FRIEDRICH

# VRP® Series Air Conditioners
# R-410A Refrigerant



| Model | Revision | Voltage | BTU |
|---|---|---|---|
| VRP12K | D | 230 | 12,000 |
| VRP12R | D | 265 | 12,000 |
| VRP24K | D | 230 | 24,000 |
| VRP24R | D | 265 | 24,000 |
| VRP36K | A | 230 | 36,000 |
| VRP36K | A-A | 230 | 36,000 |

Service Manual



92511401_06

# TABLE OF CONTENTS

Table of Contents

# TABLE OF CONTENTS

# TABLE OF CONTENTS

# INTRODUCTION

The Friedrich VRP® is a variable capacity system that utilizes Precision Inverter® technology to provide optimal space conditions. While each VRP unit has a nominal capacity of 7,000, 12,000, 24,000, or 36,000 Btus, every unit has the ability to adjust Btu output based on the actual room load. This equates to:

- Greater in-room dehumidification from longer compressor run time
- Lower energy costs by consuming less power
- Greater occupant comfort due to smaller swings in room temperature and humidity

The VRP accomplishes this by constantly monitoring various system and environmental inputs to vary the output of the unit. the ability to vary compressor and blower speeds and the use of reheat coil enables the VRP to provide optimal comfort. With up to 20.0 SEER and 10.0 HSPF, the VRP provides a highly efficient solution. Further, the Precision Inverter technology allows the heat pump to operate at ambient conditions as low as 0˚ F reducing the use of strip heat. This results in significant savings in operational costs.

An optional integrated FreshAireTM system delivers conditioned fresh air into the space. The fresh air is filtered through a MERV 8 filter and is then conditioned through the unit's primary DX coils backed by a reheat coil that augments the unit's dehumidification capability. This integrated fresh air solution provides the ability to potentially downsize or eliminate additional make up air and humidity control equipment.

Friedrich's wall controller is the main interface between conditioned space and the unit. The controller has seven back-lit segment displays that indicate the system mode (cool, heat, fan only), fan speed (low, high or auto), set point (°F or °C) or alternatively room temperature (°F or °C).

The controller has an integrated temperature and humidity sensor that sends room status to the main control unit (MCU) to determine operating modes and speeds of various components.

The unitary packaged design means easier installation or replacement. Because the VRP is a packaged unit, it is installed as a completely assembled refrigeration system. Unlike VRF or chilled water systems that require on-site wiring, piping and sealing of individual components, VRP units are assembled, charged and run tested under strict quality control guidelines in Friedrich's North American factory. Additionally, there is no need to locate the cooling tower or condensing units on the ground or rooftops where green spaces can exist instead.

In sum, The Friedrich VRP offers a significant value to all parties involved in the design and construction of a new building. Because of the simpler and more straightforward nature of the packaged design, and the ability to potentially downsize or eliminate additional make up air and humidity control equipment, the VRP reduces much of the headache and complexity facing the design engineer. Because the VRP is easy to install, with no complicated floor-to-floor piping and wiring involved, the contractor can be confident of a high-quality installation and get on and off the job more quickly. And finally, the owner gets the efficiency and performance of larger, more complex and costly equipment, with a lower overall installed cost; and he/she virtually eliminates the potential safety and service issues associated with systems that rely on thousands of feet of refrigerant or water piping running throughout the building, including occupied spaces.

# INTRODUCTION

**Part Load Performance**

Exceptional Efficiencies with VRP®: Partial load conditions prevail for the majority of the time. VRP's Precision Inverter® compressor can operate down to 40% of rated capacity or up to 120% matching the unit's output to the actual demand of the space and, therefore, only consumes the energy that is required. Because of this ability to modulate the capacity, VRP delivers significantly higher efficiencies than a fixed–speed unit resulting in huge savings in operational costs. Example of variable speed efficiency below.

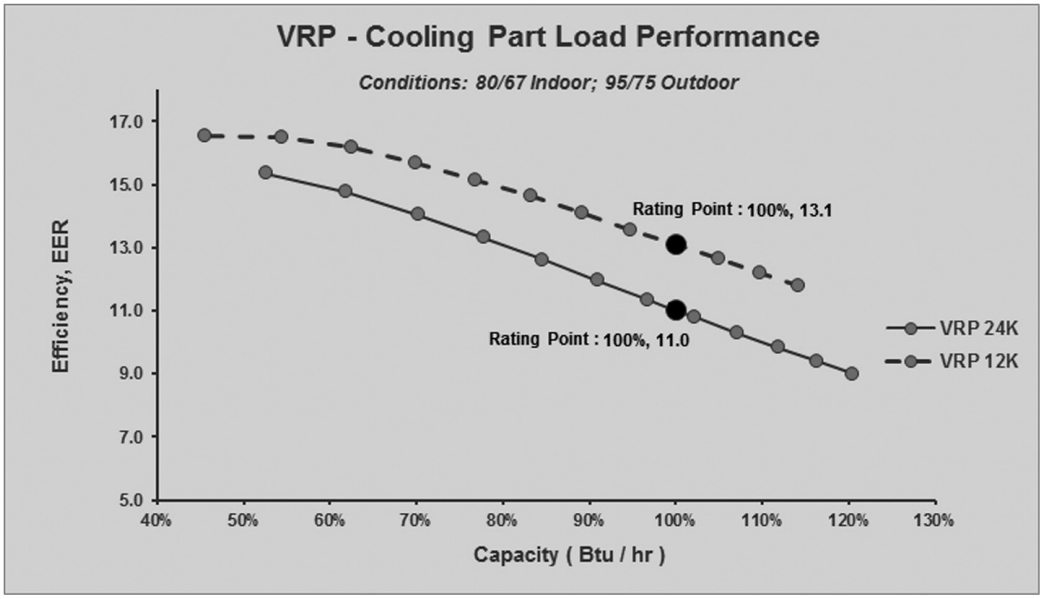



Figure 101 (Cooling Part Load Performance)

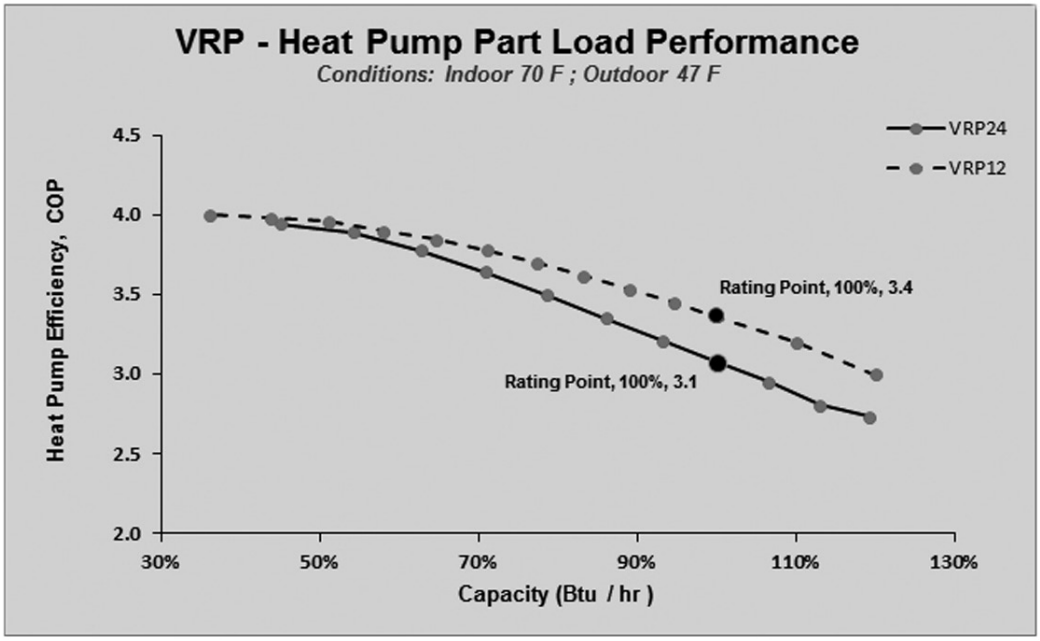



Figure 102 (Heating-Part Load Performance)

# INTRODUCTION

## VRP® Variable Speed System vs. Fixed-speed System

Low Ambient Heat Pump Performance: Variable speed technology enables VRP units to supply continuous hot air in heat pump mode even at low outdoor ambient temperatures. This reduces strip heat usage resulting in exceptional savings with VRP units when compared with traditional fixed-speed units which need to switch to strip heat at much higher ambient temperatures.

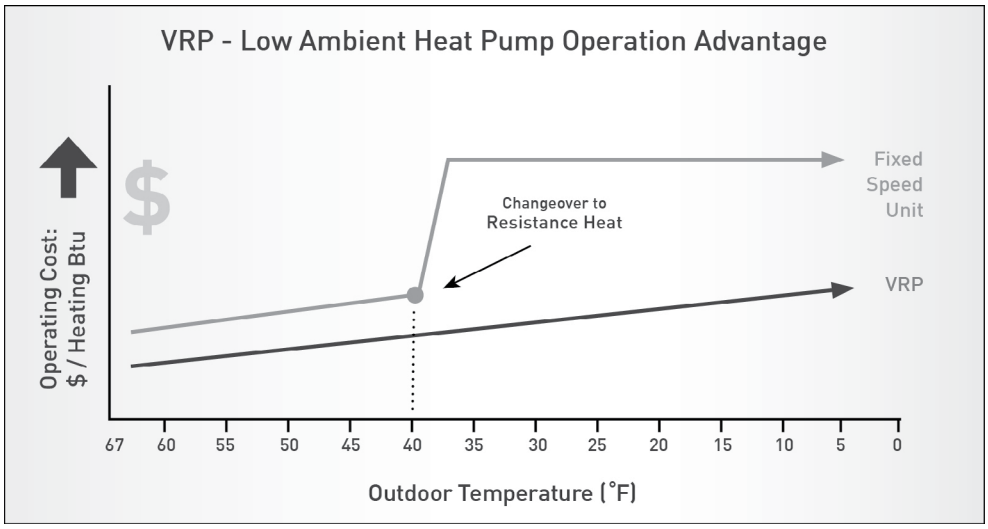



Figure 103(Cost Savings)

Precise Temperature & Humidity Control: VRP units not only help keep the air at the preferred temperature, but can more effectively remove moisture from the air. VRP units run longer cycles at lower pressures, helping to cool the air more evenly. The combination of variable speed compressor & blower motor and reheat coil in VRP units provide optimal comfort to the occupants. On the other hand, traditional fixed-speed systems tend to cool the air too fast without proper moisture removal increasing the risk of mold and other airborne problems.

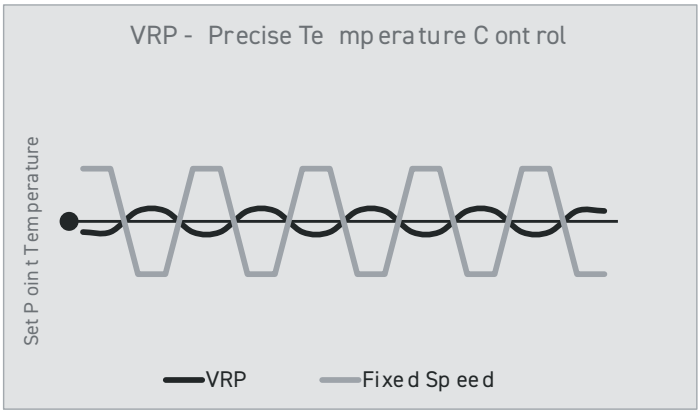



Figure 104 (Precision Temp Control)

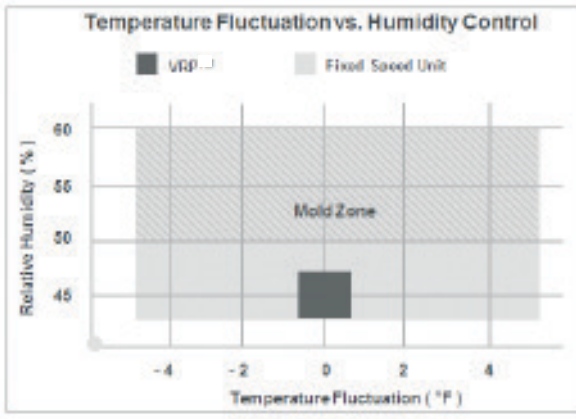



Figure 105 (Temp vs Humidity Control)

# INTRODUCTION

**FreshAire™ Conditioned Fresh Air**
FreshAire is a dedicated fresh air system that brings in up to 70 CFM of outdoor air into the VRP® unit. The FreshAire system uses one fan (up to 35 CFM) or two fans (up to 70 CFM) (depending on outdoor air CFM volume requirements) to bring in fresh outside air into the unit. The outdoor air passes through dedicated 6"x 6"x 1" MERV 8 filters that are easily replaceable from the front of the unit.

This outdoor air is mixed with the return air inside the unit prior to the main evaporator coils, reheat coil and heater. Because of the variable speed of both the compressor and evaporator fan, the VRP can increase or decrease the unit's capacity to cool, heat or dehumidify the total supply air. The system uses a proprietary algorithm to measure the dew point of the leaving air. As the system nears the room set point, the system will throttle back both the compressor and the supply air volume in order to maximize the dwell time on the indoor coil to maximize dehumidification.

(Single speed systems cycle on and off, providing less dehumidification capacity and run time as well as encounter condensate re-evaporation when cycled off.)

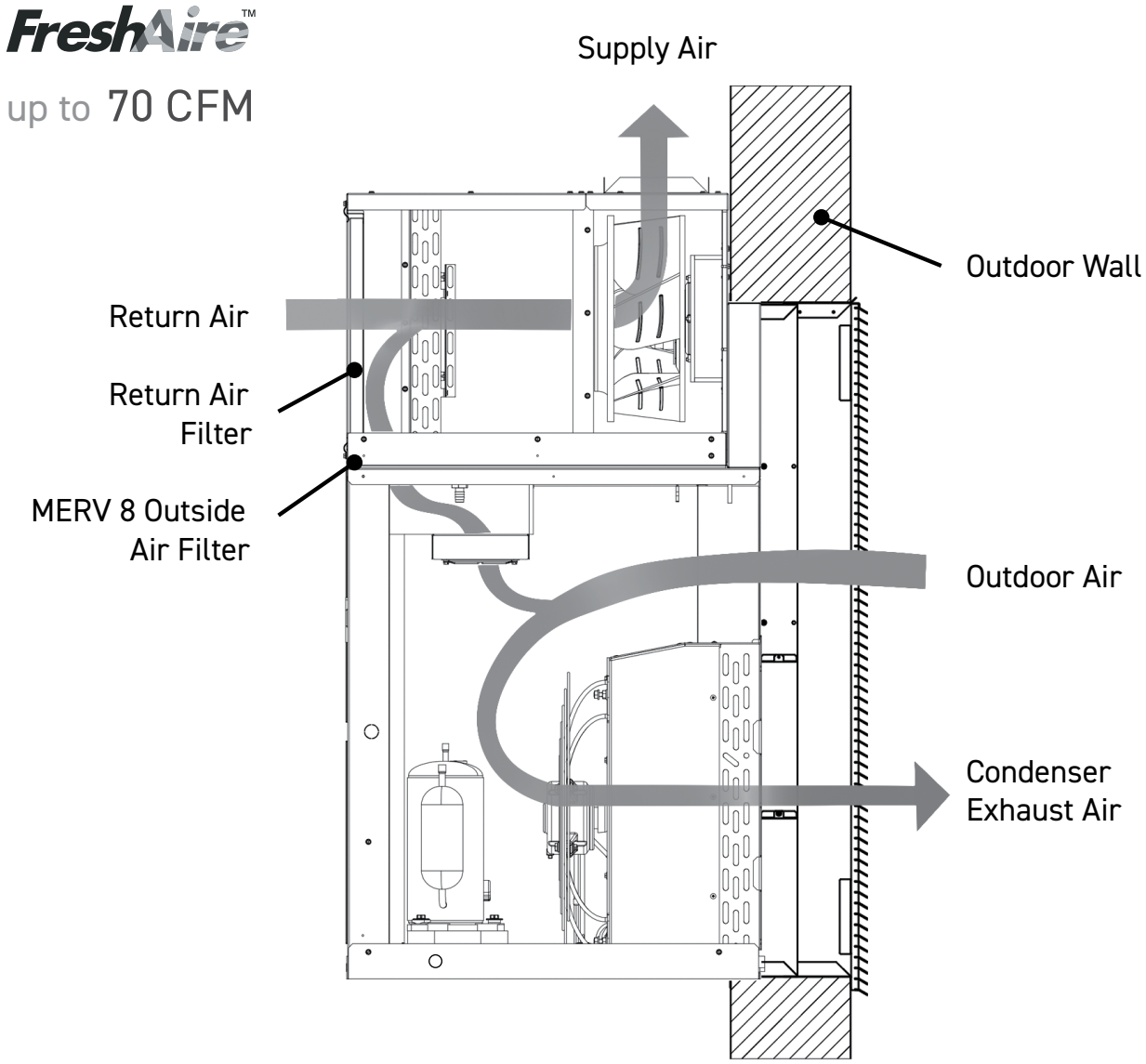



Figure 106 (FreshAire)

# INTRODUCTION

## Reheat Coil - Augments VRP's Dehumidification Capability

Temperature differences are not the only source of discomfort in a living space. Humidity also plays a big role — especially in climates that tend to be both hot and humid. The air conditioning industry's focus on humidity issues has elevated the importance of dehumidification. Air conditioning units operate in environments with varying indoor humidity levels. Therefore, the system should be able to adequately respond to the humidity changes by removing sufficient amounts of moisture in order to keep the conditioned space within the comfort zone.

Anytime the compressor is running in air conditioning mode, it will also be pulling humidity out of the space. Fixed-speed systems shut off after the desired set temperature is reached (i.e. when the sensible load is met). VRP® units run much longer at lower capacity and energy consumption than traditional systems. Humidity levels are reduced to more comfortable levels. The dehumidification capability of VRP units is enhanced through the use of a reheat coil that provides superior flexibility in satisfying a wide range of latent and sensible capacity demands. The reheat coil is placed behind the evaporator coil.

At relatively high ambient temperatures, both sensible and latent components of the system capacity are required to satisfy increased cooling and dehumidification demands. The VRP wall controller and other sensors in the unit combine to continuously monitor the space RH levels and when there is demand for extra dehumidification, the refrigerant exiting the condenser is rerouted to the reheat coil located behind the evaporator on the way to the indoor air stream supplied to the conditioned space.

Thus, cooled and dehumidified air exiting the evaporator coil is reheated to desirable comfort levels for the space.

# 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.

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

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

**Important Safety Information**

## CAUTION

DO NOT OPERATE EQUIPMENT DURING ACTIVE STAGES OF CONSTRUCTION

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

### ⚠ WARNING

Please read this manual thoroughly prior to equipment installation or operation. It is the installer's responsibility to properly apply and install the equipment. Installation must be in conformance with the NFPA 70-2008 National Electric Code or current edition, International Mechanic code 2009 or current edition and any other applicable local or national codes.

### ⚠ 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 R22 gauge sets. Failure to do so can result in property damage, personal injury, or death.

### ⚠ WARNING

**Electrical shock hazard.**

Turn OFF electric power before service or installation.

Unit must be properly grounded.

Unit must have correct fuse or circuit breaker protection. Unit's supply circuit must have the correct wire conductor size. 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 property damage, personal injury and/or death.

**Your safety and the safety of others are very important.**

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

This is the 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 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.

# 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. |

ELECTRICAL HAZARDS:

- Shutdown 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. Wait a few minutes after shutdown to allow the capacitors to discharge the stored energy.
- 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 turned 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.
- Ensure the unit that the unit is properly grounded.
- Do not cut or modify the power supply cord or remove the ground prong of the plug.
- Never operate the unit on an extension cord.
- Follow all safety precautions and use approved protective safety equipment such as: gloves, goggles, and clothing. Ensure that properly insulated tools, and testing equipment are are used as well to protect against equipment damage and reduce the risk of injury.
- Failure to follow proper safety procedures and these warnings can result in serious injury or possibly death.

# INTRODUCTION

## Model and Serial Number Identification Guides

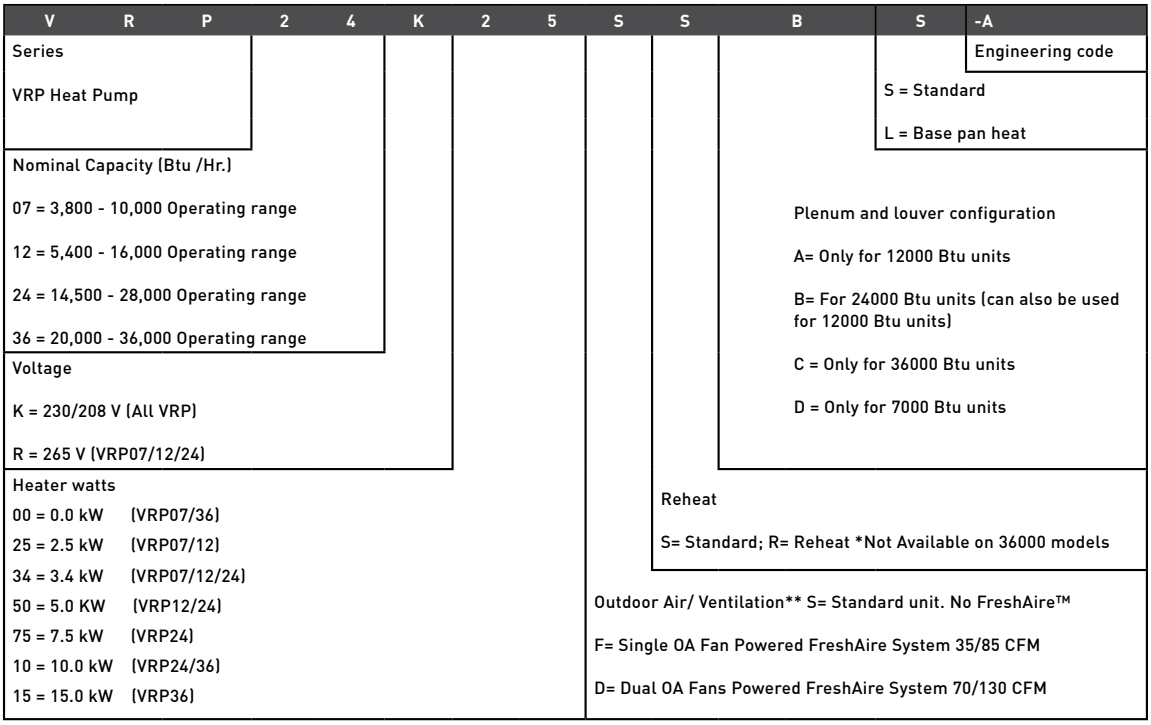



**Figure 105.1 (Model Identification Guide for Models Produced in 2022 and Prior)**

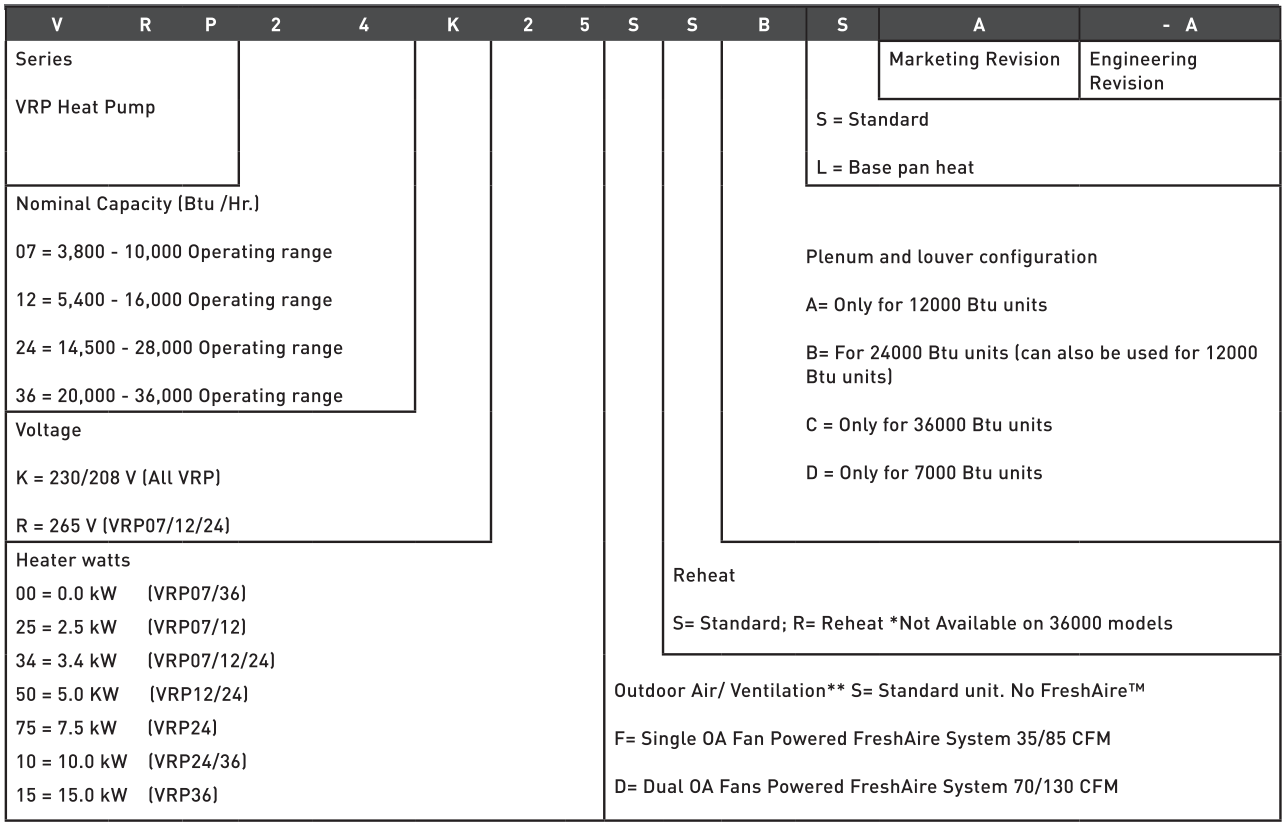



**Figure 105.2 (Model Identification Guide for Models Produced in 2023 and Beyond)**

# INTRODUCTION

**Model and Serial Number Identification Guides**

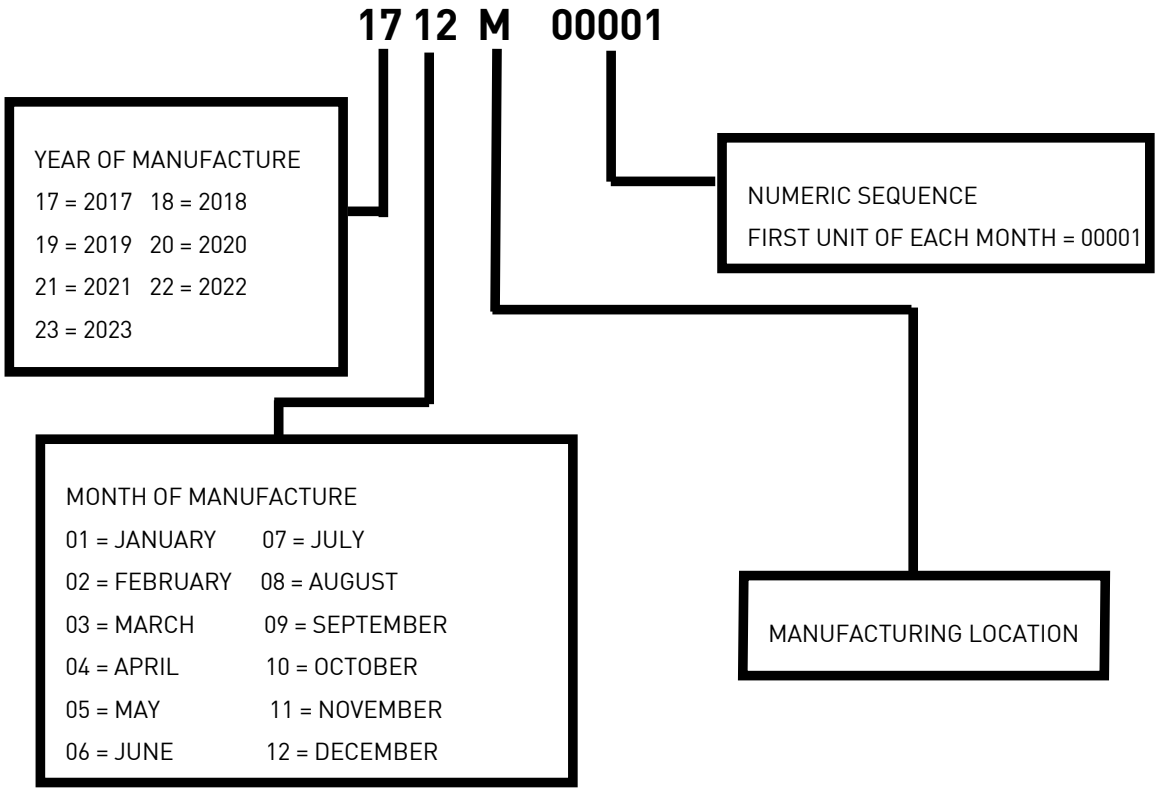



**Figure 106 (Serial Number Identification)**

# SPECIFICATIONS

**Cooling Performance**

| Model | VRP12K / VRP12R | | VRP24K / VRP12R | | VRP36KA | VRP36KA-A |
|---|---|---|---|---|---|---|
| **Cooling Performance Data (Cooling Standards: 95°F DB/75°F WB outdoor, 80°F DB/67°F WB indoor)** | | | | | | |
| Voltage | 230/208 | 265 | 230/208 | 265 | 230/208 | 230/208 |
| Cooling Btu (Rated) | 12,000 | | 23,400 | | 33,400 | 33,400 |
| Cooling Btu (Min. – Max) | 5,400– 16,000 | | 14,00 – 28,000 | | 20,000 - 36,000 | 33,400 |
| Outdoor Operating Range (°F) | 55 – 115 | | 55 – 115 | | 55 - 115 | 55 - 115 |
| Power (W) | 923 | | 2138 | | 2990 | 3,310 |
| SEER | 20.0 | | 17.5 | | 15.5 | - |
| SEER 2 | - | | - | | - | 14.7 |
| EER | 13.0 | | 11.0 | | 10.9 | - |
| EER 2 | - | | - | | - | 10.1 |
| Sensible Heat Ratio | 0.71 | | 0.7 | | 0.76 | 0.78 |
| Cooling Amps | 4.3 | | 10.0 | | 14.2 | 15.7 |
| **Heat Pump Performance Data** | | | | | | |
| Heating Btu (Rated @ 47° F) | 11,500 | | 21,000 | | 28,500 | 28,600 |
| Heating Btu (@ 17° F) | 7,700 | | 13,000 | | 18,300 | 19,200 |
| Heating Btu (Min. – Max.) | 4,000 – 14,000 | | 12,000 – 26,000 | | 16,000 - 30,000 | 16,000-30,000 |
| Heat Pump Outdoor Operating Range (°F)* | 0 – 70 | | 0 – 70 | | 0 - 70 | 0 - 70 |
| COP (Rated @ 47° F) | 3.4 | | 3.1 | | 3.25 | 3.25 |
| COP (@ 17° F) | 2.2 | | 2.4 | | 2.29 | - |
| HSPF | 10.0 | | 10.0 | | 8.6 | - |
| HSPF2 | - | | - | | - | 6.7 |
| Heating Power (W) | 991 | | 1954 | | 2570 | 2,980 |
| Heating Amps | 4.8 | 4.1 | 9.1 | 7.8 | 12.26 | - |
| Rating Standard | - | | - | | - | AHRI 210/240 |

**Figure 201 (Cooling Performance)**

# SPECIFICATIONS

### 12k Extended Cooling Performance Data

| Model: VRP12K | | Indoor Temperature | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70˚ FDB | | | 75˚ FDB | | | **80˚ FDB** | | | 85˚ FDB | | | 90˚ FDB | | |
| | | 60˚ F WB | | | 63˚ F WB | | | **67˚ F WB** | | | 71˚ F WB | | | 73˚ F WB | | |
| Outdoor Temperature Dry (°F) | (˚F) DB | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 65˚ | 11680 | 615 | 2.8 | 12755 | 615 | 2.8 | 13825 | 615 | 2.8 | 14900 | 615 | 2.8 | 15975 | 620 | 2.8 |
| | 70˚ | 11460 | 665 | 3.0 | 12510 | 665 | 3.0 | 13555 | 675 | 3.0 | 14600 | 675 | 3.0 | 15650 | 675 | 3.0 |
| | 75˚ | 11240 | 720 | 3.2 | 12260 | 720 | 3.2 | 13280 | 725 | 3.2 | 14300 | 725 | 3.2 | 15320 | 725 | 3.2 |
| | 80˚ | 10990 | 765 | 3.4 | 11980 | 775 | 3.5 | 12970 | 775 | 3.5 | 13965 | 775 | 3.5 | 14955 | 780 | 3.5 |
| | 85˚ | 10735 | 815 | 3.6 | 11700 | 820 | 3.7 | 12660 | 825 | 3.7 | 13625 | 825 | 3.7 | 14585 | 830 | 3.7 |
| | 90˚ | 10460 | 860 | 3.9 | 11400 | 870 | 3.9 | 12330 | 875 | 3.9 | 13270 | 880 | 3.9 | 14200 | 880 | 3.9 |
| | **95˚** | 10185 | 910 | 4.1 | 11090 | 920 | 4.1 | 12000 | 925 | 4.1 | 12910 | 930 | 4.2 | 13815 | 935 | 4.2 |
| | 100˚ | 9875 | 960 | 4.3 | 10760 | 970 | 4.3 | 11645 | 975 | 4.4 | 12530 | 985 | 4.4 | 13415 | 990 | 4.4 |
| | 105˚ | 9565 | 1010 | 4.5 | 10425 | 1020 | 4.6 | 11285 | 1030 | 4.6 | 12145 | 1040 | 4.7 | 13005 | 1045 | 4.7 |
| | 110˚ | 9265 | 1060 | 4.7 | 10100 | 1075 | 4.8 | 10940 | 1085 | 4.9 | 11775 | 1100 | 4.9 | 12610 | 1110 | 5.0 |
| | 115˚ | 8965 | 1120 | 5.0 | 9775 | 1130 | 5.1 | 10590 | 1145 | 5.1 | 11400 | 1155 | 5.2 | 12215 | 1170 | 5.2 |

| Model: VRP12R | | Indoor Temperature | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70˚ FDB | | | 75˚ FDB | | | **80˚ FDB** | | | 85˚ FDB | | | 90˚ FDB | | |
| | | 60˚ F WB | | | 63˚ F WB | | | **67˚ F WB** | | | 71˚ F WB | | | 73˚ F WB | | |
| Outdoor Temperature Dry (°F) | (˚F) DB | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 65˚ | 11680 | 615 | 2.4 | 12755 | 615 | 2.4 | 13825 | 615 | 2.4 | 14900 | 615 | 2.4 | 15975 | 620 | 2.4 |
| | 70˚ | 11460 | 665 | 2.6 | 12510 | 665 | 2.6 | 13555 | 675 | 2.6 | 14600 | 675 | 2.6 | 15650 | 675 | 2.6 |
| | 75˚ | 11240 | 720 | 2.8 | 12260 | 720 | 2.8 | 13280 | 725 | 2.8 | 14300 | 725 | 2.8 | 15320 | 725 | 2.8 |
| | 80˚ | 10990 | 765 | 3.0 | 11980 | 775 | 3.0 | 12970 | 775 | 3.0 | 13965 | 775 | 3.0 | 14955 | 780 | 3.0 |
| | 85˚ | 10735 | 815 | 3.2 | 11700 | 820 | 3.2 | 12660 | 825 | 3.2 | 13625 | 825 | 3.2 | 14585 | 830 | 3.2 |
| | 90˚ | 10460 | 860 | 3.3 | 11400 | 870 | 3.4 | 12330 | 875 | 3.4 | 13270 | 880 | 3.4 | 14200 | 880 | 3.4 |
| | **95˚** | 10185 | 910 | 3.5 | 11090 | 920 | 3.6 | 12000 | 925 | 3.6 | 12910 | 930 | 3.6 | 13815 | 935 | 3.6 |
| | 100˚ | 9875 | 960 | 3.7 | 10760 | 970 | 3.8 | 11645 | 975 | 3.8 | 12530 | 985 | 3.8 | 13415 | 990 | 3.8 |
| | 105˚ | 9565 | 1010 | 3.9 | 10425 | 1020 | 4.0 | 11285 | 1030 | 4.0 | 12145 | 1040 | 4.0 | 13005 | 1045 | 4.1 |
| | 110˚ | 9265 | 1060 | 4.1 | 10100 | 1075 | 4.2 | 10940 | 1085 | 4.2 | 11775 | 1100 | 4.3 | 12610 | 1110 | 4.3 |
| | 115˚ | 8965 | 1120 | 4.4 | 9775 | 1130 | 4.4 | 10590 | 1145 | 4.5 | 11400 | 1155 | 4.5 | 12215 | 1170 | 4.5 |

Cooling Standards: 95°F DB/75°F WB outdoor, 80°F DB/67°F WB indoor

**Figure 202 (12k Extended Cooling Performance Data)**

# SPECIFICATIONS

## 24k Extended Cooling Performance Data

| Model: VRP24K | | Indoor Temperature | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70˚ FDB | | | 75˚ FDB | | | **80˚ FDB** | | | 85˚ FDB | | | 90˚ FDB | | |
| | | 60˚ F WB | | | 63˚ F WB | | | **67˚ F WB** | | | 71˚ F WB | | | 73˚ F WB | | |
| Outdoor Temperature Dry (°F) | **(˚F) DB** | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 65˚ | 22875 | 1420 | 6.4 | 24980 | 1420 | 6.4 | 27075 | 1420 | 6.4 | 29180 | 1420 | 6.4 | 31285 | 1430 | 6.4 |
| | 70˚ | 22440 | 1535 | 6.8 | 24500 | 1535 | 6.8 | 26545 | 1560 | 6.8 | 28590 | 1560 | 6.8 | 30650 | 1560 | 6.8 |
| | 75˚ | 22010 | 1665 | 7.3 | 24010 | 1665 | 7.3 | 26005 | 1675 | 7.3 | 28005 | 1675 | 7.3 | 30000 | 1675 | 7.3 |
| | 80˚ | 21520 | 1765 | 7.7 | 23460 | 1790 | 7.9 | 25400 | 1790 | 7.9 | 27350 | 1790 | 7.9 | 29285 | 1800 | 7.9 |
| | 85˚ | 21025 | 1880 | 8.2 | 22910 | 1895 | 8.4 | 24795 | 1905 | 8.4 | 26680 | 1905 | 8.4 | 28560 | 1915 | 8.4 |
| | 90˚ | 20485 | 1985 | 8.8 | 22325 | 2010 | 8.8 | 24145 | 2020 | 8.8 | 25985 | 2030 | 8.8 | 27810 | 2030 | 8.8 |
| | **95˚** | 19945 | 2100 | 9.3 | 21720 | 2125 | 9.3 | 23500 | 2135 | 9.3 | 25280 | 2150 | 9.5 | 27055 | 2160 | 9.5 |
| | 100˚ | 19340 | 2215 | 9.8 | 21070 | 2240 | 9.8 | 22805 | 2250 | 10 | 24540 | 2275 | 10 | 26270 | 2285 | 10 |
| | 105˚ | 18730 | 2330 | 10.2 | 20415 | 2355 | 10.4 | 22100 | 2380 | 10.4 | 23785 | 2400 | 10.7 | 25470 | 2415 | 10.7 |
| | 110˚ | 18145 | 2450 | 10.7 | 19780 | 2480 | 10.9 | 21425 | 2505 | 11.1 | 23060 | 2540 | 11.1 | 24695 | 2565 | 11.3 |
| | 115˚ | 17555 | 2585 | 11.3 | 19145 | 2610 | 11.6 | 20740 | 2645 | 11.6 | 22325 | 2665 | 11.8 | 23920 | 2700 | 11.8 |

| Model: VRP24R | | Indoor Temperature | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70˚ FDB | | | 75˚ FDB | | | **80˚ FDB** | | | 85˚ FDB | | | 90˚ FDB | | |
| | | 60˚ F WB | | | 63˚ F WB | | | **67˚ F WB** | | | 71˚ F WB | | | 73˚ F WB | | |
| Outdoor Temperature Dry (°F) | **(˚F) DB** | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 65˚ | 22875 | 1420 | 5.5 | 24980 | 1420 | 5.5 | 27075 | 1420 | 5.5 | 29180 | 1420 | 5.5 | 31285 | 1430 | 5.5 |
| | 70˚ | 22440 | 1535 | 5.9 | 24500 | 1535 | 5.9 | 26545 | 1560 | 5.9 | 28590 | 1560 | 5.9 | 30650 | 1560 | 5.9 |
| | 75˚ | 22010 | 1665 | 6.3 | 24010 | 1665 | 6.3 | 26005 | 1675 | 6.3 | 28005 | 1675 | 6.3 | 30000 | 1675 | 6.3 |
| | 80˚ | 21520 | 1765 | 6.7 | 23460 | 1790 | 6.9 | 25400 | 1790 | 6.9 | 27350 | 1790 | 6.9 | 29285 | 1800 | 6.9 |
| | 85˚ | 21025 | 1880 | 7.1 | 22910 | 1895 | 7.3 | 24795 | 1905 | 7.3 | 26680 | 1905 | 7.3 | 28560 | 1915 | 7.3 |
| | 90˚ | 20485 | 1985 | 7.7 | 22325 | 2010 | 7.7 | 24145 | 2020 | 7.7 | 25985 | 2030 | 7.7 | 27810 | 2030 | 7.7 |
| | **95˚** | 19945 | 2100 | 8.1 | 21720 | 2125 | 8.1 | 23500 | 2135 | 8.1 | 25280 | 2150 | 8.3 | 27055 | 2160 | 8.3 |
| | 100˚ | 19340 | 2215 | 8.5 | 21070 | 2240 | 8.5 | 22805 | 2250 | 8.7 | 24540 | 2275 | 8.7 | 26270 | 2285 | 8.7 |
| | 105˚ | 18730 | 2330 | 8.9 | 20415 | 2355 | 9.1 | 22100 | 2380 | 9.1 | 23785 | 2400 | 9.3 | 25470 | 2415 | 9.3 |
| | 110˚ | 18145 | 2450 | 9.3 | 19780 | 2480 | 9.5 | 21425 | 2505 | 9.7 | 23060 | 2540 | 9.7 | 24695 | 2565 | 9.9 |
| | 115˚ | 17555 | 2585 | 9.9 | 19145 | 2610 | 10.1 | 20740 | 2645 | 10.1 | 22325 | 2665 | 10.3 | 23920 | 2700 | 10.3 |

Cooling Standards: 95°F DB/75°F WB outdoor, 80°F DB/67°F WB indoor

**Figure 203 (24k Extended Cooling Performance Data)**

# SPECIFICATIONS

## 12 and 24k Extended Heating Performance Data

| Model: VRP12K | | Indoor Temperature Dry Bulb (F) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 60˚ | | | **70˚** | | | 80˚ | | |
| Outdoor Temperature Dry Bulb (F) | **(˚F) DB** | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 17˚ | 7551 | 866 | 3.5 | 7100 | 946 | 3.8 | 6609 | 1014 | 4.1 |
| | 25˚ | 8810 | 877 | 3.6 | 8273 | 958 | 4 | 7688 | 1031 | 4.3 |
| | 35˚ | 10384 | 890 | 3.8 | 9740 | 974 | 4.2 | 9036 | 1051 | 4.5 |
| | **47˚** | 12272 | 906 | 4 | 11500 | 992 | 4.4 | 10654 | 1077 | 4.8 |
| | 55˚ | 13531 | 916 | 4.2 | 12673 | 1004 | 4.6 | 11733 | 1093 | 5 |
| | 62˚ | 14633 | 925 | 4.3 | 13700 | 1015 | 4.7 | 12677 | 1108 | 5.1 |
| Model: VRP12R | | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| Outdoor Temperature Dry Bulb (F) | **(˚F) DB** | | | | | | | | | |
| | 17˚ | 7551 | 866 | 3.0 | 7100 | 946 | 3.3 | 6609 | 1014 | 3.5 |
| | 25˚ | 8810 | 877 | 3.1 | 8273 | 958 | 3.4 | 7688 | 1031 | 3.7 |
| | 35˚ | 10384 | 890 | 3.3 | 9740 | 974 | 3.6 | 9036 | 1051 | 3.9 |
| | **47˚** | 12272 | 906 | 3.4 | 11500 | 992 | 3.8 | 10654 | 1077 | 4.1 |
| | 55˚ | 13531 | 916 | 3.6 | 12673 | 1004 | 4.0 | 11733 | 1093 | 4.3 |
| | 62˚ | 14633 | 925 | 3.7 | 13700 | 1015 | 4.1 | 12677 | 1108 | 4.4 |
| Model: VRP24K | | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| Outdoor Temperature Dry Bulb (F) | **(˚F) DB** | | | | | | | | | |
| | 17˚ | 15208 | 1399 | 6.4 | 14299 | 1528 | 7 | 13310 | 1638 | 7.5 |
| | 25˚ | 17407 | 1473 | 6.7 | 16347 | 1610 | 7.4 | 15190 | 1732 | 7.9 |
| | 35˚ | 20156 | 1565 | 7.2 | 18907 | 1712 | 7.8 | 17541 | 1850 | 8.5 |
| | 47˚ | 23455 | 1675 | 7.7 | 21979 | 1835 | 8.4 | 20362 | 1991 | 9.1 |
| | 55˚ | 25654 | 1749 | 8 | 24027 | 1917 | 8.8 | 22243 | 2086 | 9.5 |
| | 62˚ | 27579 | 1813 | 8.3 | 25819 | 1989 | 9.1 | 23888 | 2168 | 9.9 |
| Model: VRP24R | | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| Outdoor Temperature Dry Bulb (F) | **(˚F) DB** | | | | | | | | | |
| | 17˚ | 15208 | 1399 | 5.5 | 14299 | 1528 | 6.0 | 13310 | 1638 | 6.5 |
| | 25˚ | 17407 | 1473 | 5.8 | 16347 | 1610 | 6.4 | 15190 | 1732 | 6.8 |
| | 35˚ | 20156 | 1565 | 6.2 | 18907 | 1712 | 6.7 | 17541 | 1850 | 7.3 |
| | **47˚** | 23455 | 1675 | 6.6 | 21979 | 1835 | 7.2 | 20362 | 1991 | 7.8 |
| | 55˚ | 25654 | 1749 | 6.9 | 24027 | 1917 | 7.6 | 22243 | 2086 | 8.2 |
| | 62˚ | 27579 | 1813 | 7.2 | 25819 | 1989 | 7.8 | 23888 | 2168 | 8.5 |

Heating Standards: 47°F DB/43°F WB outdoor, 70°F DB/60°F WB indoor

**Figure 204 (12 and 24k Extended Heating Performance Data)**

# SPECIFICATIONS

### 36k A-A Extended Cooling Performance Data

| Model: VRP24 | | Indoor Temperature | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 70˚ FDB | | | 75˚ FDB | | | **80˚ FDB** | | | 85˚ FDB | | | 90˚ FDB | | |
| | | 60˚ F WB | | | 63˚ F WB | | | **67˚ F WB** | | | 71˚ F WB | | | 73˚ F WB | | |
| Outdoor Temperature Dry (°F) | (˚F) DB | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
| | 65˚ | 22875 | 1420 | 6.4 | 24980 | 1420 | 6.4 | 27075 | 1420 | 6.4 | 29180 | 1420 | 6.4 | 31285 | 1430 | 6.4 |
| | 70˚ | 22440 | 1535 | 6.8 | 24500 | 1535 | 6.8 | 26545 | 1560 | 6.8 | 28590 | 1560 | 6.8 | 30650 | 1560 | 6.8 |
| | 75˚ | 22010 | 1665 | 7.3 | 24010 | 1665 | 7.3 | 26005 | 1675 | 7.3 | 28005 | 1675 | 7.3 | 30000 | 1675 | 7.3 |
| | 80˚ | 21520 | 1765 | 7.7 | 23460 | 1790 | 7.9 | 25400 | 1790 | 7.9 | 27350 | 1790 | 7.9 | 29285 | 1800 | 7.9 |
| | 85˚ | 21025 | 1880 | 8.2 | 22910 | 1895 | 8.4 | 24795 | 1905 | 8.4 | 26680 | 1905 | 8.4 | 28560 | 1915 | 8.4 |
| | 90˚ | 20485 | 1985 | 8.8 | 22325 | 2010 | 8.8 | 24145 | 2020 | 8.8 | 25985 | 2030 | 8.8 | 27810 | 2030 | 8.8 |
| | **95˚** | 19945 | 2100 | 9.3 | 21720 | 2125 | 9.3 | 23500 | 2135 | 9.3 | 25280 | 2150 | 9.5 | 27055 | 2160 | 9.5 |
| | 100˚ | 19340 | 2215 | 9.8 | 21070 | 2240 | 9.8 | 22805 | 2250 | 10 | 24540 | 2275 | 10 | 26270 | 2285 | 10 |
| | 105˚ | 18730 | 2330 | 10.2 | 20415 | 2355 | 10.4 | 22100 | 2380 | 10.4 | 23785 | 2400 | 10.7 | 25470 | 2415 | 10.7 |
| | 110˚ | 18145 | 2450 | 10.7 | 19780 | 2480 | 10.9 | 21425 | 2505 | 11.1 | 23060 | 2540 | 11.1 | 24695 | 2565 | 11.3 |
| | 115˚ | 17555 | 2585 | 11.3 | 19145 | 2610 | 11.6 | 20740 | 2645 | 11.6 | 22325 | 2665 | 11.8 | 23920 | 2700 | 11.8 |

Cooling Standards: 95°F DB/75°F WB outdoor, 80°F DB/67°F WB indoor. Values reflect performance at A2 rated compressor frequency.

# SPECIFICATIONS

### 36k A-A Extended Heating Performance Data

| Model: VRP36 | | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) | Capacity (Btu/h) | Input (W) | Amps (A) |
|---|---|---|---|---|---|---|---|---|---|---|
| Outdoor Temperature Dry Bulb (F) | (˚F) DB | | | | | | | | | |
| | 17˚ | 20495 | 2280 | 10.2 | 19175 | 2420 | 11.1 | 17790 | 2560 | 11.3 |
| | 25˚ | 5080 | 2320 | 10.4 | 21690 | 2475 | 11.3 | 20175 | 2645 | 11.5 |
| | 35˚ | 26570 | 2370 | 10.6 | 24830 | 2540 | 11.5 | 23090 | 2720 | 11.8 |
| | **47˚** | 30510 | 2465 | 10.9 | 28600 | 2620 | 11.8 | 26600 | 2805 | 12 |
| | 55˚ | 33210 | 2510 | 11 | 31115 | 2675 | 12 | 28900 | 2865 | 12.2 |
| | 62˚ | 35680 | 2555 | 11.2 | 33310 | 2720 | 12.1 | 30910 | 2905 | 12.4 |

Heating Standards: 47°F DB/43°F WB outdoor, 70°F DB/60°F WB indoor. Values reflect performance at $H1_{Full}$ compressor frequency.

