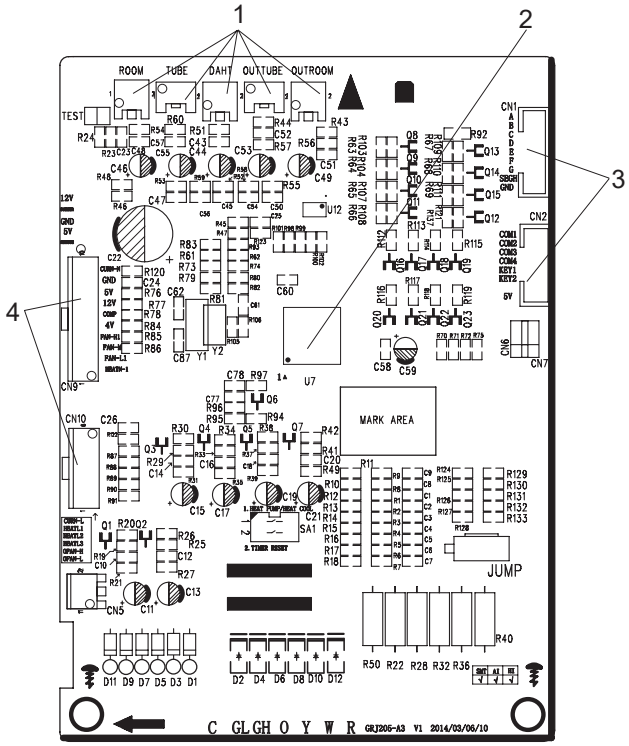
1. Install a piercing valve on the suction and discharge or liquid process tube.
2. Attach gauges to the high and low sides of the system.-
3. Start the system and run a "cooling or heating perfor mance test." If test shows:
   - A. Below normal high side pressure
   - B. Above normal low side pressure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

The compressor valves are faulty - replace the compressor.

COMPONENT TESTING

PCB Printed Diagram Board 1

●**Top view**



1	Terminal of temperature sensor
2	Main chip
3	Interface of display
4	Interface of main board

●**Bottom view**

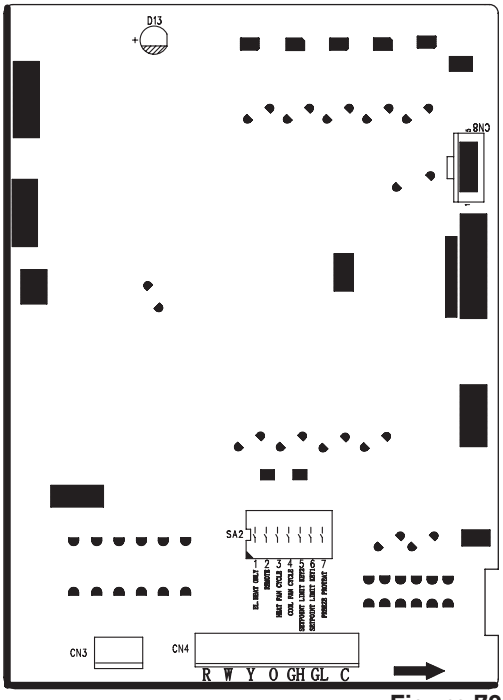
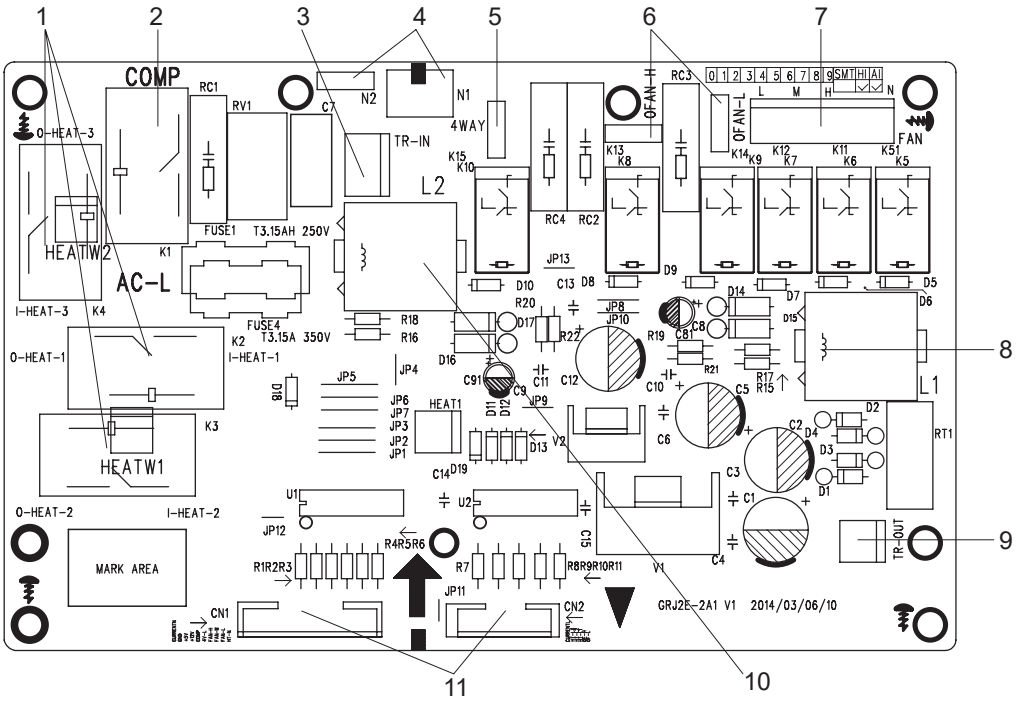


Figure 706 (Circuit Card)

COMPONENT TESTING

PCB Printed Diagram Board 2

●Top view



1	Relay of electric heating	5	Terminal of 4-way valve	9	Terminal of transformer
2	Relay of compressor	6	Terminal of outdoor fan	10	Current inductor
3	Terminal of transformer	7	Terminal of indoor fan	11	Interface of main board
4	Neutral wire interface	8	Current inductor	12	/