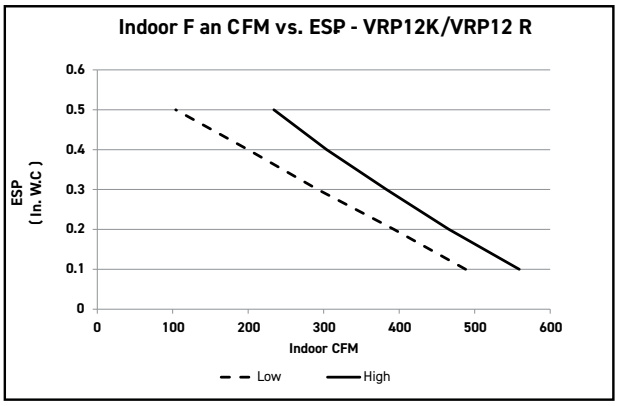
# SPECIFICATIONS

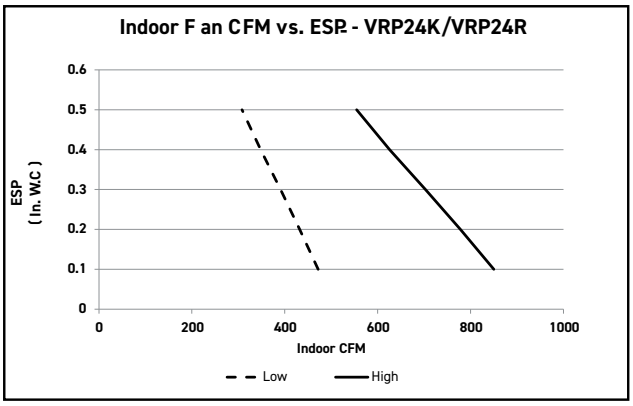
### Air Flow Data -12k and 24k

## Indoor CFM & External Static Pressure

| Model | VRP12K / VRP12R | | VRP24K / VRP24R | |
|---|---|---|---|---|
| **Air Flow Data** | | | | |
| **Indoor CFM** | Low | **High** | Low | **High** |
| **.10" ESP*** | 488 | 559 | 472 | 850 |
| .20" ESP | 393 | 466 | 432 | 778 |
| .30" ESP | 292 | 383 | 391 | 703 |
| .40" ESP | 200 | 304 | 348 | 626 |
| .50" ESP | 104 | 234 | 308 | 555 |

* Rated at 0.10 " ESP, High and includes 0.08 " ESP for factory installed 1 " filter




## Condenser CFM & External Static Pressure

VRP® is designed to mount through an exterior wall through a plenum (VRPXWP****) with an external louver (VRPXAL*).

Building design and applications may require different configurations of this external connection for aesthetic/architectural reasons. These different configurations may include custom louvers, plenums or special ducted returns.

The following are guidelines for the design of these custom external configurations.

| Condenser External Static Pressure | | | |
|---|---|---|---|
| VRP Model | Design | | Maximum |
| | CFM | ESP ( "WC) | ESP ( "WC) |
| VRP 12000 Btu | 700 | 0.03 | 0.1 |
| VRP 24000 Btu | 1150 | 0.017 | 0.11 |

CAUTION: If the Friedrich designed plenum and louver combinations are not used, the louver/duct design must be evaluated to insure the total pressure drop does not exceed the maximum allowable limits.

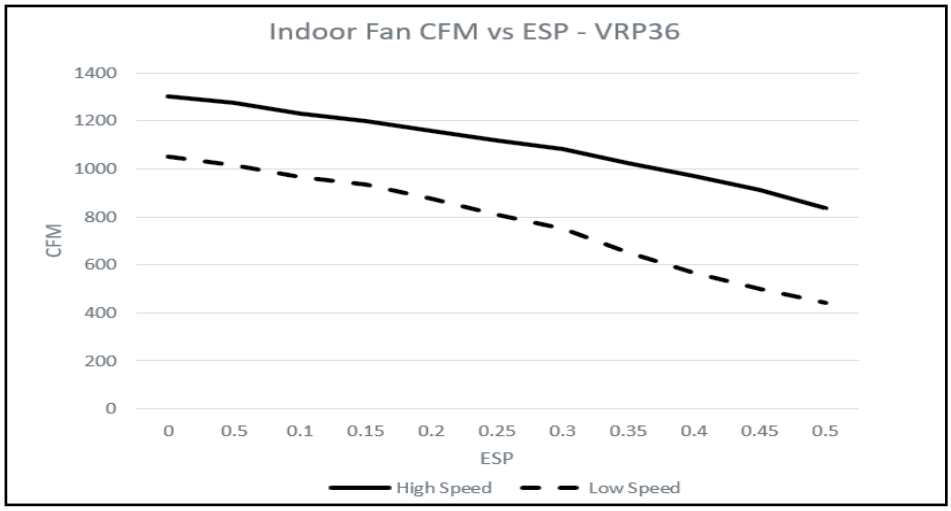
**Figure 205 (12K and 24K Air Flow Data)**

# SPECIFICATIONS

**Air Flow Data -36K A**

## Indoor CFM & External Static Pressure

| Model | VRP36K | |
|---|---|---|
| **Air Flow Data** | | |
| **Indoor CFM** | Low | **High** |
| **.15" ESP *** | 1015 | 1200 |
| .20" ESP | 875 | 1160 |
| .30" ESP - Max @ Low Speed | 750 | 1080 |
| .40" ESP | 565 | 970 |
| .50" ESP - Max @ High Speed | 440 | 835 |
| * Rated at 0.15 " ESP, High and includes 0.08 " ESP for factory installed 1 " filter | | |




## Condenser CFM & External Static Pressure

VRP® is designed to mount through an exterior wall through a plenum (VRPXWP****) with an external louver (VRPXAL*).

Building design and applications may require different configurations of this external connection for aesthetic/architectural reasons. These different configurations may include custom louvers, plenums or special ducted returns.

The following are guidelines for the design of these custom external configurations.

| Condenser External Static Pressure | | | |
|---|---|---|---|
| VRP Model | Design | | Maximum |
| | CFM | ESP ( "WC) | ESP ( "WC) |
| VRP 36000 Btu | 2030 | 0.03 | 0.20 |

CAUTION: If the Friedrich designed plenum and louver combinations are not used, the louver/duct design must be evaluated to insure the total pressure drop does not exceed the maximum allowable limits.

**Figure 206 (36K Air Flow Data)**

# SPECIFICATIONS

## Electrical Data

| VRP Model | Voltage | Heater Watts | Heating Btu | Heater Amps | ID Blower Amps | OD Blower Amps | MCA | MOP / MOCP |
|---|---|---|---|---|---|---|---|---|
| VRP12K | 230 | 2500 | 8530 | 11.2 | 0.34 | 0.57 | 14.0 | 15 |
| | 208 | 2030 | 6980 | 10.2 | 0.38 | 0.63 | | |
| | 230 | 3400 | 11601 | 15.1 | 0.34 | 0.57 | 18.9 | 20 |
| | 208 | 2780 | 9480 | 13.8 | 0.38 | 0.63 | | |
| | 230 | 5000 | 17060 | 22 | 0.34 | 0.57 | 27.5 | 30 |
| | 208 | 4100 | 13980 | 20.1 | 0.38 | 0.63 | | |
| VRP12R | 265 | 2500 | 8530 | 9.8 | 0.2 | 0.5 | 12.3 | 15 |
| | | 3400 | 11601 | 13.2 | 0.2 | 0.5 | 16.5 | 20 |
| | | 5000 | 17060 | 19.3 | 0.2 | 0.5 | 24.1 | 25 |
| VRP24K | 230 | 2500 | 8530 | 11.6 | 0.77 | 1.06 | 14.5 | 15 |
| | 208 | 2030 | 6980 | 10.7 | 0.85 | 1.17 | | |
| | 230 | 3400 | 11600 | 15.6 | 0.77 | 1.06 | 19.5 | 20 |
| | 208 | 2780 | 9480 | 14.3 | 0.85 | 1.17 | | |
| | 230 | 5000 | 17050 | 22.6 | 0.77 | 1.06 | 28.3 | 30 |
| | 208 | 4100 | 13980 | 20.6 | 0.85 | 1.17 | | |
| | 230 | 7500 | 25590 | 33.4 | 0.77 | 1.06 | 41.8 | 45 |
| | 208 | 6130 | 20900 | 30.4 | 0.85 | 1.17 | | |
| | 230 | 10000 | 34120 | 44.3 | 0.77 | 1.06 | 55.4 | 60 |
| | 208 | 8180 | 27890 | 40.2 | 0.85 | 1.17 | | |
| VRP24R | 265 | 2500 | 8530 | 10.8 | 0.7 | 1.0 | 13.5 | 15 |
| | | 3400 | 11601 | 14.2 | 0.7 | 1.0 | 17.8 | 20 |
| | | 5000 | 17060 | 20.3 | 0.7 | 1.0 | 25.4 | 25 |
| | | 7500 | 25590 | 29.7 | 0.7 | 1.0 | 37.1 | 40 |
| | | 10000 | 34120 | 39.1 | 0.7 | 1.0 | 48.9 | 60 |
| VRP36KA | 230 | 0 | 0 | 0.0 | 1.0 | 2.1 | 18.2 | 30 |
| | 208 | 0 | 0 | 0.0 | 1.0 | 2.1 | | |
| | 230 | 8820 | 30090 | 38.3 | 1.0 | 2.1 | 49.2 | 50 |
| | 208 | 7210 | 24600 | 34.7 | 1.0 | 2.1 | | |
| | 230 | 13230 | 45120 | 57.5 | 1.0 | 2.1 | 49.2 + 24.0 | 50 + 25 |
| | 208 | 10820 | 36900 | 52.0 | 1.0 | 2.1 | | |
| VRP36KA-A | 230 | 0 | 0 | 0.0 | 1.0 | 2.1 | 20.9 | 30 |
| | 208 | 0 | 0 | 0.0 | 1.0 | 2.1 | | |
| | 230 | 8820 | 30090 | 39.3 | 1.0 | 2.1 | 49.2 | 50 |
| | 208 | 7210 | 24600 | 35.7 | 1.0 | 2.1 | | |
| | 230 | 8820/4410 | 45120 | 39.3/19.2 | 1.0 | 2.1 | 49.2 + 24.0 | 50 + 25 |
| | 208 | 7210/3610 | 36900 | 35.7/17.4 | 1.0 | 2.1 | | |

MCA = Minimum Circuit Ampacity

MOP / MOCP = Maximum Overcurrent Protection / Breaker Size

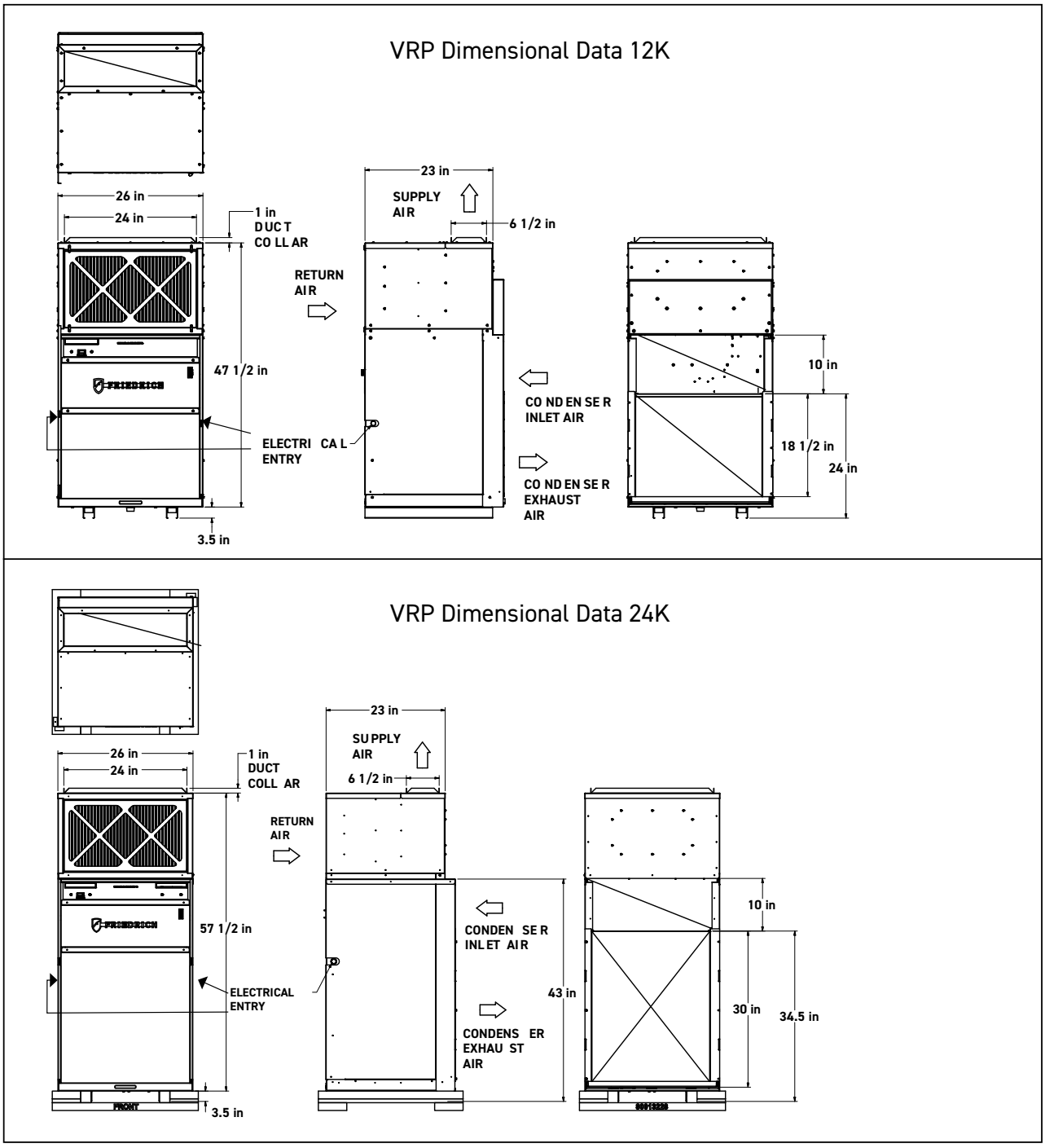
Minimum Circuit Amps (MCA) and MOCP values in the above table are calculated in accordance with The NEC. Article 440

NOTE: VRP36K15 models require dual electrical service (50A + 25A)

**Figure 207 (Electrical Data)**

# SPECIFICATIONS

**12k and 24k Unit Dimensional Data**

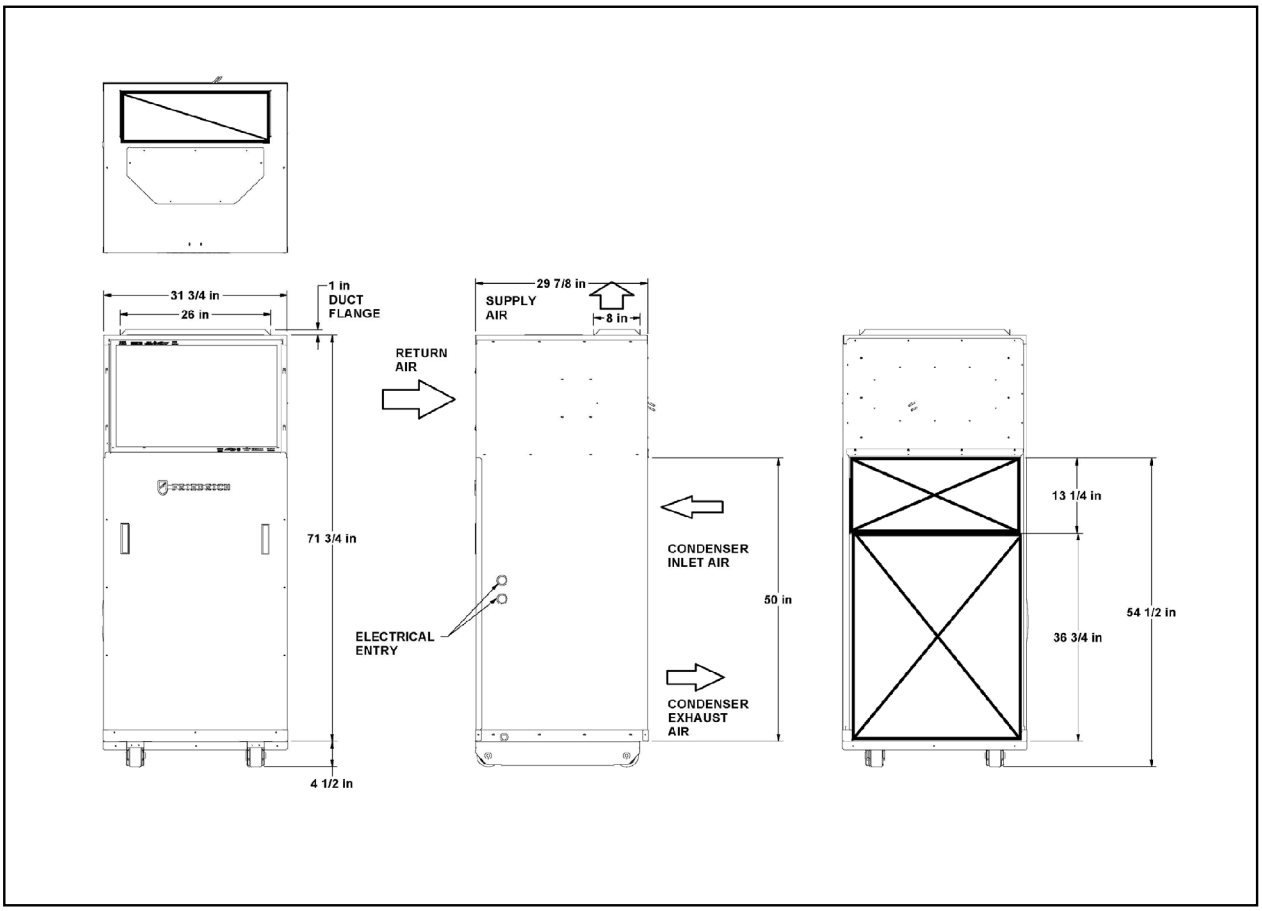



| Model | VRP12K | VRP12R | VRP24K | VRP24R |
|---|---|---|---|---|
| Dimensions (W x D x H) | 26 1/8" x 25 1/8" x 52" | | 26 1/8" x 25 1/8" x 62" | |
| Shipping Dimensions (W x D x H) | 28 1/8" x 27 3/8" x 54.5" | | 28 1/8" x 27 3/8" x 64.5" | |
| Net Weight (lbs.) | 215 | 215 | 255 | 255 |
| Shipping Weight (lbs.) | 276 | 276 | 316 | 316 |
| R410A Charge (oz.) | 49.8 | 49.8 | 68.3 | 68.3 |

**Figure 208 (12k and 24k Unit Dimensional Data)**

# SPECIFICATIONS

### 36k Unit Dimensional Data

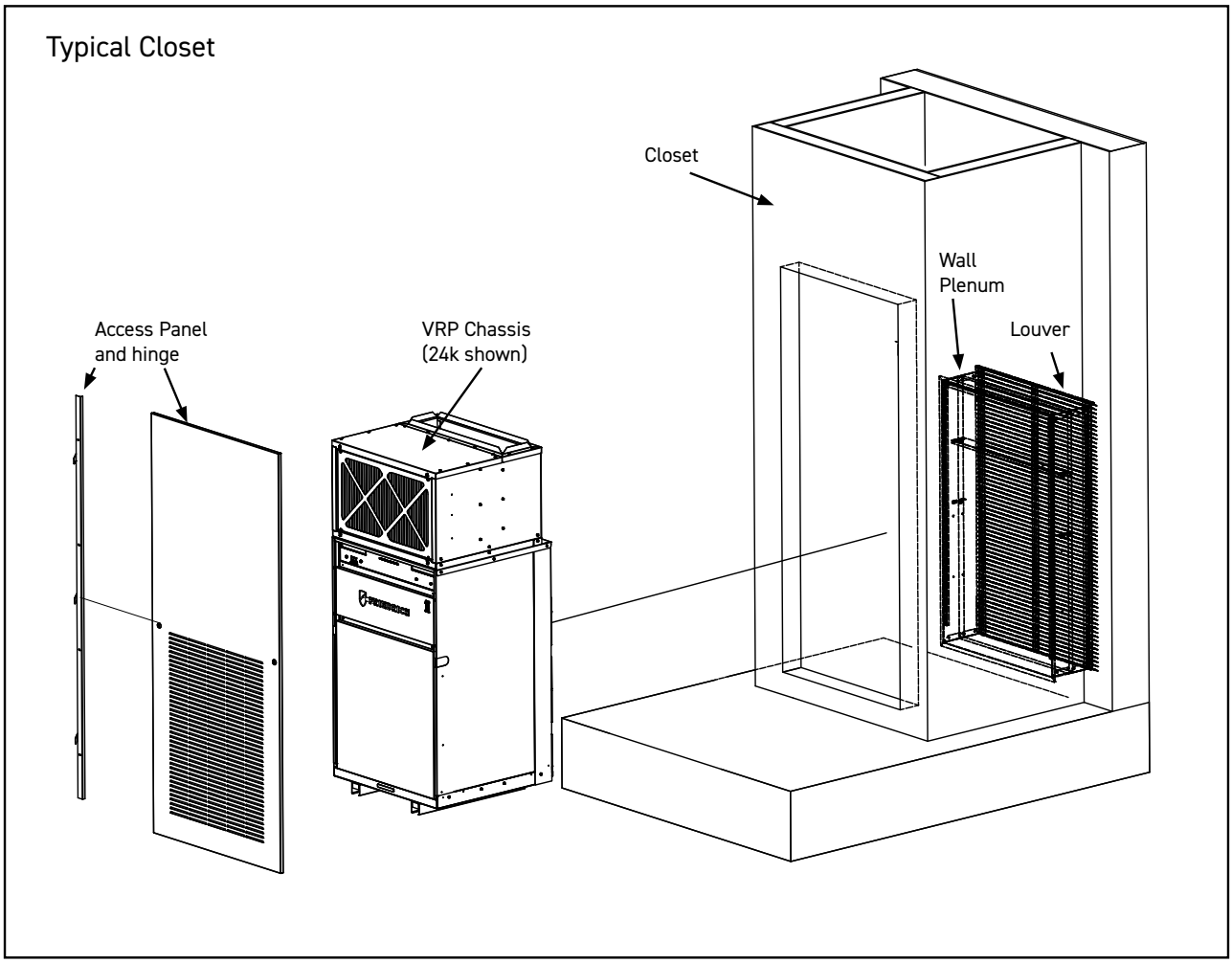



| Model | VRP36K |
|---|---|
| Dimensions (W x D x H) | 31 3/4" x 29 7/8" x 77 1/4" |
| Shipping Dimensions (W x D x H) | 34" x 35" x 81" |
| Net Weight (lbs.) | 330 |
| Shipping Weight (lbs.) | 357 |
| R410A Charge (oz.) | 125 |

**Figure 209 (36K Unit Dimensional Data)**

# SPECIFICATIONS

**12k and 24k Unit Installation Dimensional Data**



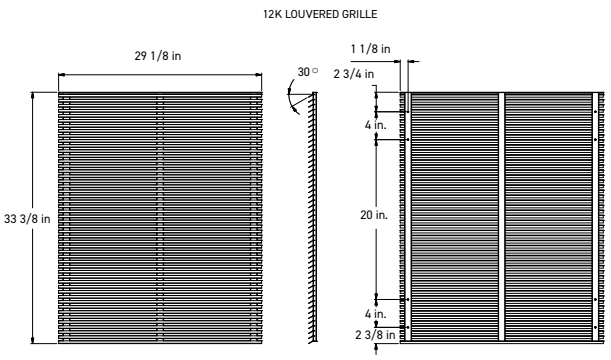

| Model | VRP12K | VRP12R | VRP24K | VRP24R |
|---|---|---|---|---|
| **Outside Wall- Cut Out Dimensions** | | | | |
| Dimensions (W x H)<br>For VRPXWPA-8 or VRPXWPA-14 Plenum | 28 1/8" x 32 1/4" | | NA | |
| Dimensions (W x H)<br>For VRPXWPB-8 or VRPXWPB-14 Plenum | 28 1/8" x 42 1/4" | | 28 1/8" x 42 1/4" | |
| Access Door- Cut Out Dimensions (W x H) | 30" x 70" | | | |
| Minimum Closet Dimensions (W x D) | See Installation Types | | | |

**Figure 210 (12k and 24k Unit Dimensional Data)**

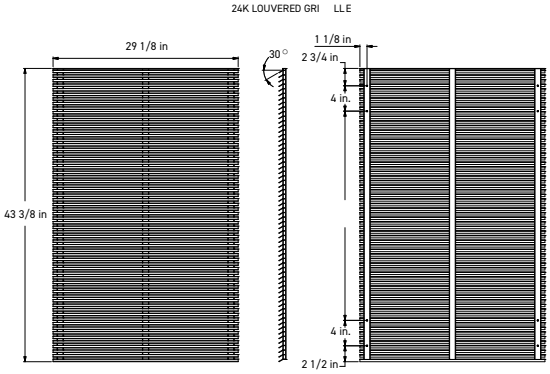
# SPECIFICATIONS

**12k and 24k Accessories Dimensional Data-Louvers & Return Access Door**

12K Louvered Grille




24K Louvered Grille




| Accessory | Description | Outer Dimensions |
|---|---|---|
| VRPXALA | Architectural louver (VRP12 only) (30 ° Blade angle) | 29 1/8" W x 33 3/8" H |
| VRPXALB | Architectural louver (VRP24) (30 ° Blade angle) (Can also be used for VRP12) | 29 1/8" W x 43 3/8" H |
| VRPXSCA | Architectural louver (VRP12 only) Custom Color - Special Order (30 ° Blade angle) | 29 1/8" W x 33 3/8" H |
| VRPXSCB | Architectural louver (VRP24) Custom Color - Special Order (30 ° Blade angle) (Can also be used for VRP12) | 29 1/8" W x 43 3/8" H |

42° blade angle louvers available by special order.

Return Air Access Panel

| | | |
|---|---|---|
| Return Air Access Panel | VRPXAP1 | 32" x 72" |

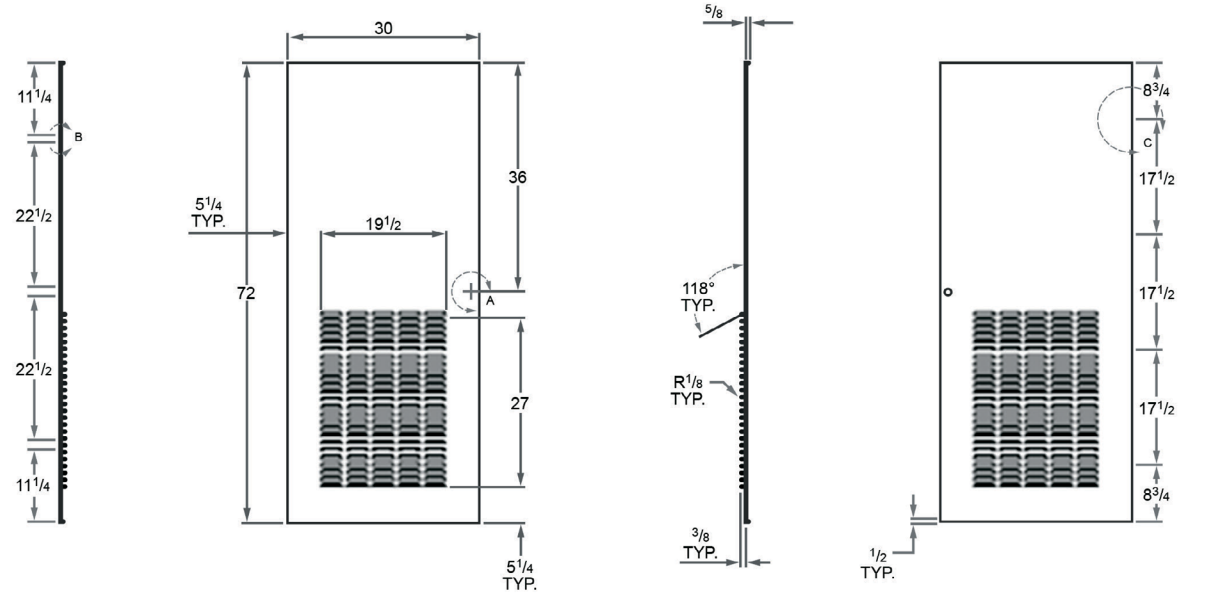



**Figure 211 (12k and 24k Accessories Dimensional Data-Louvers & Return Access Door)**

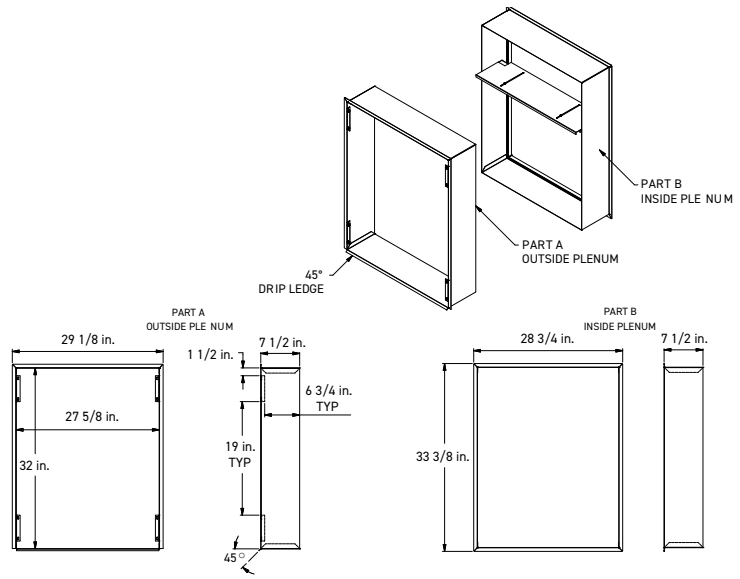
# SPECIFICATIONS

**12k and 24k Accessories Dimensional Data - Wall Plenums**

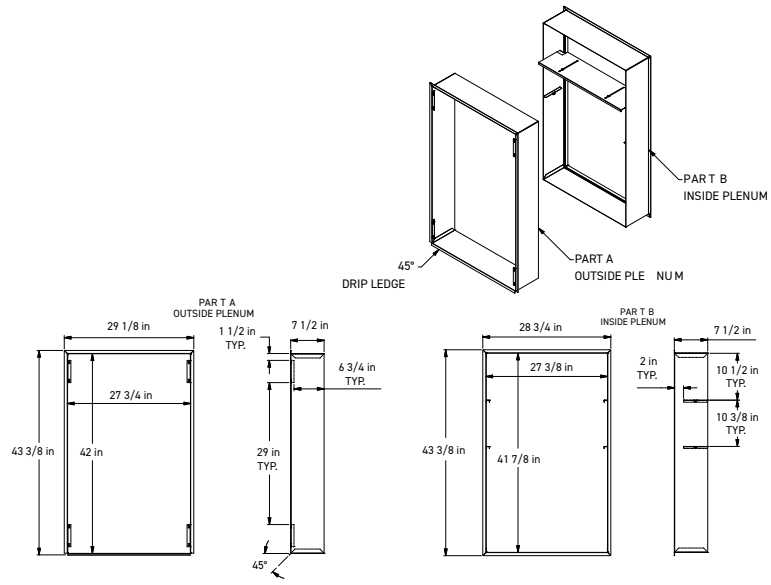
## Installation Guidelines

- Chassis is to be installed against an exterior wall. Refer to page 11 for wall cut out dimensions
- 32" x 32" recommended minimum closet dimensions for return air, drain connections and change outs
- Minimum recommended access door rough-in measurements: 30" wide by 69 3/4" high
- The use of a Friedrich wall plenum is required for installation. Refer to this page for different sizes and selection guide
- Plenum opening minimum distance from floor to lower edge of outside wall cut out should be 3"
- Wall plenum allows chassis to be inserted 2 3/8" into plenum
- Return air is accommodated with a return air filter attached to the unit or through the use of a return air filter grille. (VRPXAP1).
- Exterior louvers are available in anodized aluminum or in custom painted colors and two different sizes: One for only 12K Btu units and the other that can be used with either 12K or 24K units. Refer to page 12 for details
- Unit is controlled by a remote wall-mounted 'Controller'

Wall Plenum for VRP12 with VRPXWPA-8/14 "




Wall Plenum for VRP24 with VRPXWPB-8/14 "



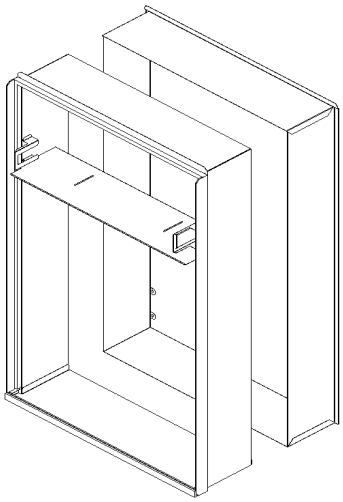

| Accessory | Description | Outer Dimensions |
|---|---|---|
| VRPXWPA-8 | Compact Wall Plenum for 4" to 8" thick wall | 28 7/8" (W) x 33 3/8" (H) |
| VRPXWPB-8 | Standard Wall Plenum for 4" to 8" thick wall | 28 7/8" (W) x 43 3/8" (H) |
| VRPXWPA-14 | Compact Wall Plenum for 8" to 14" thick wall | 28 7/8" (W) x 33 3/8" (H) |
| VRPXWPB-14 | Standard Wall Plenum for 8" to 14" thick wall | 28 7/8" (W) x 43 3/8" (H) |

**Figure 212 (12k and 24k Accessories Dimensional Data - Wall Plenums)**

# SPECIFICATIONS

**36k Accessories Dimensional Data-Louvers**

VRPXWPC-8/14



VRPXALC/VRPXSCC

| Accessory | Description | Outer Dimensions |
|---|---|---|
| VRPXWPC-8 | VRP36 Wall Plenum for 4" to 8" thick wall | 33" W x 52" H |
| VRPXWPC-14 | VRP36 Wall Plenum for 8" to 14" thick wall | 33" W x 52" H |
| VRPXALC | VRP36 Architectural Louver | 33" W x 52 1/2" H |
| VRPXSCC | VRP36 Architectural Louver Special Color | 33" W x 52 1/2" H |

**Figure 213 (36K Accessories Dimensional Data-Louvers)**

# OPERATION

## Sequence Of Operations

**Cooling Sequence:**

The wall thermostat provides the temperature set point as well as the current dry bulb temperature and relative humidity. Upon a call for cooling, the compressor modulates based on the difference between room temperature and set point. As cooling demand decreases the compressor will modulate to a minimum speed. If the room temperature drops 2 °F below set point the compressor will cycle off.

**Heating Sequence:**

The wall thermostat provides the temperature set point as well as the current dry bulb temperature and relative humidity. Upon a call for heating, the compressor modulates based on the difference between room temperature and set point. As Heating demand decreases the compressor will modulate to a minimum speed. If the room temperature raises 2 °F above set point the compressor will cycle off.

**Main Supply Fan Sequence:**

**Option 1:** (ON/Continuous) The Supply fan runs continuously

**Option 2:** (Auto) The Supply fan cycles with the compressor.

**Option 3:** (Smart Fan) The Supply fan cycles with the compressor. The fan will modulate based on the difference between the space temperature and space set point.

**IAQ Ventilation Fan Sequence:**

**Option 1:** (ON) The fan(s) run when occupancy is sensed, and the indoor blower is running.

**Option 2:** (OFF) The OSA fan(s) do not run.

**Hot Gas Reheat Coil Sequence:**

Once the sensible load of the space is satisfied, and if the relative humidity of the space is above 55%, the hot gas reheat coil will be activated. The hot gas reheat coil will remain activated until the relative humidity drops below 50% or if the room temperature creeps too far away from set point.

**Auxiliary Electric Heat Sequence:**

Auxiliary Heat is activated on a sliding scale based on outdoor ambient temperature and the difference between set point and room temperature. During mild ambient conditions, the large difference between set point and actual room temperature is permitted. In extreme low temperatures a smaller difference between the two are permitted energizing the auxiliary heat sooner.

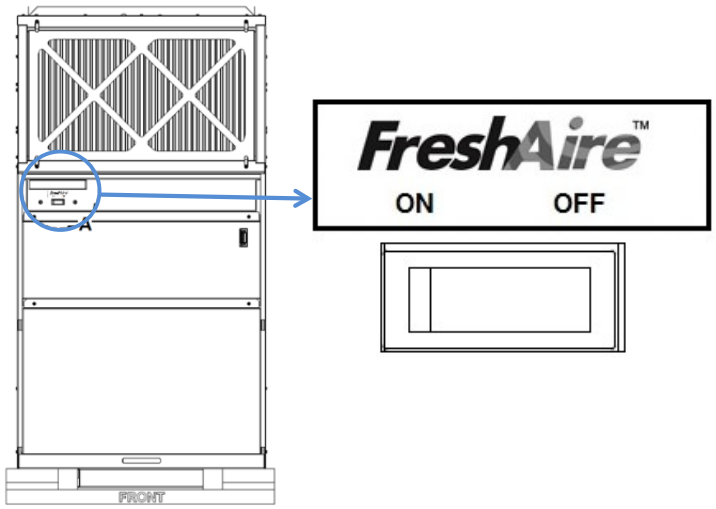
**Defrost:**

The electric heat for the VRP is to be considered "backup" and not "supplemental". At no point in time will the pump and electric heat operate simultaneous. Normally, and in a vast majority of heating conditions, the heat pump will be the primary source of heat (down to 0°F). Eventually, the outdoor coil may accumulate frost and the unit will require a defrost cycle. If the space is still 1 °F or more below set point, the VRP will stop heat pump operation and satisfy the space with electric heat. Once the room is satisfied the VRP will operate the blower and condenser fans at their lowest speeds and run the compressor in the cooling cycle to defrost the outdoor coil. The blower fan operates to help prevent the indoor coil from freezing during this process. Once the outdoor coil rises above 46 degrees Fahrenheit, the defrost cycle will end and the unit will continue with normal operation based on the space conditions and settings.

# OPERATION

**FreshAire Control**

- To engage the FreshAire system, flip the switch into the ‘ON’ position.



# OPERATION

**Component Identification**

- Indoor Coil
- Indoor Blower
- Outdoor Coil
- Outdoor Fan
- Compressor
- Electric Heater
- Electronic Expansion Valve (EEV)
- 4-Way Reversing Valve
- Reheat Solenoids
- FreshAire Fan
- Pressure Switches
- Condensate Base Pan Heaters (optional)
- Sump Pan (36k models only)

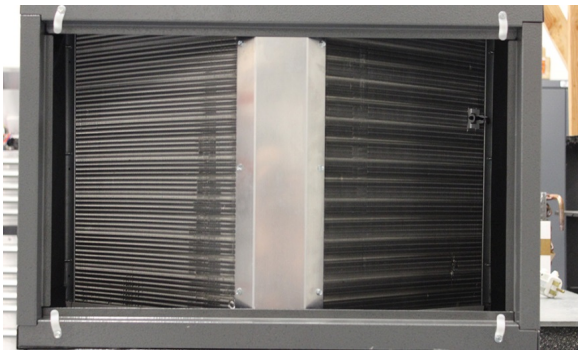
# OPERATION

**Component Identification**

**Indoor Coil 12 & 24k**

12k (1 ton)
Slab coil

24k (2 ton)
“A” frame coil



Monitored by 2 thermistors

# OPERATION

**Component Identification**

**Indoor Coil 36k**

# OPERATION

**Component Identification**

**Indoor Blower**

- BLDC
- Counter Clockwise Impeller
- 600-1300 RPM

# OPERATION

**Component Identification**

**Outdoor Coil**

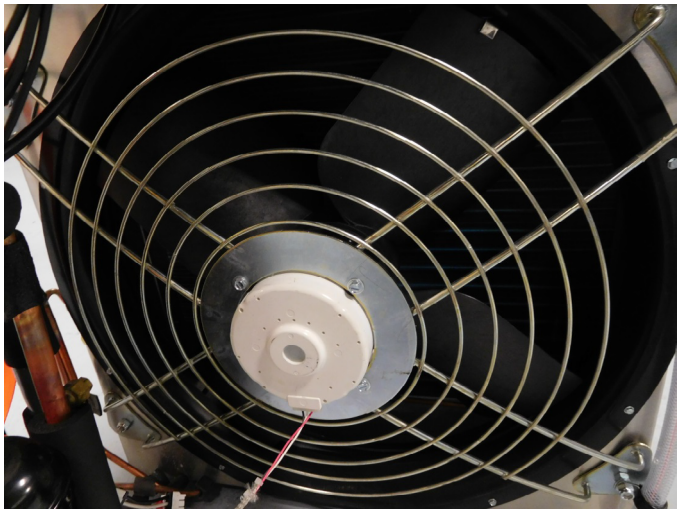
- Monitored by 1 thermistor

# OPERATION

**Component Identification**

**Outdoor Fan**

- BLDC
- Variable Speed= 600-1000 RPM



# OPERATION

**Component Identification**

**Compressor**

- 12k (1 Ton)
  - Inverter Rotary
  - Single Rotor

- 24k (2 Ton)
  - Inverter Rotary
  - Dual Rotor

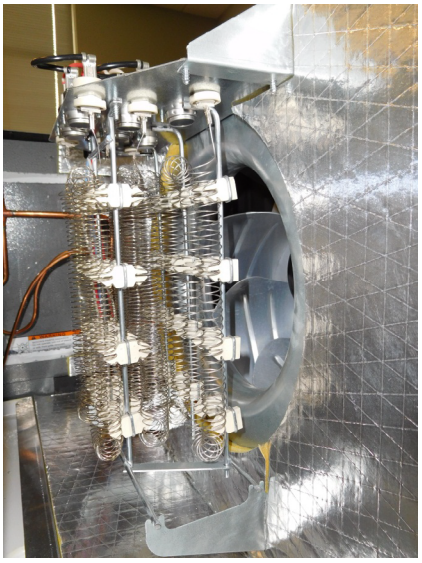
  - 36k (3 ton)
  - Copeland Scroll

# OPERATION

**Component Identification**

**Electric Heater**

- 2.5 / 3.4 / 5.0 / 7.5 / 10.0 Kilowatt variations
- Located directly behind the indoor coil and in front of the indoor blower



# OPERATION

**Component Identification**

**Electronic Expansion Valve**

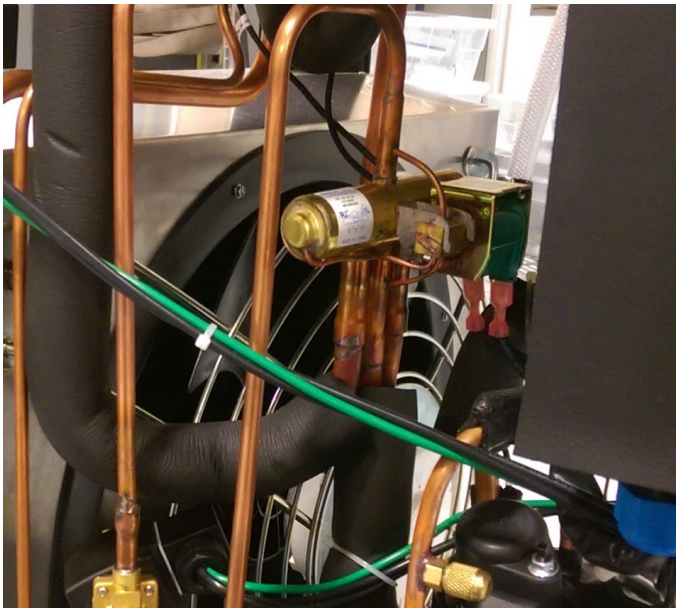
- Three sizes
  - 12k
  - 24k
  - 36k
- Used to control superheat
- Controlled by magnetic pulse

# OPERATION

**Component Identification**

**4-Way Reversing Valve**

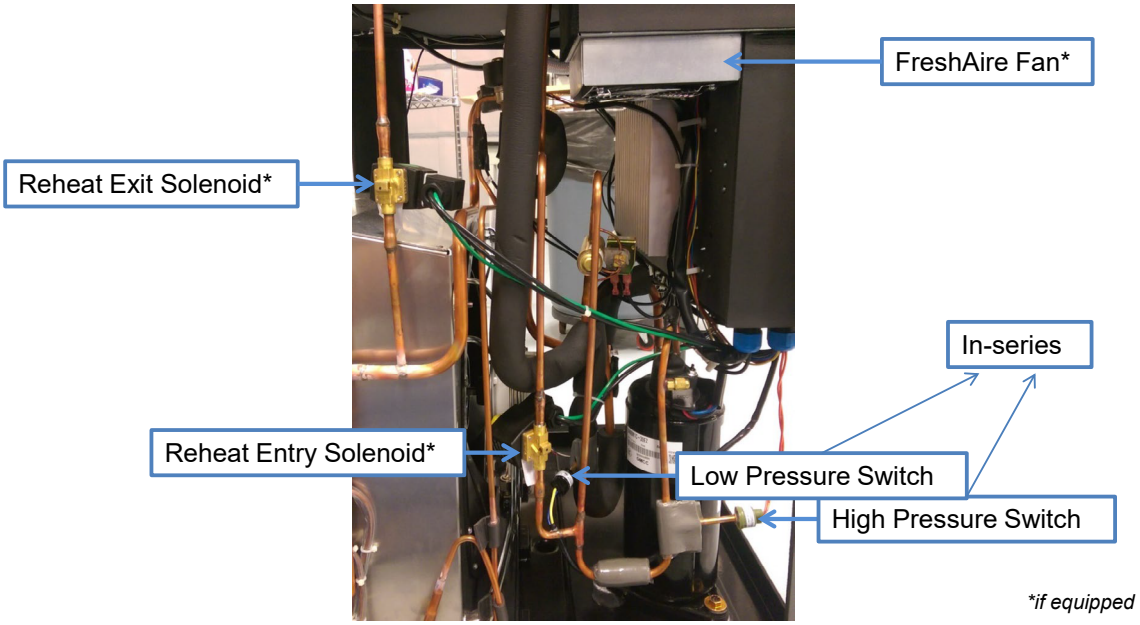
- 208/230v
- Reversing valve assembly



# OPERATION

**Component Identification**

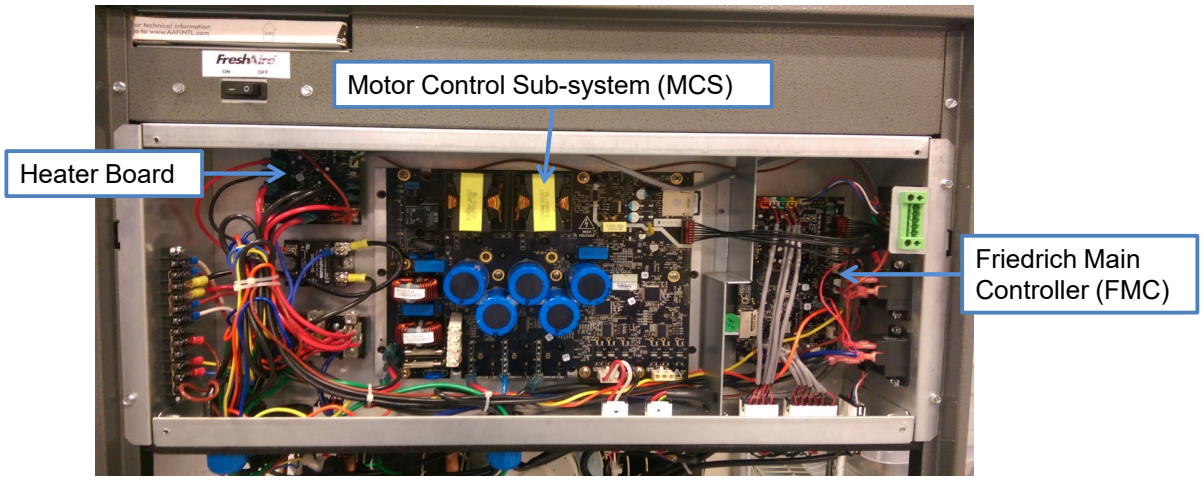
**Remaining Components (Side View)**



# OPERATION

**Component Identification**

**VRP Control Boards**



# OPERATION

**Component Identification**

**Main Controller**


- **Relay and Control Logic (VRP Brain)**
  - Diagnostic Logic
- **Communicates with:**
  - Wall Controller (WC)
  - Heater Board
  - Motor Control Sub-system (MCS)
- **Handles/Controls:**
  - Electronic Expansion Valve (EEV)
  - Pressure Switches
  - Indoor Blower
  - Reheat and FreshAire Relays
- **Upgradeable**
  - Wall Controller via SD card
  - Manual via SD card

# OPERATION

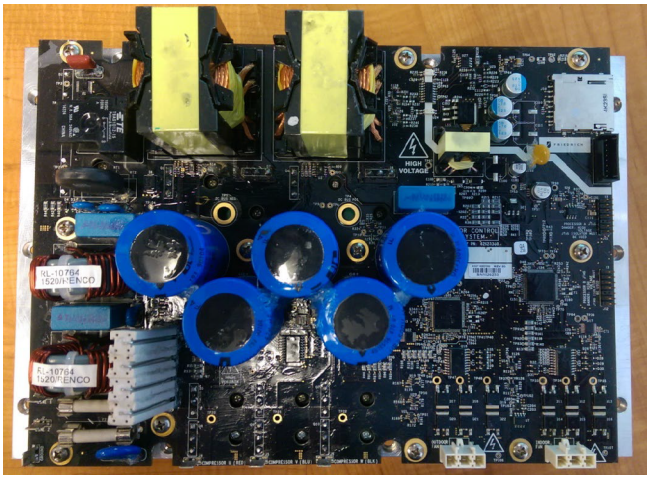
**Component Identification**
**Main Controller(FMC)**


- **Thermistors**
  - IDC Cool Inlet (T1)
  - Liquid Heat (T2)
  - Comp. Suction (T3)
  - Comp. Discharge (T4)
  - IDC Heat Cond (T5)
  - Liquid Cool (T6)
  - ODC Heat Inlet (T7)
  - Return Air (T8)
  - Discharge Air (T9)
  - Outdoor Air (T10)

# OPERATION

**Component Identification**

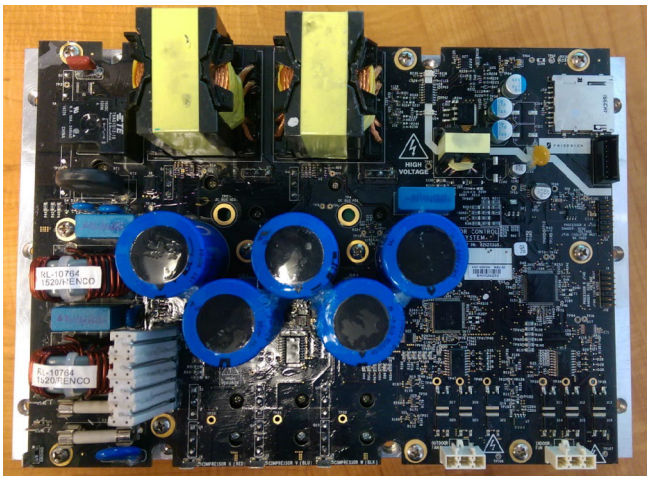
**Motor Control Sub-System (MCS)**



- High Voltage
- Controls:
  - Compressor
  - OD Fan
- Communicates directly with FMC
- Upgradeable
  - Wall controller via SD card
  - Manual via SD card

# OPERATION

**Component Identification**
**Motor Control Sub-System (MCS)**

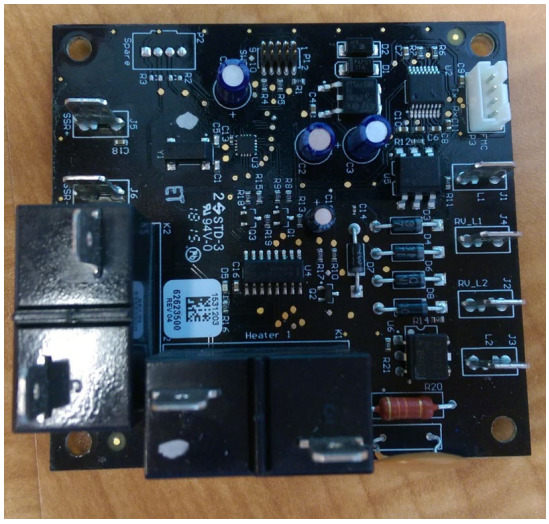


- Active Power Factor Corrector (PFC)
  - Handles robust AC voltage range
    - 187-293 Vac
  - Maintains healthy DC bus voltage
    - 430 Vdc
- Provides precise motor control
- Internal hardware and software protection

# OPERATION

**Component Identification**

**Heater Board**



- High Voltage
- Controls:
  - Electric Heater
  - 4-Way (Reversing) Valve
- Communicates directly with the FMC

# OPERATION

**Component Identification**

**Compressor Control**

- The rate of change of the space conditions is assessed periodically and the compressor frequency is changed accordingly.
- Unless diagnostically conflicted, the compressor will operate in some capacity any time there is a cooling or heat pump demand.

# OPERATION

**Component Identification**

**EEV Control**

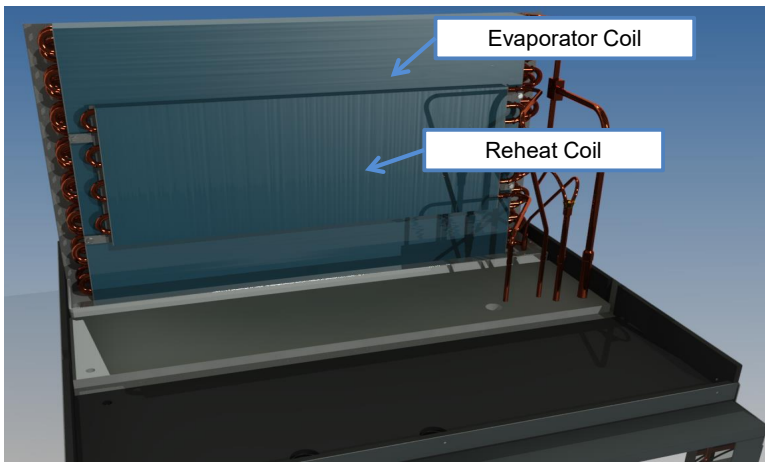
- The Electronic Expansion Valve is used to maintain superheat during both cooling and heat pump operation.
- Superheat (cooling) = Compressor Suction (T3) – IDC Cool Inlet (T1)
- Superheat (heat pump) = Compressor Suction (T3) – ODC Heat Inlet (T7)
- The EEV will open if the super heat is too high and will meter if the super heat is too low.

# OPERATION

**Component Identification**

**Reheat Control**

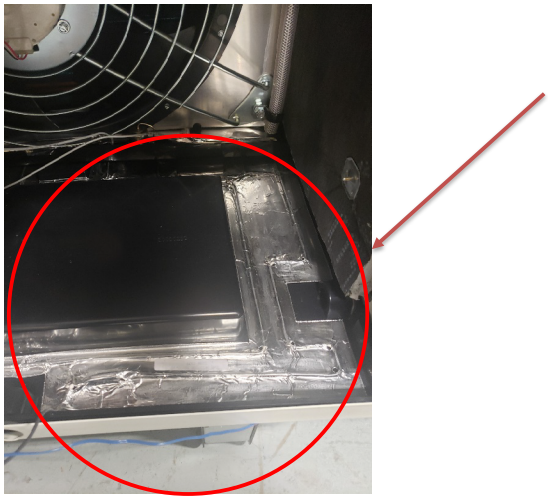
- The VRP models, when equipped with the reheat option, increase room dehumidification capability.
- The reheat option has a coil installed downstream of the main indoor evaporator coil.
- When activated, a portion of the compressor discharge gas is routed through the reheat coil.
- This coil “reheats” the air leaving the evaporator and allows longer run times for additional dehumidification without over-cooling the room.



# OPERATION

**Component Identification**

**Condensate Base Pan Heater**

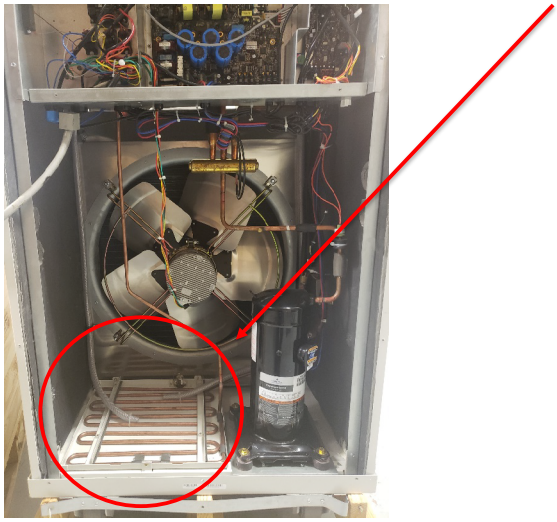


- Friedrich offers optional condensate base pan heaters.
- These heaters may be required in certain applications.
- Base pan heaters work in conjunction with an adjustable thermostatic sensing bulb and will turn on when outdoors temperatures are low enough to cause freezing of condensate in the drain pan.

# OPERATION

**Component Identification**

**Condensate Sump Pan - 36k Models**



- Only 36k models utilize a condensate sump pan
- During cooling operation condensate from the indoor coil drains into this pan
- The condensate in the pan helps pre-cool the hot liquid refrigerant and increases overall efficiency of the system.
- If the outside air gets near freezing the bellows valve in the pan opens and condensate drains out to prevent the pan from freezing.
- This pan should be cleaned during regular system maintenance.

# INSTALLATION

The Friedrich VRP has been carefully engineered and manufactured to provide many years of dependable, efficient operation while maintaining a comfortable temperature and humidity level. Many extra features have been built into the unit to ensure quiet operation, optimal circulation of cool, dry air, and the most economic operation.

Please carefully read and follow the installation instructions and safety warnings detailed in this manual. All applicable national and local mechanical and electrical codes should be followed and take precedence over any Friedrich requirements or recommendations regarding installation applications detailed in this manual.

**⚠ WARNING**

Please read this manual thoroughly prior to equipment installation or operation. It is the installer's responsibility to properly apply and install the equipment. Installation must be in conformance with the NFPA 70-2008 National Electric Code or current edition, International Mechanic code 2009 or current edition and any other applicable local or national codes.

**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 R22 gauge sets. Failure to do so can result in property damage, personal injury, or death.

**⚠ WARNING**

**Electrical shock hazard.**

Turn OFF electric power before service or installation.

Unit must be properly grounded.

Unit must have correct fuse or circuit breaker protection. Unit's supply circuit must have the correct wire conductor size. 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 property damage, personal injury and/or death.

**Your safety and the safety of others are very important.**

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

This is the 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 how to reduce the chance of injury, and tell you what will happen if the instructions are not followed.

**NOTICE**

Indications property damage can occur if instructions are not followed.

| THINK SAFETY FIRST | ⚠WARNING | ⚠AVERTISSEMENT | ⚠ ADVERTENCIA |
|---|---|---|---|
| | Do not remove, disable or bypass this unit's safety devices. Doing so may cause, fire, injuries or death. | Ne pas supprimer, 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. |

# INSTALLATION

VRP Required Minimum Clearances

### Building Exterior Unit Opening Requirements

VRP units must be installed on an outside wall. Confined spaces and/or covered areas should be avoided. Units must be installed no closer than 12" apart when two units are side by side. If three or more units are to operate next to one another, maintain a minimum of 60" between units or pairs of units (Figure B). If more than two units are sharing a floor with adjacent, outset units, a minimum distance of 64" must be kept between units (Figure C). Also, a vertical clearance of 60" must be maintained (Figure A) between units. Units installed on the bottom floor must be mounted at least 6" off of the ground.

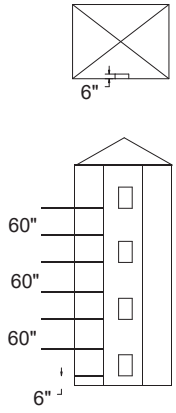



Figure A

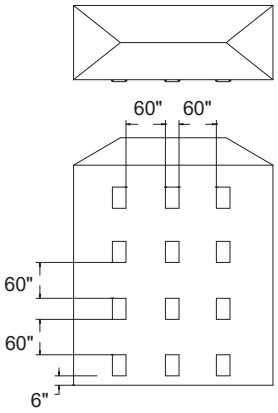



Figure B

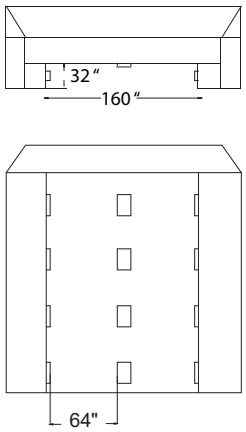



Figure C

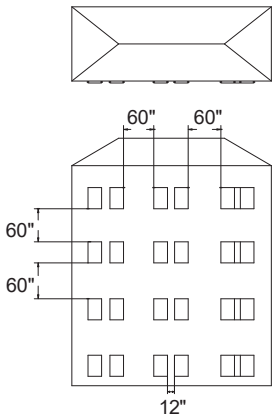


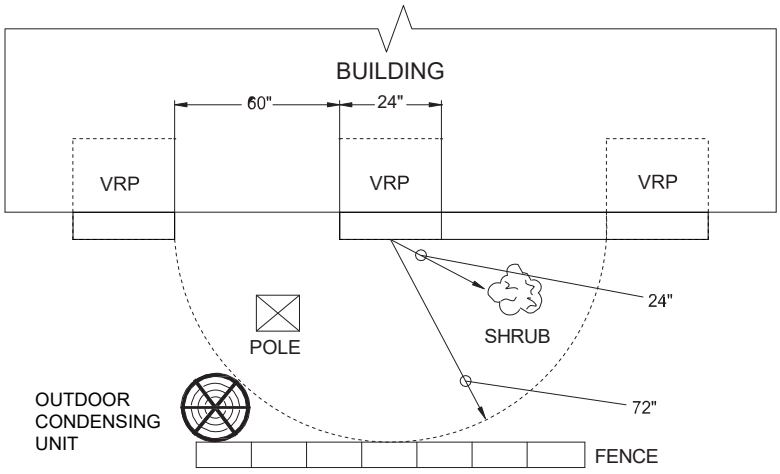

Figure D

### Grill Clearance Requirements

Where obstructions are present use the following guidelines for proper spacing from the VRP exterior louvered grill. Friedrich recommends that ALL obstructions are a minimum of 72" from the exhaust.

For minor obstruction(s) such as lamp poles or small shrubbery, a clearance of 24" from the outdoor louver must be maintained.

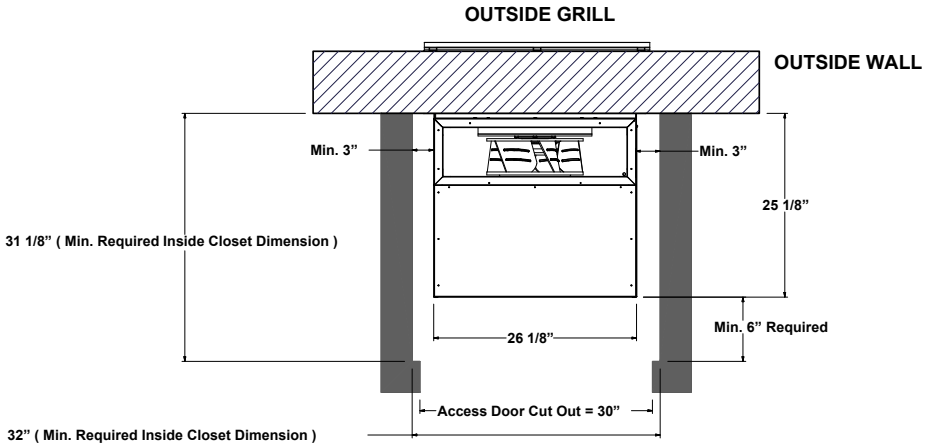
For major obstructions such as a solid fence, wall, or other heat rejecting devices like a condensing unit, a minimum distance of 72" must be kept.



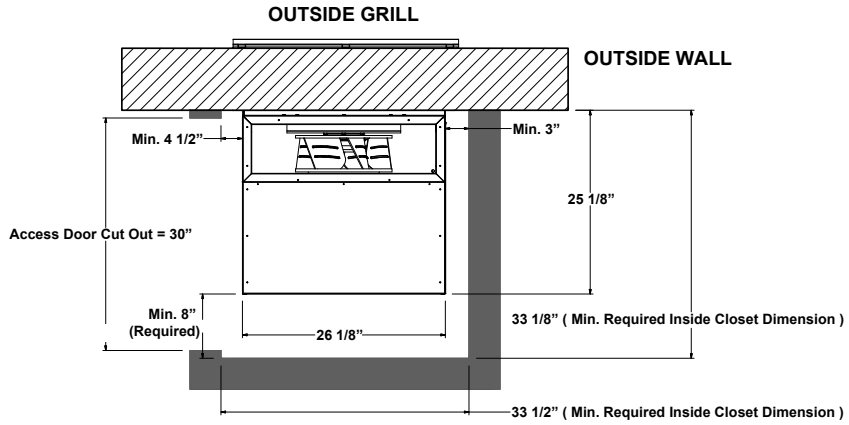

The the example pictured above is for reference only and does not represent all possible installations. Please contact Friedrich Air Conditioning for information regarding effects of other installation arrangements.

# INSTALLATION

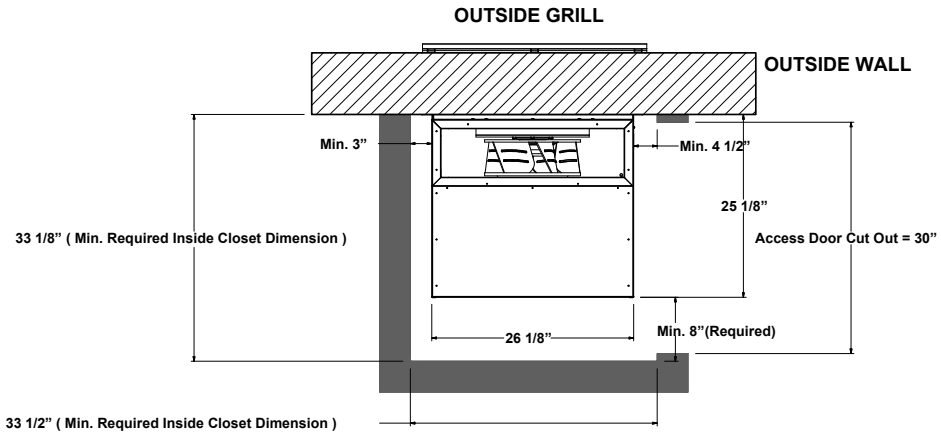
**Installation Orientations 12&24k**




**Front Installation-Top View**

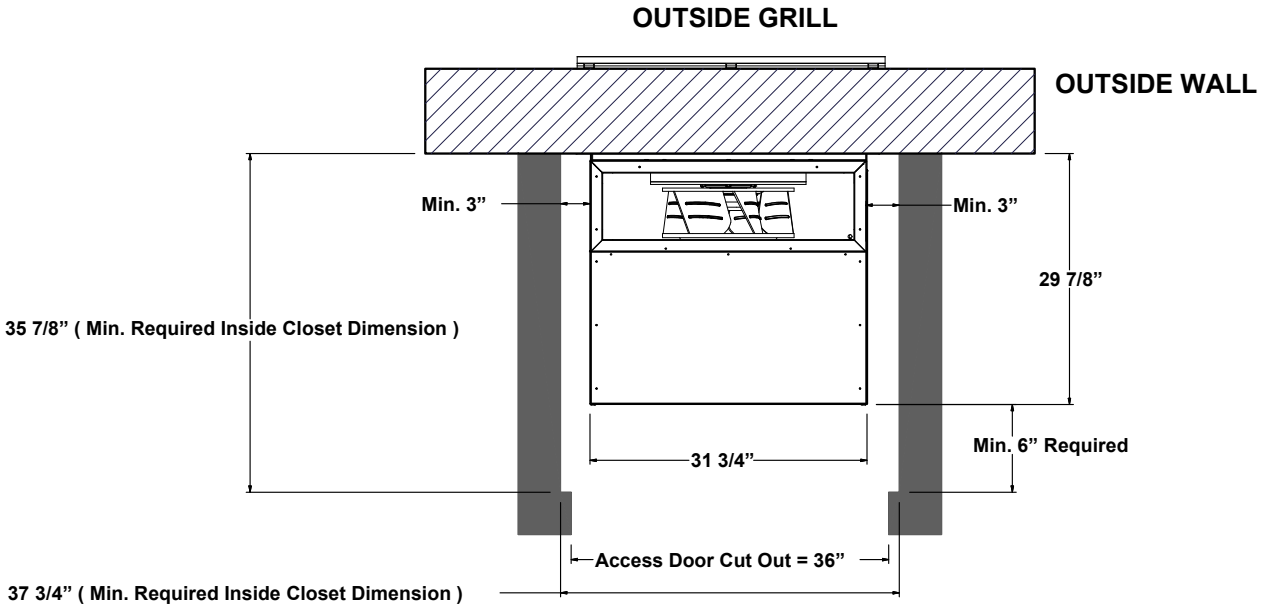



**Left Installation-Top View**



# INSTALLATION

**Installation Orientations 36k**




**NOTE:** The VRP 3-ton unit comes equipped with bi-directional casters for ease of movement. The casters only allow for movement forward and backward. The VRP 3-ton should be installed with the access door positioned in front of the unit.

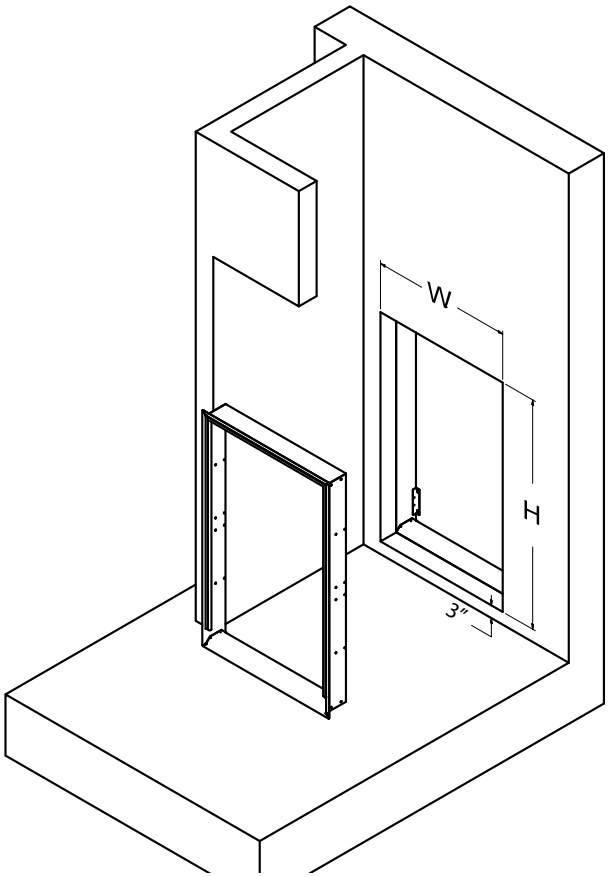
# INSTALLATION

**Exterior Wall Opening Dimensions 12 &24k**

| Exterior Wall Rough Opening Dimensions | | |
|---|---|---|
| Unit | Width | Heigth |
| Compact (VRPXWPA-*) | 28 1/8" | 32 1/4" |
| Standard (VRPXWPB-*) | 28 1/8" | 42 1/4" |

Compact (A) configuration is for 12000 BTU units only. Standard (B) configuration is for 24000 BTU and 12000 BTU units. A compact 12000 BTU unit can be converted to standard dimensions with a factory provided adapter. Ensure that the correct wall plenum is selected based on unit configuration.

NOTE: The distance between the rough opening and the finished floor/platform must be 3".



# INSTALLATION

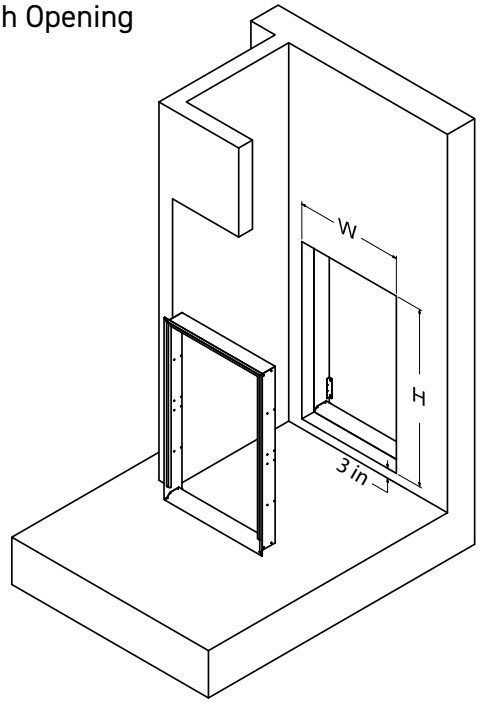
### Exterior Wall Opening Dimensions 12 &24k

| WALL OPENING DIMENSIONS | | |
|---|---|---|
| Unit | W | H |
| 12K | 28 1/8" | 32 1/4" |
| 24K* | 28 1/8" | 42 1/4" |

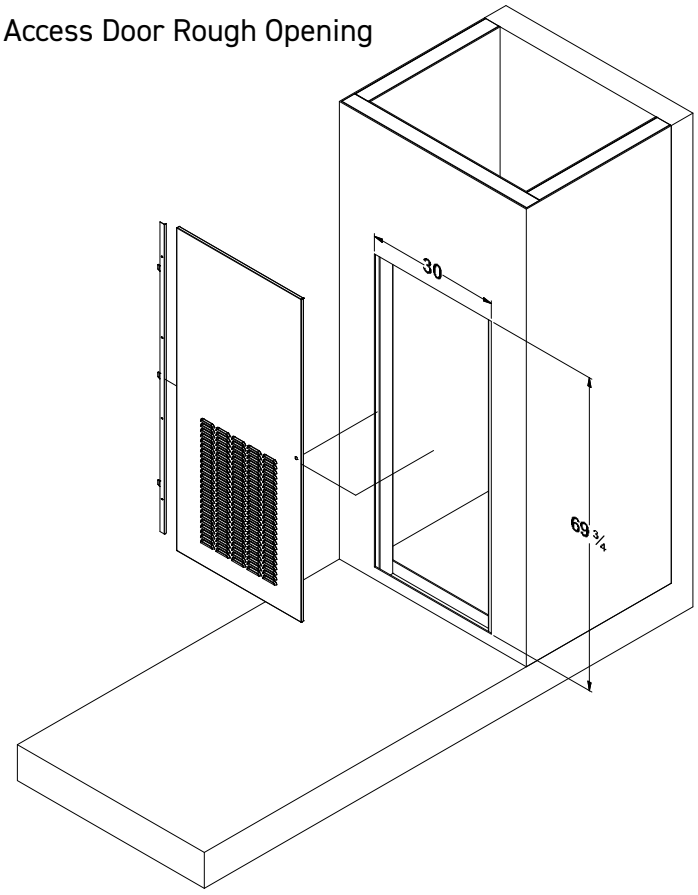
*Also applicable for 12K unit if VRPXALB/VRPXSCB Louver and VRPXWPB-8/VRPXWPB-14 plenum are selected to be used with 12K unit. (Hint: Your unit model name should have letter '**B**' as the 11th digit. Example: VRP12K34SS **B**S)

NOTE: The distance between the rough opening and the finished floor/platform should be 3"

Exterior Rough Opening




Access Door Rough Opening

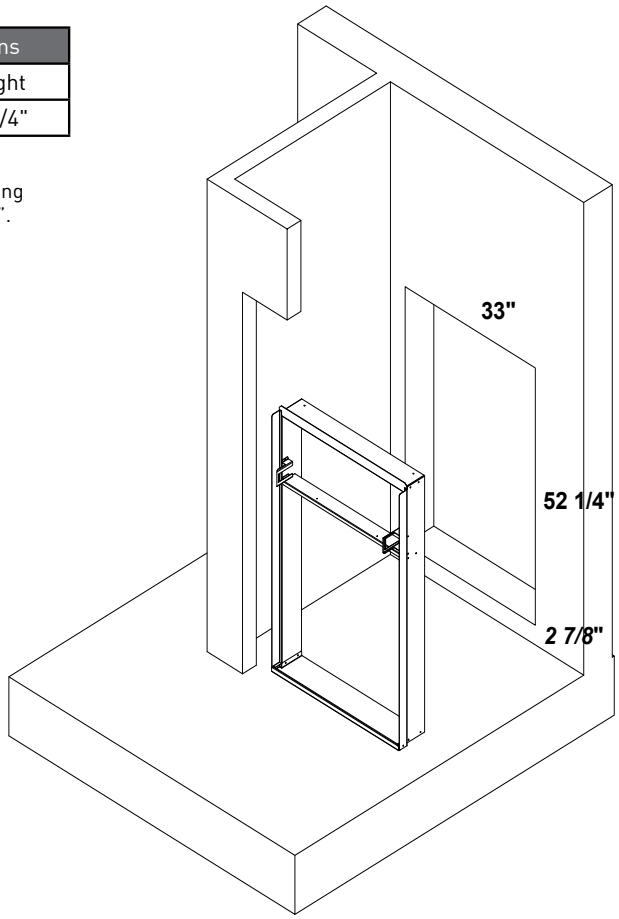


# INSTALLATION

**Exterior Wall Opening Dimensions 36k**

| Exterior Wall Rough Opening Dimensions | | |
|---|---|---|
| Unit | Width | Height |
| VRPXWPC-* | 33" | 52 1/4" |

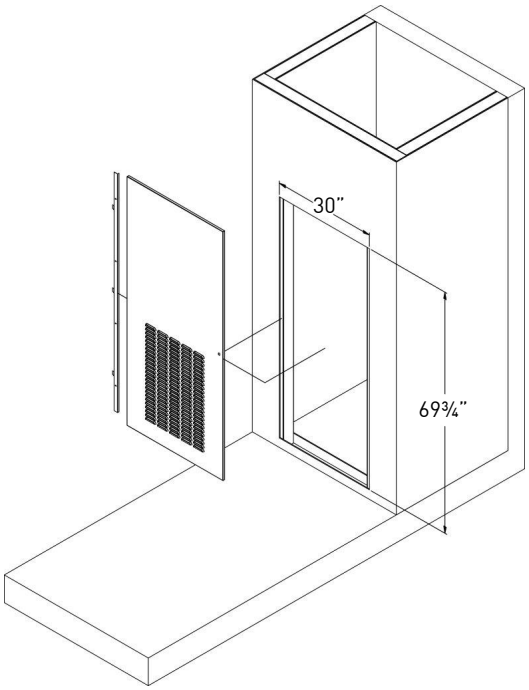
NOTE: The distance between the rough opening and the finished floor/platform must be 2 7/8".



# INSTALLATION

**Interior(Closet) Wall Opening Dimensions 12 & 24k**

**Return Air Access Door Wall Cut-Out**




**NOTE:** To maintain ease of removal and serviceability, if the unit is installed on a platform ensure that the total height of the unit from the floor does not exceed the height of the interior rough opening.

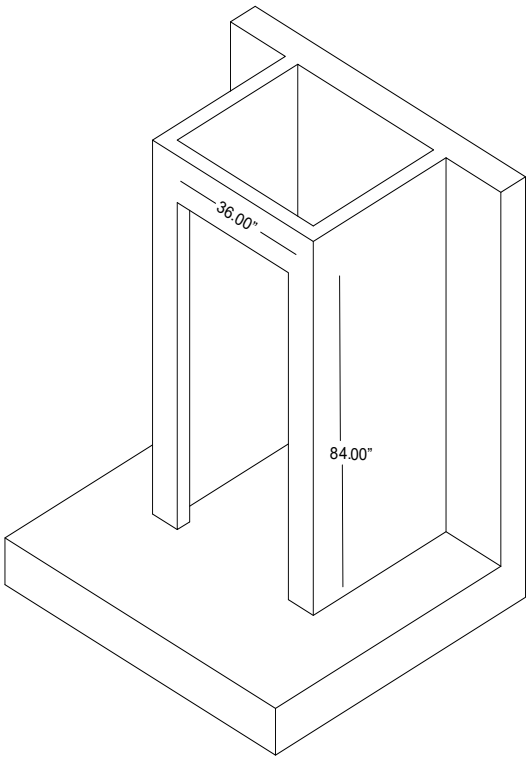
# INSTALLATION

## Interior(Closet) Wall Opening Dimensions 36k

### Return Air Access Door Wall Cut-Out

| Interior Wall Rough Opening Dimensions | | |
|---|---|---|
| Unit | Width | Height |
| VRP36 | 36" | 84" |

**NOTE**: Dimensions based on standard 36" door frame.



# INSTALLATION

**Preliminary Plumbing**

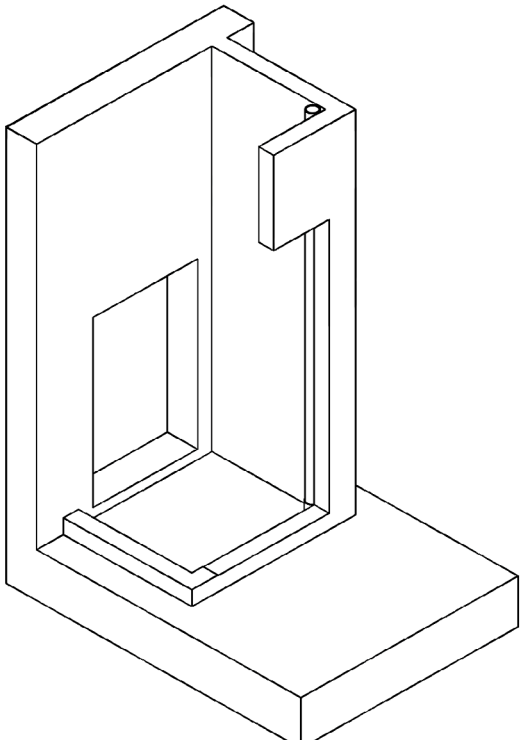
---

**Standard (Front Install)**

The image to the right shows the installation closet for the standard (Front Install) configuration (where the wall plenum is opposite the service access door).

A drainage system is required, and should provide a "P-trap" to prevent undesirable waste gas from entering into the residential area. This is represented by a vertical standpipe in the image shown, but other solutions are possible and are at the discretion of the building designer and contractor.

The near wall has been trimmed away at the door centerline to permit full view of the installation.

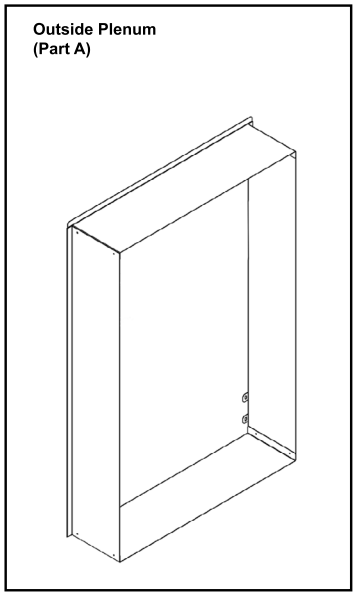


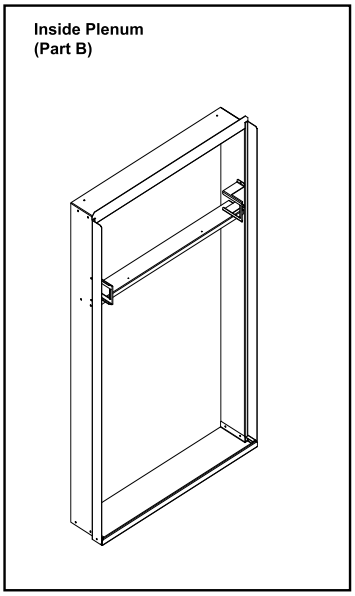
# INSTALLATION

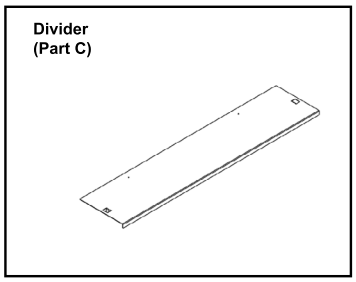
**Wall Plenum Installation 12 & 24k**

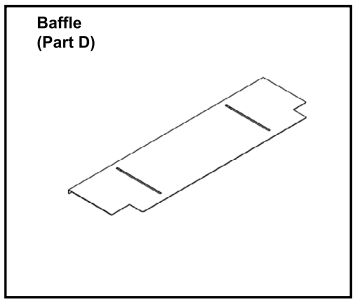
## Parts included in Plenum kit:

Outside Plenum (Part A)
Inside Plenum (Part B)
Divider (Part C)
Baffle (Part D)



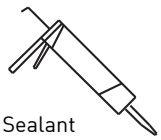

**Field Supplied Parts:**

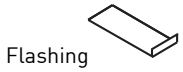
Sealant, attachment screws, and flashing
are field supplied. Silicone sealant is recommended.

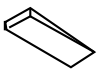
VRPXWPA-8, VRPXWPB-8 adjust for walls up to 4"- 8" thick.

VRPXWPA-14, VRPXWPB-14 adjust for walls up to 8" - 14" thick

All installations are similar.


Sealant


Flashing

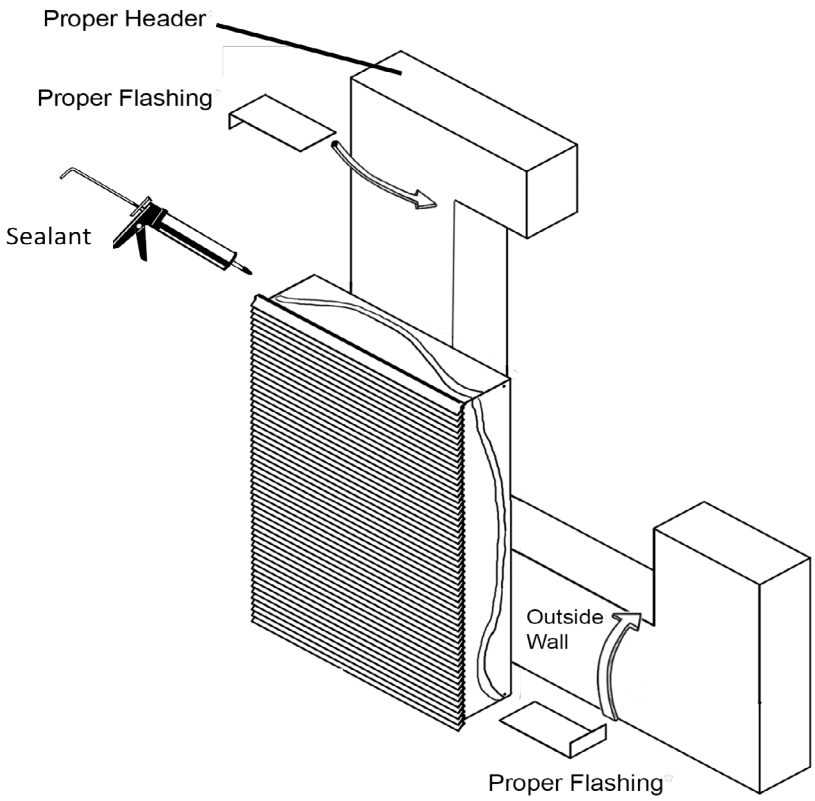

Shim


1"-3" Screws to attach the plenum assembly to the wall studs

# INSTALLATION

**Wall Plenum Installation 12 & 24k**

### Step 1 - Outside Wall Plenum Half



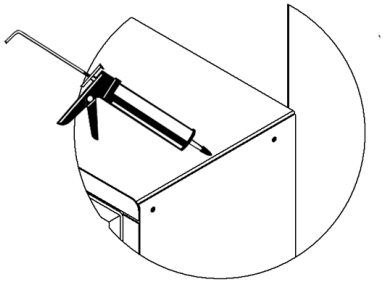

**Note: The wall plenum is not designed to carry any structural load. A load bearing header must be built above the rough opening.**

1) Prepare the rough opening. The rough opening should be lined with metal or wood. The plenum will warp if sealed against concrete or brick.
2) Dry fit the outside plenum half into the rough opening and check the fit and level.
3) Remove the outside plenum half, flash the rough opening to ensure proper fit and level.
4) Pre-installing the exterior louver (VRPXALA/B) as shown above is optional (See Page 17).
5) Apply sealant to the outside plenum half and insert into the rough opening to ensure a water-tight seal. Ensure that the outside plenum half is securely attached to the framed opening.

# INSTALLATION

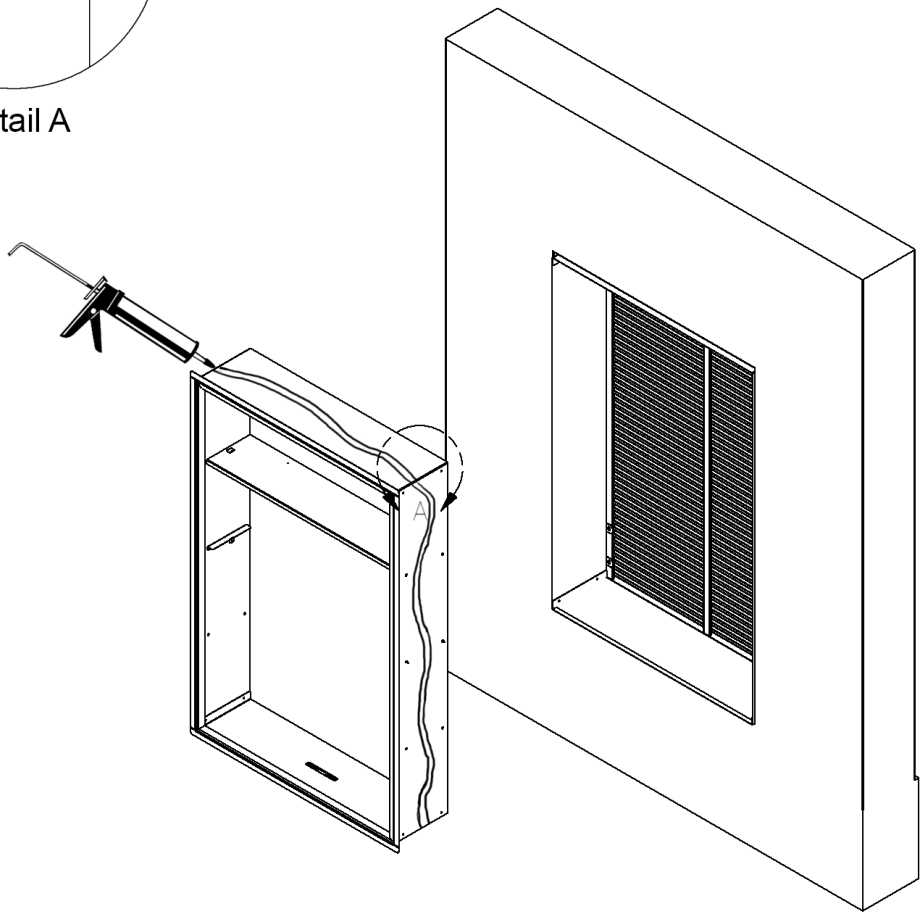
**Wall Plenum Installation 12 & 24k**

### Step 2 - Inside Wall Plenum Half



Apply Sealant to all
4 flange corners and
unused holes.

Detail A

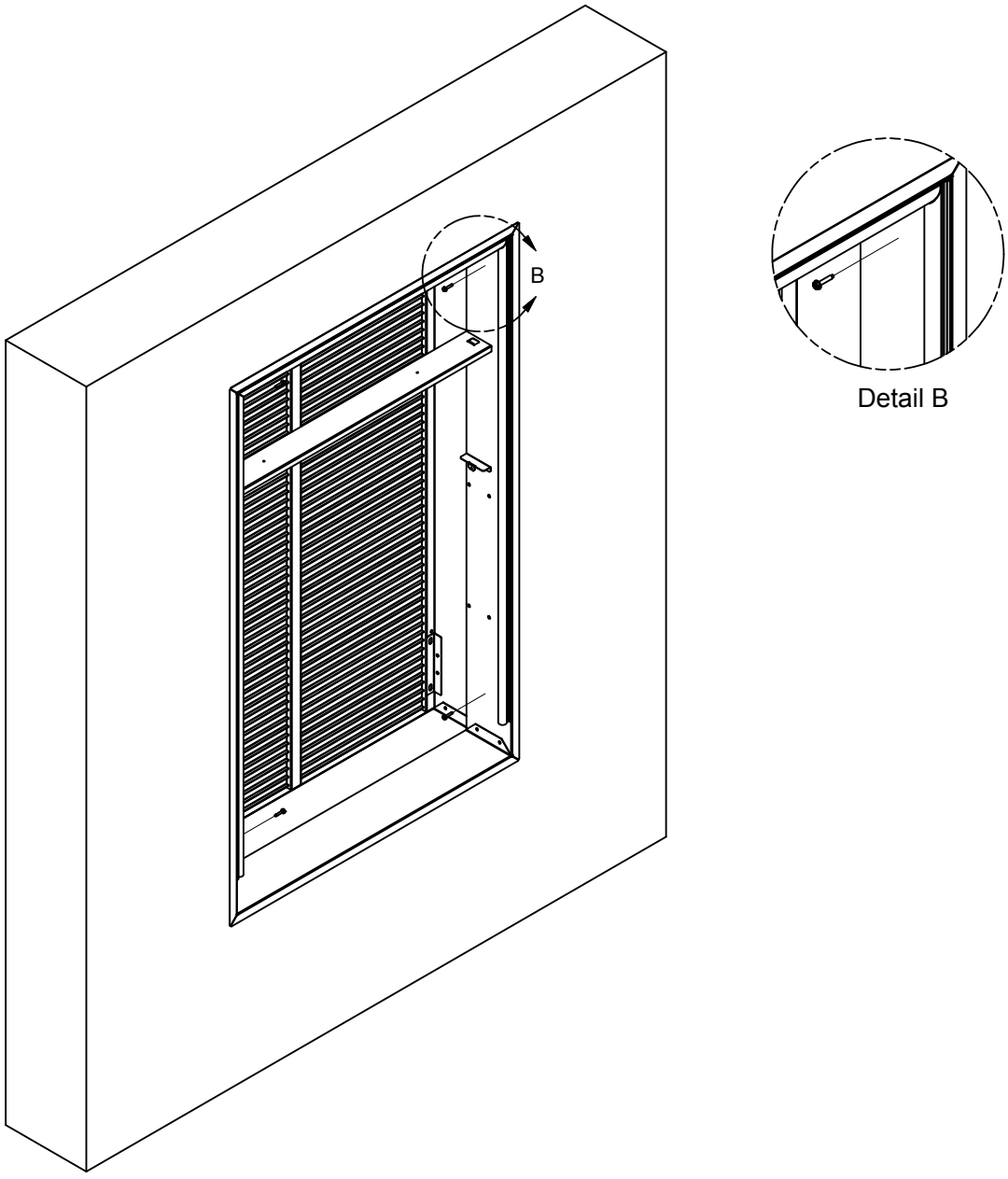



1) Apply sealant to all 4 flange corners and unused holes. See Detail A.
2) Place the baffle (Part D) on the appropriate baffle mounting tabs located on the inner perimeter of the inside plenum half based on unit size (Compact/Standard).
3) Flash the inside of the rough opening to ensure the proper fit and level.
4) Insert inside plenum half (Part B) into Outside Plenum Half (Part A). Ensure that Part A does not back out of the rough opening.
5) Remove the inside plenum half.
6) Apply sealant to the outside plenum half and insert into the rough opening to ensure a water-tight seal.

# INSTALLATION

**Wall Plenum Installation 12 & 24k**

## Step 3 - Inside Wall Plenum (cont.)




**Note: Do not place any screws, fasteners, or penetrating holes through the top or bottom of the plenum assembly.**

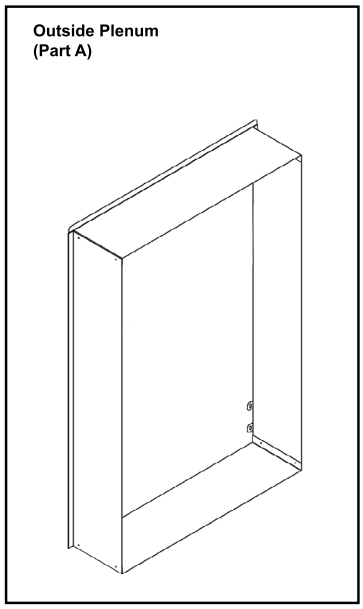
1) Drill pilot holes on the interior of the inside plenum half (Part B) as show in Detail B. Pilot holes should be located approximately 4" from the top and bottom of the inside plenum half, on both the left and right sides.

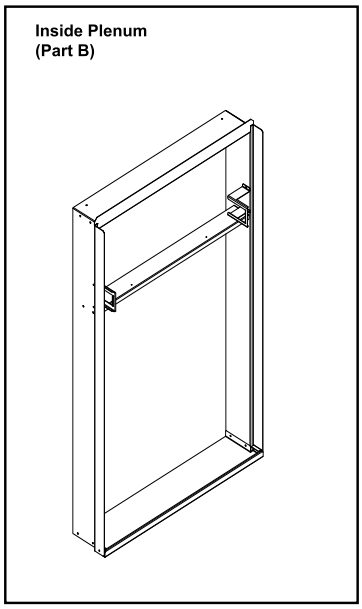
# INSTALLATION

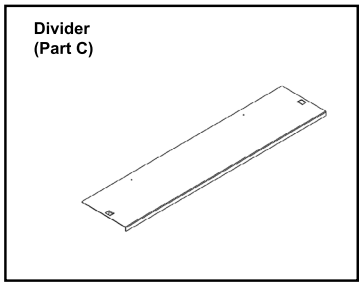
**Wall Plenum Installation 36k**

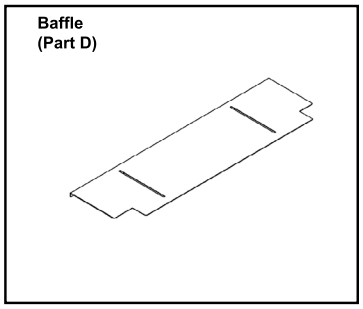
## Parts included in Plenum kit:

Outside Plenum (Part A)
Inside Plenum (Part B)
Divider (Part C)
Baffle (Part D)



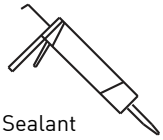

**Field Supplied Parts:**

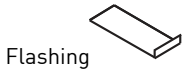
Sealant, attachment screws, and flashing
are field supplied. Silicone sealant is recommended.

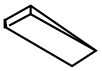
VRPXWPC-8 adjusts for walls 4”- 8” thick.

VRPXWPC-14 adjusts for walls 8” - 14” thick

All installations are similar.


Sealant


Flashing

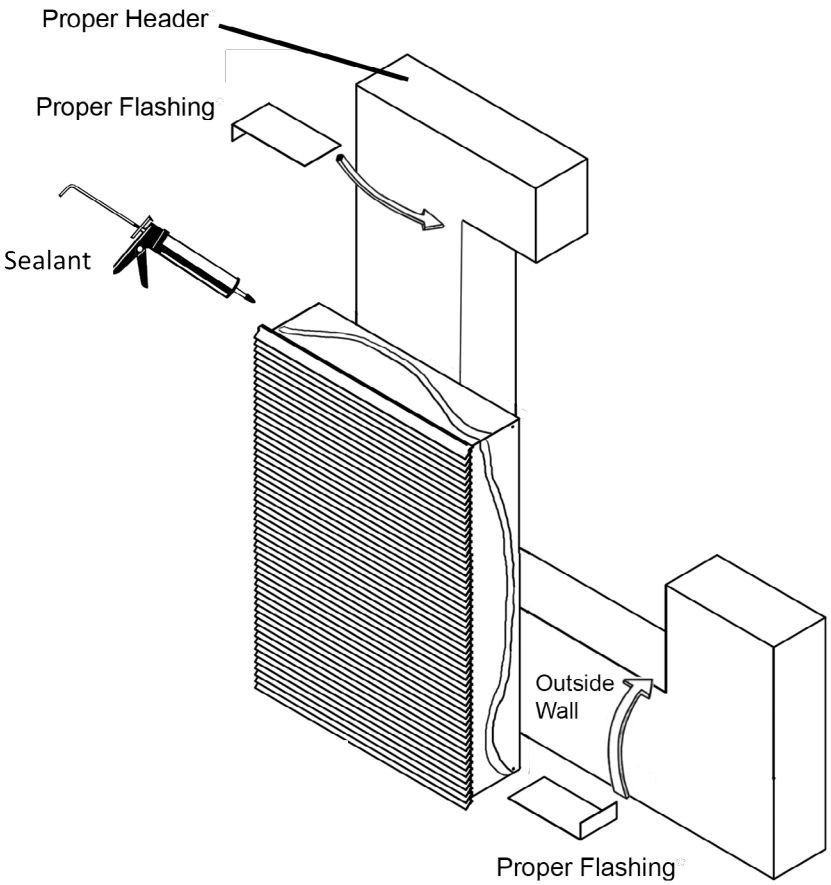

Shim


1”-3” Screws to attach the plenum assembly to the wall studs

# INSTALLATION

**Wall Plenum Installation 36k**

## Step 1 - Outside Wall Plenum Half



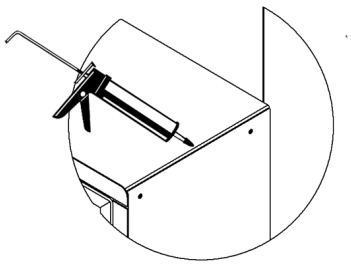

**Note: The wall plenum is not designed to carry any structural load. A load bearing header must be built above the rough opening.**

1) Prepare the rough opening. The rough opening should be lined with metal or wood. The plenum will warp if sealed against concrete or brick.
2) Dry fit the outside plenum half into the rough opening and check the fit and level.
3) Remove the outside plenum half, flash the rough opening to ensure proper fit and level.
4) Pre-installing the exterior louver as shown above is optional.
5) Apply sealant to the outside plenum half and insert into the rough opening to ensure a water-tight seal. Ensure that the outside plenum half is securely attached to the framed opening.