●Bottom view

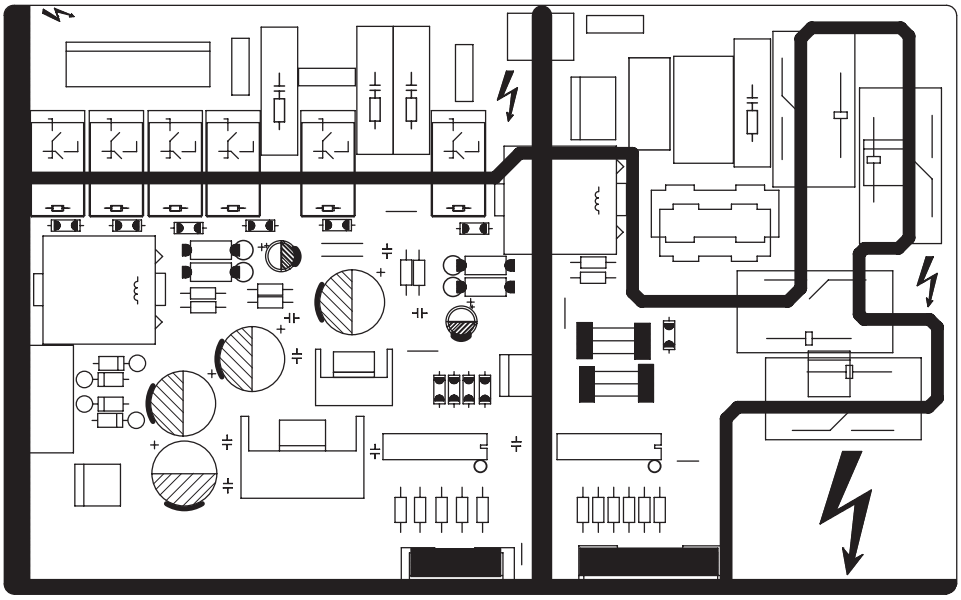


Figure 707 (Circuit Card)

COMPONENTS TESTING

Testing Component Voltage at Electronic Control Board

⚠ WARNING

ELECTRIC SHOCK HAZARD
Turn off electric power before service or installation. Extreme care must be used, if it becomes necessary to work on equipment with power applied.

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

1. THERMISTER VOLTAGS IS 4.7 VDC
2. DISPLAY BOARD VOLTAGE IS 5 VDC
3. RELAY VOLTAGE FROM LOGIC BOARD IS 4.7 VDC
4. VOLTAGE OFF TRANSFORMER TO LOGIC BOARD 12VDC
5. COMPRESSOR RELAY TO GROUND 5VDC
6. FAN RELAYS APPROX. 4.5 VDC

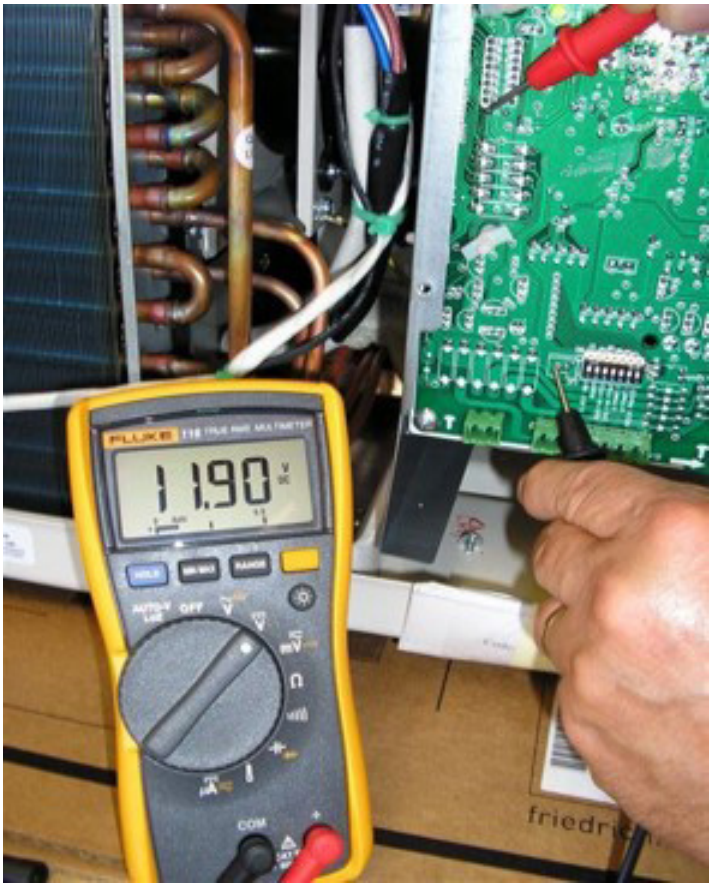


FIGURE 708 (ELECTRONIC CONTROL BOARD)