# INSTALLATION

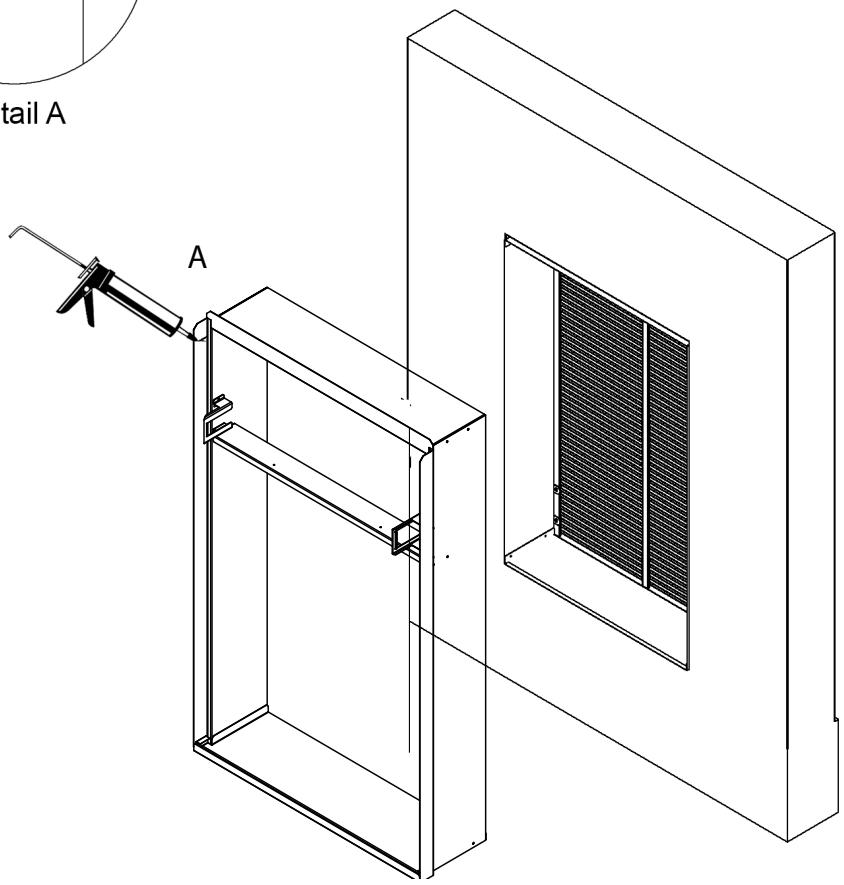
**Wall Plenum Installation 36k**

## Step 2 - Inside Wall Plenum Half



Apply Sealant to all
4 flange corners and
unused holes.

Detail A

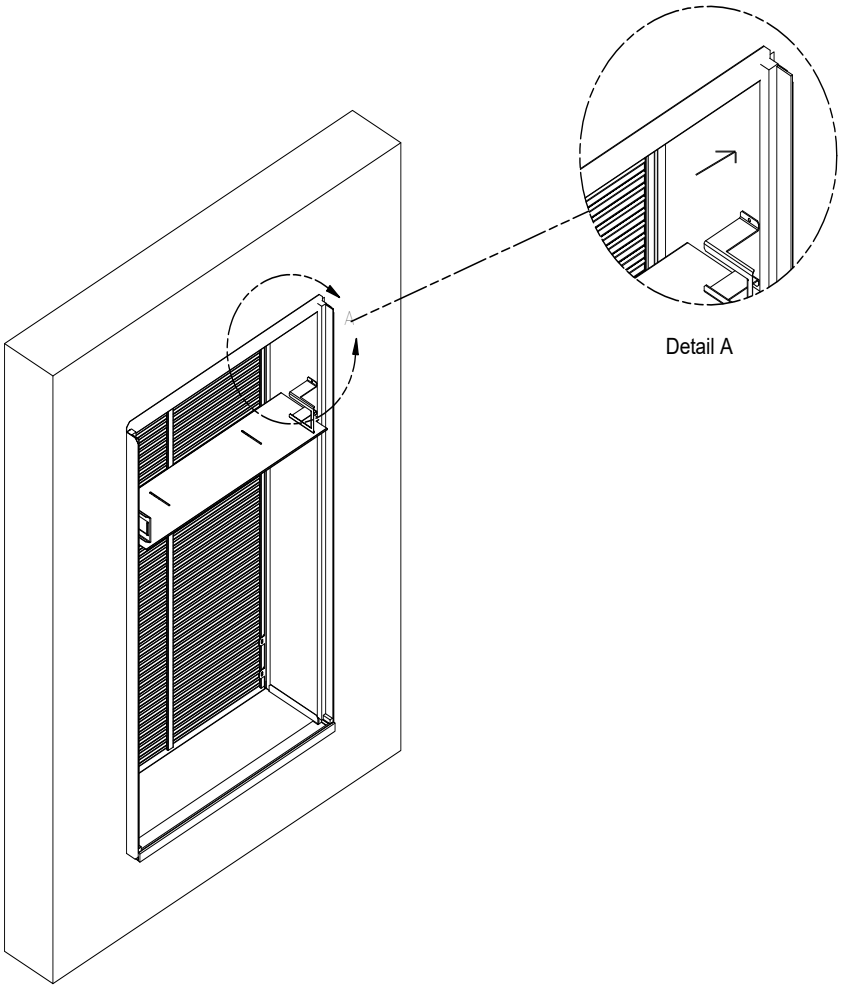



1) Apply sealant to all 4 flange corners and unused holes. See Detail A.
2) Flash the inside of the rough opening to ensure the proper fit and level.
3) Insert inside plenum half (Part B) into Outside Plenum Half (Part A). Ensure that Part A does not back out of the rough opening.
4) Remove the inside plenum half.
5) Apply sealant to the inside plenum half and insert into the rough opening to ensure a water-tight seal.

# INSTALLATION

**Wall Plenum Installation 36k**

### Step 3 - Inside Wall Plenum (cont.)




**Note: Do not place any screws, fasteners, or penetrating holes through the top or bottom of the plenum assembly.**

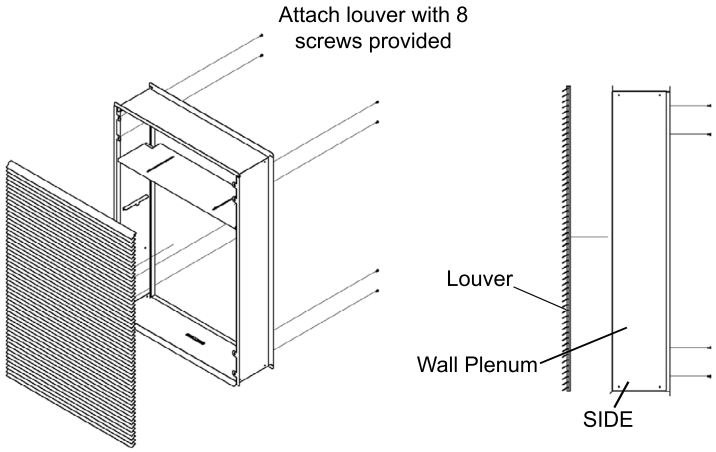
1) Drill pilot holes on the interior of the inside plenum half (Part B) as show in Detail A. Pilot holes should be located approximately 4" from the top and bottom of the inside plenum half, on both the left and right sides.

2) Install fasteners through each pilot hole. Fastener must pass through both Part A and Part B. If the inside and outside plenum halves do not overlap at fastening point, be certain to drill extra holes where needed to secure both Part A and Part B to the rough opening.

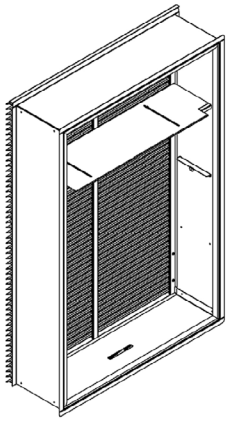
# INSTALLATION

## Louver Installation

**Installation of the louver PRIOR to Wall Plenum Installation**




NOTE: Louvers & Drip Ledge orientation is down



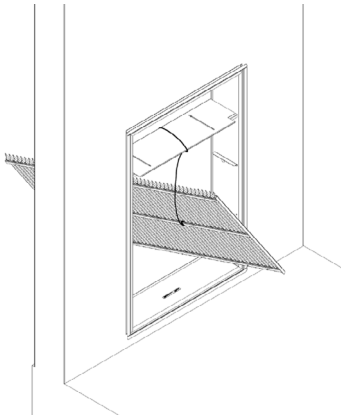
**Optional Pre-assembled Outside Element (Grill and Plenum)**

1) Hold the louver up to the outside plenum half (Part A) and line up the louver top with the very top edge of the ¾" flange.
2) Line up the wall plenum holes with the threaded holes in the louver and securely tighten fasteners.

**Installation of the louver AFTER the installation of wall plenum on elevated floors**

**From the interior of the utility closet:**

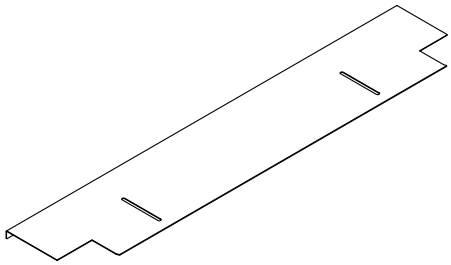
1) Tie a rope or tether to the architectural louver and the divider in the wall plenum to prevent it from falling if dropped.
3) Turn the louver sideways and push the louver out below the divider in the wall plenum.
4) Pull the louver back against the wall plenum and align the holes.
5) Insert and tighten all eight provided fasteners. When the louver is secured, remove the safety tether.



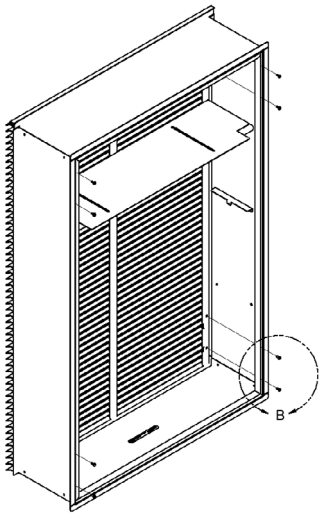
# INSTALLATION

**Final Wall Plenum And Architectural Louver Installation**

**Plenum Divider Extension Plate (Baffle)**



**Plenum Divider Extension Plate Installed into Full Plenum Assembly**




Ensure that the weather strip is undamaged and provides a continuous seal around the inner perimeter of the plenum.

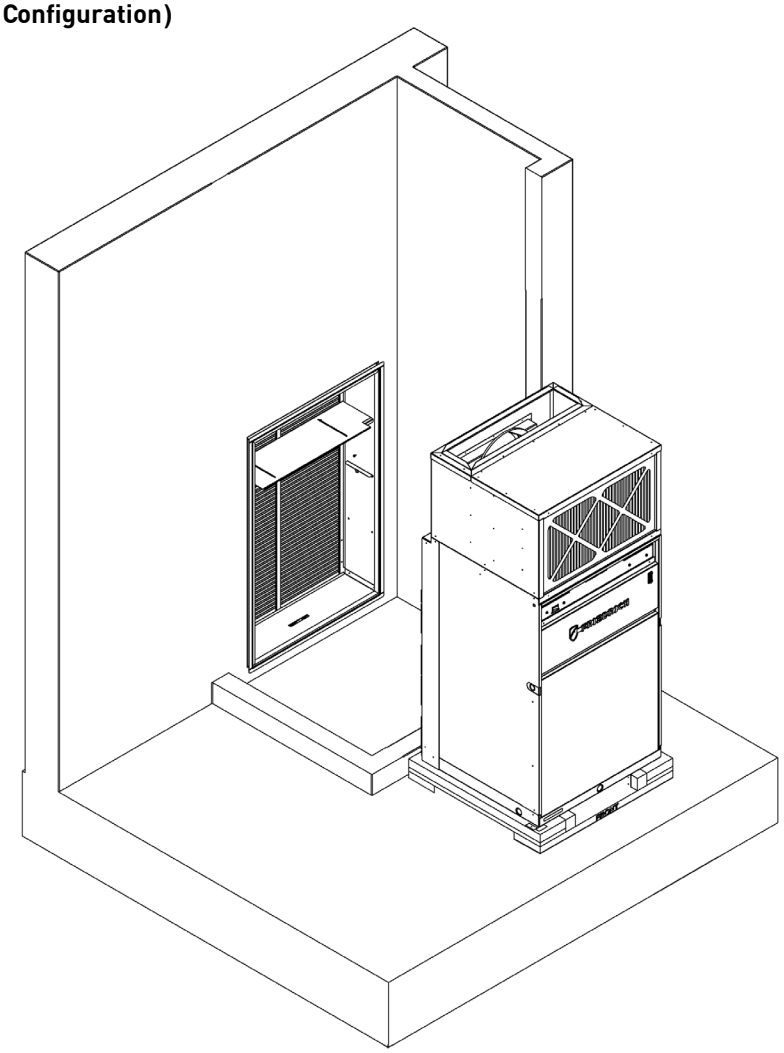
Apply silicone grease or other non-petroleum-based lubricants to the weather strip to enhance the sealing capability of the weather strip and ease installation of the air conditioner chassis.

1) Install the plenum adjuster plate. Ensure the exterior edge is seated against the inside of the architectural louver.
2) Secure the plenum divider extension plate to the architectural louver using the two provided screws.
3) Use tape and sealant to seal any gaps.

# INSTALLATION

**Unit Installation**

**Unit Placement Prior to Installation (Front-Install Configuration)**

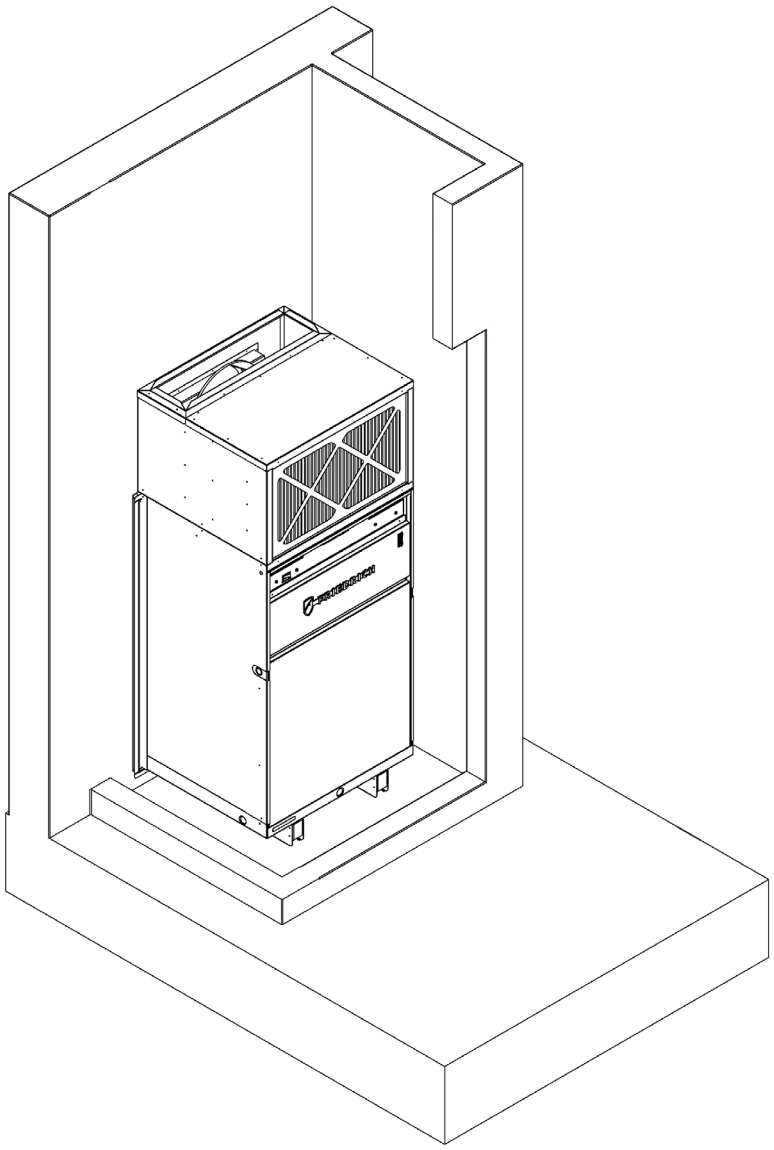


All louver, plenum, rough plumbing, and rough wiring steps must be complete prior to final installation of the air conditioning chassis.

# INSTALLATION

**Final Unit Installation Overview**

**Unit Final Placement - Front Install**



Ensure that power if off at the junction box feeding power to the air conditioner until all process steps are completed.

Move the unit from the shipping base and onto the installation site.

Insert the unit's rear extension into the wall plenum. There should be approximately 2" of penetration of the unit into the wall plenum, resulting in a complete seal all around.

Identify the appropriate drain port to use and complete plumbing.

Attach the ductwork to the unit at the supply-air outlet and ensure the seal is air tight.

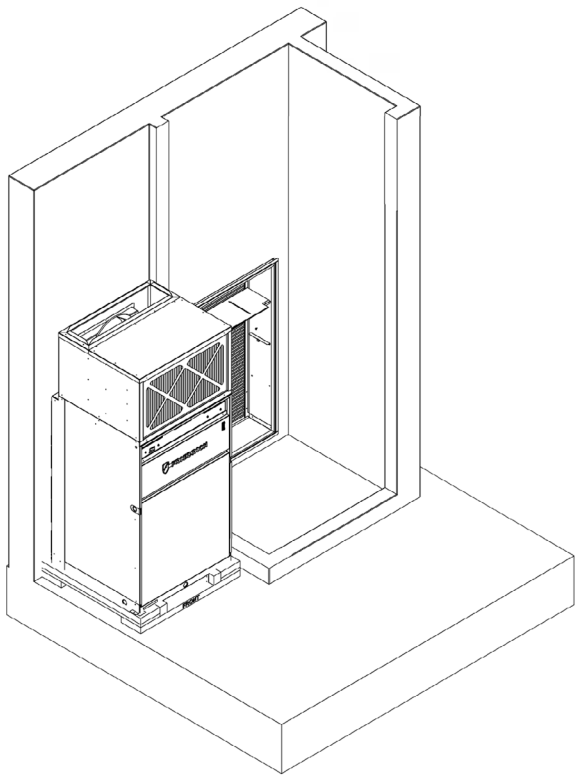
Wire and connect the wall controller.

Connect the main power.

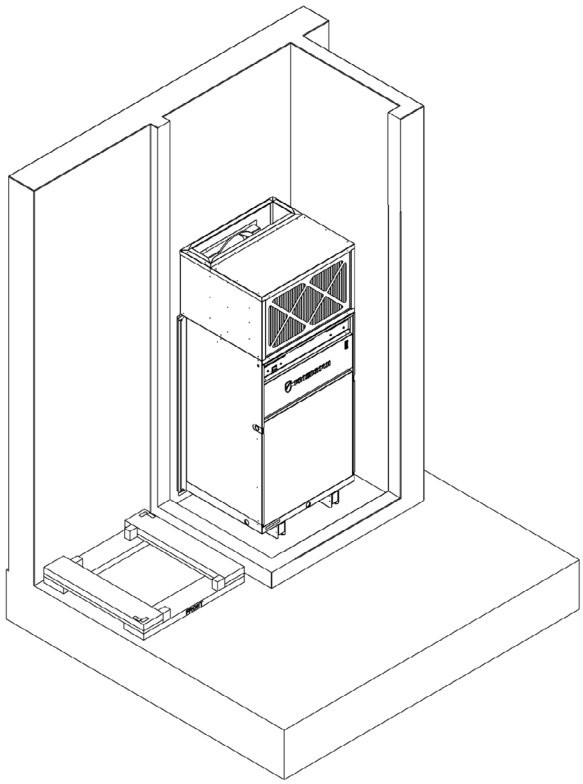
# INSTALLATION

**Side Configuration Installation**

**Left Install VRP Unit Prepared for Installation**



**Left Install VRP Unit in Closet (Fully Installed)**

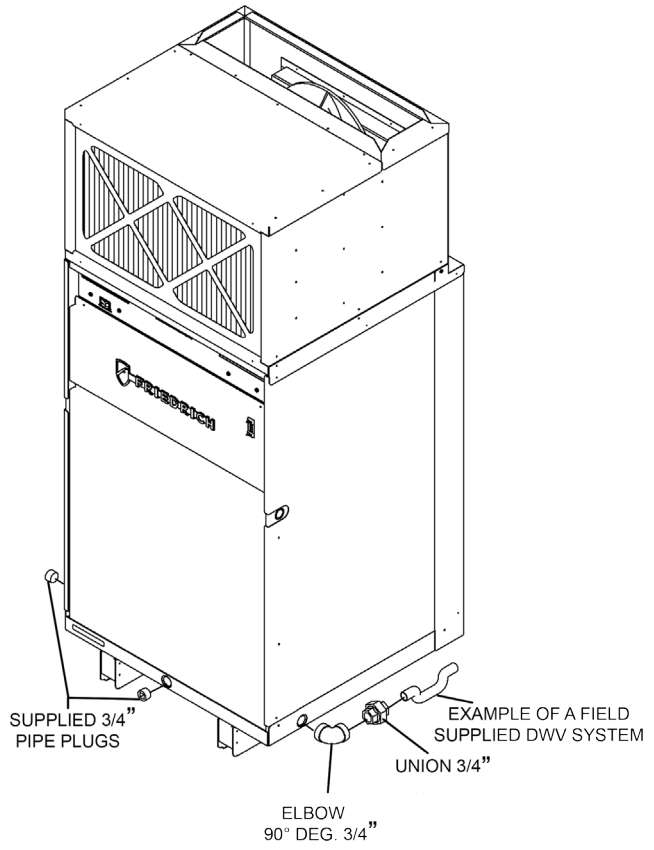


For side-install applications, place the unit adjacent to the closet and slide it in. Then, slide the unit backwards into the plenum.

# INSTALLATION

## Unit Drain Installation

**Unit Drain Installation**

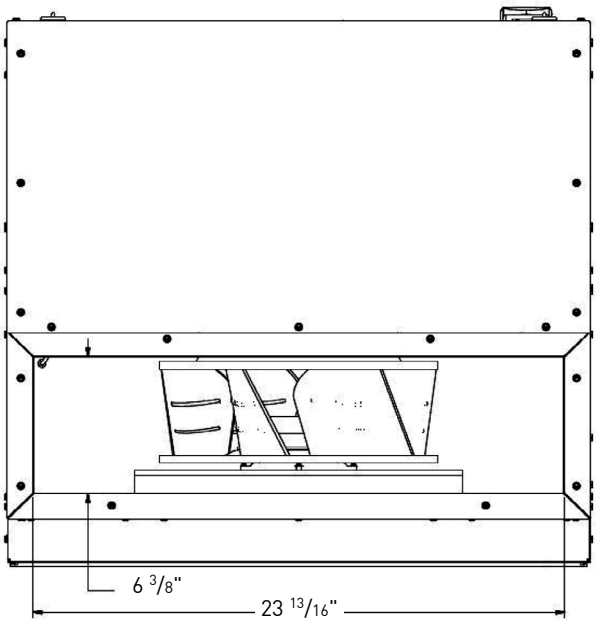



**NOTE:** Failure to follow the following procedures may result in serious property damage. A field supplied secondary condensate pan may be required. Check with local codes. In case of drainage system blockage, the unit base will allow excess water to flow out of the unit through the plenum and the architectural louver. It is critical to ensure that the drainage path is not blocked or obstructed in any way during installation.

1) Connect the supplied drain kit must be connected to one of the three (left, right or rear) 3/4" FPT connections on the unit basepan. Use of rear fitting without connection to DWV system (drain, waste, vent) may result in staining of the outside wall.
2) Insert the provided 3/4" nipple into the determined connection using field-supplied Teflon tape or pipe joint compound.
3) With the slip end of a 3/4" union, connect to the nipple with Teflon tape or pipe joint compound.
4) Hand-tighten all fittings to prevent damage to unit or fittings.
5) Install a field-supplied drain system to the slip end of the union. A trap is recommended and drain connections should be connected to building DWV system. Pitch the drain line of a 1/4" downward slope for every foot (1') of lateral horizontal run to the DWV.
6) Plug the two unused connection ports with the two provide 3/4" pipe plugs and field-supplied Teflon tape or pipe joint compound. High tighten to prevent damage to the unit or fittings. Do not thread metal or copper pipe fittings directly into unit.
7) Check the system for leaks.

# INSTALLATION

**Ductwork Installation**




Supply air duct connection is the responsibility of the installer and should be installed per industry best practices.

Sheet metal or duct board may be used for the transition from the discharge to 10" or larger diameter flexible ducting.

Avoid sharp transitions in the ductwork to ensure optimal indoor blower performance.

Allow at least 12" (18" preferred) from the discharge of the unit to the final reduced-size transition to support optimal efficiency of the blower system.

# INSTALLATION

## Wall Controller Installation 12 & 24k

### Proper Wiring of VRP unit to Wall Controller

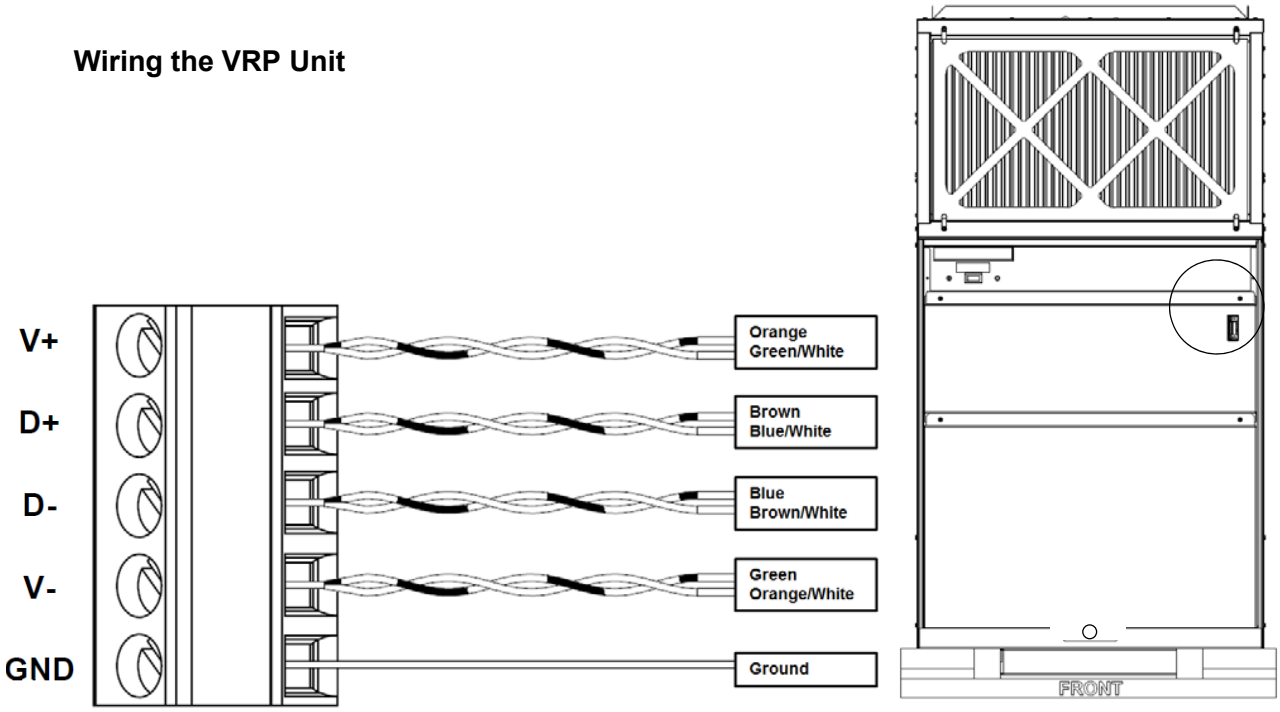
Use shielded and stranded CAT 6 cable with twisted pairs to wire the wall controller. Use the wire colors with the corresponding terminals on the wall controller to the VRP unit as shown in the table below.

| Wire Color | | Label |
|---|---|---|
| Orange<br>Green / White | | V + |
| Brown<br>Blue / White | | D + |
| Blue<br>Brown / White | | D - |
| Green<br>Orange / White | | V - |
| Ground Shield Wire | | GND |

Refer to the Accessory Section of this manual for the different types of wall controllers and accessories offered to you.

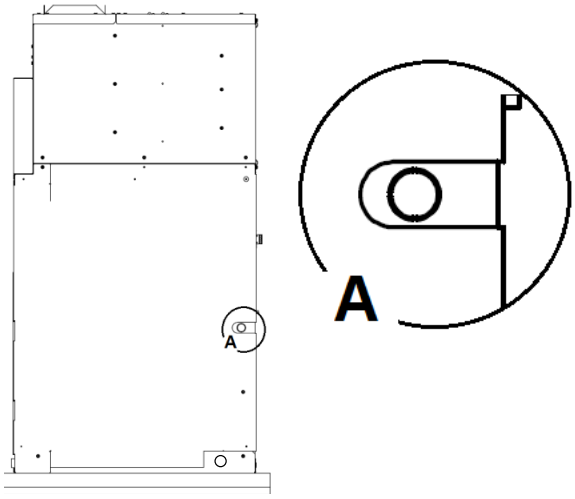
For detailed instructions on your wall controller, please go to www.Friedrich.com/accessories to locate the accessory manual.

### Wiring the VRP Unit



# INSTALLATION

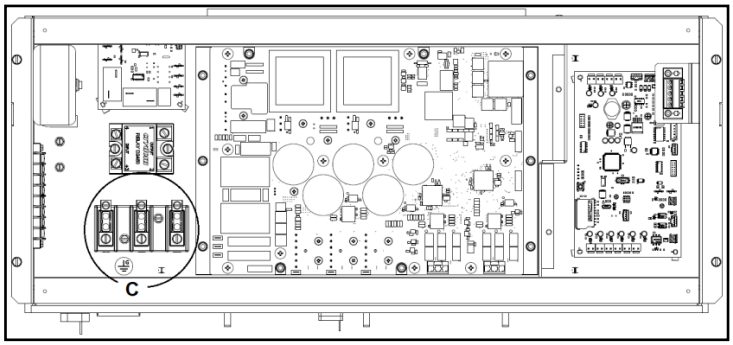
**Electrical Installation 12 & 24k**



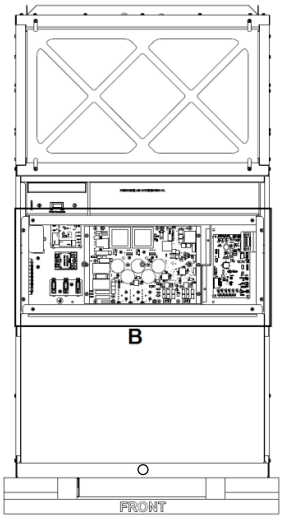

Remove and discard hole knock-out from the side of the unit (Detail A)

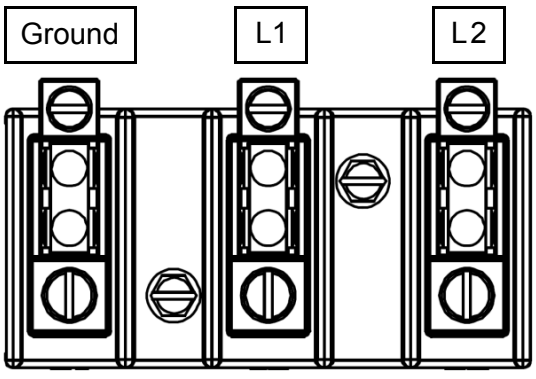
Remove the electrical access panel (Detail B) to expose the incoming Ppwer terminal block (Detail C, see below)

(Detail C, see below)




B

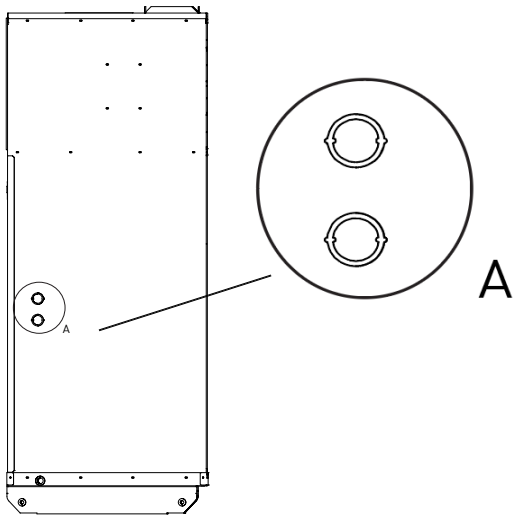



Insert all wires through the punched out hole and fasten wires as follows:

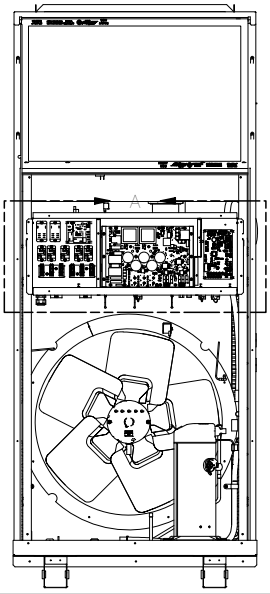
# INSTALLATION

**Electrical Installation 36k**

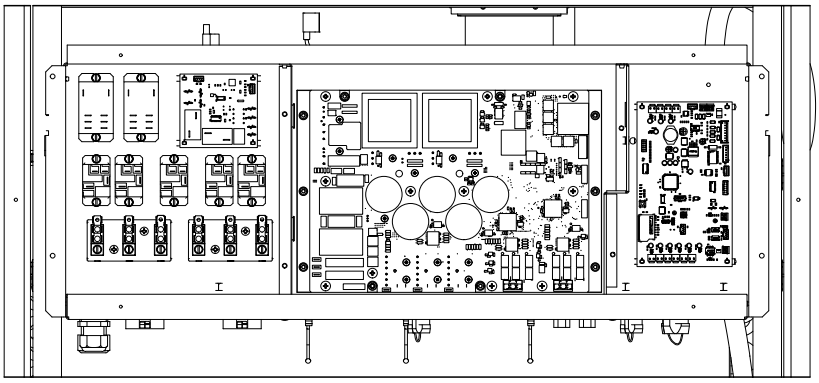



Remove and discard hole knock-out from the side of the unit (Detail A)

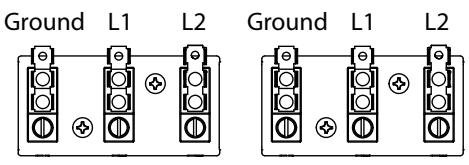
**NOTE:** Only one punch-out needs to be removed for 0.0 kW and 10.0 kW models.. Both punch-outs must be removed on the 15.0 kW models for dual service.



A



Remove the front access panel (Detail A) to expose the electrical box and incoming Power terminal block (see below)



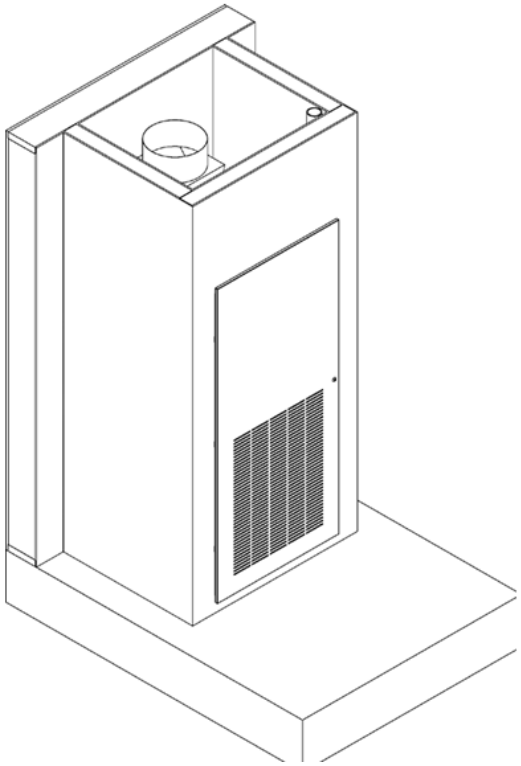

Insert all wires through the punched out hole(s) and fasten wires as shown.

The 0kW and 10kW models will require the use of only one of the terminal blocks (Block 'A'). The 15kW models will connect the extra 5kW electric heat to the remaining terminal block (Block 'B') and separate 30A service.

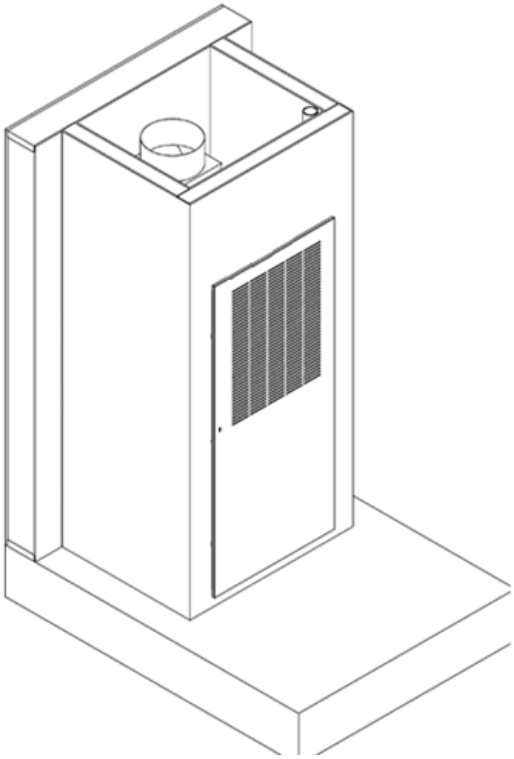
# INSTALLATION

**Return Air Door Installation 12 & 24k**

**Option 1**



**Option 2**



The door panel is supported along one edge by the provided hinge. The opposite edge has a latch which secures the panel to the adjacent framed structure.

The kit contains hinge bracket for mounting the door with the return air openings low (shown in option 1) or high (shown in Option 2) on the door. For increased sound reduction, it is recommended to install the door with the return air opening in the high position.

The door panel has a provision for filter installation on the door. This feature is only usable when the door is installed in the lower orientation (Option 1) and the unit filter has been removed.

**The unit should not be operated with both the unit filter and the door filter installed.**

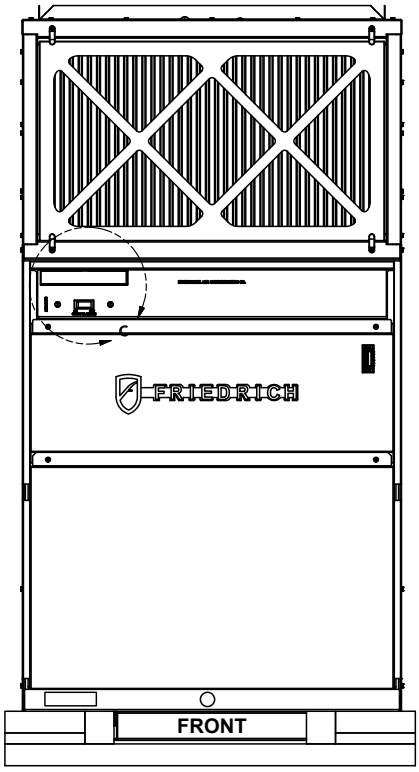
# INSTALLATION

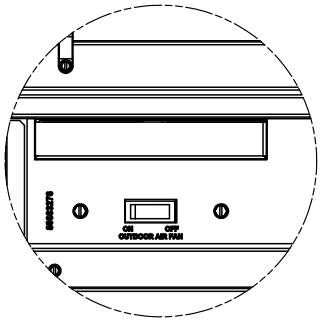
**Return Air And Door Installation 36k**

1. A 36" door louvered door is recommended for all VRP36 installations.
2. The louvered portion of the door should have a minimum of 325 sq. in. of free area.
3. Alternatively, a solid door may be used in tandem with a transfer register on an adjacent wall to the closet. The transfer register should have a minimum free area of 325 sq. in.

# INSTALLATION

**FreshAire System Set-up and Operation**



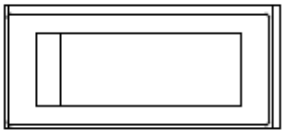

DETAIL C

If equipped with the FreshAire™ System, the unit will come with a FreshAire filter and blank-off plate.

**Remove the blank-off plate prior to turning the unit on.**

To remove the blank off plate, pull the attached tab shown in Detail A. The blank-off plate can be discarded or retained for future use.

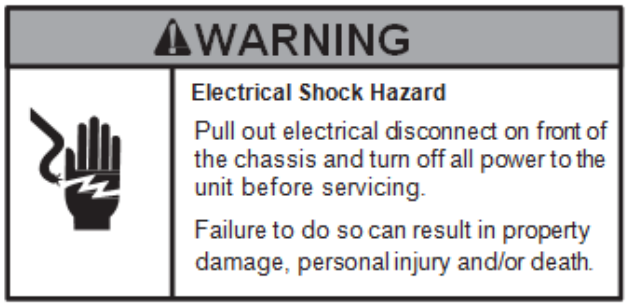
To engage the FreshAire™ System, flip the switch into the On Position.

ON OFF
OUTDOOR AIR FAN

# INSTALLATION

**Final Installation Checklist**




- Inspect and ensure that all components and accessories have been installed properly and that they have not been damaged during the installation process.
- Ensure that all installation instructions 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 circuit breaker(s) or fuse(s) and supply circuit wire size have been sized correctly.
- Check the condensate water drain(s) to ensure that they are adequate for the removal of condensate water and that they meet approval of the end user.
- Ensure that the entire installation is in compliance with all applicable national and local codes and ordinances having jurisdiction.
- **ENSURE THAT THE SUPPLY VOLTAGE TO THE UNIT IS WITHIN THE OPERATING RANGE**
- Secure all access panels (i.e. front cover and/or control box), apply power to the unit.
  The unit commissioning should be done at this time to ensure unit function.

  **NOTE: Maintaining a log for recording the dates of maintenance and/or service is recommended, and should be suggested to the owner or operator of the equipment.**

- 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.

## Chassis Operation

### Cooling Operation

The set point must be at least 3°F below room temperature to ensure compressor operation.
In the cooling mode, when demand is present, the indoor blower and outdoor fan will operate. The compressor will vary operating speed to maintain desired set point.

### Heat Pump Operation

The set point must be greater than 3°F but not greater than 6°F above room temperature to ensure compressor operation.
In the heating mode, when demand is present, the indoor blower and outdoor fan will operate. The compressor will vary operating speed to maintain desired set point.

### Electric Heat Operation

If the set-point is greater than 5°F - 15°F (depending on outdoor conditions) above room temperature, the heat pump operation will be terminated and the electric heater will be energized to satisfy the heating demand.
If heat pump operation is not available due to defrost or error, the electric heater will be used to satisfy heating demand.

### FreshAire™

The FreshAire™ System (optional) delivers outside air to the indoor space. The system has a fan that draws outdoor air into the system. The outdoor air leaves the system through a filter and enters the indoor space in front of the indoor conditioning coil. The outdoor air mixes with the return air and is drawn through the indoor conditioning coil. The optional system can be configured to have either a single (F option) outdoor air fan and filter, or dual (D option) outdoor air fans and filters.

The FreshAire™ System uses a 6 x 6 x 1 filter (quantity of 1 for option F and 2 for option D). The filters are accessed through the front of the unit just below the main unit filter. Slide the filter straight out to remove and straight in to replace.

# INSTALLATION

**Return Air Grille/ Access Panel VRPXAP1**

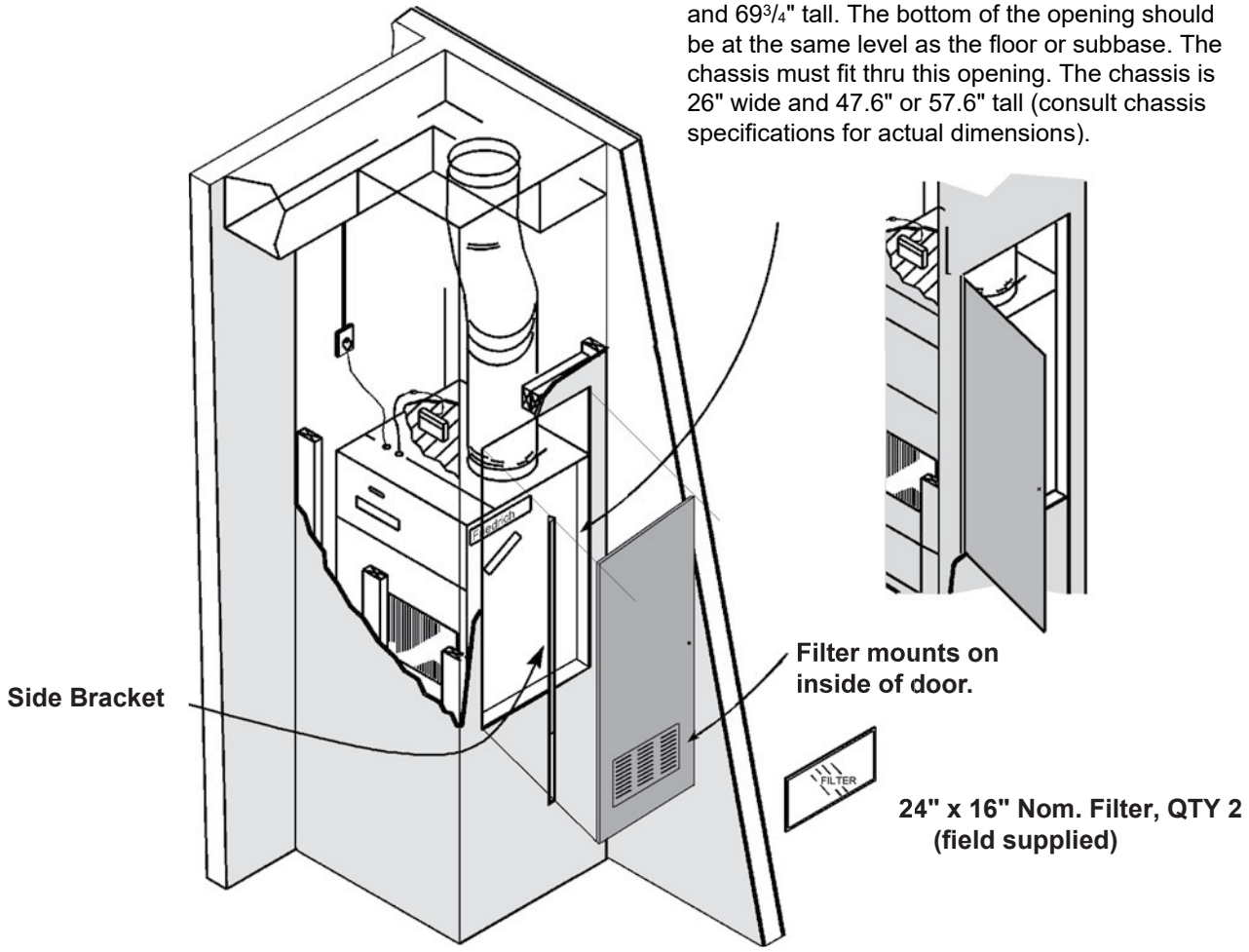
## Parts Included in this Kit

- VRPXAP1 Return Air Grille / Access Panel (72" Tall x 32" Wide)
- Mounting Bracket
- Mounting Screws

## Parts not Included in this Kit

- 24" x 16" Filter, QTY 2
- 5/32" Allen wrench for latch mechanism operation

Frame and sheetrock the access hole to 30" wide and 69 3/4" tall. The bottom of the opening should be at the same level as the floor or subbase. The chassis must fit thru this opening. The chassis is 26" wide and 47.6" or 57.6" tall (consult chassis specifications for actual dimensions).



# TROUBLESHOOTING

**VRP Troubleshooting Map**

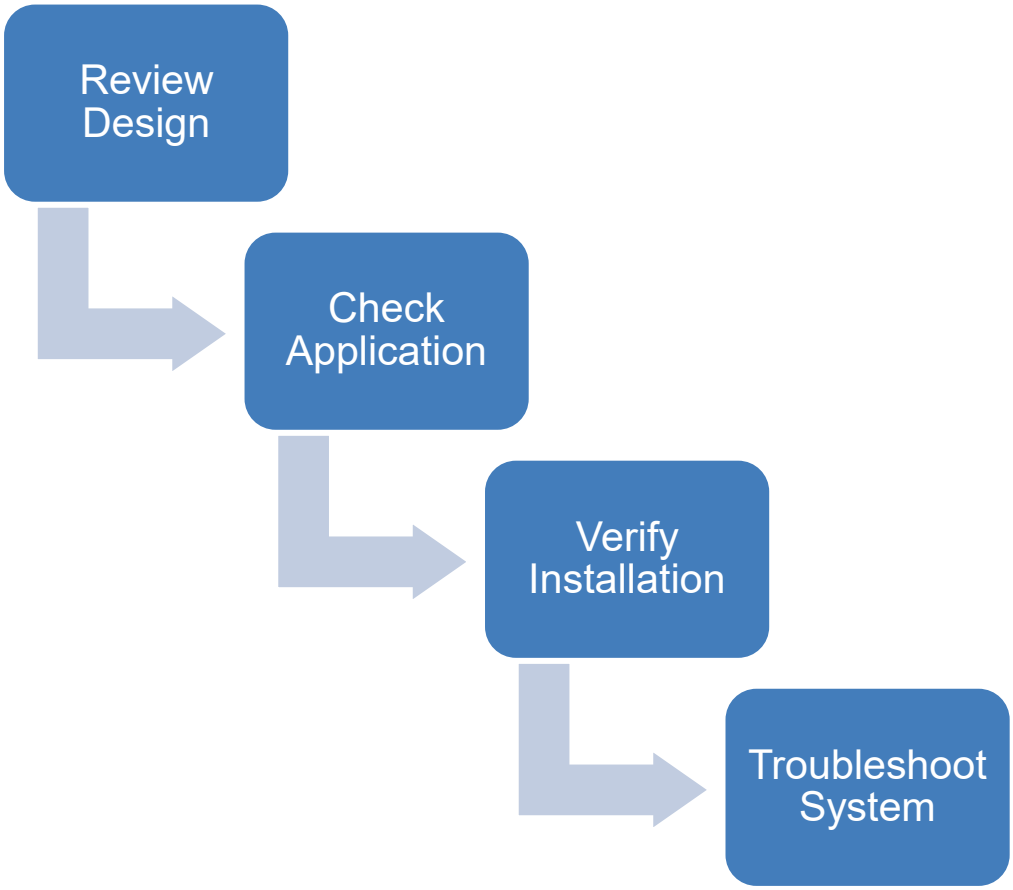




Figure 701 (Troubleshooting Map)

# TROUBLESHOOTING

**Required Tools**

Meters = Need to Read

- Volts A/C – 500
- Volts D/C – 600
- Ohms – 10k Megaohms.