COMPONENTS TESTING

Testing Line Voltage

208/230
265V AC

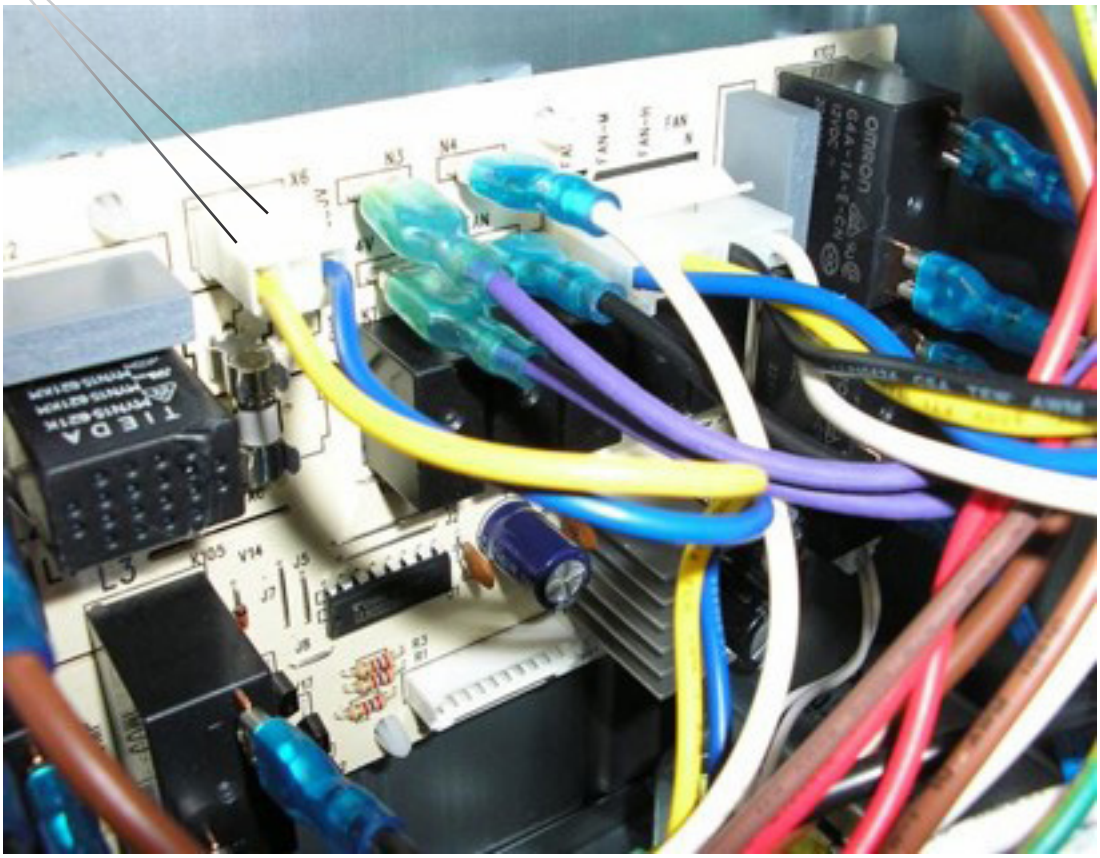


FIGURE 709 (LINE VOLTAGE)

R-410A SEALED SYSTEM REPAIR

⚠ WARNING

Refrigeration system under high pressure

Do not puncture, heat, expose to flame or incinerate.

Only certified refrigeration technicians should service this equipment.

R410A systems operate at higher pressures than R22 equipment. Appropriate safe service and handling practicces must be used.

Only use gauge sets designed for use with R410A. Do not use standard R22 gauge sets.

The following is a list of important considerations when working with R-410A equipment

1. R-410A pressure is approximately 60% higher than R-22 pressure.
2. R-410A cylinders must not be allowed to exceed 125 F, they may leak or rupture.
3. R-410A must never be pressurized with a mixture of air, it may become
flammable.
4. Servicing equipment and components must be specifically designed for use with R-410A and dedicated to prevent contamination.

⚠ WARNING

EPA 608 Warning:
It is a violation of the environmental Protection Agency, Claus608A, to service refrigeration systems without proper certification

5. 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.
6. Gauge hoses must have a minimum 750-psig service pressure rating
7. Recovery cylinders must have a minimum service pressure rating of 400 psig, (DOT 4BA400 and DOT BW400 approved cylinders).
8. POE (Polyol-Ester) lubricants must be used with R-410A equipment.
9. To prevent moisture absorption and lubricant contamination, do not leave the refrigeration system open to the atmosphere longer than 1 hour.
10. Weigh-in the refrigerant charge into the high side of the system.
11. Introduce liquid refrigerant charge into the high side of the system.
12. For low side pressure charging of R-410A, use a charging adaptor.
13. Use industry standard R-410A filter dryers.

NOTE: SEALED SYSTEM REPAIRS TO COOL-ONLY MODELS REQUIRE THE INSTALLATION OF A LIQUID LINE DRIER.
NOTE: SEALED SYSTEM REPAIRS TO HEAT PUMP MODELSMODELS REQUIRE THE INSTALLATION OF A DRIER ON THE SUCTION SIDE.

EQUIPMENT REQUIRED:

1. Eletrical Multimeter
2. E.P.A. Approved Refrigerant Recovery System
3. Vacuum Pump (capable of 200 microns or less vacuum.)
4. Acetylene torch.
5. Electronic Halogen Leak Detector capable of detecting HFC (Hydrofluorocarbon) refrigerants.
6. R410A Refrigerant Manifold
7. 1/4" Braze-type Access Ports
8. Pinch Tool
9. Digital Refrigerant Scale
10. Vacuum Gauge - (0 - 1000 microns)
11. Facilities for flowing nitrogen through refrigeration tubing during all brazing processes.

EQUIPMENT MUST BE CAPABLE OF:

1. Recovering refrigerant to EPA required levels.
2. Evacuation from both the high side and low side of the system simultaneously.
3. Introducing refrigerant charge into high side of the system.
4. Accurately weighing the refrigerant charge introduced into the system.

R-410A SEALED SYSTEM REPAIRS

Refrigerant Charging

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

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

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

⚠ WARNING

RISK OF ELECTRIC SHOCK

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

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

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

NOTE: Because the refrigerant system is a sealed system, service process tubes will have to be installed. First install a line tap and remove refrigerant from system. Make necessary sealed system repairs and vacuum system. Crimp process tube line and solder end shut. Do not leave a service valve in the sealed system.

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

NOTE:Factory sealed units will not be overcharged

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

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

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

R-410A SEALED SYSTEM REPAIRS

⚠ WARNING

RISK OF ELECTRIC SHOCK

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

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

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

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

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

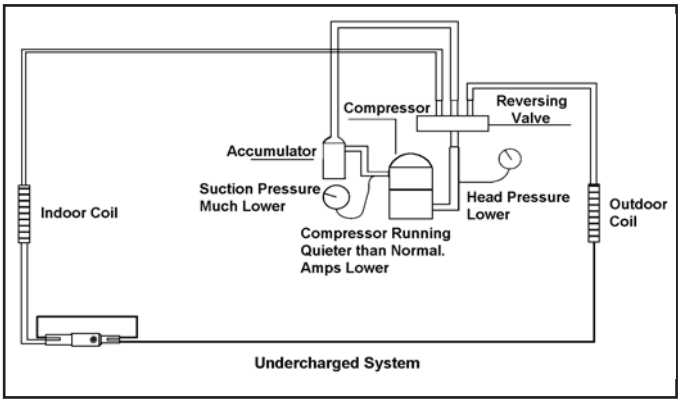


Figure 601 (Undercharged System)

Undercharged Refrigerant Systems

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

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

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

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

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

If the compressor reads low amperage and has a high discharge line temperature at the compressor, it is an indication of low system refrigerant.

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

R-410A SEALED SYSTEM REPAIRS

⚠ WARNING

RISK OF ELECTRIC SHOCK

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

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

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

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

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

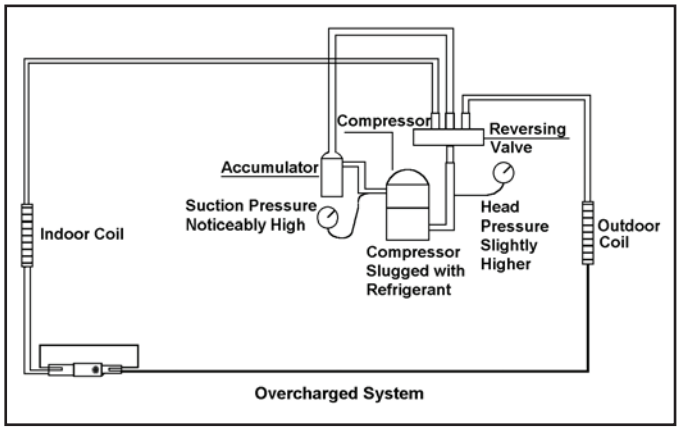


Figure 602 (Overcharged System)

Overcharged Refrigerant Systems

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

NOTE:Factory sealed units will not be overcharged

An overcharge can cause the compressor to fail, since it would be "slugged" with liquid refrigerant.
The charge for any system is critical. When the compressor is noisy, suspect an overcharge, when you are sure that the air quantity over the evaporator coil is correct. Icing of the evaporator will not be encountered because the refrigerant will boil later if at all. Gauges connected to system will usually have higher head pressure (depending upon amount of over charge). Suction pressure should be slightly higher.

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

R-410A SEALED SYSTEM REPAIRS

Restricted Refrigerant System

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

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

With a complete restriction there is no circulation of refrigerant in the system.
Restricted refrigerant systems display the same symptoms as a "low-charge condition."

A quick check for either condition begins at the evaporator. With a partial restriction, there may be gurgling sounds at the metering device entrance to the evaporator. The evaporator in a partial restriction could be partially frosted or have an ice ball close to the entrance of the metering device. Frost may continue on the suction line back to the compressor.

Often a partial restriction of any type can be found by feel, as there is a temperature difference from one side of the restriction to the other. There will ususally be a diiference felt at the capillary tube. This does not indicate a restricted condition.

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

Make all checks posible before tapping into the system and installing gauges.

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

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

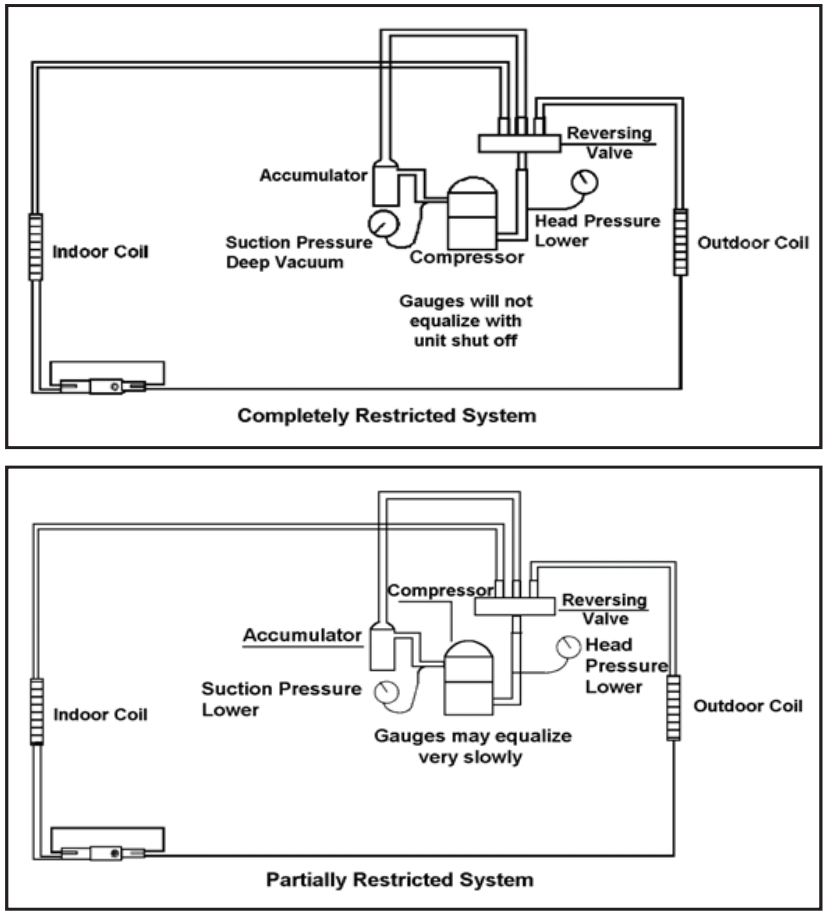


Figure 603 (Restricted System)

R-410A SEALED SYSTEM REPAIRS

Sealed System Method of Charging/ Repairs

⚠ 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.

⚠ 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.

The refrigerant cycle is critically charged. The only acceptable method for charging the sealed system is the Weighed in Charge Method.

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

1. Install a piercing valve to remove refrigerant from the sealed system. (Piercing valve must be removed from the system before recharging.)
2. Recover Refrigerant in accordance with EPA regulations.
3. Install a process tube to sealed system.
4. Make necessary repairs to system.
5. Evacuate the system to 1500 microns
6. Repressurize to 50 PSI with nitrogen
7. Evacuate the system to 1000 microns
8. Repressurize to 50 PSI with nitrogen
9. Evacuate the system to below 500 microns
10. Weigh in the refrigerant charge with the property quantity of refrigerant per model nameplate.
11. Start unit, and verify performance.
12. Crimp the process tube and solder the end shut.