Test Leads:

- Needle Point
- 1000V/20A Rated

410a Gauge Manifold

Figure 702 (Troubleshooting Tools)

# TROUBLESHOOTING

**Required Skills**

1. Patience – Revolutionary digital communicating technology has replaced older analog components.

2. Patience – Needle point leads will save you time when backprobing molex connectors.

3. Patience – Know who to call when you need help.

4. Observation – There are many LED indicators on the MCS and FMC which all correspond to unit operation.

5. Electrical tracing – 24V AC systems have replaced low (5-10V) DC voltage.

6. DC Communication – The interpretation of values and commands transmitted by VDC.

**Troubleshooting by Rule Out Methodology**

**Probability Diagnosis:**

- The act of ruling out and understanding certain components operation *based on experience* and simply watching and observing the system operate.

**Rule Out:**

- The act of understanding how components operate to *maintain their logical sequence of operation* where failure to produce expected results occurs.

**True Certainty Diagnosis:**

- The act of proving a condition exists, or existed, by testing and acquiring physical and empirical evidence which caused, or is the result, of that condition.

# TROUBLESHOOTING

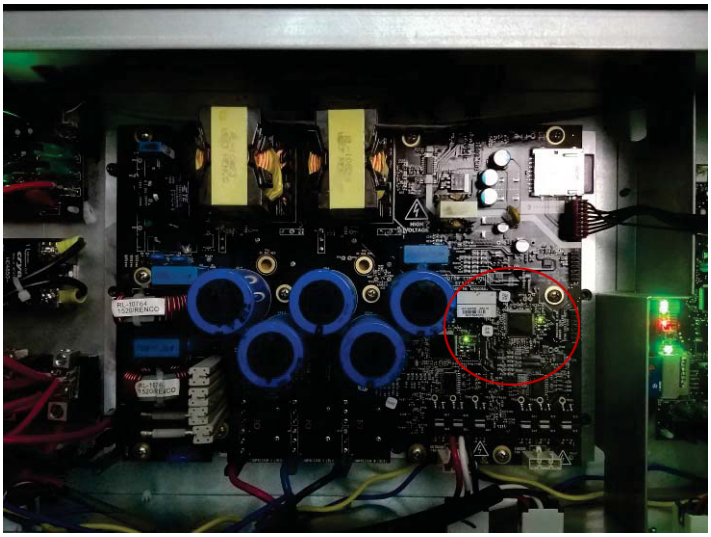
**Check For Power**

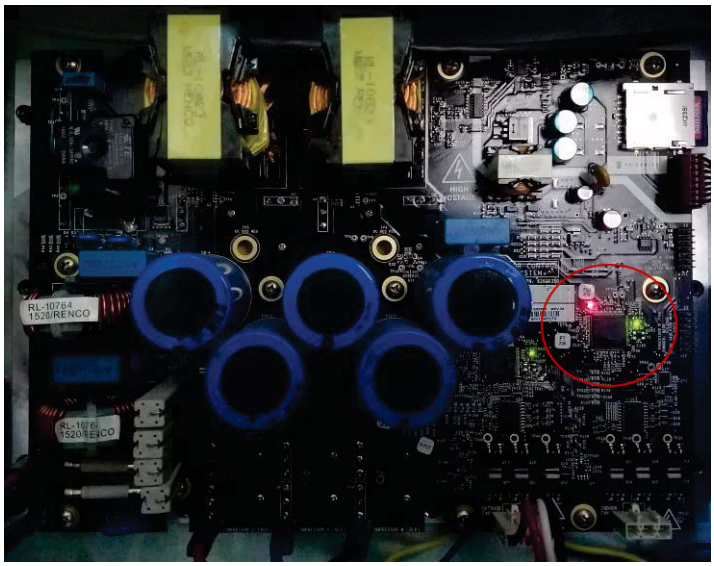
If the wall controller does not light up, ensure the unit has power.

Check the electrical circuit breaker.

Check the units disconnect.

If in doubt, uncover the electrical panel from the unit and check that the processors on the motor control board are flashing green, not red.





# TROUBLESHOOTING

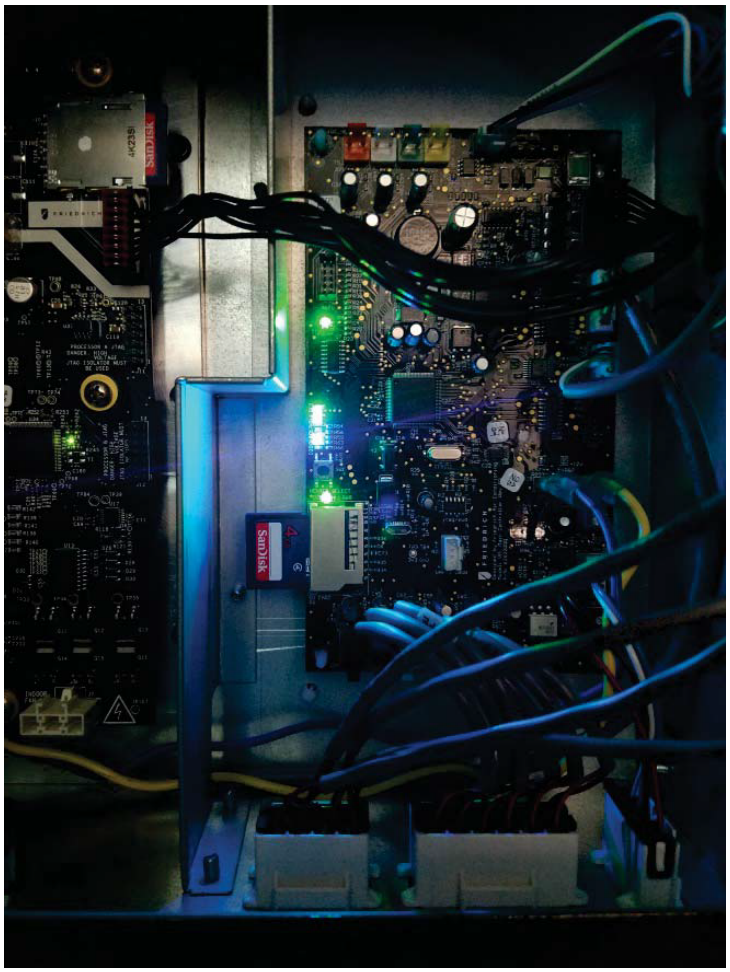
**Diagnostic Code Check**

The FMC will have green lights, but if an error code occurs, a blue and/or red light will flash.

The blue LED is the 10 digit and the red LED is the singles digit.

For example, 4 blue flashes and 3 red flash would be a code 43.

If more than one code is active, the FMC will cycle through the codes in active numeric order, one at a time, then return to the first code.



# TROUBLESHOOTING

## Diagnostic Code (Temperature Based)

**Temperature Based:**

Thermistors (sensors) modify VDC and is interpreted through the FMC.
Errors indicate a possible issue with the sensor, FMC, or the sensor has detected an abnormal condition (or an out of parameter value).
Solution: Sensor error, FMC error, or abnormal condition.

VRP Sensor Bank contains 10 sensors for air and coil temperature. Each is 10k Ohm and must be unplugged from the FMC to test against a resistance chart. The sensors have a two-port molex connected to the FMC. They all share a common power supply which can be checked against the other connectors for continuity and rule out the FMC.

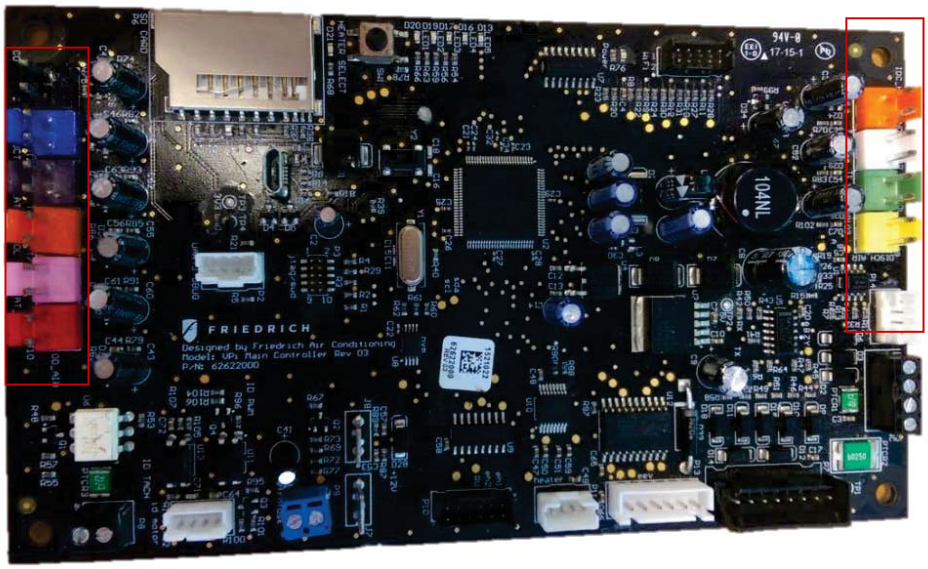
**Rule Out Thermistors**:

A thermistor will only give an error code if the thermistor is shorted, 0 ohms, or opened, O/L. If the thermistor is out of range, it may not give an error code and the system may not operate correctly.

Make sure your meter has a high enough range to read the sensor. If your meter only goes to 2k ohms and you're trying to read 10k ohms, it will read O/L.
Refer to Thermistor Values chart in Component Testing section

**Rule out FMC - Continuity Check**

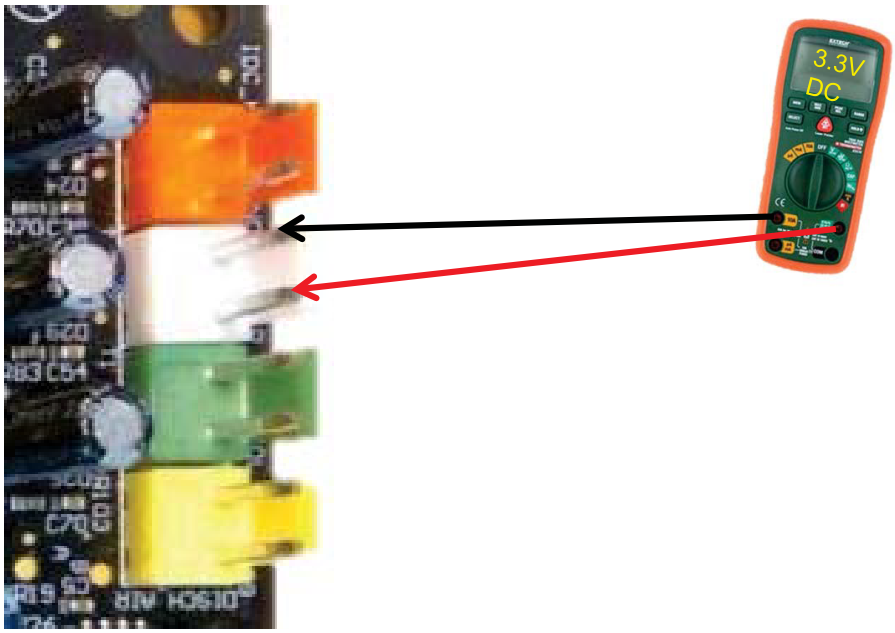
The first pin in each set can be checked against the others to make sure voltage has the ability to flow through that thermistor port.




**Rule out FMC - Voltage Check**

The Thermistor port can be checked without the sensor attached to verify proper voltage is being passed through the molex.

Voltage should be ~3.3 VDC



# TROUBLESHOOTING

## Diagnostic Codes (Voltage/ Amperage)

### Amperage (or Current) Diagnostic Codes

The current sensing portion of the MCS had detected that the motor is pulling more than designed amperage.

Grounded Motor

Faulty/"Damaged" Motor

Damaged MCS Board

### I2T (IPM Amperage) Faults

The current sensing portion of the MCS had detected that the motor is pulling the maximum allowable amperage for an extended period of time.

Dirty or restricted coils

Blocked or restricted Motor

Abnormally high outdoor temperature

Damaged MCS Board

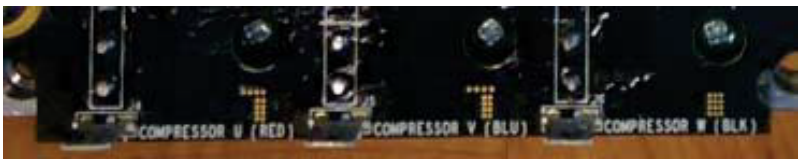
Voltage Diagnostic Codes

The current sensing portion of the MCS had detected that the system voltage is abnormally high or low.

Verify proper voltage.

### Voltage/Amperage Related Diagnostics –Compressor Rule Out

Compressor is attached to the MCS with flag terminals for easy access. If you do not get the same resistance through each phase (+/- 0.1), then test the terminals directly.




Check the each terminal to the compressor to ground.

Disconnect wires from compressor before checking. The compressor should ohm out with the same resistance between the terminals

***5M+ Ohms***

***1.5 to 3.5 Ohms on any two phases***


1-2
1-3
2-3

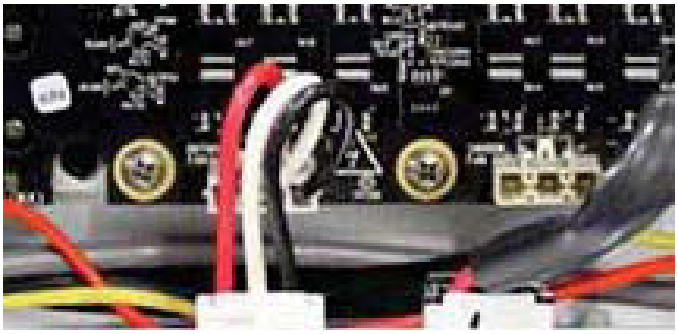
# TROUBLESHOOTING

**Voltage /Amperage Related Diagnostics- ODF Rule Out**

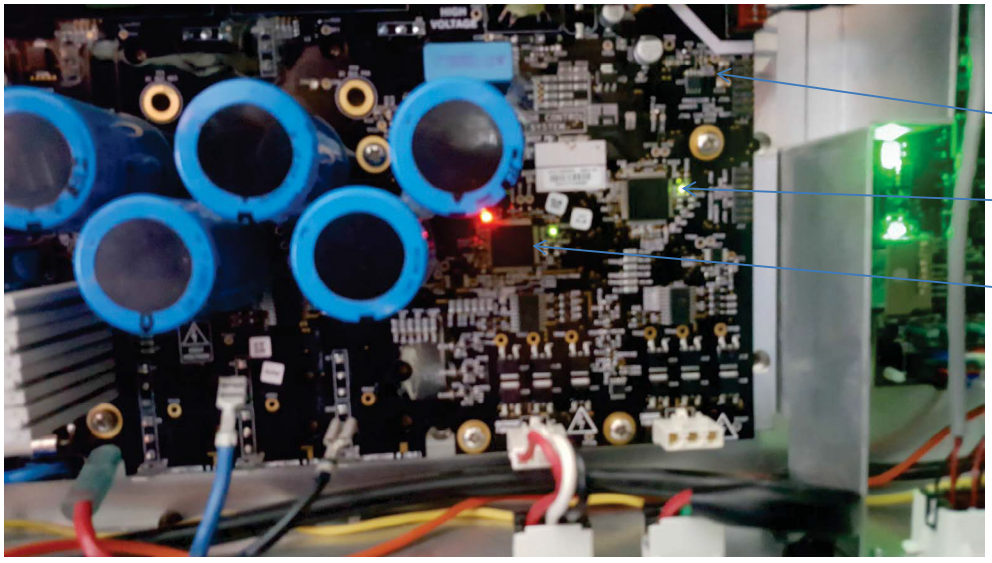
The Outdoor Fan Motor (ODF), like the Compressor, is a BLDC Motor. Troubleshooting this component is the same as the compressor.

Ohm at the connector at the MCS first for the same resistance (+/-0.1) across any two phases, then check each phase to ground.

Back probe the terminal pins with needle point leads!



**Voltage/Amperage Related Diagnostics - MCS Operational Lights**

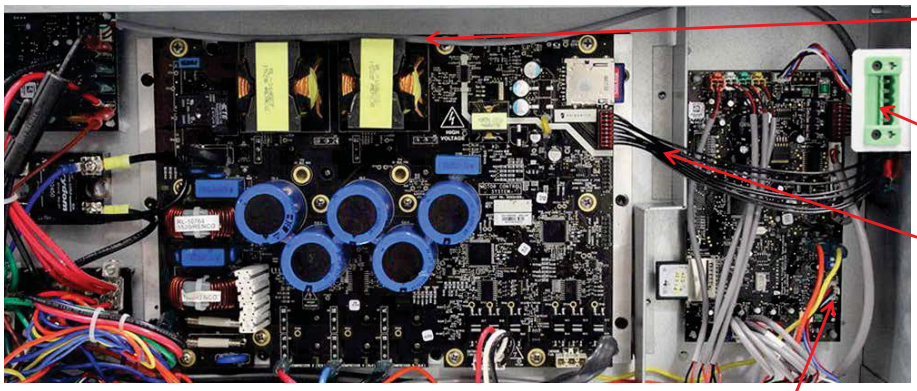


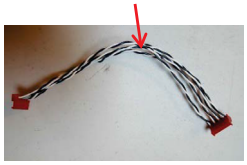

*If a fault LED is produced on motor engagement, rule out firmware, then motor. Lastly, change the MCS board.*

# TROUBLESHOOTING

**Configuration/Communication Diagnostic Codes**

The FMC, MCS, Heater Board (HB), Wall Controller and Indoor Fan all communicate via ribbon cables. If communication is lost or dropped, the VRP will not operate. These codes will also populate when there is a software, firmware, or logic failure.

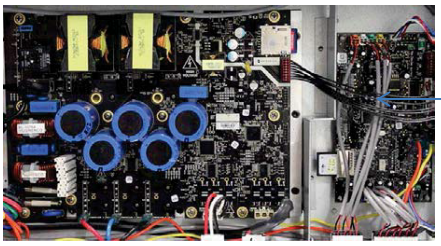


**Configuration/Communication Diagnostic Codes 27 & 43**

Check HB and MCS ribbon cable connection to FMC. Is the HB light on?

If HB light is on, the cable is more than likely working correctly. If the light is not on, it could be a malfunctioned HB or cable.



Verify the ribbon cable is fully inserted in the FMC and MCS. If all checks pass, there may be an issue with software. Replace MCS and FMC SD card.

# TROUBLESHOOTING

**Configuration/Communication Diagnostic Codes – 39 (IDF Comm Error)**

IDF Layout:

When checking communication, use the ground (blk) to reference all other pins in VDC:

3-pin block – Power

Red – L1

Grn – Ground

Blue – L2

4-Pin block – Communication

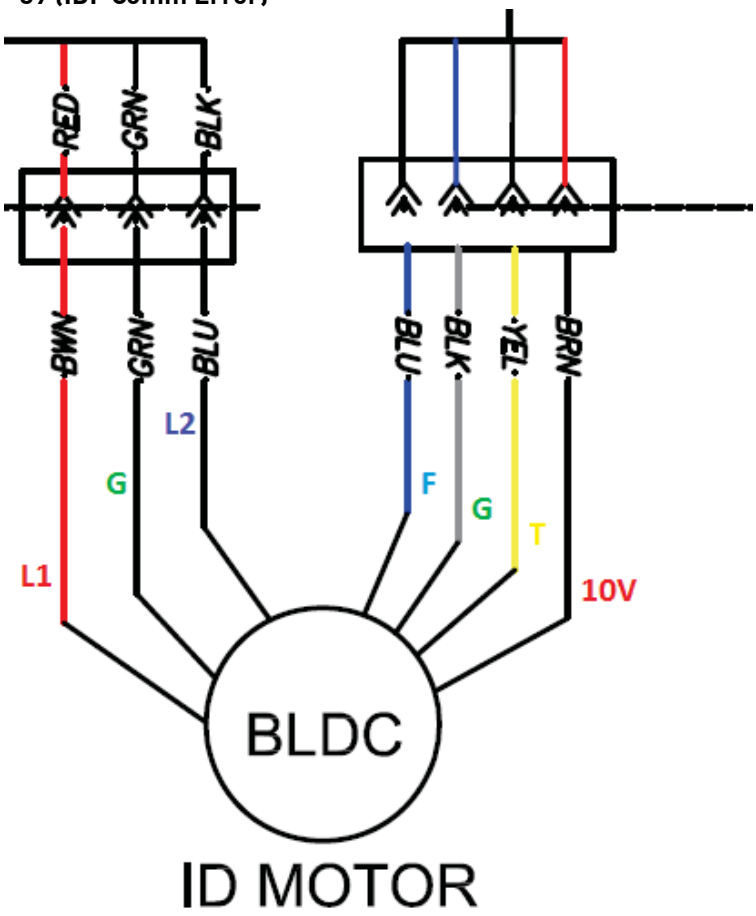
Brn – 10V

Yel – Signal to Fan (T) ~1-5VDC

Blk – Ground

Blu–Tacfrom Fan (F) ~1-5VDC

Verify proper voltage to fan on power block, then make sure 10v is present on communication block. Start a call for fan and measure signal to fan. If voltage is present, FMC is good. Check fan for blockage or possible damage.



# TROUBLESHOOTING

## Diagnostic Codes

| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 3 | Return Air sensor (T8) is open or shorted | 1. An open or shorted sensor is detected by the A/D conversion value residing at the upper or lower end of the conversion range.<br>2. The Ambient Indoor Temperature Sensor(T8) is open or shorted<br>3. Defective contact between male and female electrical molex connectors.<br>4. The sensor is not properly connected to the FMC. | 1. Disconnect the sensor at the FMC. Verify voltage at pins then reconnect.<br>Diagnostic Code (Temperature Based)<br>2. Ohm out the sensor to determine the failure point and correct as needed.<br>Refer to Component Testing (Thermistor Values)<br>3. Replace the FMC board. |
| 4 | Indoor Coil Cool Inlet sensor (T1) is open or shorted | | |
| 5 | Outdoor Coil Heat Inlet sensor (T7) is open or shorted | | |
| 6 | Discharge Air sensor (T9) is open or shorted | | |
| 7 | Outdoor Ambient Air sensor (T10) is open or shorted. | | |
| 8 | Indoor Coil Heat Cond. sensor (T5) is open or shorted. | | |
| 9 | Compressor Discharge sensor (T4) is open or shorted. | | |
| 10 | Compressor Suction sensor (T3) is open or shorted. | | |
| 11 | Liquid Cool sensor (T6) is open or shorted | | |
| 12 | Liquid Heat sensor (T2) is open or shorted | | |
| 13 | Humidity sensor is open or shorted. | 1. The wall controller is not properly connected to the FMC.<br>2. There is an issue with the sensor itself. | 1. Verify that the wall controller is connected correctly.<br>2. Check voltage.<br>3. Check wiring configuration.<br>4. Replace wall controller. |
| 14 | High or Low Pressure Limit Switch Open<br>Black FMC Board Only | 1. Pressure of suction line is too low.<br>2. Pressure of discharge line is too high.<br>3. Quick connects on FMC board are loose or damaged.<br>4. Faulty high or low pressure switch.<br>5. In Heating mode check indoor coil restriction(High Pressure).<br>6. In Cooling mode check outdoor coil restriction(High Pressure).<br>7. Outdoor fan not running.(High Pressure) | 1. Check high and low pressure switches per procedure located in the component testing section of this manual.<br>2. Check EEV per procedure located in the component testing section of this manual.<br>3. Determine cause of leak or restriction in sealed system and repair. |
| 14 | High Pressure Limit Switch Open<br>Blue FMC Board Only | 1. Pressure of discharge line is too high.<br>2. Quick connects on FMC board are loose or damaged.<br>3. Faulty high pressure switch.<br>4. Overcharged unit.<br>5. In Heating mode check indoor coil restriction.<br>6. In Cooling mode check outdoor coil restriction.<br>7. Outdoor fan not running. | 1. Check high pressure switch per procedure located in the component testing section of this manual.<br>2. Check EEV per procedure located in the component testing section of this manual.<br>3. Determine cause of leak or restriction in sealed system and repair. |

# TROUBLESHOOTING

## Diagnostic Codes

| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 15 | Low Pressure Limit Switch Open<br>Blue FMC Board Only | 1. Pressure of suction line is too low.<br>2. Quick connects on FMC board are loose or damaged.<br>3. Faulty low pressure switch.<br>4. Undercharged or leaking unit. | 1. Check low pressure switch per procedure located in the component testing section of this manual.<br>2. Check EEV per procedure located in the component testing section of this manual.<br>3. Determine cause of leak or restriction in sealed system and repair. |
| 18 | Float Switch Open<br>Blue FMC Board Only | 1. Open circuit on float switch port.<br>2. Board failure. | |
| 19 | Outdoor Coil > 175°F | 1. The Outdoor Coil reaches a temperature greater than 175°F<br>2. Outdoor fan is not running when the compressor is on in cool.<br>3. EEV malfunction<br>4. Seal system restriction.<br>5. Improper installation causing outdoor air recirculation. | 1. Ensure that the outdoor fan is properly connected and operational<br>2. Check EEV per procedure located in the component testing section of this manual.<br>3. Repair sealed system restriction problem.<br>4. Outdoor fan replacement. 12-24k<br>5. Out door Fan replacement 36k<br>5. Ensure proper installation of unit and baffle per Installation section of this manual. |
| 20 | The Indoor Coil at sensor T1's location reaches a temperature < 30°F and remains there for 5 consecutive minutes | 1. Lower than usual IDB speeds.<br>2. Low refrigerant charge.<br>3. Low Ambient. | 1. Ensure that the IDB is connected properly and is operational.<br>2. Check that there is no blockage in the duct work.<br>3. Check the filter.<br>4. Check for refrigerant leaks and reprocess. |
| 21 | Unit cycles (heat or cool demand) > 9 times per hour | 1. Unit is oversized for the space<br>2. Wall controller is placed in a position where the temperature is grossly off of the actual room condition. | 1. Ensure that the wall controller's placement is "correct" based on room air flow |
| 22 | Unit cycles (heat or cool demand) < 3 times per hour. | This diagnostic test is used for testing and non-critical analysis only<br>The unit cycles heating or cooling demand less than 3 times within an hour | Normal operation code will clear automatically |
| 23 | Room Freeze Protection | 1. The Indoor Ambient temperature is below 40°F<br>2. Inadequate insulation in room or closet.<br>3. Wall Controller sensor is bad<br>4. T8 Sensor is bad | 1. Make sure the room is properly insulated.<br>2. Ohm out T8 sensor and replace if necessary. Refer to thermistor values chart<br>3. Replace Wall Controller |
| 24 | The Discharge Air sensor is reading above 185°F | 1. IDB is not operating when electric heat is on.<br>2. Electric heat limit switches are failing. | 1. Check Electric Heat Element.<br>2. Verify operation of IDB, replace if necessary. |

# TROUBLESHOOTING

## Diagnostic Codes

| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 25 | Indoor Coil Restriction | If one thermistored coil is frozen while another thermistored coil is not. | 1. Check coils.<br>2. Check thermistor voltage and ohms values.<br>3. Monitor unit operation. |
| 26 | Temperature is Beyond Operating Limits | The T8 (Indoor Ambient) sensor reads less than 0°F or greater than 130°F | 1. Make sure diagnostic 23 is activated and perform solutions.<br>2. Make sure the room is properly insulated. |
| 27 | Minimum Configuration not Met | One of the following conditions must be TRUE in order for this test to register an error<br>1. The Heater Board is NOT Connected<br>2. The MCS board is NOT initialized<br>3. The unit is NOT Provisioned<br>4. Communication with the MCS has failed<br>MCS communication failure is determined by comparing the PFC current value that is retrieved every 12 seconds. If the value remains the same for 5 minutes, the assumption is made that all communication with MCS is blocked | 1. Ensure that the heater board is connected properly to the FMC. Replace the board/or communication cable as necessary.<br>2. Ensure that the MCS board is powered up.<br>3. Replace the MCS-FMC communication cable as necessary.<br>4. Replace with a known provisioned FMC. |
| 28 | Outdoor Coil < 30°F (Defrost) | The Heat Pump has accumulated 60 minutes of runtime while the Outdoor Coil sensor read below 30°F | 1. Power Cycle unit.<br>2. Check coils.<br>3. Check fan motor operation. |
| 29 | Bad Heater Board Revision | Heater board firmware does not allow simultaneous heat operation (Only applicable to 3 ton). | |
| 30 | MCS Indoor Fan Over Current<br>The MCS board has flagged a current fault on the Indoor Fan axis and notified the FMC. | 1. Short on the MCS board<br>2. Improperly wired indoor blower.<br>3. Grounded/Damaged indoor blower | Power cycle the unit and see if the problem persists, if so:<br>1. Ensure that the orientation of the wiring for the indoor fan is correct.<br>2. Replace the MCS board.<br>3. Replace the indoor blower 12-24k<br>Replace the indoor blower 36k |
| 31 | MCS Outdoor Fan Current Fault.<br>The MCS board has flagged a current fault on the Outdoor Fan axis and notified the FMC | 1. Short on the MCS board<br>2. Improperly wired outdoor fan.<br>3. Grounded/Demagged outdoor fan. | Power cycle the unit and see if the problem persists, if so:<br>1. Ensure that the orientation of the wiring for the outdoor fan is correct.<br>2. Replace the MCS board.<br>3. Replace the outdoor blower 12-24k<br>Replace the outdoor blower 36k |
| 32 | MCS Compressor Current Fault.<br>The MCS board has flagged a current fault on the Compressor axis and notified the FMC | 1. Short on the MCS board<br>2. Improperly wired compressor<br>3. Grounded/Demagged compressor | 1. Short on the MCS board<br>2. Improperly wired compressor<br>3. Grounded/Demagged compressor<br>4. Replace Compressor |

# TROUBLESHOOTING

## Diagnostic Codes

| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 33 | Compressor Lubrication | 1. The Compressor has run at low frequency ( less than 35 Hz) for 200 consecutive minutes and requires lubrication<br>2. Monitors if the FMC has not provisioned | Normal Operation code will clear automatically. |
| 34 | Unit Not Provisioned | Provisioned is defined as both switch and "provision" data has been set | Replace with provisioned the FMC |
| 35 | MCS DC Bus Over Voltage<br>The MCS board has flagged an Over Voltage fault on the MCS DC Bus and notified the FMC | The MCS bus voltage rose above ~465 VDC when one of the motor axis was enabled. | Power cycle the unit and see if the problem persists, if so:<br>1. Replace the MCS board |
| 36 | MCS DC Bus Under Voltage<br>The MCS board has flagged an Under Voltage fault on the MCS DC Bus and notified the FMC | The MCS board has flagged an Under Voltage fault on the MCS DC Bus and notified the FMC | Power cycle the unit and see if the problem persists, if so:<br>1. Check line voltage<br>2. Replace the MCS board. |
| 37 | MCS Board Over Temperature | 1. The MCS board is reporting a board temperature of greater than 60°C<br>2. The MCS board components are not being properly cooled while running under heavy load. (greater than 70°C/160°F) | 1. Verify proper installation<br>2. Replace MCS board |
| 38 | MCS Heatsink Over Temperature | 1. The MCS board is reporting a heat sink temperature of greater than 60°C<br>2. The MCS heat sink components are not being properly cooled while running under heavy load. (greater than 70°C/160°F) | 1. Verify proper installation<br>2. Replace MCS board |
| 39 | PSC Fan Low RPM | The Indoor Fan's RPM is less than 60% of its commanded RPM for 5 minutes | Configuration/Communication Diagnostic Codes – 39 (IDF Comm Error) |
| 40 | Wall Controller not Connected | The FMC determines the Wall Controller is not connected | Check all wiring between the FMC and the wall controller |
| 41 | EEV Fault | The EEV returns a fault status in the FMC | 1. Power cycle unit.<br>2. See EEV testing.<br>3. Check EEV wires and motor.<br>4. Check voltage and ohms readings.<br>5. Replace EEV Stepper Motor |
| 43 | MCS Communication Failure | If no "good" message between the FMC and MCS has occurred in 15 minutes the error is reported. | Replace the communication wire between the MCS<br>and FMC. |
| 44 | Reversing Valve out of Position (Stuck) | The RV is in the incorrect position (On/Off) for the mode that the system is in<br>The Discharge Air temperature is not indicative of active cooling or heating for 5 minutes | 1. Recycle power to unit.<br>2. Check coil voltage.<br>3. Check heater board voltage.<br>4. Replace power coil.<br>5. Replace heater board.<br>6. Replace Reversing Valve. |

# TROUBLESHOOTING

## Diagnostic Codes

| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 46 | Indoor Coil > 175°F for 5 consecutive minutes | The T5 sensor reads a temperature greater than 175°F for 5 consecutive minutes | 1. Power cycle unit<br>2. Check Thermistor voltage and ohms values.<br>3. Check indoor blower motor<br>4. Monitor equipment operation<br>5. Replace Thermistor |
| 47 | MCS Compressor I2T Fault<br>"The MCS board has flagged an Compressor I2T fault and has notified the FMC."<br>The Compressor is operating at max allowable amperage for an extended period ) | The problem occurred more than 5 times within an hour<br>1. Dangerously low charge.<br>2. Abnormally high outdoor temperatures<br>3. Restriction in the sealed system.<br>4. A damaged compressor. | Power cycle the unit and see if the problem persists, if so:<br>1. Ensure the EEV is operational.<br>2. Infer the presence of a sealed system obstruction and reprocess/repair if necessary.<br>3. Replace the compressor.<br>4. Replace MCS |
| 48 | MCS Indoor Fan I2T Fault<br>The MCS board has flagged an IDF I2T fault and has notified the FMC.<br>(The indoor fan is operating at max allowable amperage for an extended period of time) | The problem occurred more than 5 times within an hour<br>1. Restricted Airflow<br>2. Abnormally high outdoor temperatures<br>3. Damaged Indoor Fan | Power cycle the unit and see if the problem persists, if so:<br>1. Check that the indoor fan blade is moving (i.e. locked rotor).<br>2. Check that the indoor air supply is not impeded<br>3. Replace the indoor fan. |
| 49 | MCS Outdoor Fan I2T Fault.<br>The MCS board has flagged an ODF I2T fault and has notified the FMC.<br>(The outdoor fan is operating at max allowable amperage for an extended period of time) | The problem occurred 5 or more times within an hour<br>1. Restricted Airflow<br>2. Abnormally high outdoor temperatures<br>3. Damaged Outdoor Fan | This condition requires a system reset.<br>1. Check that the outdoor fan blade is moving (i.e. locked rotor/frozen drain pan).<br>2. Check that the outdoor air supply is not impeded<br>3. If the problem continues, replace the outdoor fan. |
| 50 | MCS 15V Rail Fault.<br>The MCS board has flagged a 15V rail fault and has notified the FMC. | There is an issue with the 15 V rail on the MCS | This condition requires a system reset.<br>1. Restart the system with the FMC disconnected from the MCS.<br>A. If the processor has a red light when rebooted, replace the MCS. |
| 52 | MCS PFC Over Voltage<br>The MCS board has flagged a PFC over voltage and has notified the FMC. | The MCS board has flagged a PFC over voltage and has notified the FMC. | The MCS board has flagged a PFC over voltage and has notified the FMC. |
| 53 | MCS AC Line Under Voltage.<br>The MCS board has flagged an AC line under voltage and has notified the FMC." | The input AC line voltage is less than 187V rms | The system will require a reset.<br>1. If the system does not power up, replace the MCS board.<br>2. Ensure that there were no brownouts in the area recently.<br>3. Ensure that the input voltage is greater than 187V. If it is less than 187V this error may occur often due to voltage sag. |

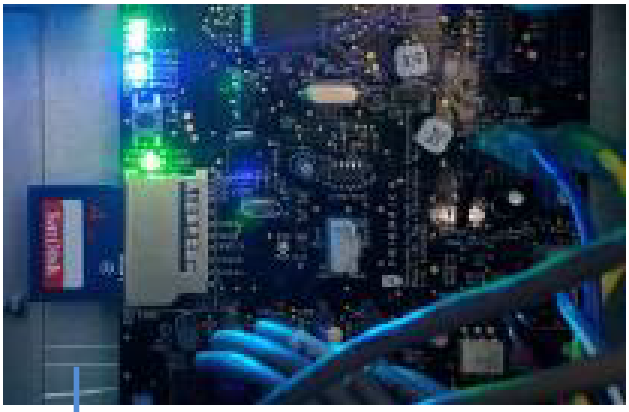
# TROUBLESHOOTING

## Diagnostic Codes

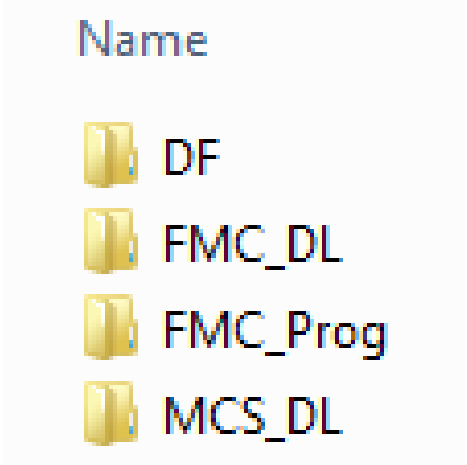
| Diag | Description | Diagnostic Check point | Solution |
|---|---|---|---|
| 54 | MCS AC Line Over Voltage.<br>The MCS board has flagged an AC line over voltage and has notified the FMC. | The input AC line voltage exceeds 293V rms. | The system will require a reset.<br>1. If the system does not power up, replace the MCS board.<br>2. Ensure that the input voltage is less than 293V. If it is greater than 293V this error may occur often due to voltage spikes. |

# Retrieving VRP Data

1. Remove SD Card from the FMC Board (far right board) and  insert into a computer or connected SD Card reader.

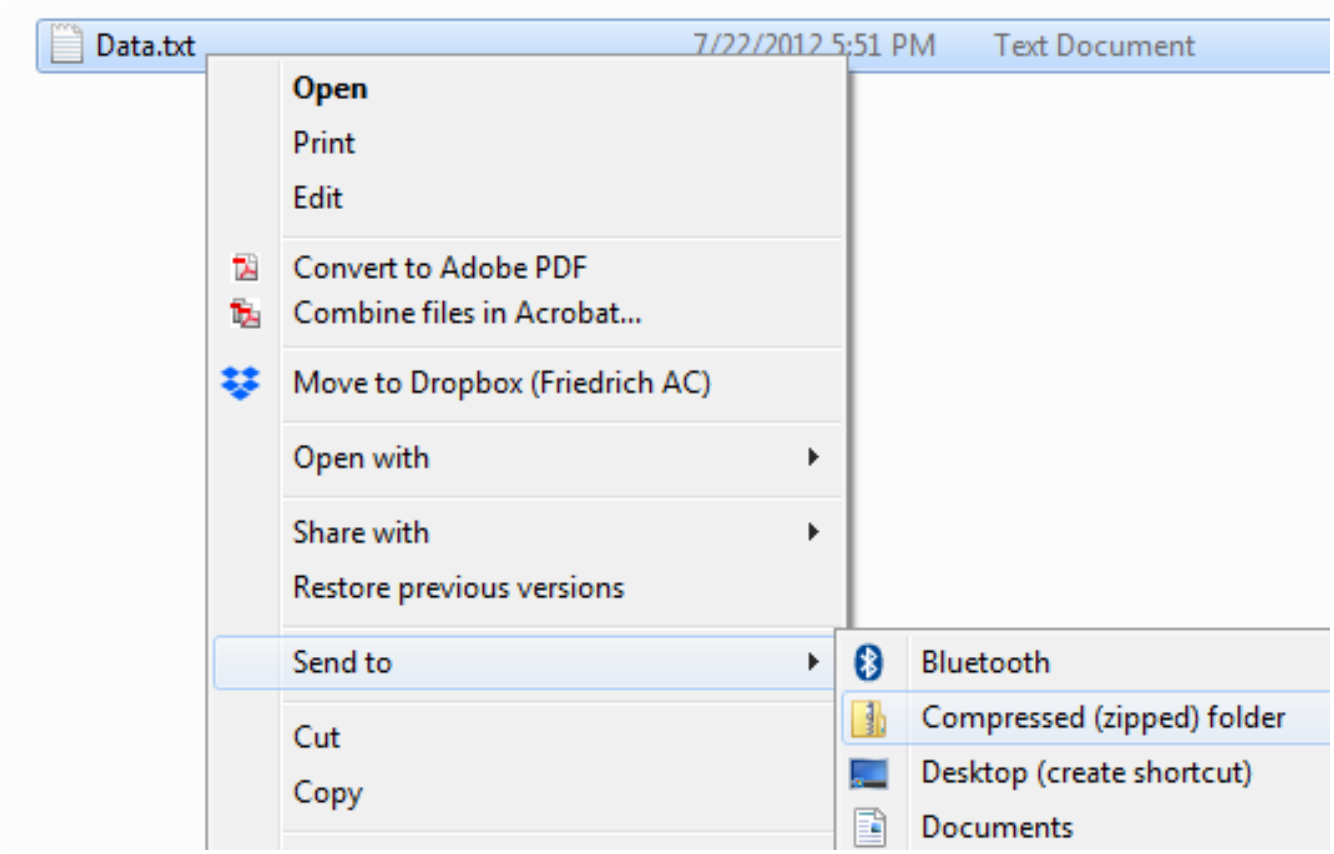


2. Find the file marked DF and double click to open.



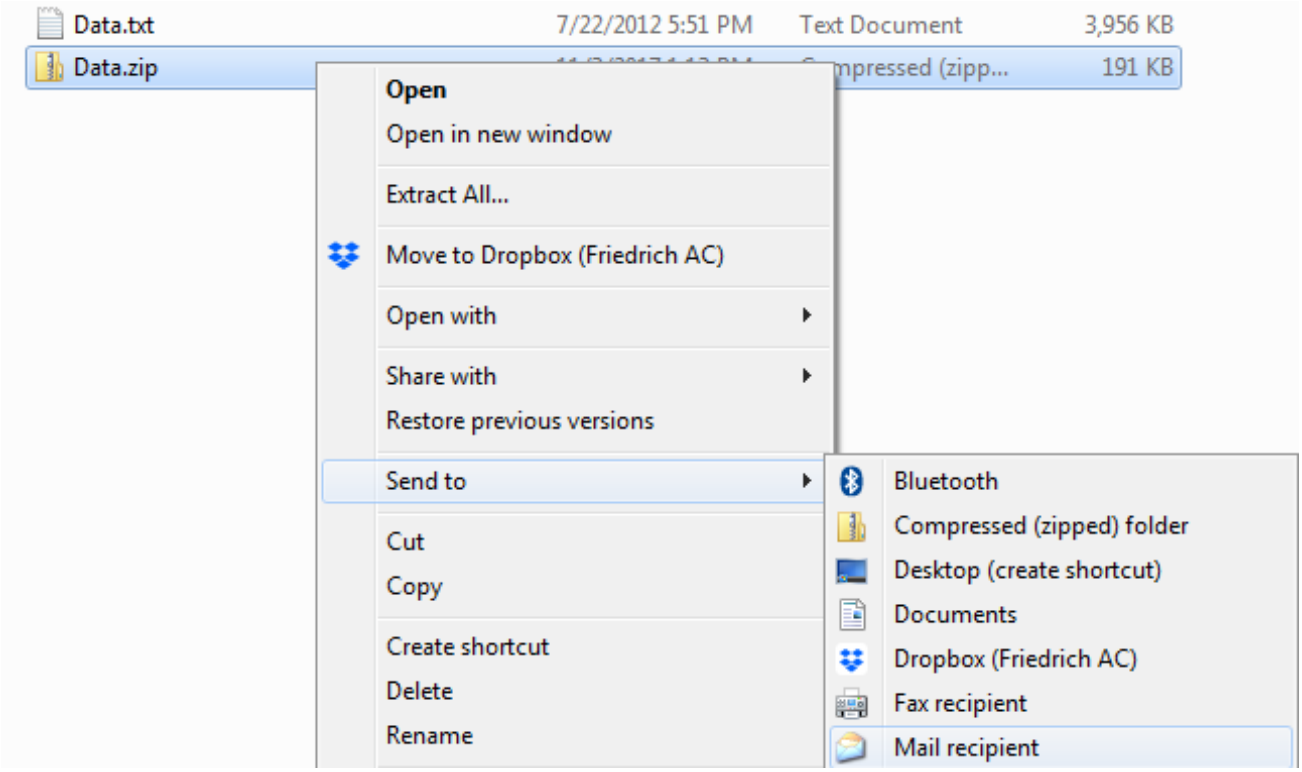
# Retrieving VRP Data

Right Click “Data.txt.” Send to: Compressed (zipped) folder

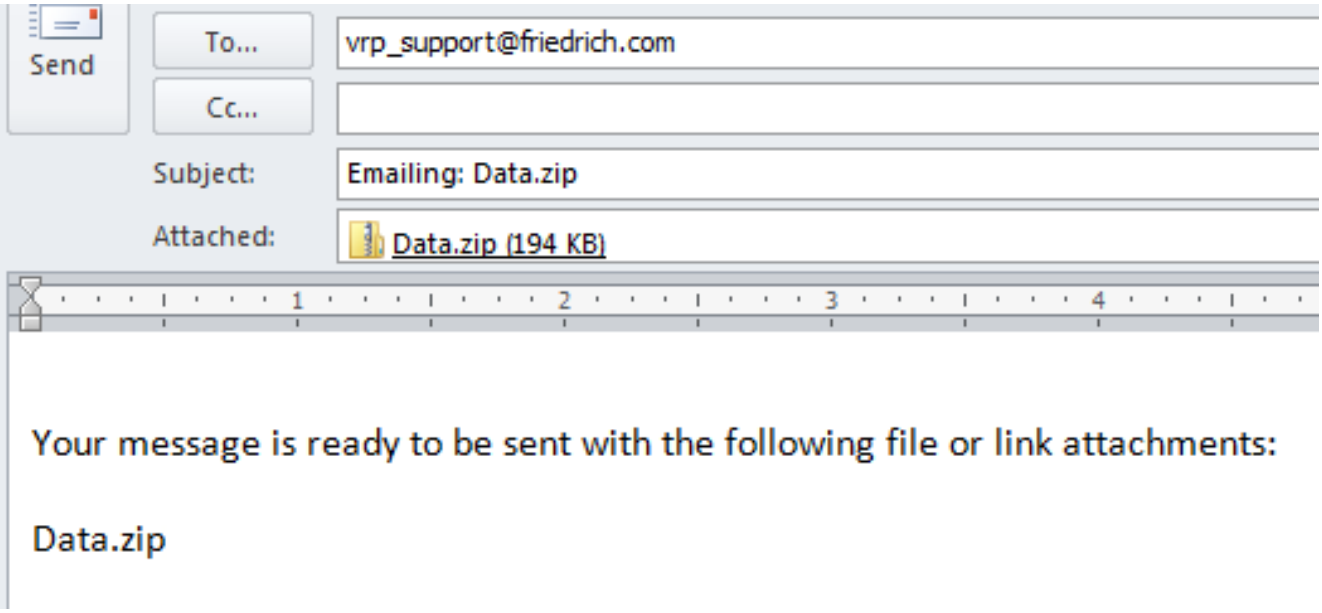


# Retrieving VRP Data

You have now created a Data.Zip file. Right click the new file then click on Send to > Mail Recipient. Email the file to VRP_Support@Friedrich.com.

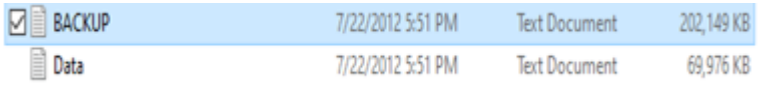



Email Data.ZIP to VRP_Support@Friedrich.com !! FILE SIZE WILL VARY !!



# Retrieving VRP Data

There maybe times when the Backup file is also needed. Please follow the same instructions only now choose the Backup file instead of the Data file. Because of the file size, you will need to send this on a separate email.




Note: Please list site name, concern or reason for sending the file and your contact information within your email. If sending multiple files please identify them by room number, apartment number etc.

# 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 practices must be used.

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

**⚠ WARNING**

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

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.

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.