R-410A 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 proper protective clothing must be worn 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. **PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED**. Do not use gauge manifold for this purpose if there has been a burnout. You will contaminate your manifold and hoses. Use a Schrader valve adapter and copper tubing for burnout failures.
3.After all refrigerant has been recovered, disconnect suction and discharge lines from the compressor and remove compressor. Be certain to have both suction and discharge process tubes open to atmosphere.
4.Carefully pour a small amount of oil from the suction stub of the defective compressor into a clean container.
5.Using an acid test kit (one shot or conventional kit), test the oil for acid content according to the instructions with the kit.
6.If any evidence of a burnout is found, no matter how slight, the system will need to be cleaned up following proper procedures.
7.Install the replacement compressor.

CAUTION: While the unit is being evacuated, seal all openings on the defective compressor. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

8. Pressurize with trace amounts of R-410A and nitrogen and leak test all connections with a leak detector.Repair any leaks found.
8a. If leak detector is unavailable remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.
Repeat Step 8 to ensure no more leaks are present
9. Evacuate the system with a good vacuum pump capable of a final vacuum of 200 microns or less. The system should be evacuated through both liquid line and suction line gauge ports.

9a.Evacuate the system to 1500 microns.
9b. Repressurize to 50 PSI with nitrogen.
9c. Evacuate the system to 1000 microns.
9d. Repressurize to 50 PSI with nitrogen.
9e. Evacuate the system to below 500 microns.

10. Weigh in the refrigerant charge with the property quantity of R-410A refrigerant per model nameplate.
11.Start unit, and verify performance.
12. Crimp the process tube and solder the end shut.

R-410A SEALED SYSTEM REPAIRS

Compressor Replacement -Special Procedure in Case of Compressor Burnout

1. Recover all refrigerant and oil from the system.
2. Remove compressor, capillary tube and filter drier from the system.

3. Flush evaporator condenser and all connecting tubing with dry nitrogen or equivalent. Use approved flushing agent to remove all contamination from system. Inspect suction and discharge line for carbon deposits. Remove and clean if necessary. Ensure all acid is neutralized.
4. Reassemble the system, including new drier strainer and capillary tube.

5. Pressurize with trace amounts of R-410A and nitrogen and leak test all connections with a leak detector. Repair any leaks found.
5a. If leak detector is unavailable remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.

Repeat Step 5 to insure no more leaks are present.

NOTE: While the unit is being evacuated, seal all openings on the defective compressor. Compressor manufacturers will void warranties on units received not properly sealed. Do not distort the manufacturers tube connections.

9. Evacuate the system with a good vacuum pump capable of a final vacuum of 200 microns or less. The system should be evacuated through both liquid line and suction line gauge ports.

- 9a.Evacuate the system to 1500 microns.
- 9b. Repressurize to 50 PSI with nitrogen.
- 9c. Evacuate the system to 1000 microns.
- 9d. Repressurize to 50 PSI with nitrogen.
- 9e. Evacuate the system to below 500 microns.

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

⚠ WARNING

HIGH PRESSURE HAZARD

Sealed Refrigeration System contains refrigerant and oil under high pressure.

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

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

⚠ 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.

R-410A 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 proper protective clothing must be worn 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. Install Process Tubes. Recover refrigerant from sealed system. PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.
2. Remove solenoid coil from reversing valve. If coil is to be reused, remove solenoid and protect from heat while changing valve.
3. Unbraze all lines from reversing valve.
4. Clean all excess braze from all tubing so that they will slip into fittings on new valve.
5. Remove solenoid coil from new valve.
6. Protect new valve body from heat while brazing with plastic heat sink (Thermo Trap) or wrap valve body with wet rag.
7. Fit all lines into new valve and braze lines into new valve.

⚠ WARNING

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.

8. PPressurize sealed system with trace amounts of R-410A and nitrogen up to 550 psi. Perform Triple evacuation and leak processes, using a suitable leak detector according to HVAC industry standards.
9. Once the sealed system is leak free, install solenoid coil on new valve and charge the sealed system by weighing in the proper amount and type of refrigerant as shown on rating plate. Crimp the process tubes and solder the ends shut. Do not leave Schrader or piercing valves in the sealed system.

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

Wrap the reversing valve with a large rag saturated with water. "Re-wet" the rag and thoroughly cool the valve after each brazing operation of the four joints involved.

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

WIRING DIAGRAMS

PDE07

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP.	Capacitor
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue	⏚	Grounding wire
YEGN	Yellow-Green	BK	Black	/	/