EQUIPMENT REQUIRED:

1. Electrical Multimeter
2. E.P.A. Approved Refrigerant Recovery System
3. Vacuum Pump (capable of 200 microns or less vacuum.)
4. Acetylene Welder
5. Electronic Halogen Leak Detector capable of detecting HFC (Hydrofluorocarbon) refrigerants.
6. R-410A Refrigerant Manifold
7. 1/4" Braze-type Access Ports
8. Pinch Tool
9. 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 E.P.A. 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 REPAIR

## Refrigerant Charging

**⚠ 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**

**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.

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

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

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

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

# R-410A SEALED SYSTEM REPAIR

**Undercharged Refrigerant Systems**

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

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

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

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

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

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

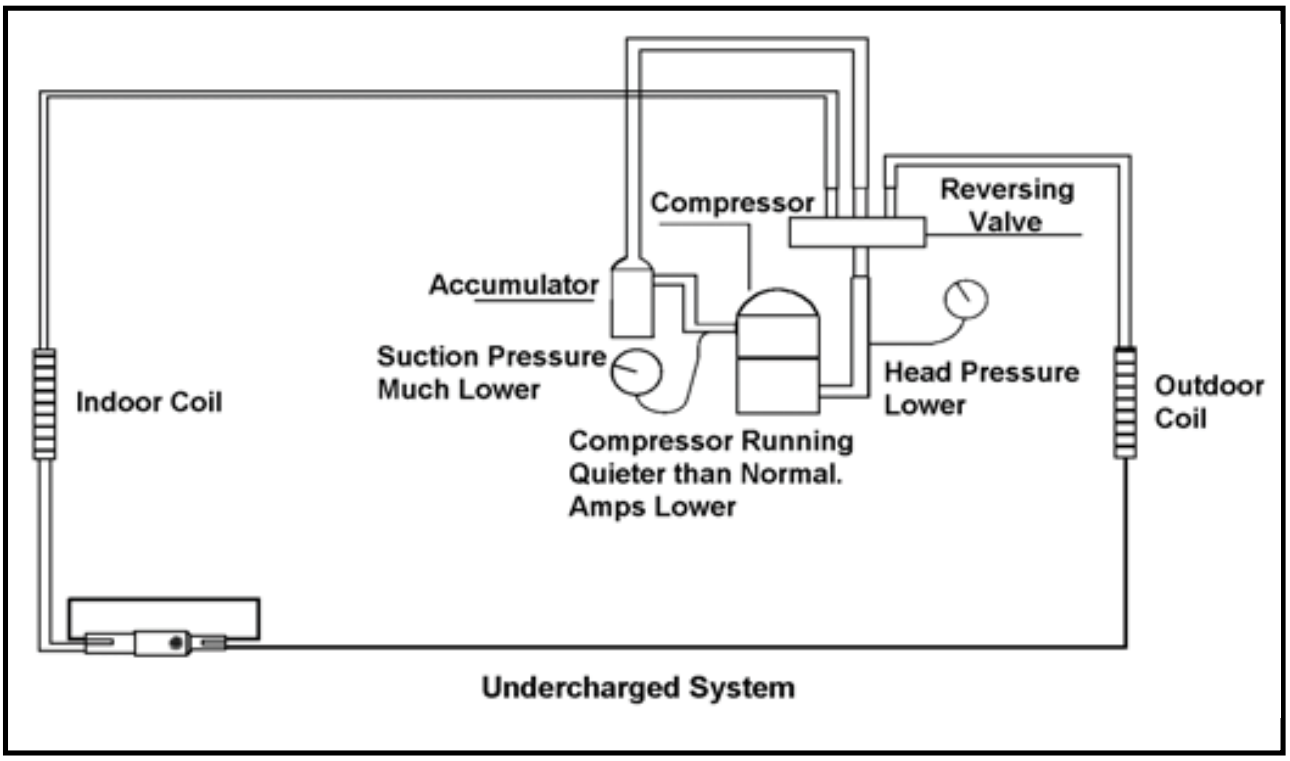



Figure 501(Undercharged System)

# R-410A SEALED SYSTEM REPAIR

## Overcharged Refrigerant Systems

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

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

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

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

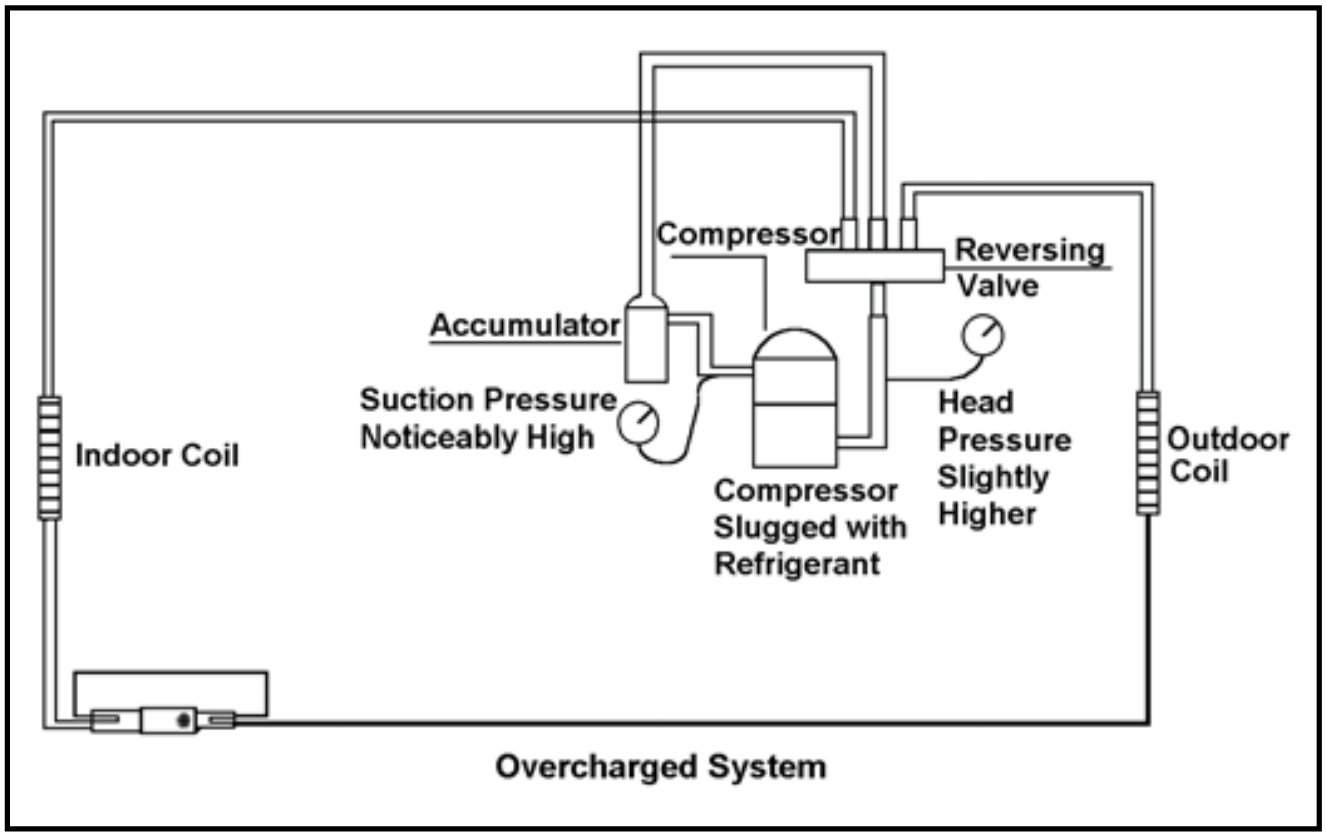



Figure 502(Overcharged System)

# R-410A SEALED SYSTEM REPAIR

## Restricted Refrigerant System

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

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

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

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

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

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

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

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

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

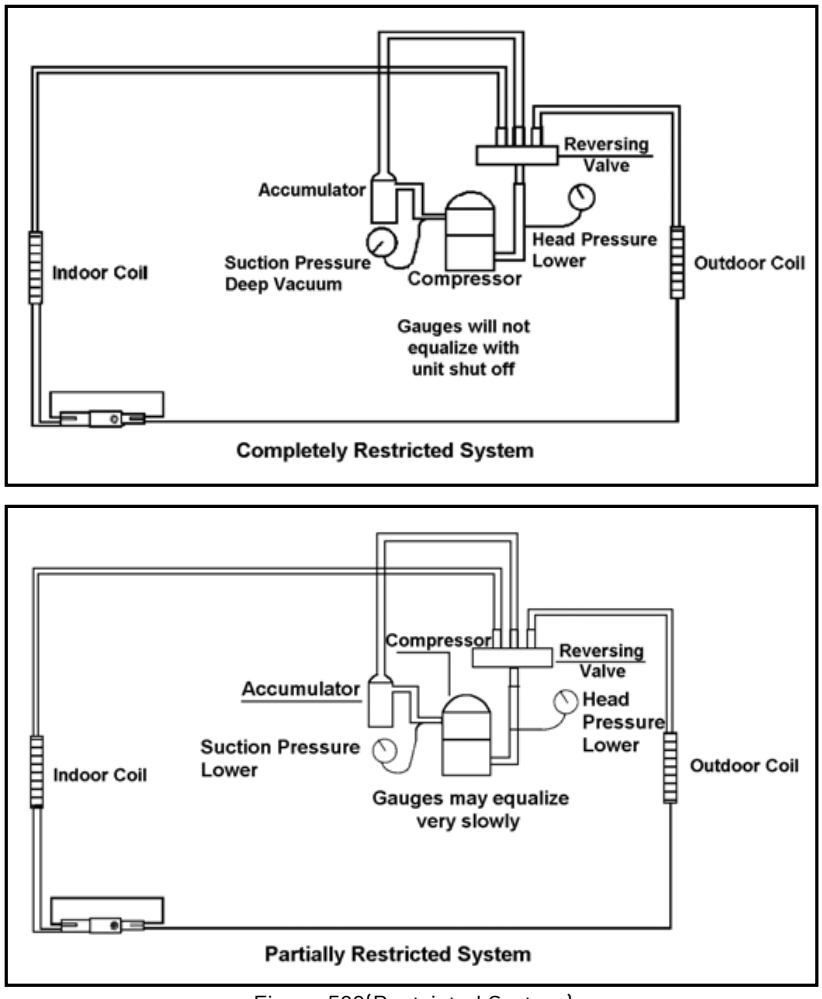



Figure 503(Restricted System)

# R-410A SEALED SYSTEM REPAIR

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

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

1. Connect your EPA approved gauges to the proper valves with 750 psig rated pressure hoses.
2. Recover Refrigerant in accordance with EPA regulations.
4. Make necessary repairs to system.

NOTE: When brazing, ensure to flow nitrogen to reduce contamination of capillaries and valves.

5. Evacuate system and hold at or below 500 microns.
6. Weigh in refrigerant with the property quantity of R-410A refrigerant.
7. Start unit, and verify performance.
8. Remove hoses and ensure valves are tight and sealed to the O-ring in the valve cap.

# R-410A SEALED SYSTEM REPAIR

**Compressor Replacement**

**⚠ WARNING**

**ELECTRIC SHOCK HAZARD**

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

**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**

**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.

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.

8. Pressurize with a combination of R-410A and nitrogen and leak test all connections. If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with with an electronic or Halide leak detector. Recover refrigerant and 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 insure 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. 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.

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

# R-410A SEALED SYSTEM REPAIR

## Compressor Replacement -Special Procedure in Case of Compressor Burnout

**⚠ WARNING**

**HIGH PRESSURE HAZARD**

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and 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.

1. Recover all refrigerant and oil from the system.

2. Remove compressor,and EEV.

3. Flush evaporator, condenser and all connecting tubing with dry nitrogen or equivalent. Use standard 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.

5. Pressurize with a combination of R-410A and nitrogen and leak test all connections. If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with with an electronic or Halide leak detector. Recover refrigerant and 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

6. 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. 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.

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.

# R-410A SEALED SYSTEM REPAIR

**Replace The Reversing Valve**

**⚠ WARNING**

**HIGH PRESSURE HAZARD**

Sealed Refrigeration System contains refrigerant and oil under high pressure.

Proper safety procedures must be followed, and 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**

Not following the above WARNING could result in fire or electically unsafe conditions which could cause moderate or serious property damage.
Read, understand and follow the above warning.

1. Recover refrigerant from sealed system. PROPER HANDLING OF RECOVERED REFRIGERANT ACCORDING TO EPA REGULATIONS IS REQUIRED.
2. Remove solenoid coil from reversing valve. If coil is to be reused, protect from heat while changing valve.
3. 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. Pressurize sealed system with a combination of R-410A and nitrogen and check for leaks, using a suitable leak detector. Recover refrigerant per EPA guidelines.
9. Once the sealed system is leak free, install solenoid coil on new valve and charge the sealed system by weighing in the proper amount and type of refrigerant as shown on rating plate. Crimp the process tubes and solder the ends shut. Do not leave Schrader or piercing valves in the sealed system.

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

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

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

# R-410A SEALED SYSTEM REPAIR

**Replace The Condenser Coil 12k/24k**

1. Remove unit from the closet.
2. Ensure no charge is left in the system, evacuating according to EPA standards.
3. Remove the lower left panel.
4. Remove six mount screws on rear of condenser coil.
5. Detach one thermistor from coil.
6. Sweat out tubing connections to condenser coil as required
7. Slide coil and shroud assembly out of the rear of the unit to access the 6 screws attaching the shroud to the outdoor coil.
8. Remove coil from shroud and reinstall evaporator coil in reverse sequence.
9. Pressurize with a combination of R-410A and nitrogen. Leak test all connections. If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with with an electronic or Halide leak detector. Recover refrigerant and repair any leaks found.
10. If leak detector is unavailable, remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.

Repeat Step 9 to insure no more leaks are present.

10. 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. 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.

11. 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.

# R-410A SEALED SYSTEM REPAIR

**Replace The Condenser Coil 36k**

1. Remove unit from the closet.
2. Ensure no charge is left in the system, evacuating according to EPA standards.
3. Remove the front and side panels.
4. Sweat out tubing connections to condenser coil as required
5. Remove mount screws attaching condenser coil to shroud on the left and right side of the coil.
6. Detach thermistor from coil.
7. Slide coil out of the rear of the unit.
8. Instal new coil in reverse sequence.
9. Pressurize with a combination of R-410A and nitrogen. Leak test all connections. If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with an electronic or Halide leak detector. Recover refrigerant and repair any leaks found.
10. If leak detector is unavailable, remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.

Repeat Step 9 to insure no more leaks are present.

11. 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. 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.

12. 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.

Figure 504 (36k Condenser replacement)

# R-410A SEALED SYSTEM REPAIR

**Replace The Evaporator Coil 12k/24k**

1. Remove unit from closet.

2. Ensure no charge in the system, evacuating according to EPA standards.

3. Remove top panel.

4. Remove duct collar.

5. Remove left side upper panel.

**NOTE: The 24k units utilize 2 evaporator coils and 2 reheat coils if applicable. The replacement varies from 12k unit. Additional panels may need to be removed depending on which coil or coils are being replaced.**

6. Detach 2 thermistors from coil.

7. If Unit has a reheat coil;

    Reheat coil can be removed from evaporator coil by removing 4 screws.

    Caution: (reheat coil will need to be supported to prevent damage to tubing.

    Alternatively, the tube to reheat coil can either be sweated off and rebrazed or cut and swedged.

8. Sweat out evaporator coil tubing connections.

9. Remove 3 screws on right hand side end plate.

10. Lift coil up and out and replace evaporator coil in reverse sequence. Reinstall reheat coil if applicable.

11. Pressurize with a combination of R-410A and nitrogen and leak test all connections . If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with an electronic or Halide leak detector. Recover refrigerant and repair any leaks found.

12. If leak detector is unavailable remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.

Repeat Step 11 to insure no more leaks are present

13. 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. 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.

14. 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.

Figure 505 (12k Evaporator coil)

Figure 506 (24k Evaporator coil)

# R-410A SEALED SYSTEM REPAIR

**Replace The Evaporator Coil 36k**

1. Remove unit from closet.

2. Ensure no charge in the system, evacuating according to EPA standards.

3. Remove front, side, and top panels

Caution: Rear blower panel will need to be supported or removed if top panel is removed. Damage to equipment could otherwise occur.

Figure 507 (Support blower panel)

**NOTE: The 36k units utilize 2 evaporator coils and 2 reheat coils if applicable. Either or both coils may be replaced as required.**

6. Detach 2 thermistors from coil.

7. If Unit has a reheat coil;

Reheat coil can be removed from evaporator coil by removing 4 screws.

Caution: (reheat coil will need to be supported to prevent damage to tubing.

Alternatively, the tube to reheat coil can either be sweated off and rebrazed or cut and swedged.

8. Remove screws on front header plate.

9. Sweat out evaporator coil tubing connections.

10. Remove remaining screw attaching coil to the drain pan.

11. Lift coil up and out and replace evaporator coil in reverse sequence. Reinstall reheat coil if applicable.

Figure 508 (Remove Header Panel)

12. Pressurize with a combination of R-410A and nitrogen and leak test all connections . If a leak cannot be found, pressurize with a combination of Nitrogen and a trace charge of R-410A and sweep with an electronic or Halide leak detector. Recover refrigerant and repair any leaks found.

13. If leak detector is unavailable remove all refrigerant from system and pressurize with nitrogen to 550 psi. Check that system holds pressure.

Repeat Step 11 to insure no more leaks are present

14. 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. 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.

15. 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.

# R-410A SEALED SYSTEM REPAIR

**Replace The Evaporator Coil Drain Pan**

1. Remove unit from the closet.
2. Remove top panel.
3. Remove filter.
4. Remove left and right upper side panels
5. Carefully lift coil up a few inches and support to avoid damage to tubing.
6. Pry up plastic drain pan using putty knife or other suitable tool.
7. Scape off any glue or sealant remaining on the unit using putty knife or other suitable tool.
8. Install new pan, evaporator coil, and panels.

NOTE: 36k Unit Evaporator drain pan does not normally need to be replaced. If replacement were required, removal of evaporator coils may be necessary to facilitate replacement.

# COMPONENT TESTING

## Electronic Expansion Valve (EEV)

**⚠ 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.

All units are equipped with Electronic Expansion Valve (EEV) metering devices.

The electronic expansion valve (EEV) operates with a much more sophisticated design than Capillary tube metering devices. EEVs control the flow of refrigerant entering a direct expansion evaporator. They do this in response to signals sent to them by an electronic controller. A small motor is used to open and close the valve port.

**Check Stepper Motor**

1. To remove the stepper motor from the valve body, rotate the stepper motor approximately 30 degrees to unlock the locking tabs, and then lift straight up.

2. Check that the stepper motor is plugged into the FMC (EEV, P13).

3. Verify wires are connected and intact on stepper motor.

4. Check the resistance of the stepper motor by ohming out all of the wires to each other.

5. The resistance of the blue wire to the either the yellow, orange, black, or red wire should be 46 ohms.

6. The resistance of the yellow, orange, black, or red wires to each other should be 93 ohms.

**Checking for restrictions**

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 EEV is 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 normal, the EEV is not restricted.

4. If the operating pressures are lower than normal in both the heating and cooling mode, or the system pressure is very high (over 575 psi) on the liquid side and very low (or vacuum) on the low side, the EEV may be restricted.

5. Inspect and examine the EEV stepper motor first! Then Verify the unit has proper refrigerant charge and no leaks prior to continuing diagnosis of bad Valve body.

Possible causes for expansion valve failures:

Low air flow or turbulent air flow (i.e. short plenum distribution boxes or bull head T fittings. These conditions can cause the EEV valve to shut down due to a very cold coil and the valve is incorrectly replaced as failed shut.

# 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.**

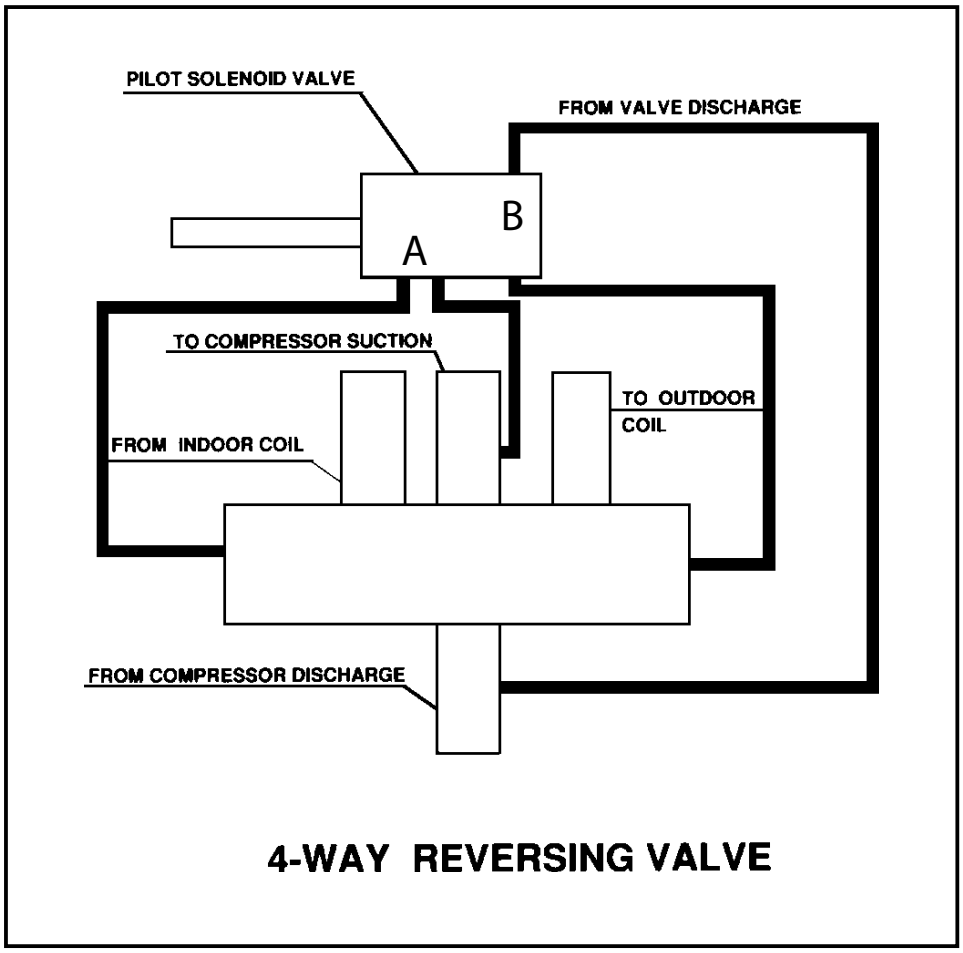



Figure 601 (Reserving Valve)

# 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**

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.

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". Do not hammer on valve.

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

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

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

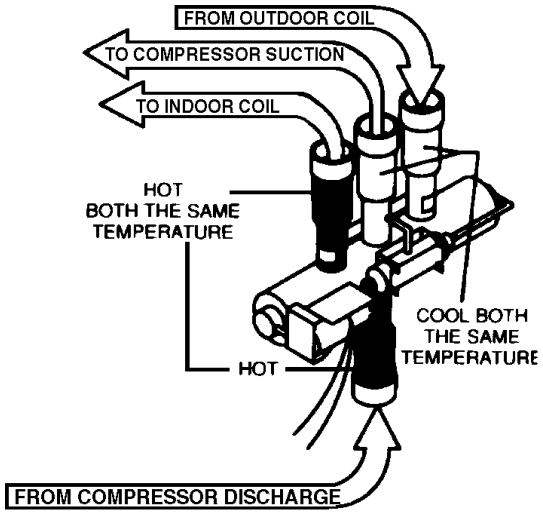
If the valve is stuck in the heating position, block the air flow through the indoor coil and allow discharge pressure to build in the system. Then switch the system from heating to cooling.

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

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

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

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




**Reversing Valve in Heating Mode**

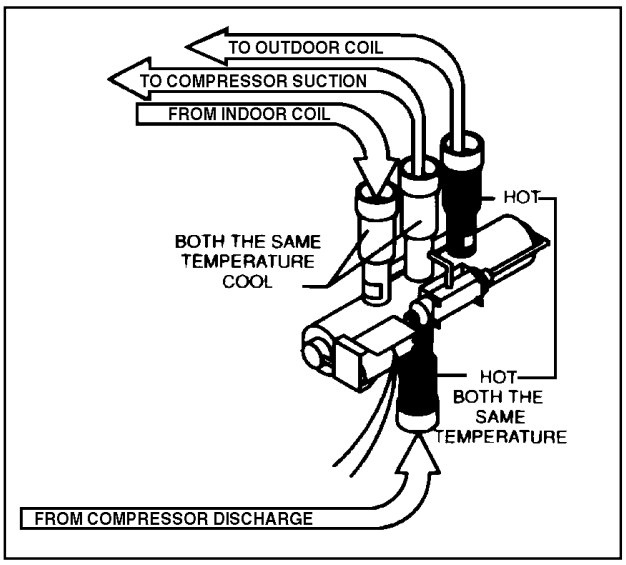



Figure 602 (Reserving Valve)

# COMPONENT TESTING

## Touch Test Chart : To Service Reversing Valves

| NORMAL FUNCTION OF VALVE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| VALVE OPERATING CONDITION | DISCHARGE TUBE from Compressor | SUCTION TUBE | COIL | Tube to OUTSIDE COIL | LEFT Pilot | RIGHT Pilot | NOTES:<br>* TEMPERATURE OF VALVE BODY<br>** 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 dama ge. | 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 suf fi 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 603 (Reserving Valve)

# COMPONENT TESTING

**Compressor Checks**

**⚠ WARNING**

**ELECTRIC SHOCK HAZARD**

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

**Caution: After disconnecting power from unit, allow 2 minutes for capacitors to discharge before handling MCS board, disconnecting leads, or taking readings with a meter.**

1. Remove front panel from unit and gain access to the MCS board.
2. Locate and disconnect the motor winding leads shown in the figure below.

   U= Red  V= Blue  W= Black
3. Using an OHM Meter, check resistance from U to V, U to W, and V to to W.

   All of the readings should be within 0.1 ohms of each other.

   A difference of more than 01. ohms indicates that windings may be damaged and the compressor should be replaced.

**NOTE: Actual OHM values may vary due to temperature of the compressor.**

4. Using a MegOhm Meter, check the motor windings for a short to ground.

   Measure the resistance of each winding to ground.

   A reading of less than 10 Megohms indicates that the motor windings may be damaged and the compressor should be replaced.

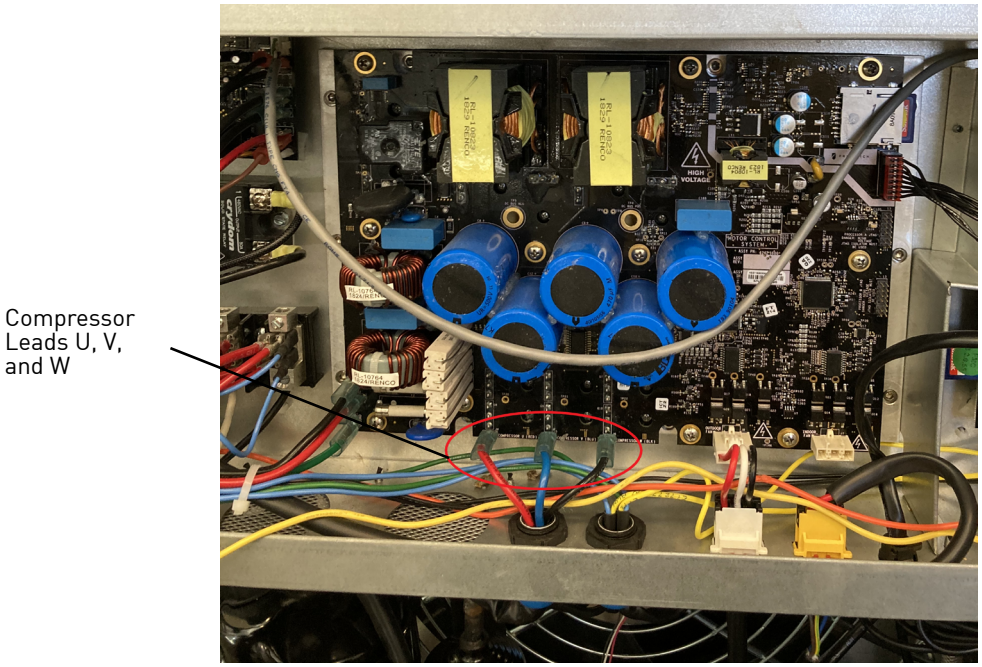



Figure 604 (Compressor Checks)

# COMPONENT TESTING

## Check the Outdoor Fan 12k/24k

**Caution: Wait for 2 minutes after removing power from the unit to allow capacitors to discharge before handling the MCS board, disconnecting leads or connectors, or taking ohm readings.**

1. Remove outdoor fan connector from MCS board at J8 as shown in figure below.
2. Ohm out all three wires to each other.
3. 15 ohms is a normal reading.
4. If the resistance is not within 0.1 ohms, replace motor or repair associated wiring.

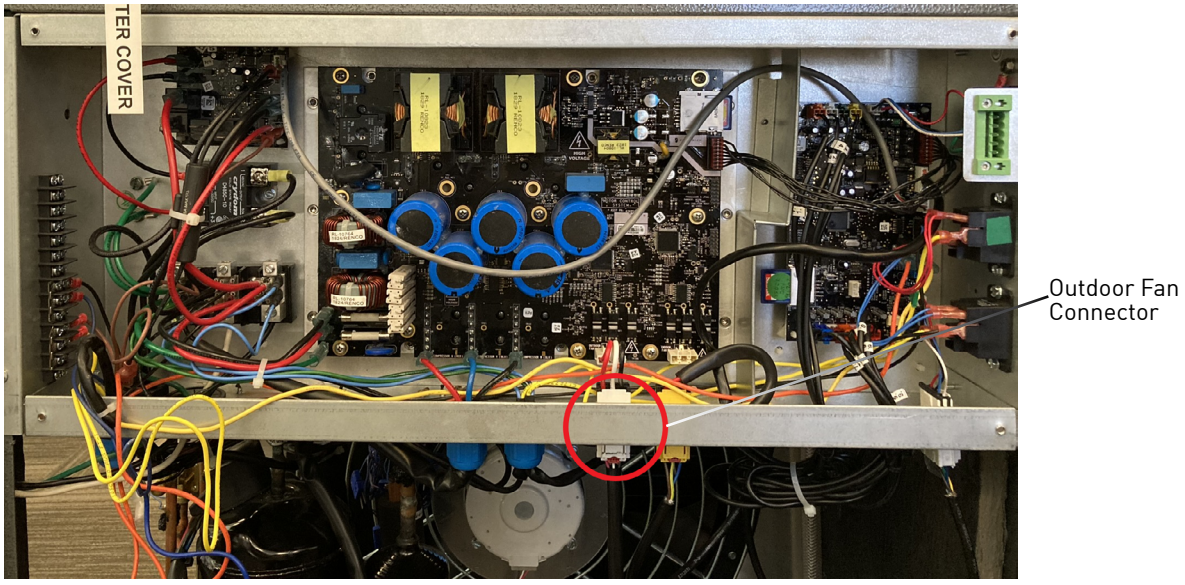



Figure 605 (Outdoor Fan)

# COMPONENT TESTING

## Check the Outdoor Fan 36k

**Caution: Wait for 2 minutes after removing power from the unit to allow capacitors to discharge before handling the MCS board, disconnecting leads or connectors, or taking ohm readings.**

1. Check that red and black wires have line voltage at terminal block.
2. Jumper yellow wire to L1 and check that motor runs
3. Jumper orange wire to L1 and check that motor runs.
4. Jumper orange wire and yellow wire to L1 and check that motor runs.
5. If fan does not run in all three conditions, fan motor should be replaced.

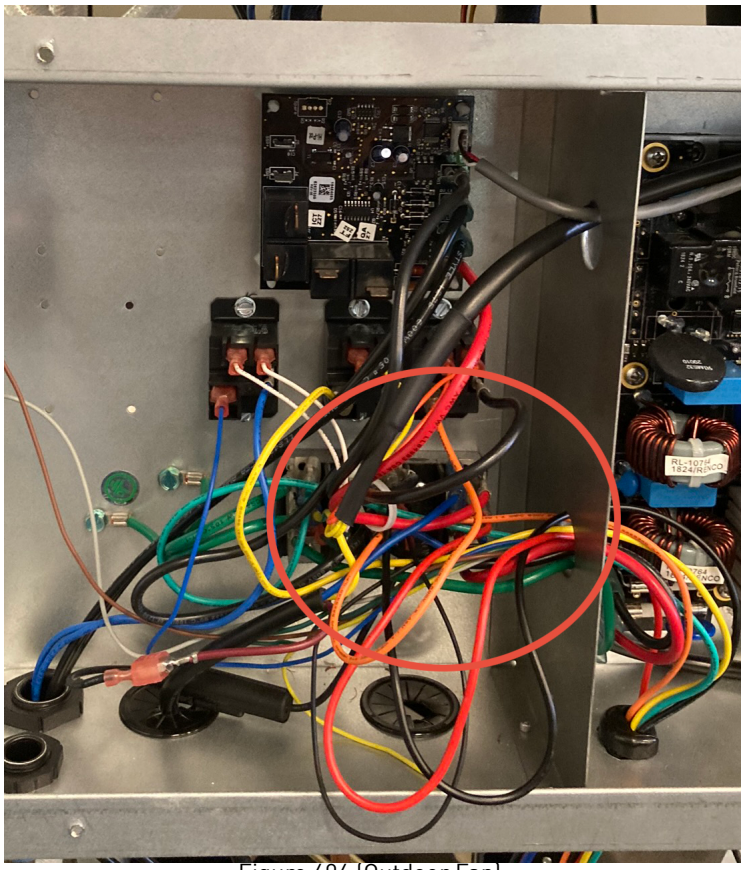


Figure 606 (Outdoor Fan)

# COMPONENT TESTING

## Replace the Outdoor Fan 12k/24k

**Caution: Wait for 2 minutes after removing power from the unit to allow capacitors to discharge before handling the MCS board, disconnecting leads or connectors, or taking ohm readings.**

1. Remove unit from closet.
2. Remove front, left and and right side access panels.
3. Unplug molex harness from cabinet junction (white 3 pin plug)
4. Remove nuts from fan motor mount at 4 places.

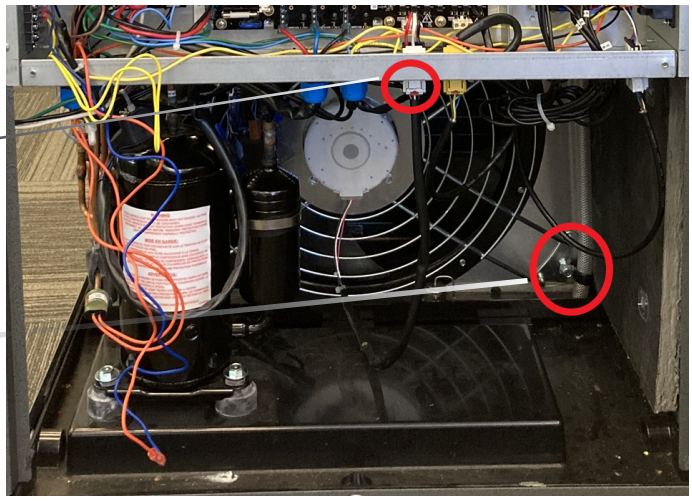



Figure 607 (Outdoor Fan)

5. Remove 8 screws from fan inlet ring.
6. Fan assembly can be removed through the right side of the unit.
7. Remove fan blade from motor shaft.
8. Remove motor from mount.
9. Install new fan motor in reverse sequence.

# COMPONENT TESTING

## Replace the Outdoor Fan Motor 36k

1. Remove front panel.
2. Disconnect and tag fan motor electrical connections.
3. Loosen set screw attaching fan blade to fan motor shaft.
4. Loosen belly band clamp bolt.
5. Remove Motor.
6. Install new motor in reverse sequence.

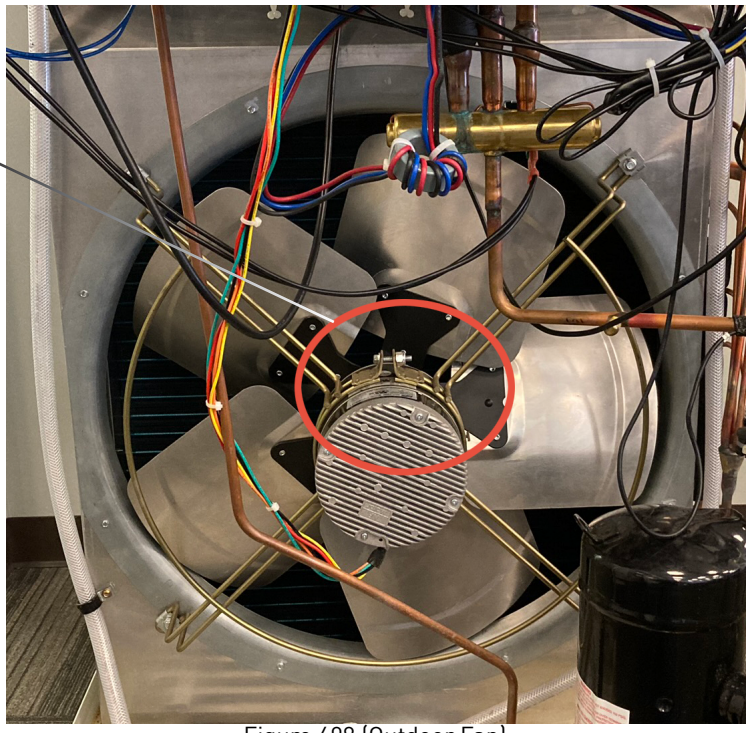


Figure 608 (Outdoor Fan)

# COMPONENT TESTING

## Check the Indoor Fan 12k/24k

1. Check for line voltage at yellow molex connector.

NOTE:To unplug connector, pull down on the red locking tab and squeeze the connector while pulling down.

2. If no line voltage  trace back to terminal block

3. Check for 10 vdc at green and brown wire at white molex connector for indoor fan motor next fmc board.
4. If line voltage is present at yellow connector, but 10 vdc is not present at white connector, indoor fan motor is bad.
5. If 10 vdc is present at white molex connector, jump from brown wire to yellow wire.

If fan does not run at full speed, fan is bad.

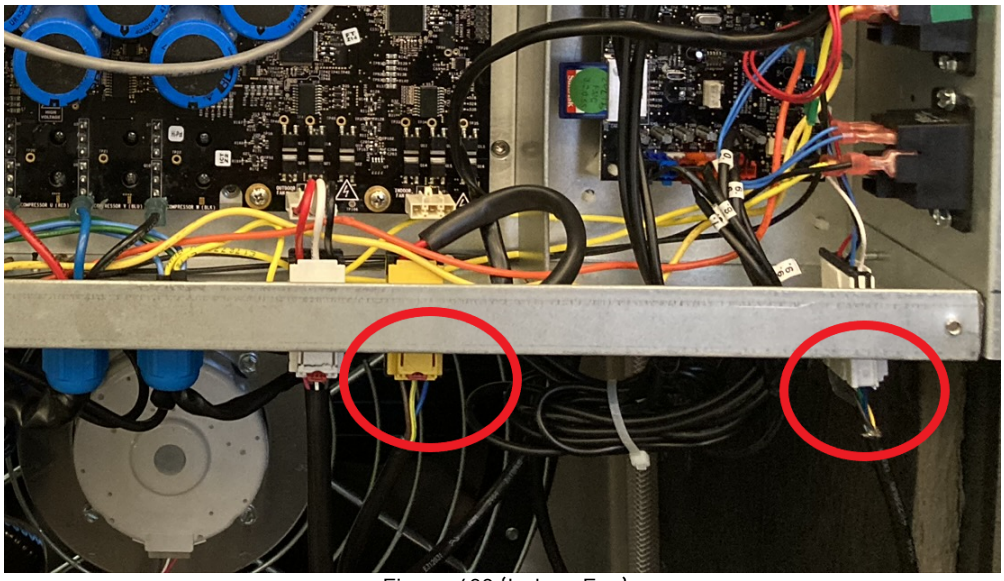


Figure 609 (Indoor Fan)

# COMPONENT TESTING

## Check the Indoor Fan 36k

1. Check for line voltage at terminal block. (blue and red wires)

Note: There is an in-line fuse installed on red wire (check for continuity if line voltage is not present.) always ensure power is removed from unit when checking continuity)

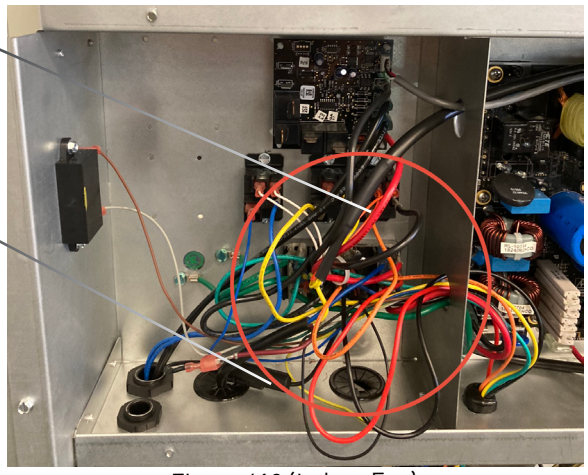


Figure 610 (Indoor Fan)

2. Check for 10 vdc at red and black wire at white molex connector for indoor fan motor next to fmc board.

3. If line voltage is present at terminal block, but 10 vdc is not present at white connector, indoor fan motor is bad.

4. If 10 vdc is present at white molex connector, jump from red wire to yellow wire.

If fan does not run at full speed, fan is bad.

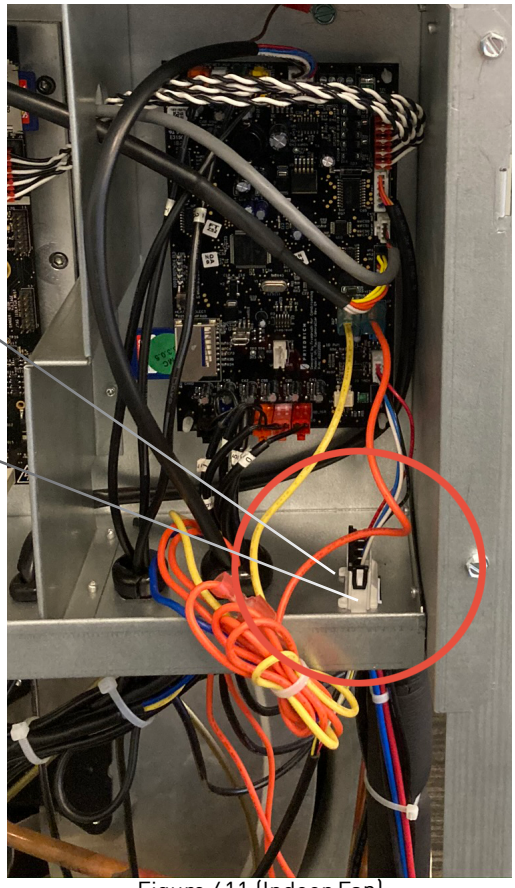


Figure 611 (Indoor Fan)

# COMPONENT TESTING

## Replace the Indoor Fan 12k/24k

1. Remove unit from closet.
2. Unplug yellow and white molex connectors. Unlock connector by pulling down on red tab and squeezing connector.
3. Remove wires from clips back to fan
4. Remove duct collar by removing screws

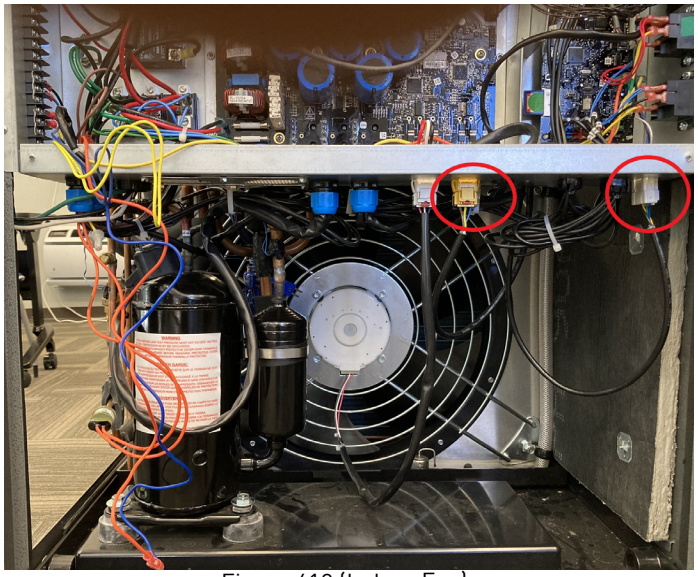


Figure 612 (Indoor Fan)

5. Remove rear panel by removing perimeter screws.
6. Remove rear panel from fan by removing 10 screws.

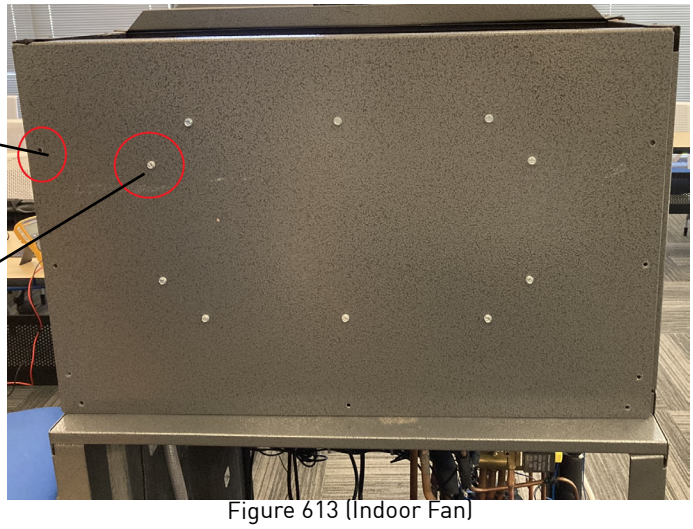


Figure 613 (Indoor Fan)

7. Remove fan mount bolts (Allen Head bolts (4 places).)
8. Install new fan motor in  reverse sequence.

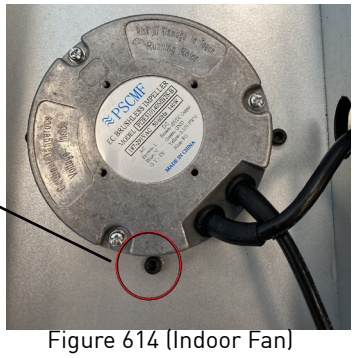


Figure 614 (Indoor Fan)

# COMPONENT TESTING

## Replace the Indoor Fan 36k

1. Remove unit from closet.
2. Disconnect Indoor fan electrical connections. Tag and identify.
3. Remove wires from clips back to fan.
4. Remove rear panel by removing perimeter screws.

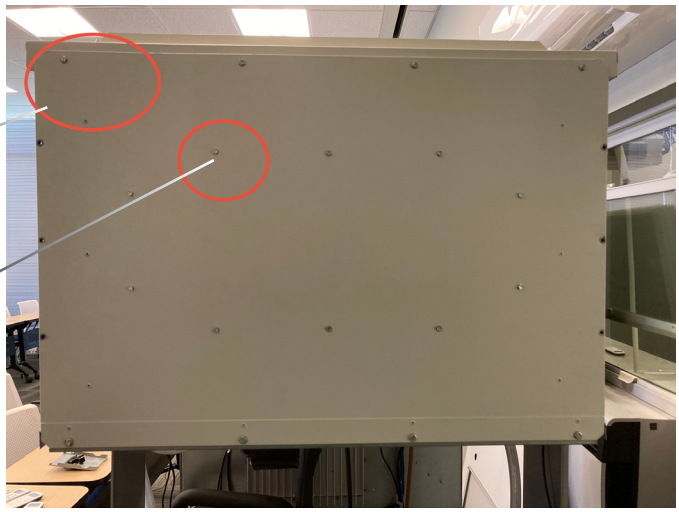


Figure 615 (Indoor Fan)

6. Remove rear panel from fan by removing 10 screws.
7. Remove fan mount bolts (Allen Head bolts (4 places).
8. Install new fan motor in  reverse sequence.


Figure 616 (Indoor Fan)

# COMPONENT TESTING

**Check the Heating Elements**

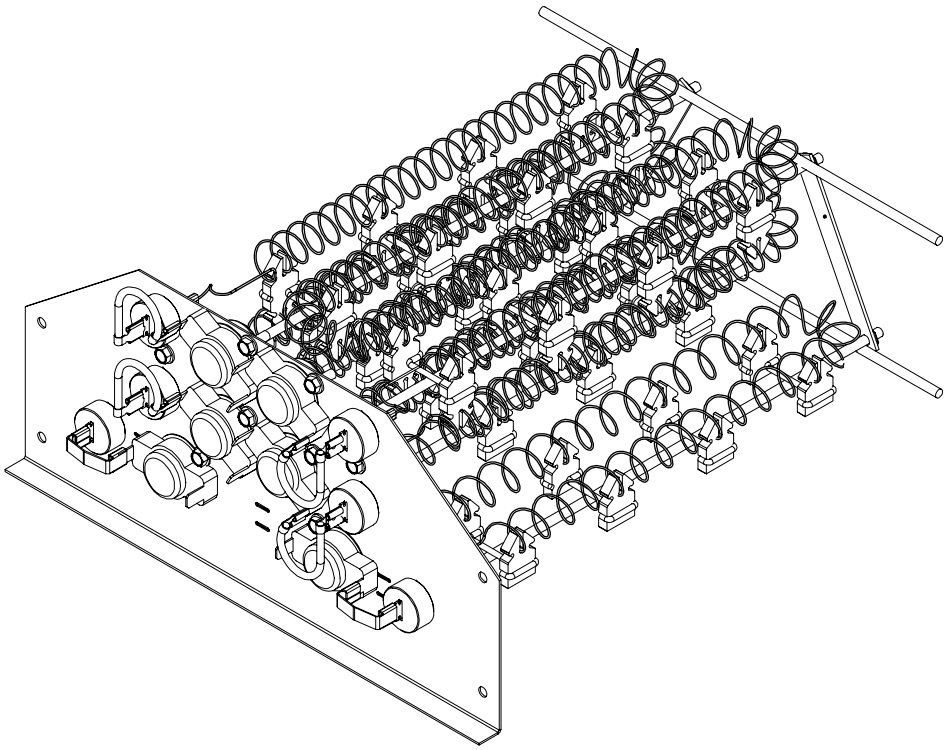


Figure 617 (Heating Elements)

| COIL 1 | COIL 2 | COIL 3 | THERMAL DISC LIMITER | THERMAL DISC FUSE |
|---|---|---|---|---|
| **265V 10 KW MULTI** | | | | |
| 5000KW<br>12.35 OHMS +-5% | 2500 KW<br>24.71 OHMS +- 5% | 2500 KW<br>24.71 OHMS +- 5% | OPEN 165°F<br>CLOSE 135°F | OPEN 240°F |
| **265V 5 KW MULTI** | | | | |
| 2450KW<br>27.54 OHMS +-5% | 800 KW<br>84.35 OHMS +- 5% | 1500 KW<br>44.99 OHMS +- 5% | OPEN 165°F<br>CLOSE 135°F | OPEN 240°F |
| **230V 10 KW MULTI** | | | | |
| 5000KW<br>10.13 OHMS +-5% | 2500 KW<br>20.26 OHMS +- 5% | 2500 KW<br>20.26 OHMS +- 5% | OPEN 165°F<br>CLOSE 135°F | OPEN 240°F |
| **230V 5 KW MULTI** | | | | |
| 2450KW<br>20.68 OHMS +-5% | 800 KW<br>63.32 OHMS +- 5% | 1500 KW<br>33.77 OHMS +- 5% | OPEN 165°F<br>CLOSE 135°F | OPEN 240°F |

# COMPONENT TESTING

**Replace the Heating Elements**

1. Remove duct work as necessary to gain access to top panel.

2. Remove top panel.

Note: on 36k units remove access panel on top of unit.

3. Disconnect input wires (2 places)

4. Remove Mounting screws (4 places).

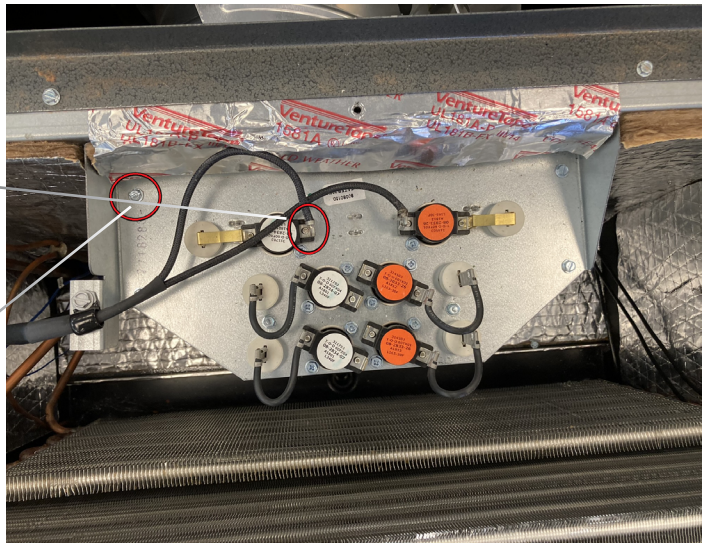


Figure 618 (Heating Elements)

5. Lift heater element assembly straight up and out of unit.

# COMPONENTS TESTING

## MCS Motor Control System Board Pin out

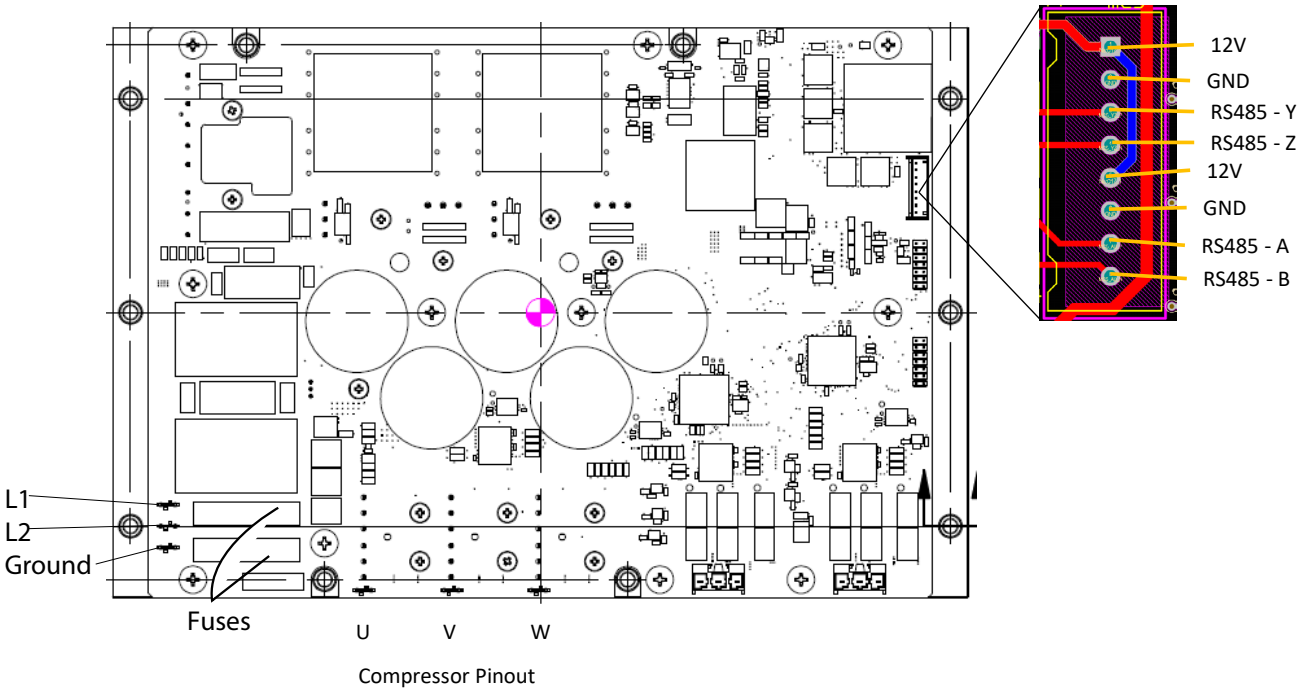



Figure 619 (MCS Board)

1. Check power from pins 1 to 2 for 12 volts.
2. Check power from pins 5 to 6 for 12 volts.
3. Check power from Line 1 to ground for appropriate voltage.
4. Check power from Line 2 to ground for appropriate voltage.
5. Remove power from the unit and allow two minutes for capacitors to discharge before attempting to take continuity readings.
6. Check for continuity on the fuses. If fuses are blown, replace MCS board.

# COMPONENTS TESTING

## MCS Motor Control System Board Replacement

1. Remove power from the unit and wait 2 minutes for capacitor bleed off before removing leads or handling the MCS board.
2. Disconnect electrical connections and tag wires.
3. Unhook heater board communication cable to avoid damage.
3. Remove 10 9/64 allen head bolts.
4. Tap from the back to dislodge the board.

**Caution: when reinstalling bolts use hand tools and hand tighten. Cross threading the bolts may cause the need for high level repairs.**

5. Remove SD card from old board and place into new board.
6. Install new board into unit.

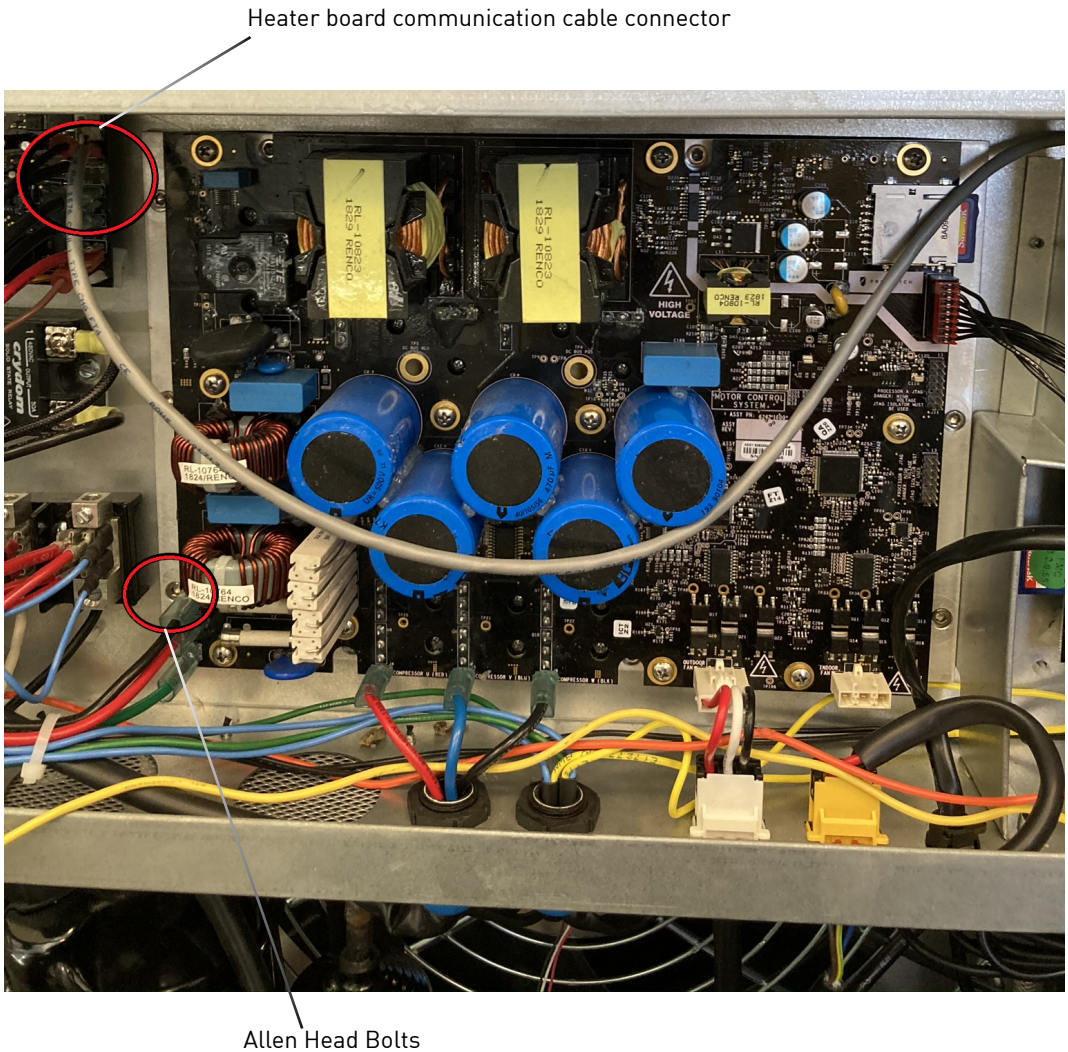



Figure 620 (MCS Board)

# COMPONENTS TESTING

**FMC Board Pin Out**

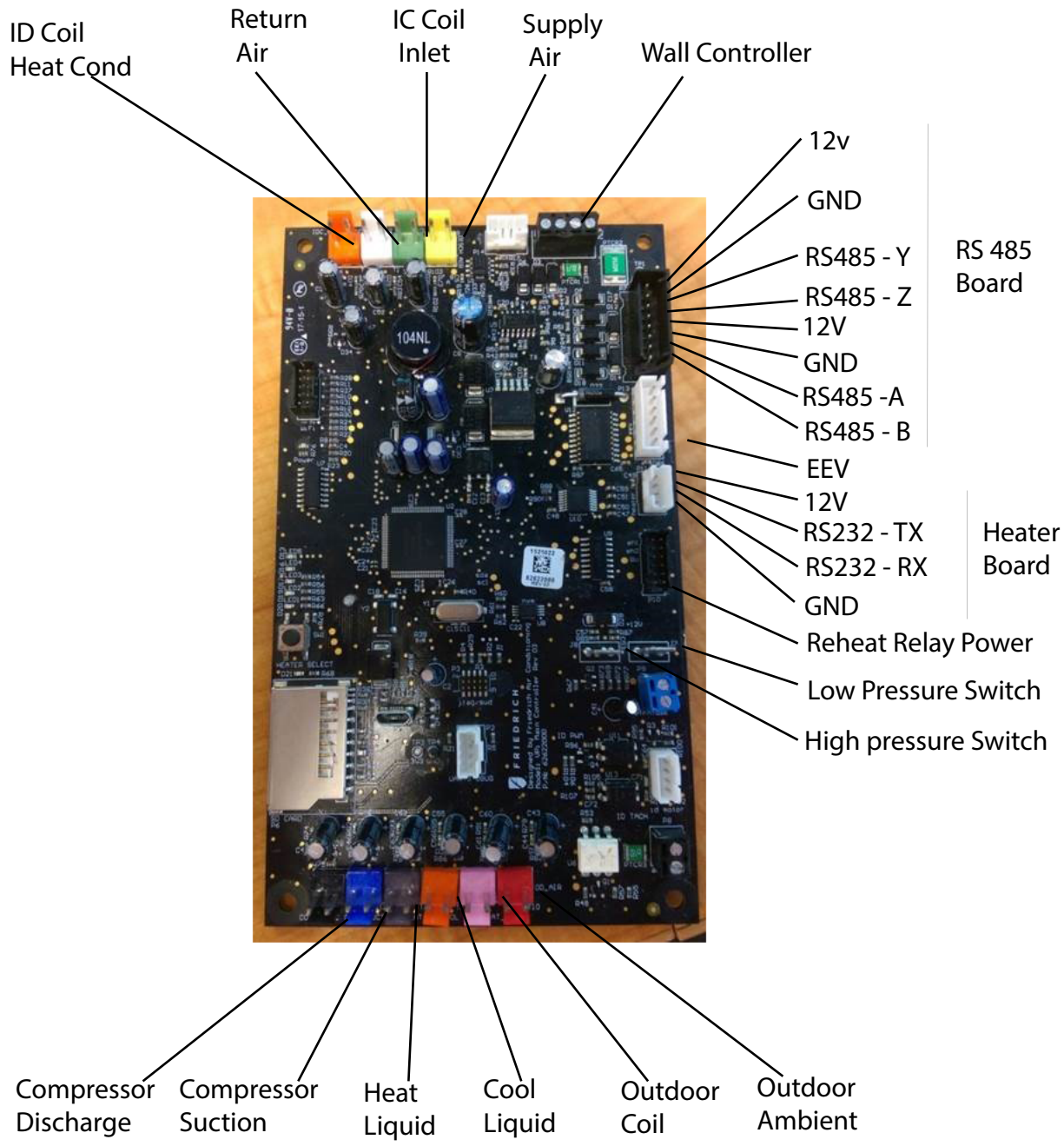



Figure 621 (FMC Board)

1. Check for 12 v to ground 3 places.
2. Check for 3.3 volts across thermistor pins.
3. Check resistance of thermistors (10 places). Refer to thermistor values (See Appendix).

# COMPONENTS TESTING

## Fmc Board Pin Out -Blue Board

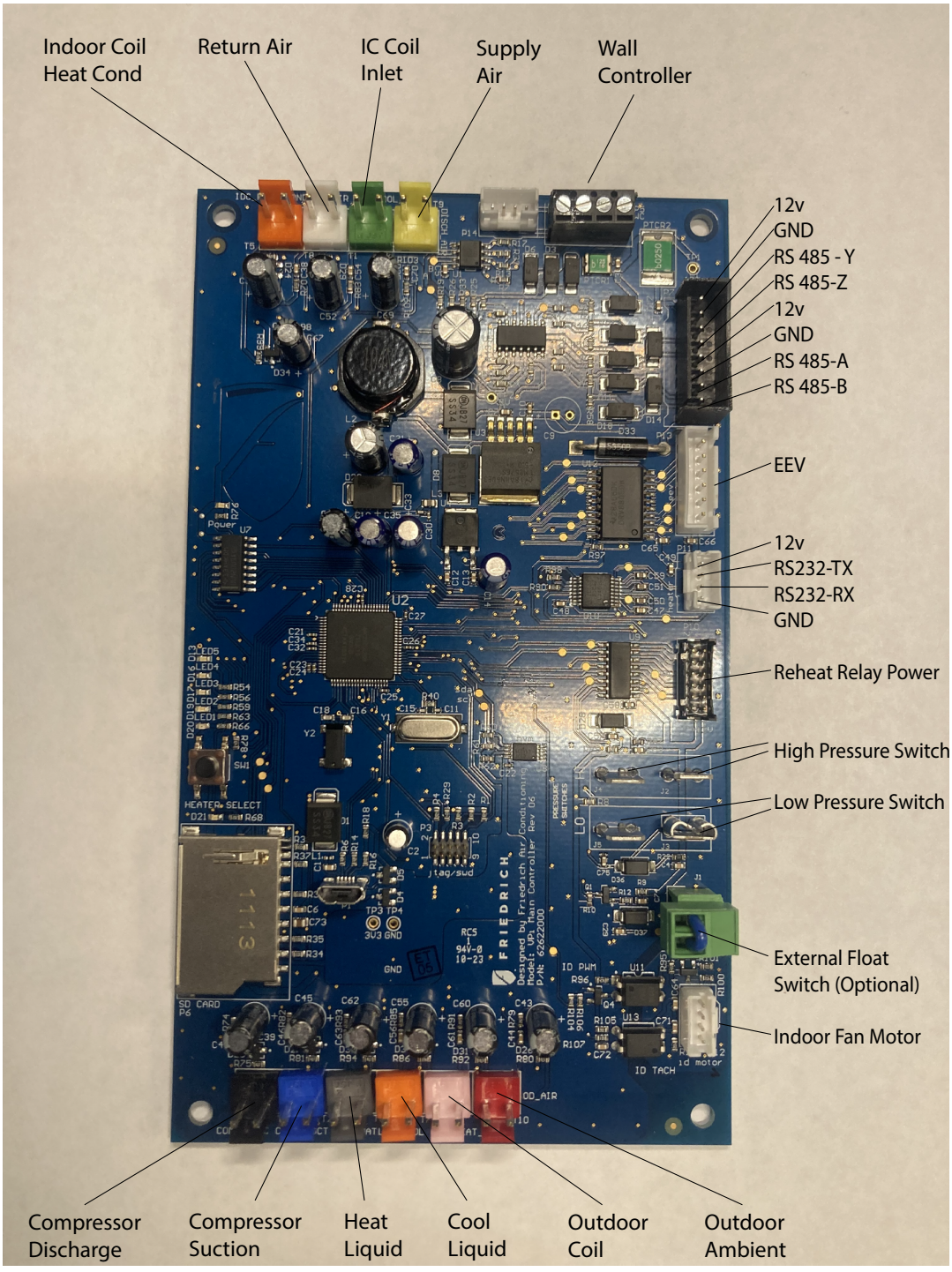



**Figure 622 (FMC Board) (Blue Board)**

NOTE: If the FMC board has been replaced on your unit, you may have different configuration for the FMC board. Refer to Figure 616.1 if the unit has a black FMC board installed and Figure 622 if the unit has a blue FMC board installed.

1. Check for 12 v to ground 3 places.
2. Check for 3.3 volts across thermistor pins.
3. Check resistance of thermistors (10 places). Refer to thermistor values (Figure 630).

# COMPONENTS TESTING

## FMC Board Replacement

Note: When ordering the part, the model and serial number must be supplied for flashing of board.

1. Disconnect all electrical connections, tag and identify wires.
2. Carefully compress pcb standoffs and remove board.
3. Install new board.

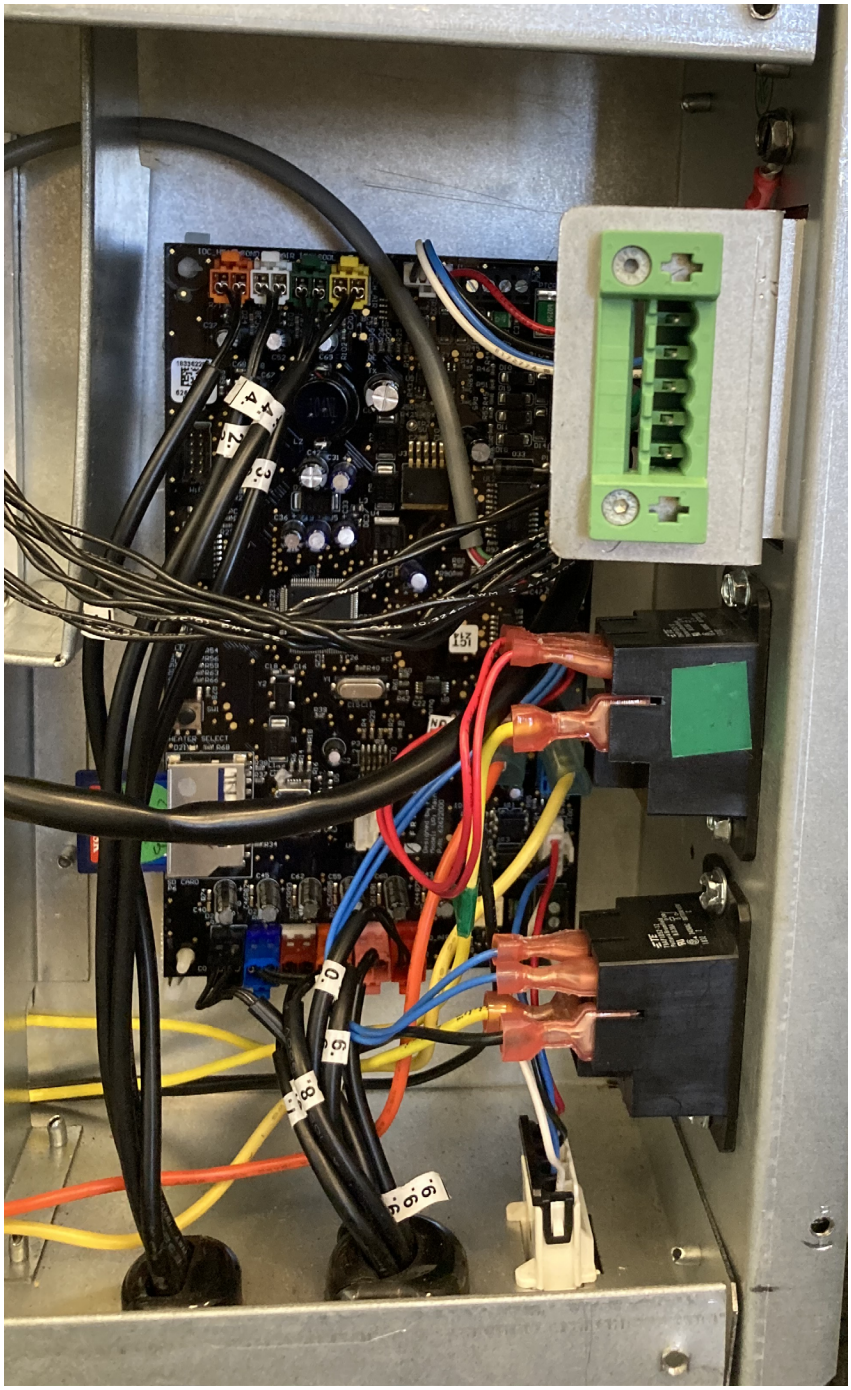


Figure 623 (FMC Board)

# COMPONENTS TESTING

**Heater Board Pin Out**

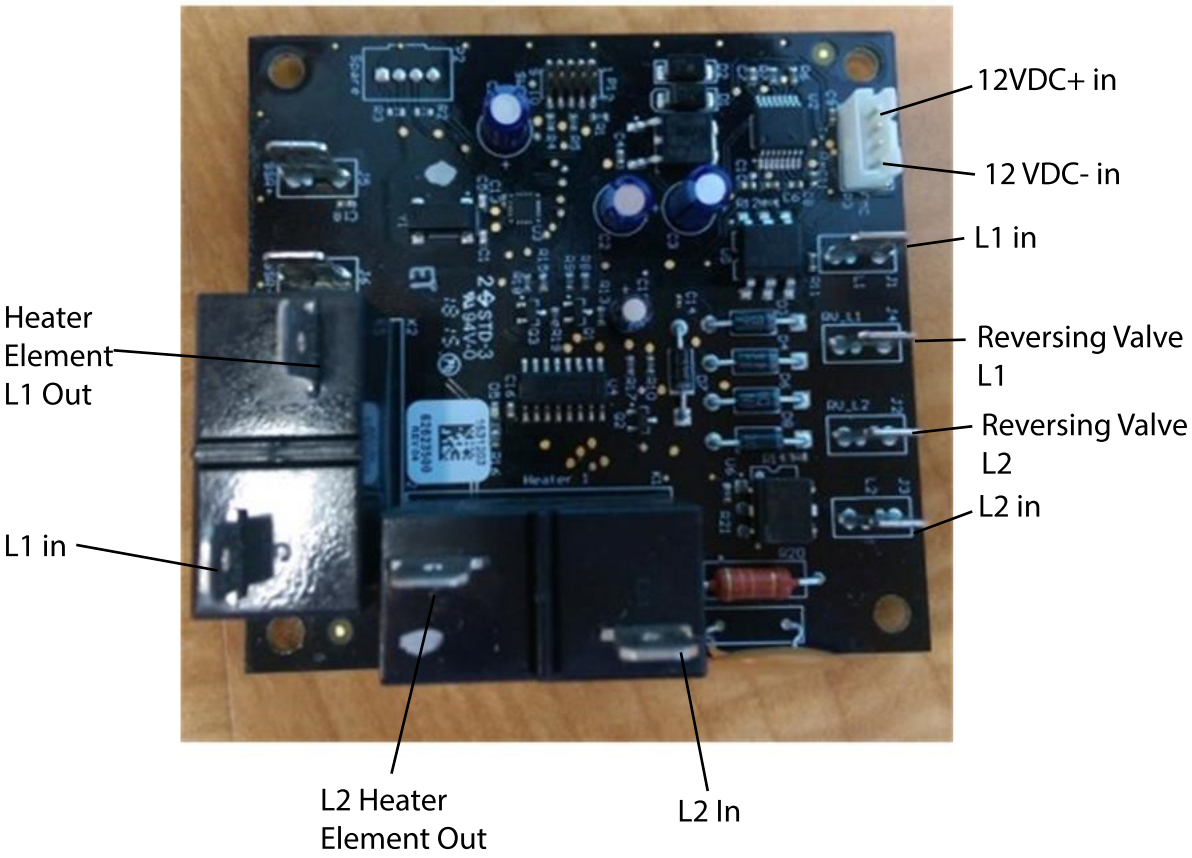



Figure 624 (Heater Board)

Is the green light on the board illuminated?

1. If not check connecting cable by unplugging and re-seating at both ends of cable.

Still no light?

2. Check for 12 vdc on outside pins (1 and 4) on plug P3.
3. Check continuity through the cable from the FMC board.
4. Check for line voltage at L1 and L2.
5. With demand for electric heat on check for voltage at L1 and L2 out.

# COMPONENTS TESTING

**Heater Board Replacement**

1. Ensure power is removed from the unit.
2. Disconnect all wires and identify.
3. Remove board by carefully compressing standoffs.
4. Install new board.

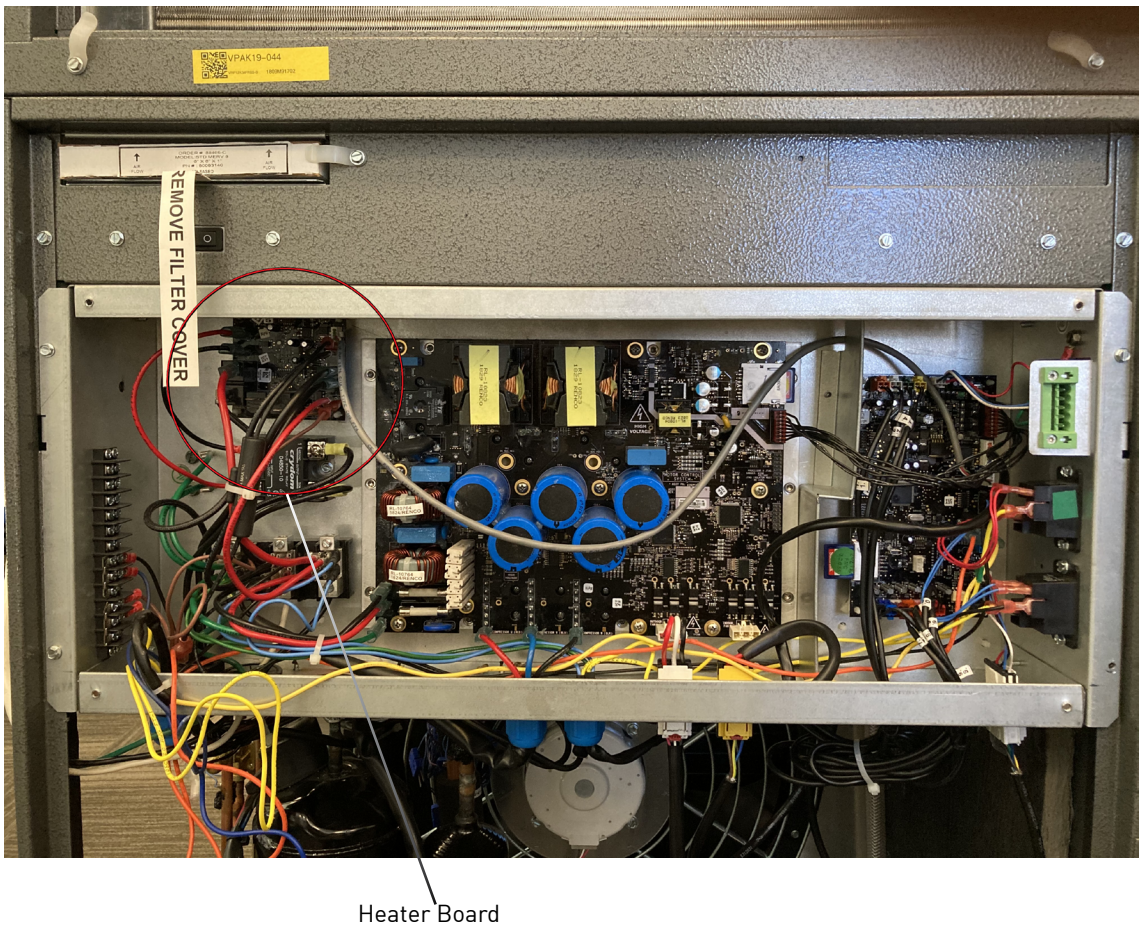



Figure 625 (Heater Board)

# COMPONENTS TESTING

**Thermistor Locations**
**T8 (Return Air Sensor)**

**The T8 (Return Air Sensor) is located behind the Air Filter.**

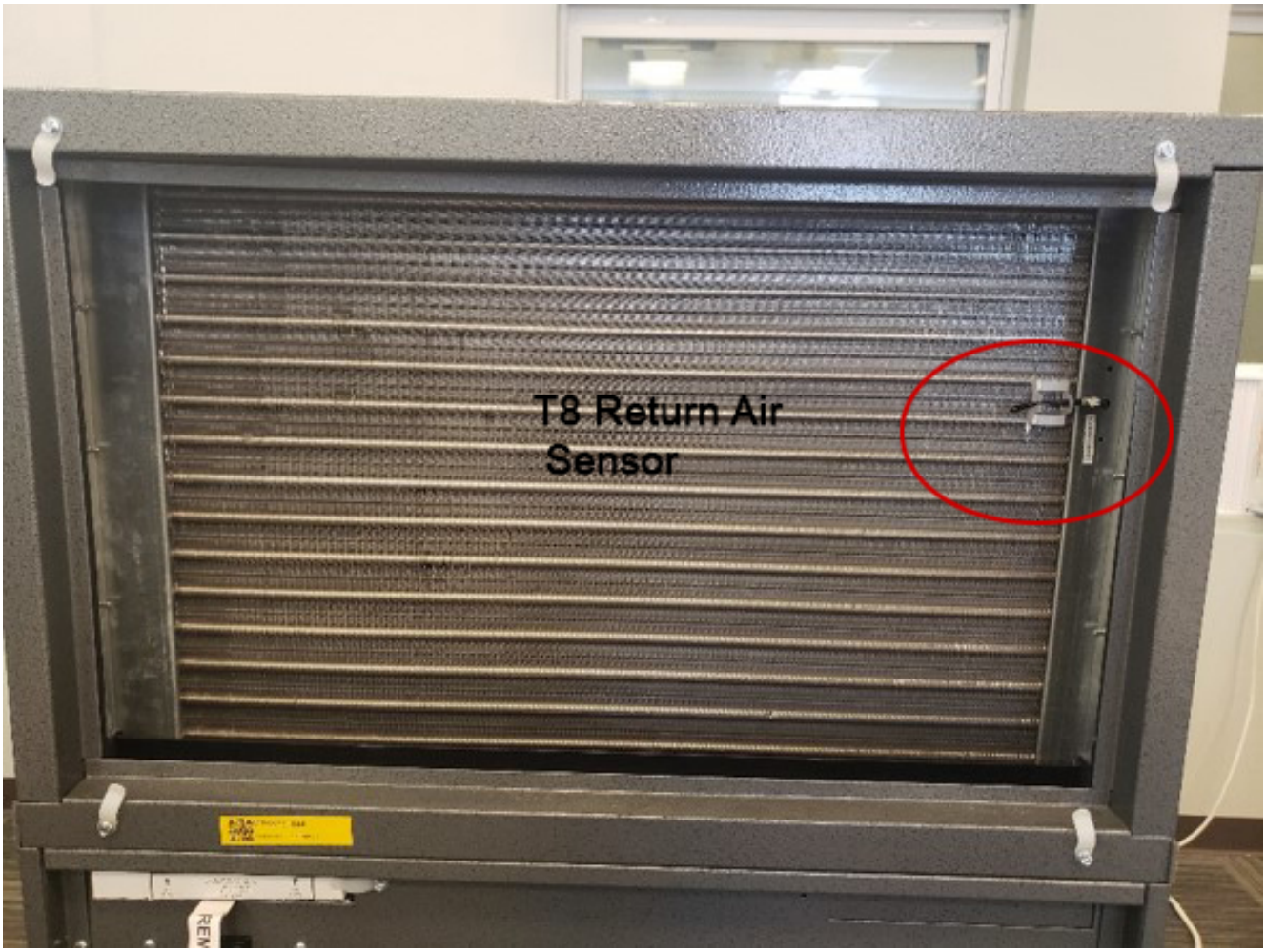



Figure 626 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T1 (Evaporator Coil In Sensor)**
**T5 (Evaporator Coil Out Sensor)**

**To access the evaporator coil sensors remove the top panel and right side upper panel.**
**The top sensor is T5 ( Evap. Coil Out)**
**The lower sensor is T1 ( Evap. Coil In.)**

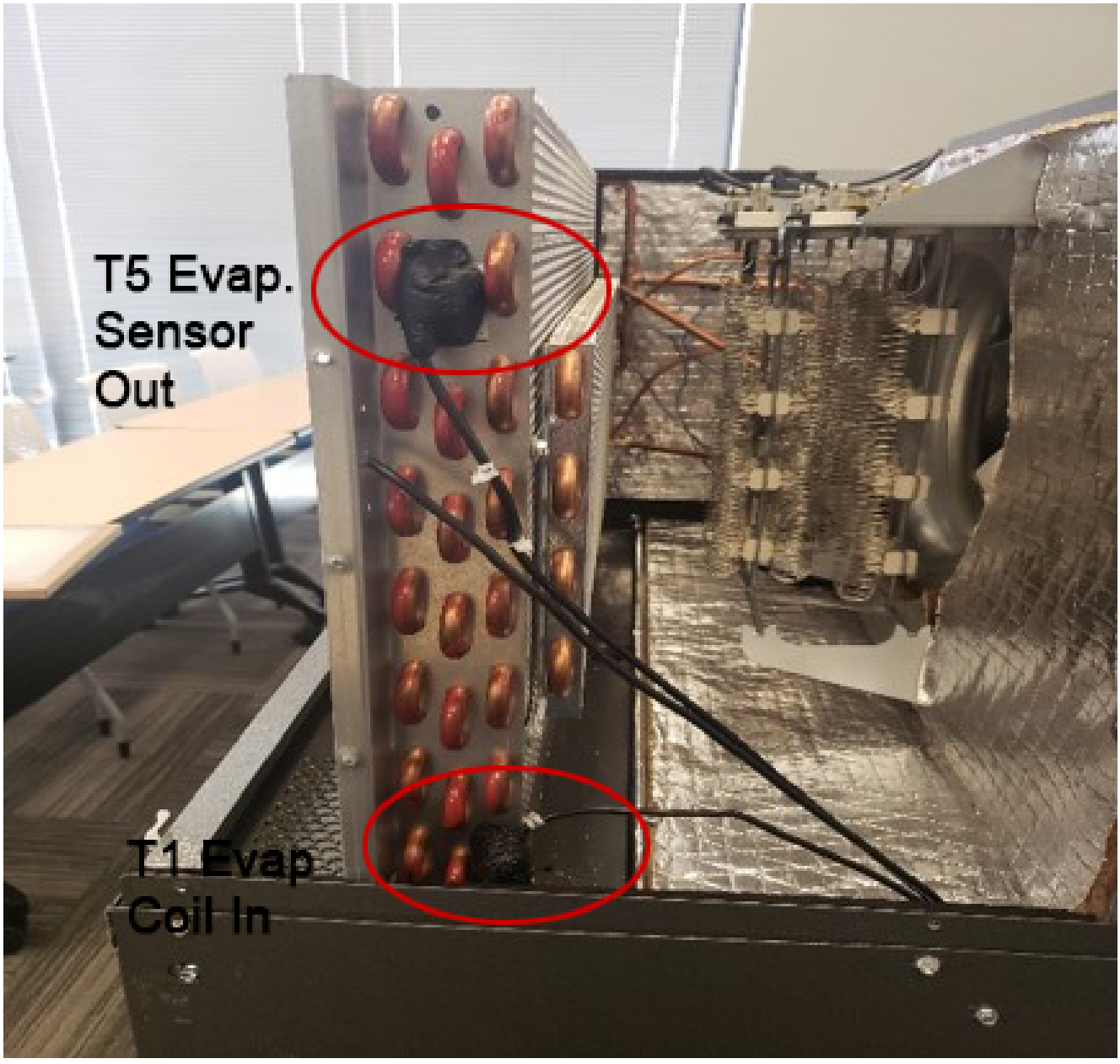



Figure 626 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T9 (Discharge Air Sensor)**

The T9 discharge air sensor is located inside the blower housing.

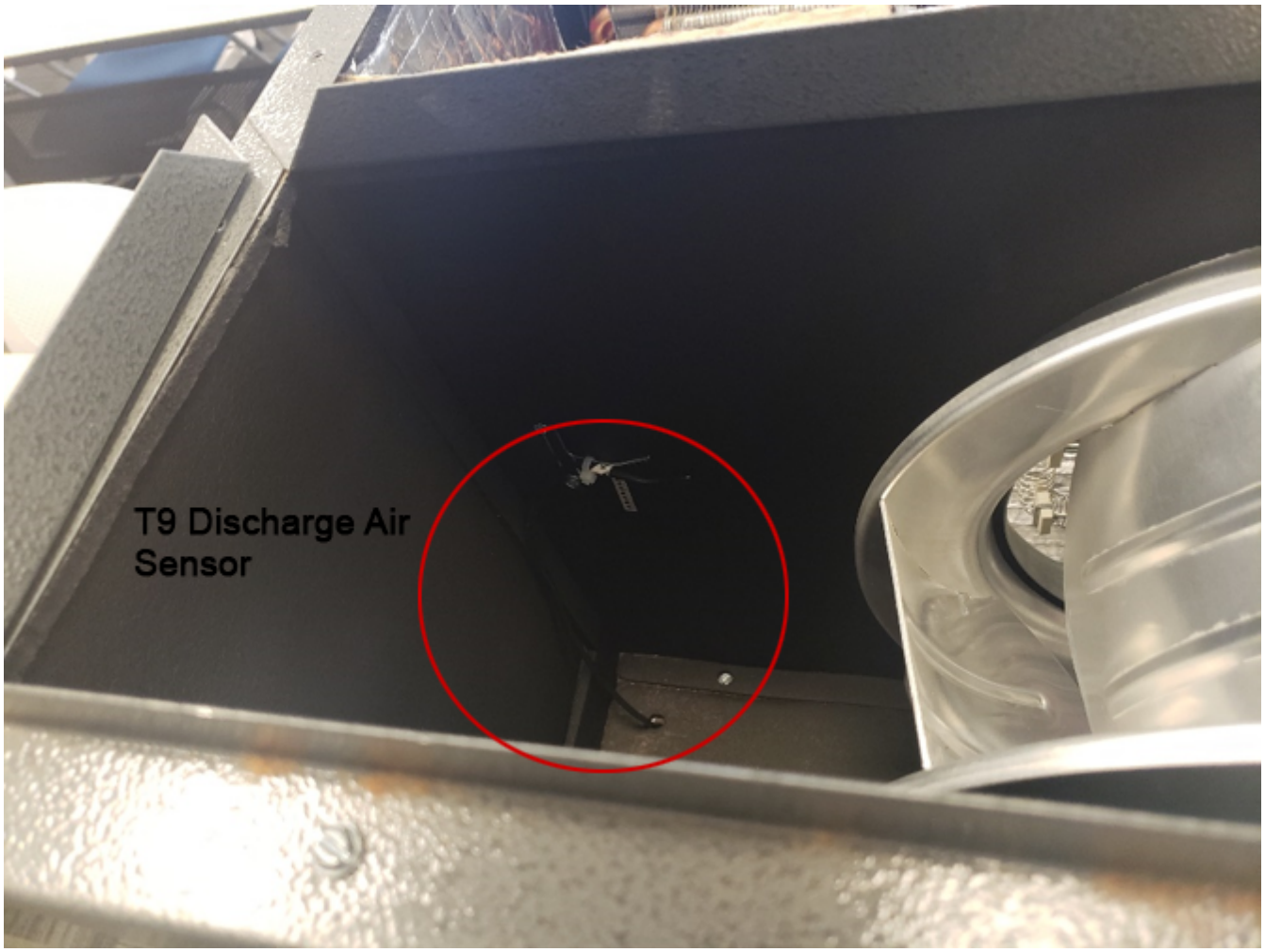



Figure 627 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T2 (Liquid Heat)**
**T6 (Liquid Cool)**

The T2 and T6 Sensors are located in the outdoor section attached to the EEV ( Electronic Expansion Valve).

The pipe going into the bottom of the EEV is T2 (Liquid Heat).

The one on the pipe leaving the side of the EEV is T6 (Liquid Cool).

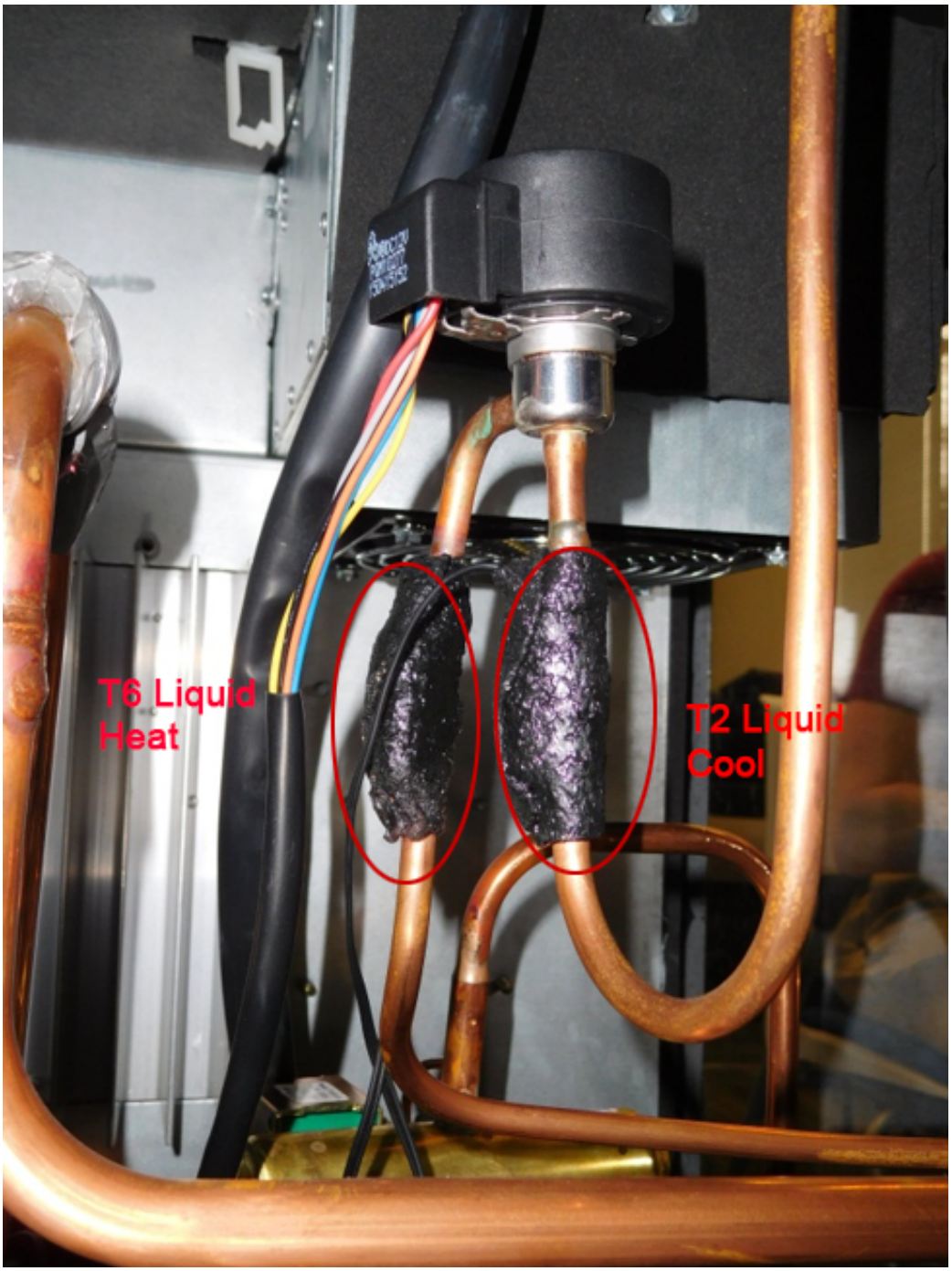



Figure 628 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T10 (Outdoor Ambient Air Sensor)**

The T10 (Outdoor Ambient Air Sensor) is located in the outdoor section, mounted on the bottom of the indoor blower housing.

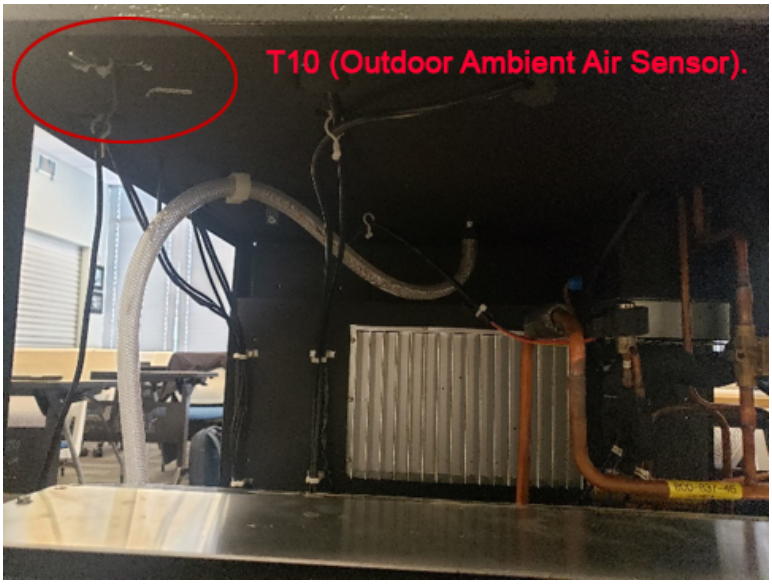




Figure 629 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T7 (Cond. Coil Sensor)**

T7 (Cond. Coil Sensor is attached to the outdoor coil on the right hand side.
This sensor is attached to the coil roughly halfway down on one of the return bends.

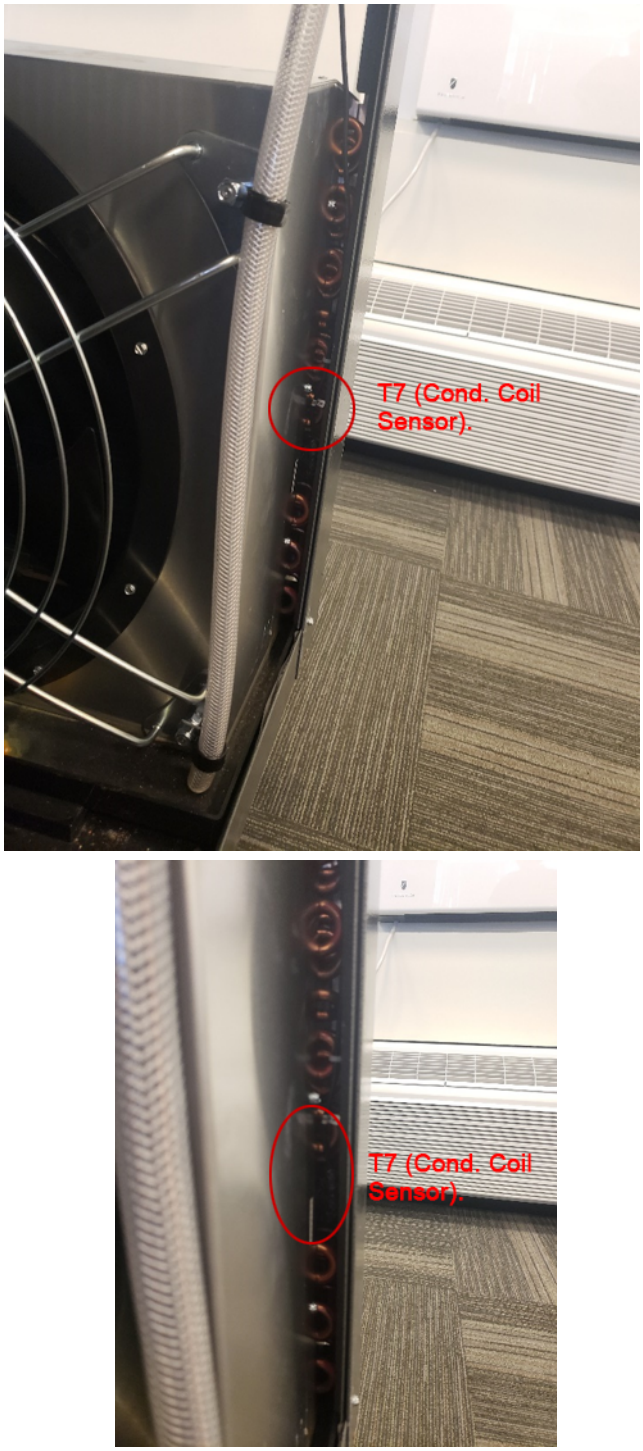



Figure 630 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T4 (Comp. Discharge).**

The T4 (Comp. Discharge) is attached to the compressor discharge line.

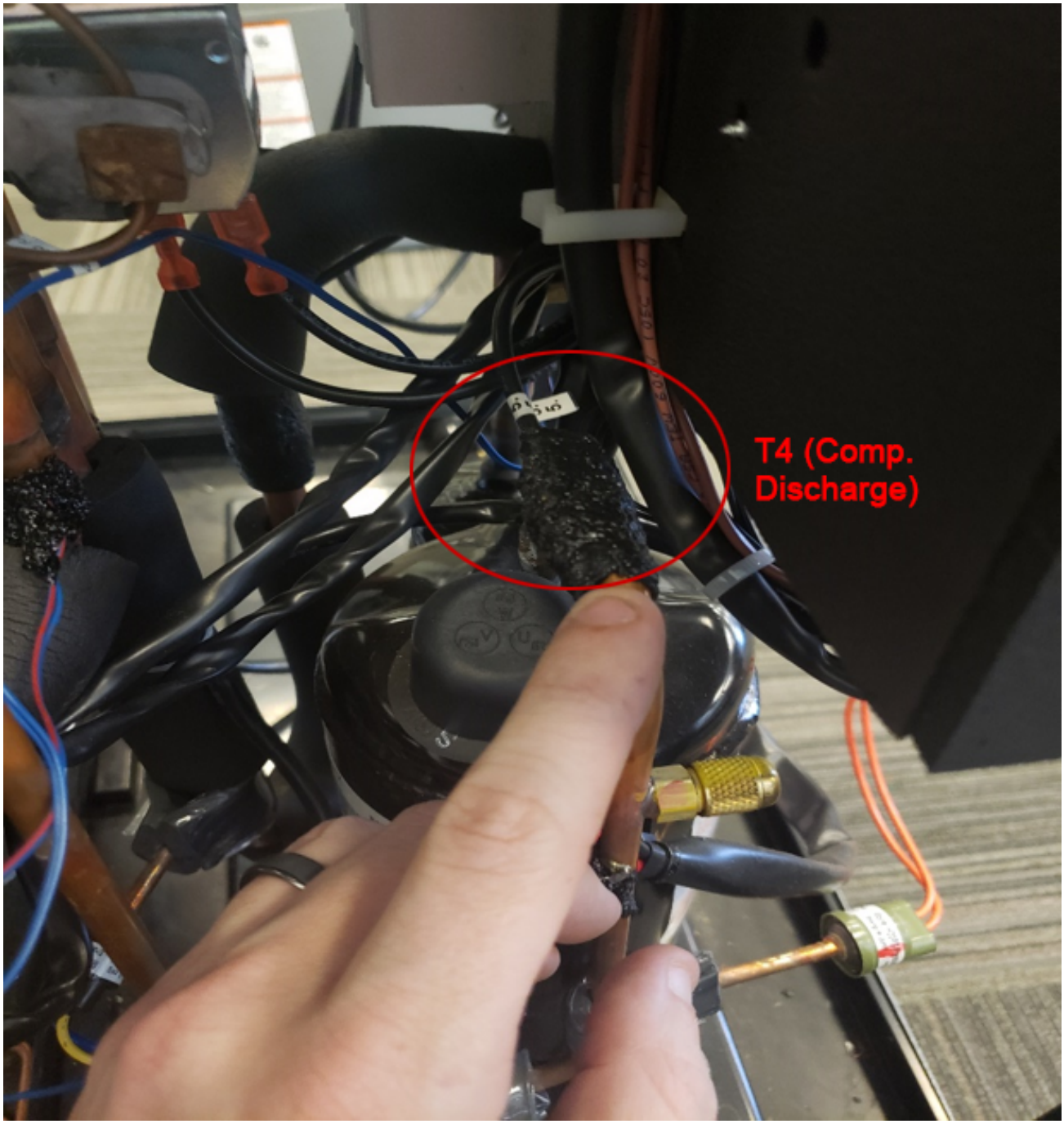



Figure 631 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Locations**

**T3 (Comp. Suction).**
The T3 (Comp. Suction) is attached to the compressor suction line.


Figure 632 (Thermistor Locations)

# COMPONENTS TESTING

**Thermistor Part numbers**

VPH and VRP revision –A/B models used a sensor pack for the indoor and outdoor sensors.