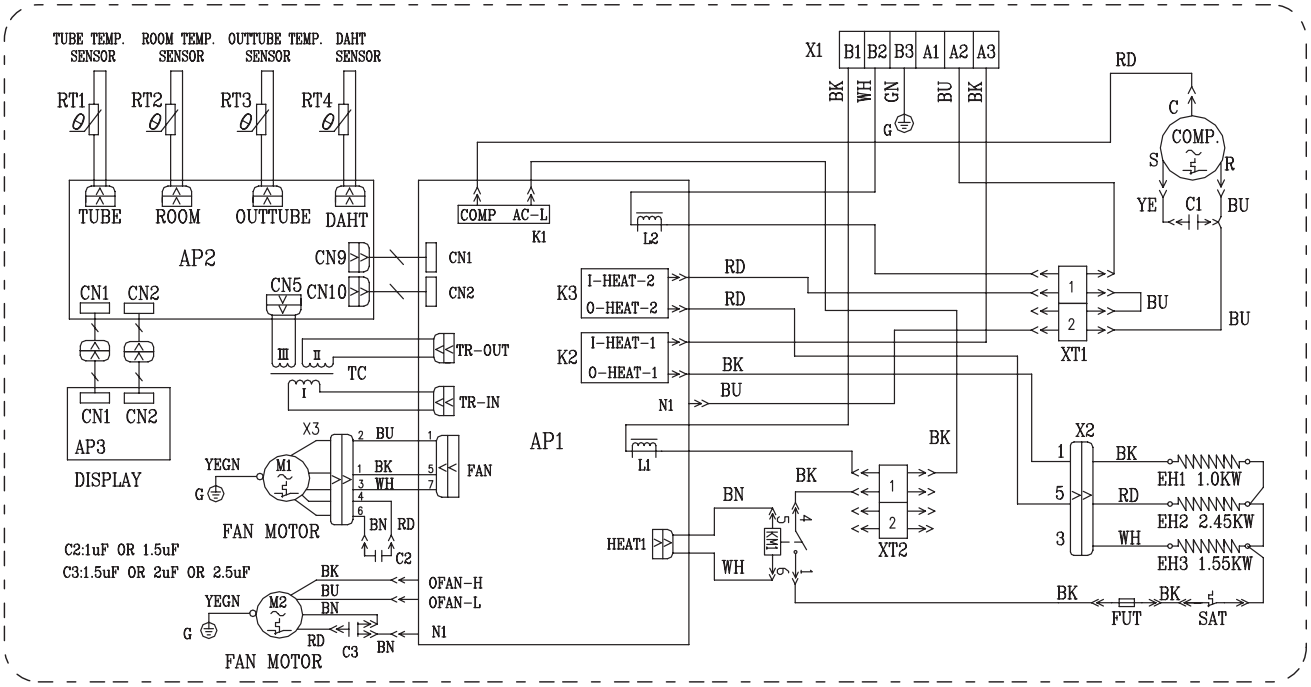


Figure 801

WIRING DIAGRAMS

PDH07

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP.	Capacitor
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue	⏚	Grounding wire
YEGN	Yellow-Green	BK	Black	/	/

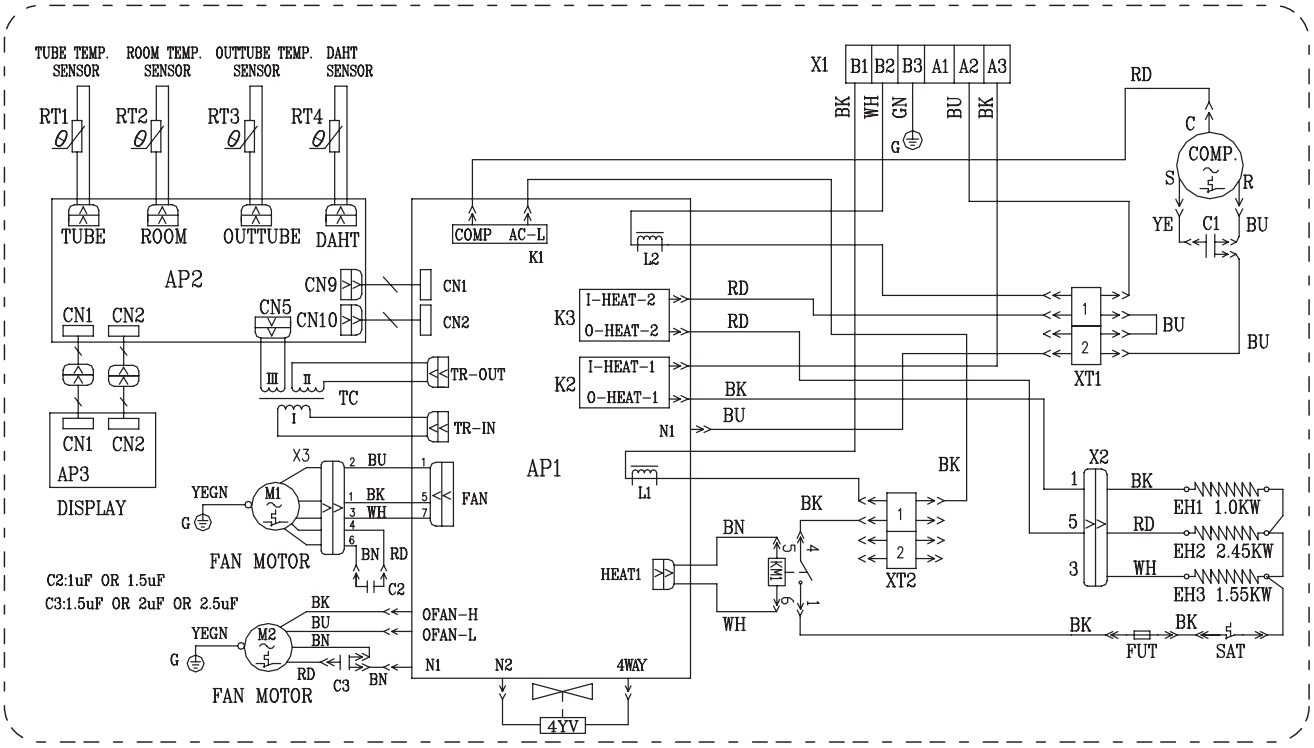


Figure 802

WIRING DIAGRAMS

PDE09, PDE12, PDE15

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP.	Capacitor
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue	⏚	Grounding wire
YEGN	Yellow-Green	BK	Black	/	/

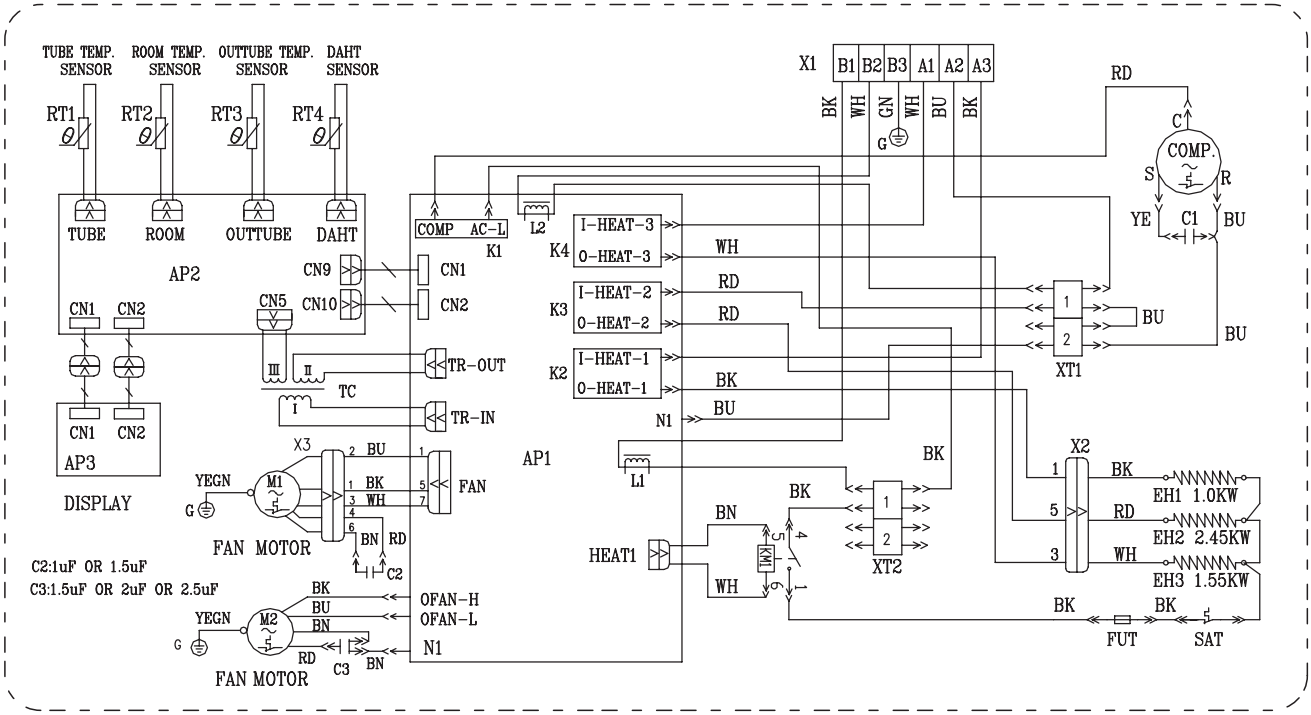


Figure 803

WIRING DIAGRAMS

PDH09, PDH12, PDH15

Symbol	Symbol Color	Symbol	Symbol Color	Symbol	Name
WH	White	GN	Green	CAP.	Capacitor
YE	Yellow	BN	Brown	COMP	Compressor
RD	Red	BU	Blue	⏚	Grounding wire
YEGN	Yellow-Green	BK	Black	/	/

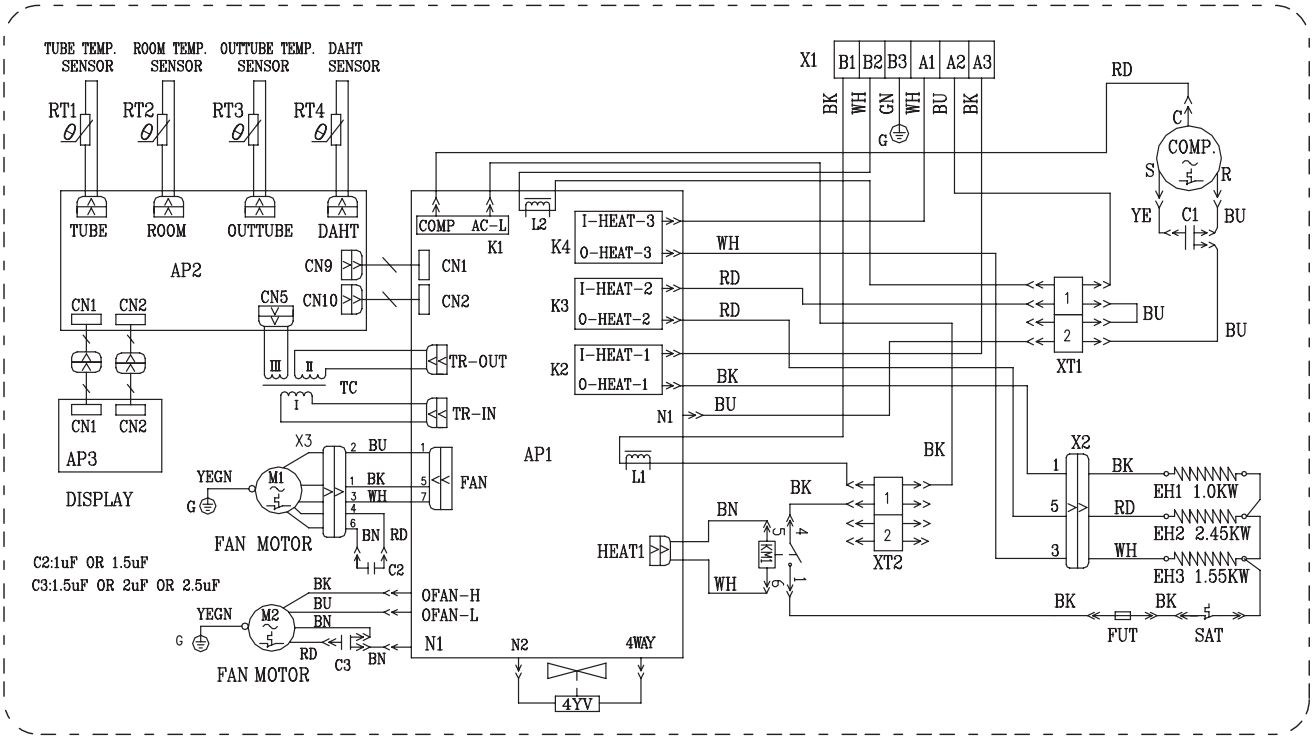


Figure 804

INTERACTIVE PARTS VIEWER

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

Please click on the link below:

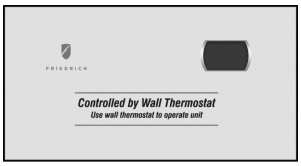
Interactive Parts Viewer

For Further Assistence contact Friedrich Technical Support at **(1-800-541-6645)**.