VRP revision –C and newer all use single sensors.

THe Single sensors are compatible with the sensor pack.

The sensor packs are no longer available and all VRP/VPH models will use the single sensors going forward.

The part numbers for the individual sensors are listed here.

| Part Number | Sensor |
|---|---|
| 80083701 | SENSOR EVAP COIL OUT ORG (T5) |
| 80083702 | SENSOR RETURN AIR TEMP WHT (T8) |
| 80083703 | SENSOR EVAP COIL IN GRN (T1) |
| 80083704 | SENSOR DISCHARGE AIR YEL (T9) |
| 80083705 | SENSOR COMPRESSOR DISCHARGE BLK (T4) |
| 80083706 | SENSOR COMPRESSOR SUCTION BLU (T3) |
| 80083707 | SENSOR HEATING LIQUID BRW (T2) |
| 80083708 | SENSOR COOLING LIQUID ORG (T6) |
| 80083709 | SENSOR CONDENSER OUT PNK (T7) |
| 80083710 | SENSOR AMBIENT RED (T10) |

# COMPONENTS TESTING

## Check High and Low Pressure Limit Switches (Black FMC Board Installed)

**NOTE: If the FMC board has been replaced on your unit, you may have a different configuration for the FMC board. Refer to Figure 621 if the unit has a black FMC board installed and Figure 622 if the unit has a blue FMC board installed.**

1. Ensure power is removed from the unit.
2. At fmc board disconnect the orange (J8) and yellow (J7) wires.
3. The switches are wired together in series and if either switch is faulty you will get an error code 14.
4. Trace high pressure switch wires through grommet into upper cabinet and locate disconnect point.
5. Disconnect orange and blue wire.
6. Check orange to orange to check high pressure switch.
7. Check yellow to blue for low pressure switch.
8. An ohms reading of open indicates a faulty switch or refrigerant pressure.

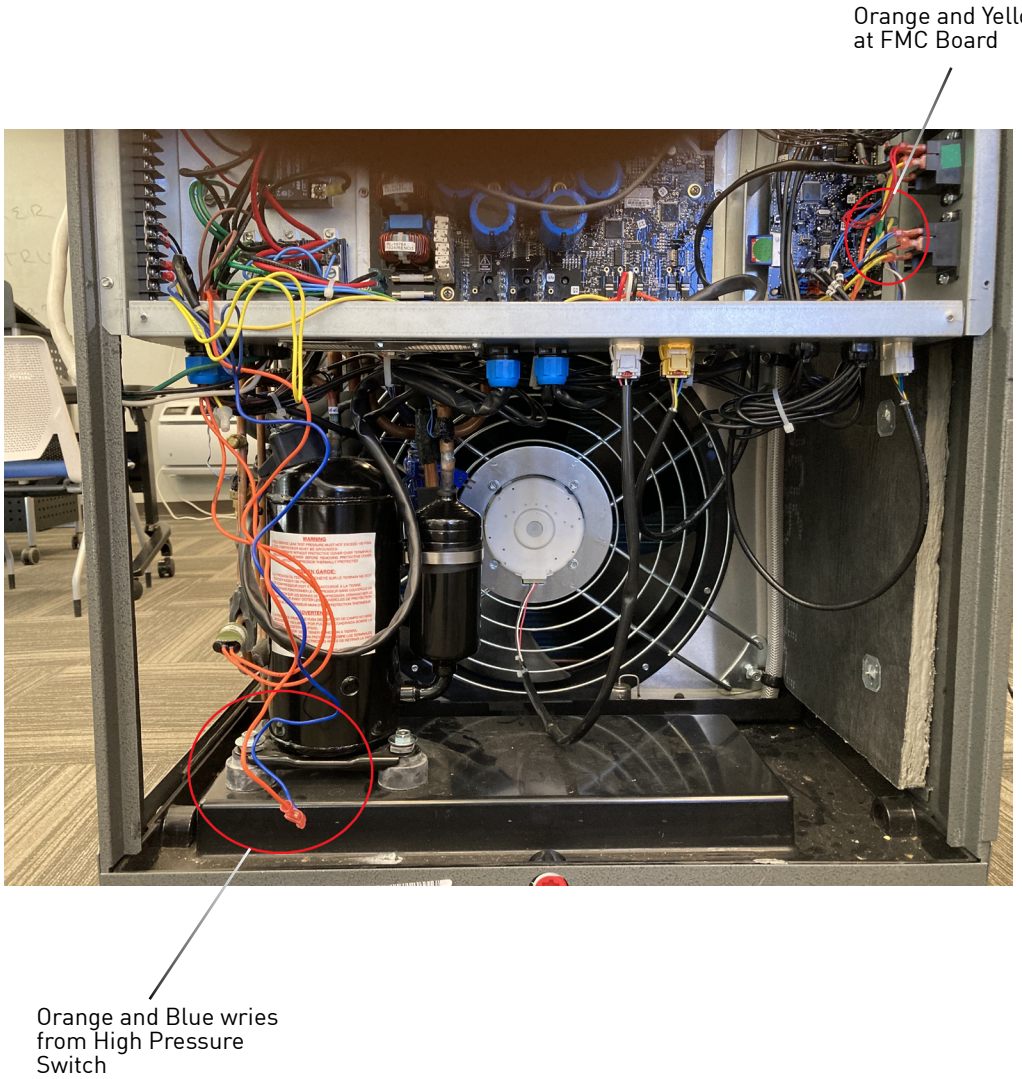
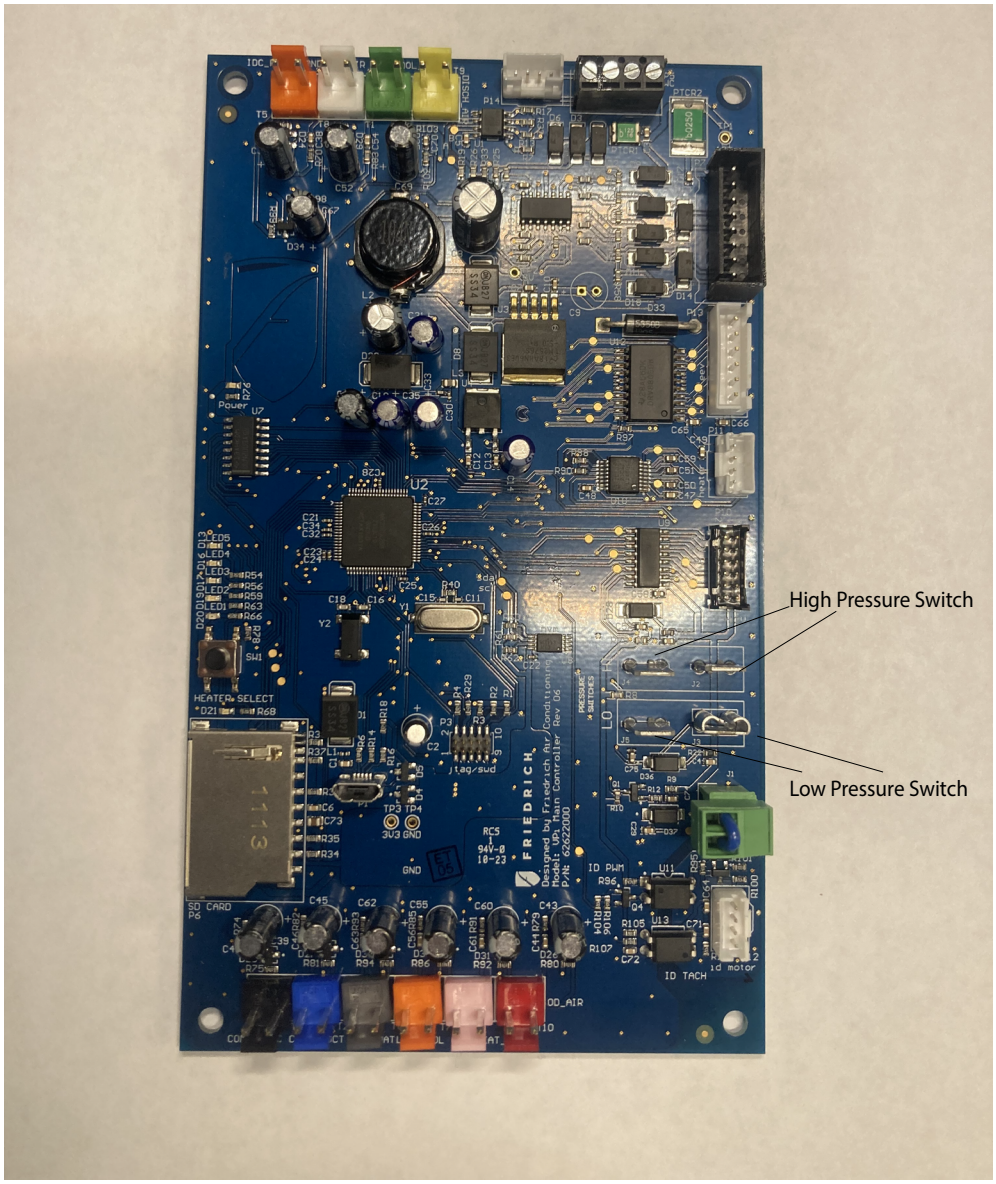



Figure 633 (Pressure Limit Switches)

# COMPONENTS TESTING

## Check High and Low Pressure Limit Switches (Blue FMC Board Installed)

**NOTE: If the FMC board has been replaced on your unit, you may have a different configuration for the FMC board. Refer to Figure 621 if the unit has a black FMC board installed and Figure 622 if the unit has a blue FMC board installed.**




**CAUTION:** Ensure power is removed from the unit.

1. Check High Pressure Switch
    1.1 At fmc board disconnect the (J2) and(J4) wires.
    1.2 Measure resistance across the wires
    1.3 An ohms reading of open indicates a faulty switch or high refrigerant pressure.
2. Check Low Pressure Switch
    1.1 At fmc board disconnect the (J3) and(J5) wires.
    1.2 Measure resistance across the wires
    1.3 An ohms reading of open indicates a faulty switch or low refrigerant pressure.

# COMPONENTS TESTING

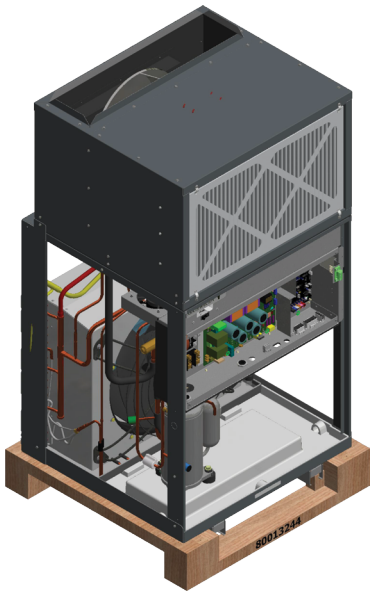
## Replace High Pressure Limit Switch

DISCONNECT POWER AND FOLLOW ALL LABELED WARNINGS.

NOTE The pressure switch can either be replaced by brazing in a new part of ordering a "bolt-on" kit that attached to the service port. The method below describes the use of the bolt-on kit.

**Step 1.** Attention! Please read these instructions before attempting installation. Always turn off all the power to the unit.


**Step 2.** Remove front and side panels for a better access.

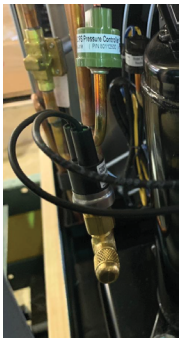


# COMPONENTS TESTING

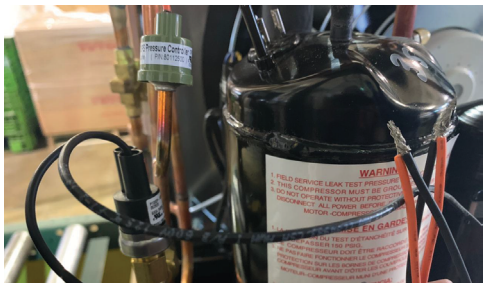
**Replace High Pressure Limit Switch**

**Step 3.** Install pressure switch to discharge tube service port. To minimize refrigerant loss, install assembly quickly.





**Step 4.** Cut the wires off old pressure switch and strip them. Attach to existing wire to new pressure switch wires with the two wire nuts supplied in kit. You can't miss wire it.




**Step 5.** Collect all loose wiring and zip tie together, remove any reaming wire from old pressure switch.

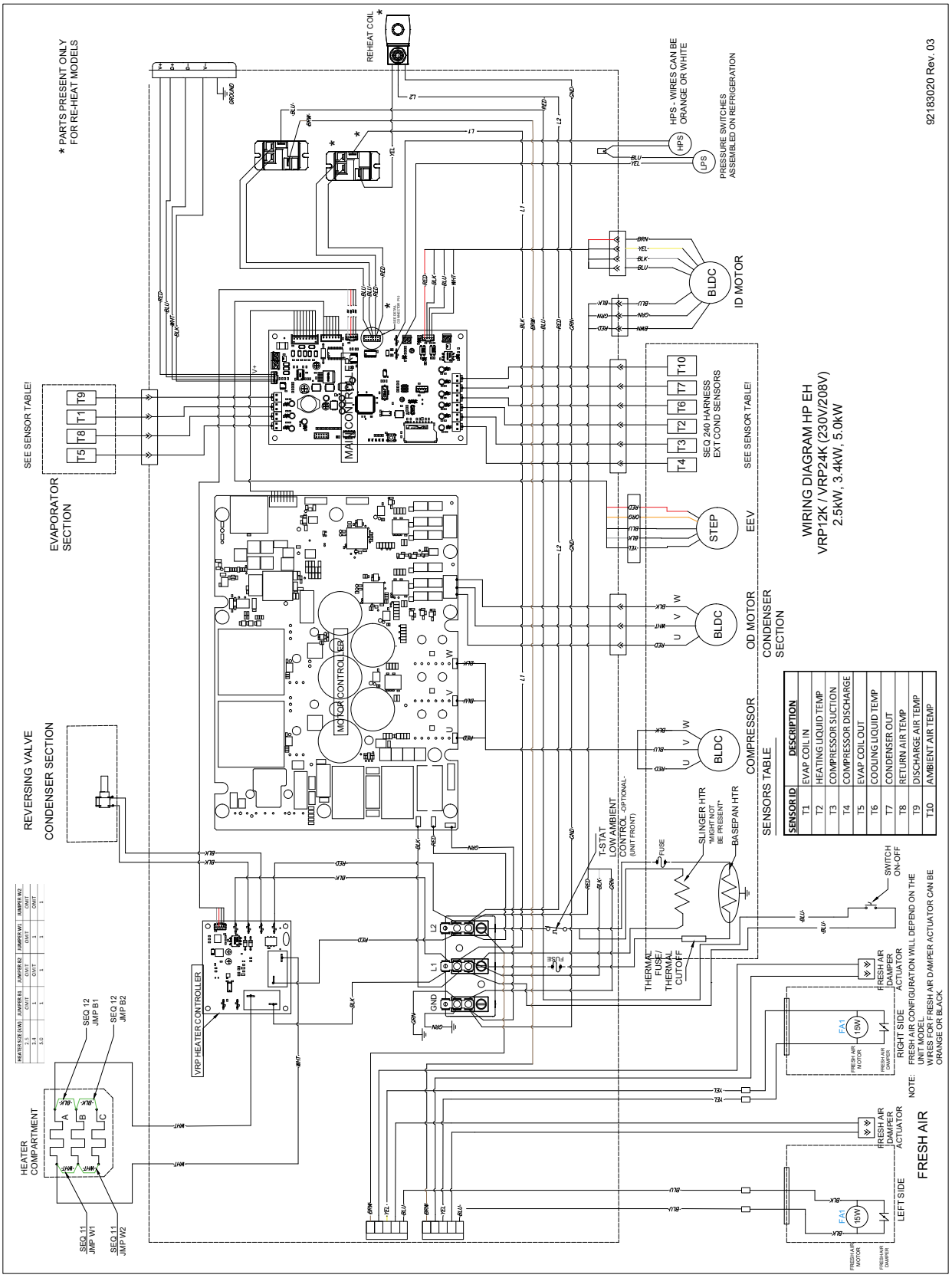


**Step 6.** New switch is complete. Reinstall all panels and power up unit to make sure all repairs were completed.

# WIRING DIAGRAMS

## 12-24 BTU (D MODELS) (208/230V 2.5, 3.4, & 5.0 KW)

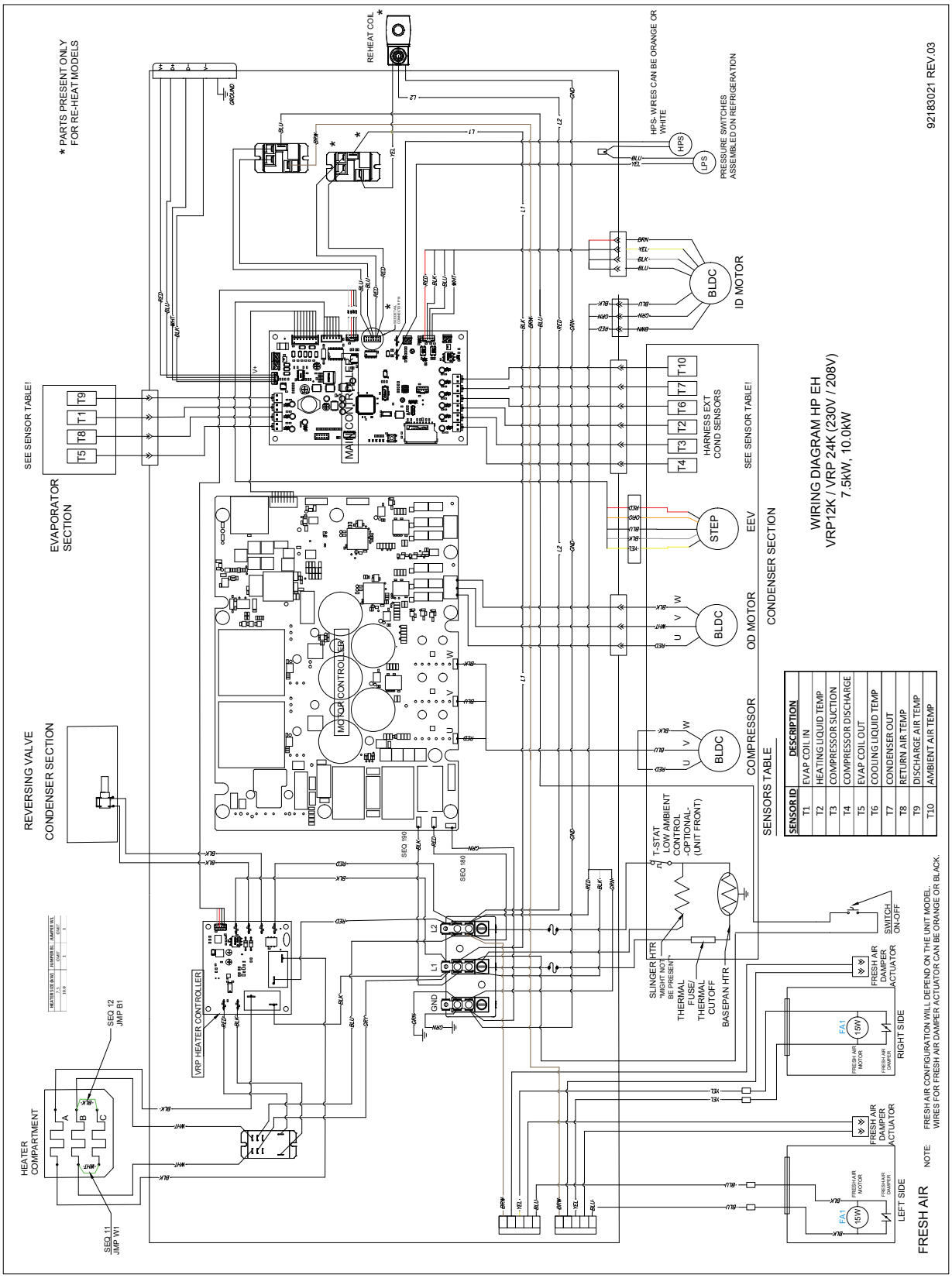
**Figure 801 (Wiring Diagram)**



# WIRING DIAGRAMS

## 12-24 BTU (D MODELS) (208/230V 7.5&10.0 KW)

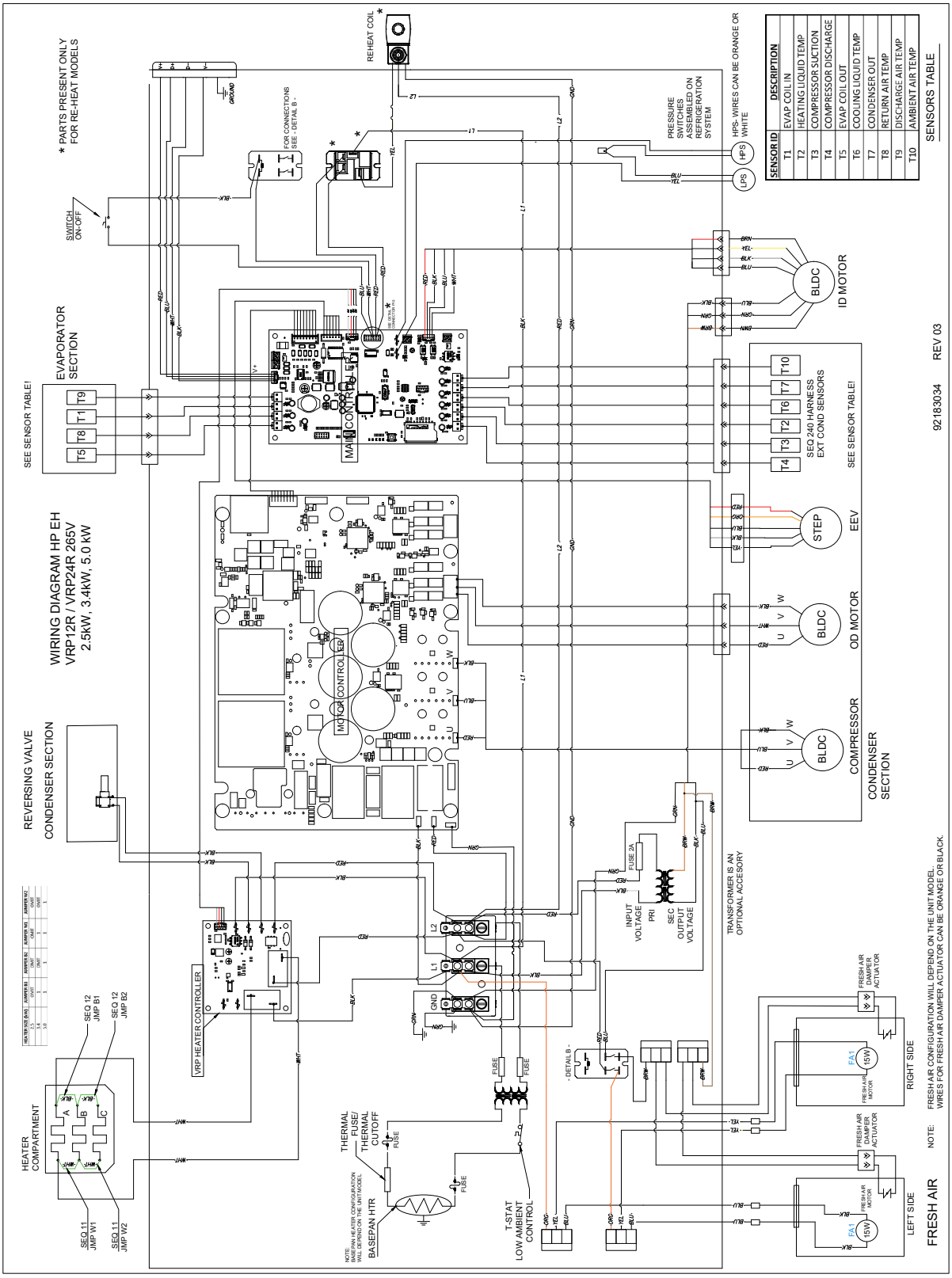
**Figure 802 (Wiring Diagram)**



# WIRING DIAGRAMS

## 12-24 BTU (D MODELS) (265V 2.5, 3.4, & 5.0 kW)

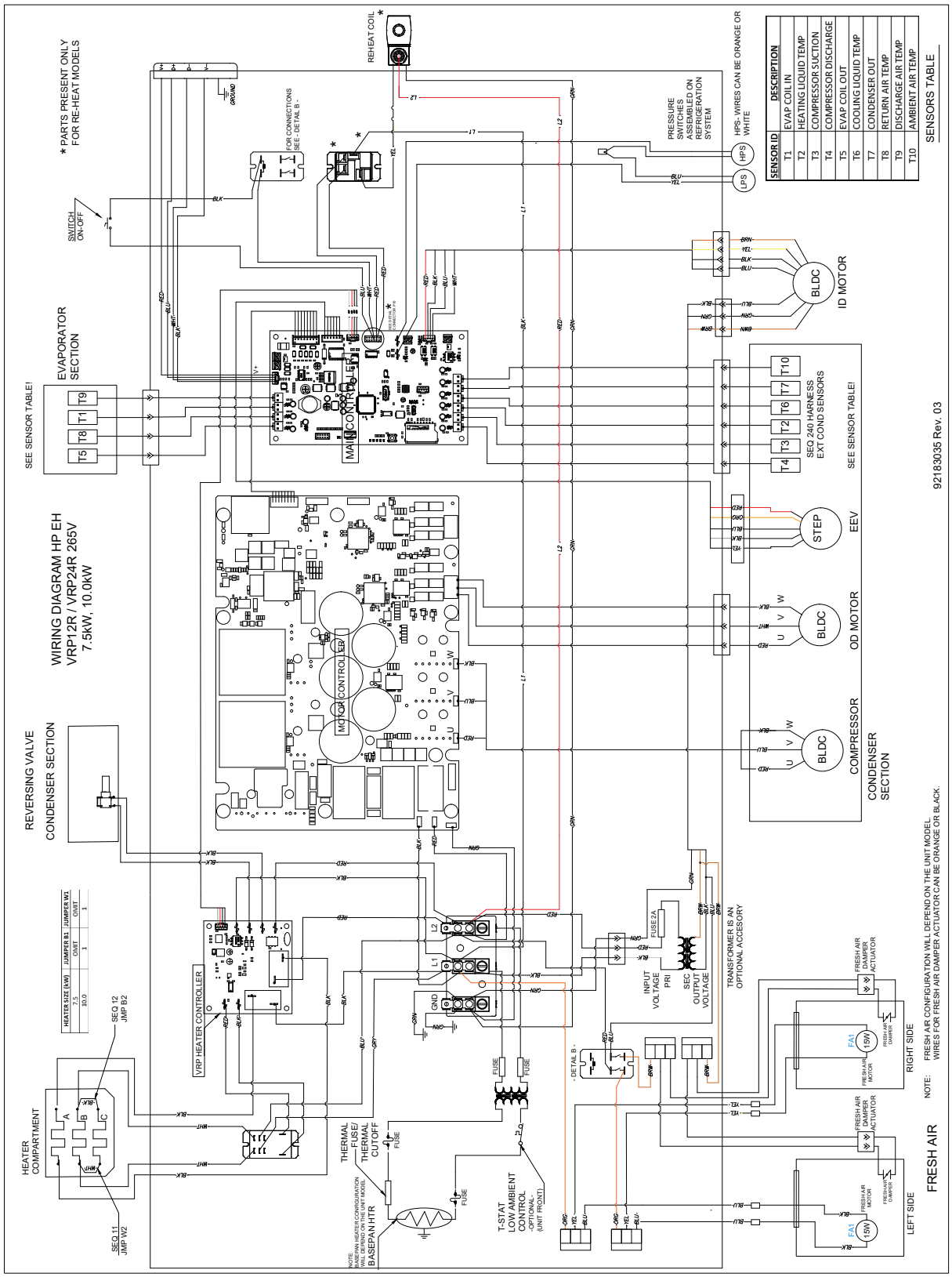
**Figure 803 (Wiring Diagram)**



# WIRING DIAGRAMS

## 12-24 BTU (D MODELS) (265V 7.5, 10 kW)

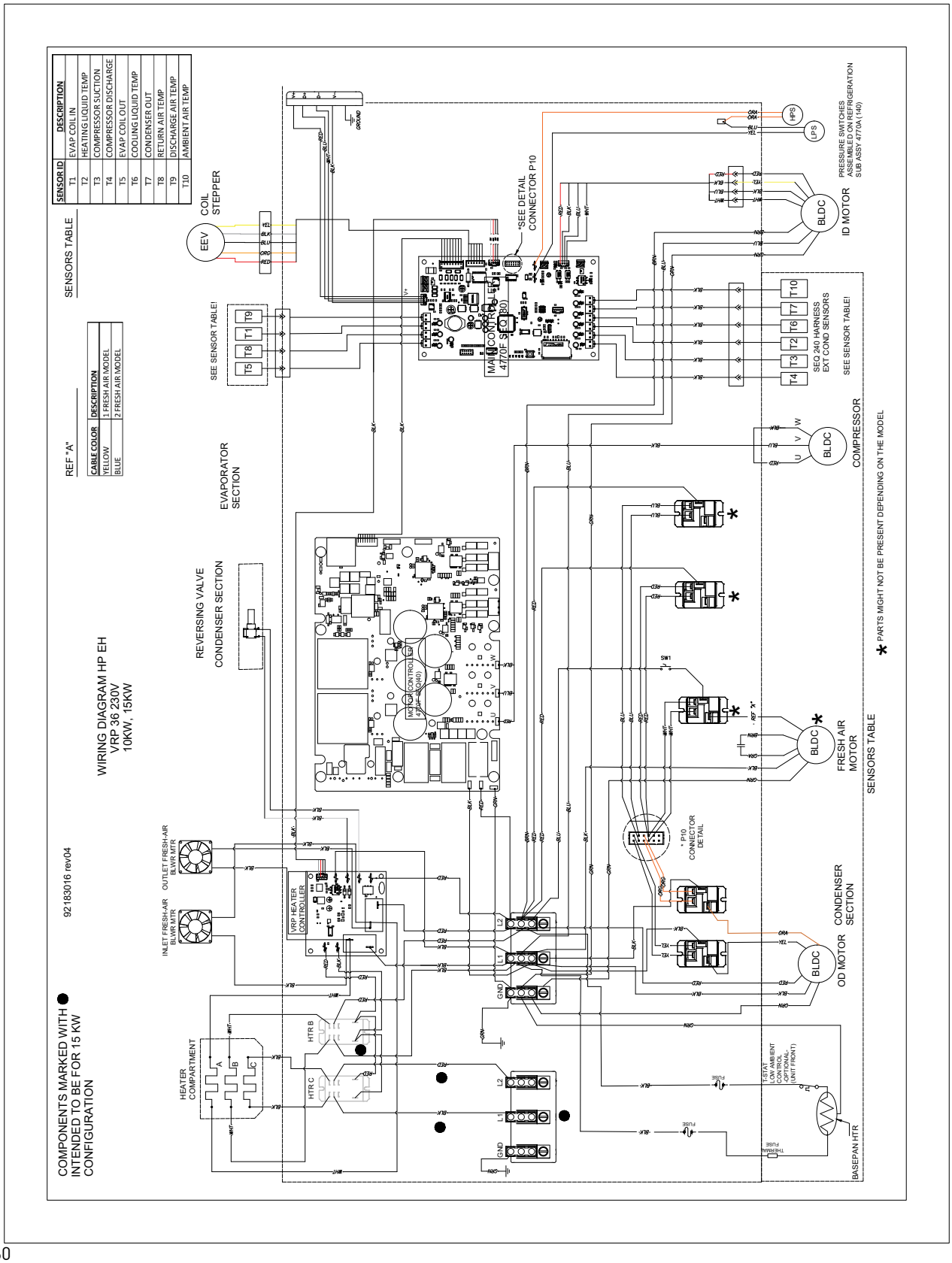
**Figure 804 (Wiring Diagram)**



# WIRING DIAGRAMS

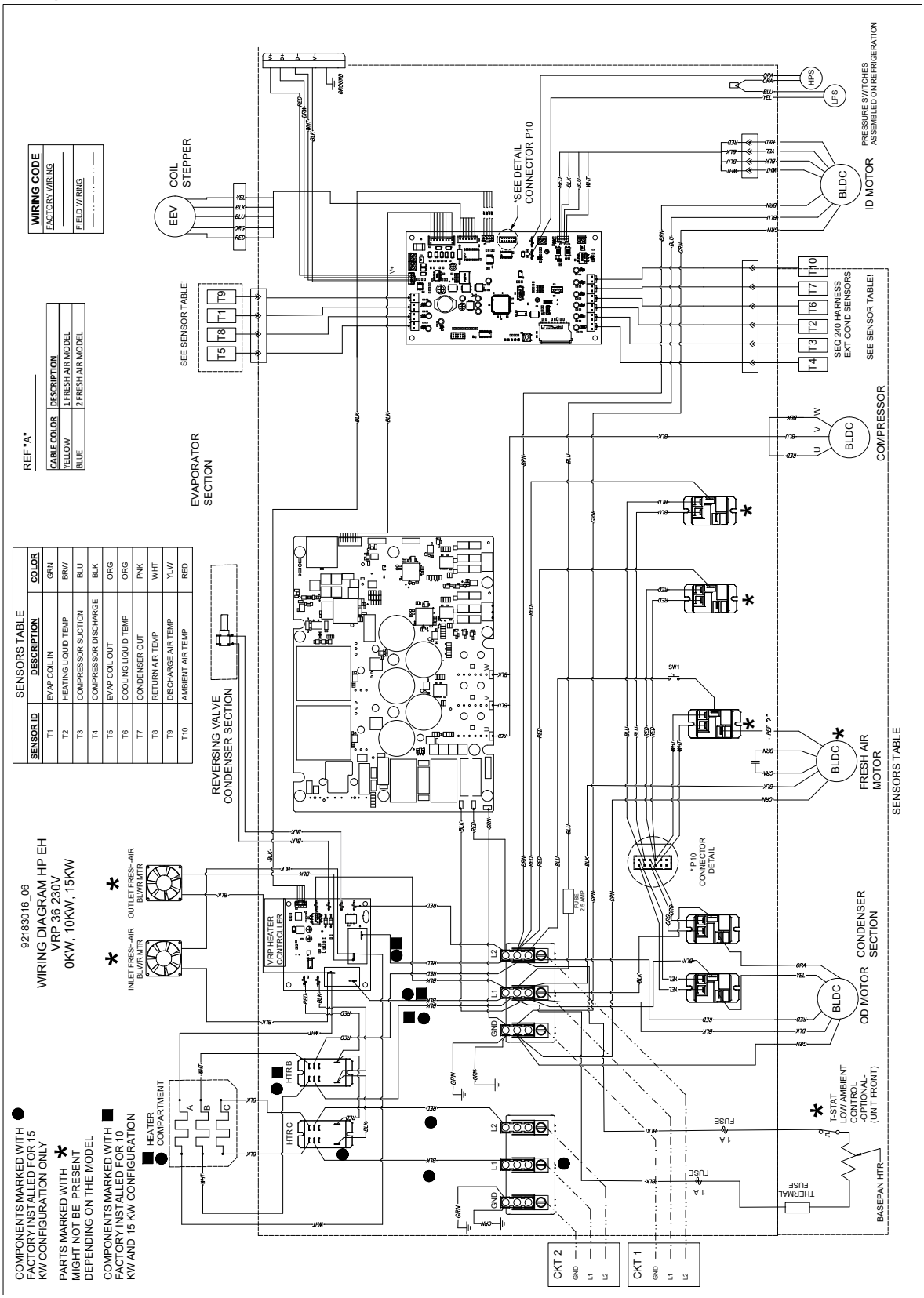
**Figure 805 (Wiring Diagram)**

**36 BTU - 208/230V A**



# WIRING DIAGRAMS

## 36 BTU - 208/230V A-A

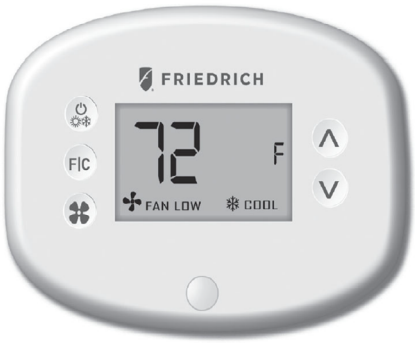


# ACCESSORIES

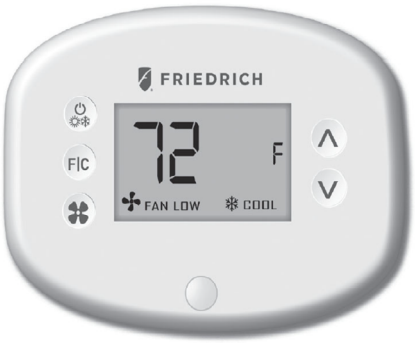
Visit www.Friedrich.com/accessories to find Accesory Product Manuals

## Friedrich offers two types of control options for VRP units:

- Standard Wall Controller (Wired), VRPXWCT
- Energy Management Wall Controller with an Occupancy Sensor
  - Wired, VRPXEMRT2
  - Wireless, VRPXEMWRT2




VRPXWCT




VRPXEMRT2 / VRPXEMWRT2

- Real time motion and thermal occupancy sensor
- Wired or wireless installation
- 5 energy savings presets
- Remote monitoring

# ACCESSORIES

## Louvers

| Accessory | Description | Compatible Model(s) |
|---|---|---|
| VPAL2 | Architectural louver - 30˚ Blade angle | VRP07 |
| VRSC2 | Architectural louver - 30˚ Blade angle - Custom color (Special order) | VRP07 |
| VRPXALA | Architectural louver - 30˚ Blade angle | VRP12 |
| VRPXSCA | Architectural louver - 30˚ Blade angle - Custom color (Special order) | VRP12 |
| VRPXALB | Architectural louver - 30˚ Blade angle | VRP12 & VRP24 |
| VRPXSCB | Architectural louver - 30˚ Blade angle - Custom color (Special order) | VRP12 & VRP24 |
| VRPXALC | Architectural louver - 30˚ Blade angle | VRP36 |
| VRPXSCC | Architectural louver - 30˚ Blade angle - Custom color (Special order) | VRP36 |

42˚ blade angle louvers available by special order.

## Wall Plenums

| Accessory | Description | Compatible Model(s) |
|---|---|---|
| VPAWP1-8 | Vert-I-Pak/VRP floating chassis, telescoping wall plenum - 4”-8” wall depth | VRP07 |
| VPAWP1-14 | Vert-I-Pak/VRP floating chassis, telescoping wall plenum - 8”-14” wall depth | VRP07 |
| VRPXWPA-8 | VRP floating chassis, telescoping wall plenum - 4”-8” wall depth | VRP12 |
| VRPXWPA-14 | VRP floating chassis, telescoping wall plenum - 8”-14” wall depth | VRP12 |
| VRPXWPB-8 | VRP floating chassis, telescoping wall plenum - 4”-8” wall depth | VRP12 & VRP24 |
| VRPXWPB-14 | VRP floating chassis, telescoping wall plenum - 8”-14” wall depth | VRP12 & VRP24 |
| VRPXWPC-8 | VRP telescoping wall plenum - 4”-8” wall depth | VRP36 |
| VRPXWPC-14 | VRP telescoping wall plenum - 8”-14” wall depth | VRP36 |

## Access Panels

| Accessory | Description | Compatible Model(s) |
|---|---|---|
| VPRG4 | Vert-I-Pak/VRP louvered access panel - left in-swing | VRP07 |
| VPRG4R | Vert-I-Pak/VRP louvered access panel - right in-swing | VRP07 |
| VRPXAP1 | VRP louvered access panel (left and right in-swing) | VRP07, VRP12, VRP24 |
| VRPXAPPR1 | VRP hanging perimeter return access panel | VRP07, VRP12, VRP24 |

Pre-primed (paintable) panels available by special order

## Miscellaneous

| Accessory | Description | Compatible Model(s) |
|---|---|---|
| VPDP2 | VRP07 auxiliary drain pan (Required) | VRP07 |
| VRPXFK-2 | Filter bracket kit for 2” deep filters (up to MERV 13) - includes gasket | VRP07, VRP12, VRP24, VRP36 |
| VPFKU | Telescoping filter bracket kit for 2” - 4” deep filters (up to MERV 13) - includes gasket | VRP07, VRP12, VRP24, VRP36 |

# ACCESSORIES

## Wall Controllers and Accessories

| Accessory | Description | Compatible Model(s) |
|---|---|---|
| VRPXWCT | Wired standard VRP wall controller | VRP07, VRP12, VRP24, VRP36 |
| VRPXEMRT2 | Wired energy management wall controller | |
| VRPXEMWRT2 | Wireless (to the unit) energy management controller | |
| VRPXEMRT2LC | Wired energy management wall controller with lighting control (Requires EMROS) | |
| VRPXEMRT2HC | Wired energy management wall controller with Hilton Connect Room (RTM) compatibility | |
| EMOCT | Energy management online connection kit | |
| EMRAF | Energy management online remote access fee | |
| EMROS | Energy management wired remote occupancy sensor | |
| EMRTS | Energy management remote temperature sensor | |
| EMRDS | Energy management door switch | |
| EMCWP | Energy management J-box wall-plate | |
| EMRWOS | Energy management wireless remote occupancy sensor | |

# APPENDIX

## Interactive Parts Viewer

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

Please click on the link below:

Interactive Parts Viewer

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

## Limited Warranty

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

# APPENDIX

**Thermistor Values**

All thermistors in the VRP units have a 10k ohm Resistance at 77° F.

The chart below shows the value vs. temperature

If the sensor reads O/L (open) or 0 OHM (short) it is a bad sensor and should be replaced.

If the sensors OHM value equates to a temperature that is incorrect, i.e. room temperature is 65 ° but the sensor reads 6 OHM (97°), then the sensor is out of calibration and needs to be replaced.

| TEMP | RESISTENCE (K Ohms) | | | RESISTANCE TOLERANCE % | |
|---|---|---|---|---|---|
| F | MIN | CENTR | MAX | MIN | MAX |
| -25 | 210.889 | 225.548 | 240.224 | 6.50 | 6.51 |
| -20 | 178.952 | 190.889 | 202.825 | 6.25 | 6.25 |
| -15 | 151.591 | 161.325 | 171.059 | 6.03 | 6.03 |
| -10 | 128.434 | 136.363 | 144.292 | 5.81 | 5.81 |
| -5 | 108.886 | 115.340 | 121.794 | 5.60 | 5.60 |
| 0 | 92.411 | 97.662 | 102.912 | 5.38 | 5.38 |
| 5 | 78.541 | 82.812 | 87.083 | 5.16 | 5.16 |
| 10 | 66.866 | 70.339 | 73.812 | 4.94 | 4.94 |
| 15 | 57.039 | 59.864 | 62.688 | 4.72 | 4.72 |
| 20 | 48.763 | 51.060 | 53.357 | 4.50 | 4.50 |
| 25 | 41.786 | 43.654 | 45.523 | 4.28 | 4.28 |
| 30 | 35.896 | 37.415 | 38.934 | 4.06 | 4.06 |
| 31 | 34.832 | 36.290 | 37.747 | 4.02 | 4.02 |
| 32 | 33.803 | 35.202 | 36.601 | 3.97 | 3.97 |
| 33 | 32.808 | 34.150 | 35.492 | 3.93 | 3.93 |
| 34 | 31.846 | 33.133 | 34.421 | 3.89 | 3.89 |
| 35 | 30.916 | 32.151 | 33.386 | 3.84 | 3.84 |
| 36 | 30.016 | 31.200 | 32.385 | 3.80 | 3.80 |
| 37 | 29.144 | 30.281 | 31.418 | 3.75 | 3.75 |
| 38 | 28.319 | 29.425 | 30.534 | 3.76 | 3.77 |
| 39 | 27.486 | 28.532 | 29.579 | 3.67 | 3.67 |
| 40 | 26.697 | 27.701 | 28.704 | 3.62 | 3.62 |
| 45 | 23.116 | 23.931 | 24.745 | 3.40 | 3.40 |
| 50 | 20.071 | 20.731 | 21.391 | 3.18 | 3.18 |
| 55 | 17.474 | 18.008 | 18.542 | 2.96 | 2.96 |
| 60 | 15.253 | 15.684 | 16.115 | 2.75 | 2.75 |
| 65 | 13.351 | 13.697 | 14.043 | 2.53 | 2.53 |
| 66 | 13.004 | 13.335 | 13.666 | 2.48 | 2.48 |
| 67 | 12.668 | 12.984 | 13.301 | 2.44 | 2.44 |
| 68 | 12.341 | 12.644 | 12.947 | 2.39 | 2.39 |
| 69 | 12.024 | 12.313 | 12.603 | 2.35 | 2.35 |
| 70 | 11.716 | 11.993 | 12.269 | 2.31 | 2.31 |
| 71 | 11.418 | 11.682 | 11.946 | 2.26 | 2.26 |
| 72 | 11.128 | 11.380 | 11.633 | 2.22 | 2.22 |
| 73 | 10.846 | 11.088 | 11.329 | 2.18 | 2.18 |
| 74 | 10.574 | 10.804 | 11.034 | 2.13 | 2.13 |
| 75 | 10.308 | 10.528 | 10.748 | 2.09 | 2.09 |
| 76 | 10.051 | 10.260 | 10.469 | 2.04 | 2.04 |
| 77 | 9.800 | 10.000 | 10.200 | 2.00 | 2.00 |
| 78 | 9.550 | 9.748 | 9.945 | 2.03 | 2.03 |
| 79 | 9.306 | 9.503 | 9.699 | 2.07 | 2.07 |
| 80 | 9.070 | 9.265 | 9.459 | 2.10 | 2.10 |
| 81 | 8.841 | 9.033 | 9.226 | 2.13 | 2.13 |
| 82 | 8.618 | 8.809 | 9.000 | 2.17 | 2.17 |
| 83 | 8.402 | 8.591 | 8.780 | 2.20 | 2.20 |
| 84 | 8.192 | 8.379 | 8.566 | 2.23 | 2.23 |
| 85 | 7.987 | 8.172 | 8.358 | 2.27 | 2.27 |
| 86 | 7.789 | 7.972 | 8.155 | 2.30 | 2.30 |
| 87 | 7.596 | 7.778 | 7.959 | 2.33 | 2.33 |
| 88 | 7.409 | 7.589 | 7.768 | 2.37 | 2.37 |
| 89 | 7.227 | 7.405 | 7.583 | 2.40 | 2.40 |
| 90 | 7.050 | 7.226 | 7.402 | 2.43 | 2.43 |
| 91 | 6.878 | 7.052 | 7.226 | 2.47 | 2.47 |
| 92 | 6.711 | 6.883 | 7.055 | 2.50 | 2.50 |
| 93 | 6.548 | 6.718 | 6.889 | 2.53 | 2.53 |
| 94 | 6.390 | 6.558 | 6.727 | 2.57 | 2.57 |
| 95 | 6.237 | 6.403 | 6.569 | 2.60 | 2.60 |
| 96 | 6.087 | 6.252 | 6.417 | 2.63 | 2.63 |
| 97 | 5.942 | 6.105 | 6.268 | 2.67 | 2.67 |
| 98 | 5.800 | 5.961 | 6.122 | 2.70 | 2.70 |
| 99 | 5.663 | 5.822 | 5.981 | 2.73 | 2.73 |
| 100 | 5.529 | 5.686 | 5.844 | 2.77 | 2.77 |
| 105 | 4.912 | 5.060 | 5.208 | 2.93 | 2.93 |
| 110 | 4.371 | 4.511 | 4.651 | 3.10 | 3.10 |
| 115 | 3.898 | 4.030 | 4.161 | 3.27 | 3.27 |
| 120 | 3.482 | 3.606 | 3.730 | 3.43 | 3.43 |

Figure 630 (Thermistor Values)

# APPENDIX

## Friedrich Authorized Parts Depots

**United Products Distributors Inc.**

4030A Benson Ave

Halethorpe, MD 21227

888-907-9675

c.businsky@updinc.com

**Shivani Refigeration & Air Conditioning Inc.**

2259 Westchester Ave.

Bronx, NY 10462

sales@shivanionline.com

**NEUCO Inc.**

515 W Crossroads Parkway
Bolingbrook, IL 60440

312.809.1418

borr@neuco.com

**The Gabbert Company**
6868 Ardmore
Houston, Texas 77054

713-747-4110
800-458-4110

**Johnstone Supply of Woodside**

27-01 Brooklyn Queens Expway
Woodside, New York 11377

718-545-5464
800-431-1143

**Reeve Air Conditioning, Inc.**

2501 South Park Road

Hallandale, Florida 33009

954-962-0252
800-962-3383

**Total Home Supply**

26 Chapin Rd Ste 1109

Pine Brook, NJ 07058

877-847-0050

support@totalhomesupply.com

https://www.totalhomesupply.com/brands/Friedrich.html

FRIEDRICH

## TECHNICAL SUPPORT CONTACT INFORMATION

Friedrich Air Conditioning Co.

10001 Reunion Place, Suite 500 • San Antonio, Texas 788.5

1-31.5-541-6645

www.friedrich.com