ACCESSORIES

New Construction 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 be cut to your specific depth requirements..	
PXGA	GRILLE Standard, stamped aluminium, anodized to resist chalking and oxidation.	
PXAA PXBG PXSC	ARCHITECTURAL GRILLES Consist of heavy-gauge 6063-T5 aluminum alloy: PXAA – Clear, extruded aluminum PXBG – Beige acrylic enamel PXSC – Also available in custom colors.	
PXSE	SLEEVE EXTENSION RETROFIT KIT Galvanized zinc coated steel, 2.4" sleeve extension attached to the room side of the sleeve to allow for the installation of a PD-Series Friedrich PTAC in a T-Series sleeve.	
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 circiut breaker. PXSB23020 - Electrical Subbase - 230V 15 & 20A PXSB23030 - Electrical Subbase - 230V 30A PXSB26515 - Electrical Subbase - 265V 15A PXSB26520 - Electrical Subbase - 265V 20A PXSB26530 - Electrical Subbase - 265V 30A	
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 - 2.5 kW 18 inch length PXPC26520A Non-LCDI 265V 20A Cord - 3.5 kW 18 inch length PXPC26530 Non-LCDI 265V 30A Cord - 5.0 kW 18 inch 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.	

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.	
EMWRT2	Wireless thermostat with occupancy sensor.	
EMRT2	Wired thermostat with occupancy sensor.	

APPENDIX

Appendix 1 Reference Sheet of Celsius and Fahrenheit

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

Set temperature

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

Ambient temperature

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

APPENDIX

Appendix 2 Resistance Table of 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

Appendix 3 Resistance Table of Tube Temperature Sensors for Indoor and Outdoor and Discharge Temperature Sensor for Outdoor(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

WARRANTY

PD-SERIES
PACKAGED TERMINAL AIR CONDITIONERS
LIMITED WARRANTY

SAVE THIS CERTIFICATE. It gives you specific rights. You may also have other rights which may vary from state to state and province to province.

In the event that your unit needs servicing, contact your nearest authorized service center. If you do not know the nearest service center, ask the company that installed your unit or contact us - see address and telephone number above. To obtain service and/or warranty parts replacement, you must notify an authorized FRIEDRICH Air Conditioning Co. service center, distributor, dealer, or contractor of any defect within the applicable warranty period.

When requesting service: please have the model and serial number from your unit readily available.

Unless specified otherwise herein, the following applies:
FRIEDRICH PACKAGED TERMINAL AIR CONDITIONERS AND HEAT PUMPS

LIMITED WARRANTY - TWO YEAR (Twenty Four (24) months from the date of installation). Any part found to be defective in the material or workmanship will be repaired or replaced free of charge by our authorized service center during the normal working hours; and

LIMITED WARRANTY - THIRD THROUGH FIFTH YEAR (Sixty (60) months from the date of installation). ON THE SEALED REFRIGERATION SYSTEM. Any part of the sealed refrigeration system that is defective in material or workmanship will be repaired or replaced free of charge (excluding freight charges) by our authorized service center during normal working hours. The sealed refrigeration system consists of the compressor, metering device, evaporator, condenser, reversing valve, check valve, and the interconnecting tubing.

These warranties apply only while the unit remains at the original site and only to units installed inside the continental United States, Alaska, Hawaii, Puerto Rico, Mexico and Canada. The warranty applies only if the unit is installed and operated in accordance with the printed instructions and in compliance with applicable local installation and building codes and good trade practices. For international warranty information, contact the Friedrich Air Conditioning Company - International Division.

Any defective part to be replaced must be made available to **FRIEDRICH** in exchange for the replacement part. Reasonable proof must be presented to establish the date of install, otherwise the beginning date of this certificate will be considered to be our shipment date plus sixty days. Replacement parts can be new or remanufactured. Replacement parts and labor are only warranted for any unused portion of the unit's warranty.

We will not be responsible for and the user will pay for:
1. Service calls to:
   A) Instruct on unit operation. B) Replace house fuses or correct house wiring. C) Clean or replace air filters. D) Remove the unit from its installed location when not accessible for service required. E) Correct improper installations.

2. Parts or labor provided by anyone other than an authorized service center.

3. Damage caused by:
   A) Accident, abuse, negligence, misuse, riot, fire, flood, or acts of God. B) Operating the unit where there is a corrosive atmosphere containing chlorine, fluorine, or any damaging chemicals (other than in a normal residential environment). C) Unauthorized alteration or repair of the unit, which in tum affects its stability or performance. D) Failing to provide proper maintenance and service. E) Using an incorrect power source. F) Faulty installation or application of the unit. **G) Operation of the unit during Construction**

We shall not be liable for any incidental, consequential, or special damages or expenses in connection with any use or failure of this unit. We have not made and do not make any representation or warranty of fitness for a particular use or purpose and there is no implied condition of fitness for a particular use or purpose. We make no expressed warranties except as stated in this certificate. No one is authorized to change this certificate or to create for us any other obligation or liability in connection with this unit. Any implied warranties shall last for one year after the original purchase date. Some states and provinces do not allow limitations on how long an implied warranty or condition lasts, so the above limitations or exclusions may not apply to you. The provisions of this warranty are in addition to and not a modification of or subtraction from the statutory warranties and other rights and remedies provided by law.

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

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

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

In case of any questions regarding the provisions of this warranty, the English version will govern.

CUSTOMER SATISFACTION and QUALITY ASSURANCE

Friedrich is a conscientious manufacturer, concerned about customer satisfaction, product quality, and controlling warranty costs. As an Authorized Service Provider you play a vital role in these areas. By adhering to the policies and procedures you provide us with vital information on each warranty repair you complete. This information is used to identify product failure trends, initiate corrective action, and improve product quality, thereby further reducing warranty expenses while increasing customer satisfaction levels.

FRIEDRICH AUTHORIZED PARTS DEPOTS

AAA Refrigeration Service
1322 24th Street, Suite B Kenner,
Louisiana 70062

504-464-7444
877-813-7444

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

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
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