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# Installation Operation Maintenance

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BULLDOG SideWinder  
Heat Pump



SideWinder  
Models: SWD008- SWD015



[www.bulldogheatpump.com](http://www.bulldogheatpump.com)

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For Technical Support: 1-647-210-3819

Before calling technical support, please have the model and serial number of the unit ready.

For Parts:

For replacement parts, please call your local Bulldog Representative with the model and serial number of the unit.

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**ATTENTION IS NEEDED FOR THE FOLLOWING STATEMENTS:**

**WARNING:** Indicates a potentially hazardous situation which if not avoided could result in death or serious injury.



**CAUTION:** Indicates a potentially hazardous situation which if not avoided could result in minor or moderate injury. It also indicates unsafe practice that could cause product or property damage.

**NOTICE:** Notes intended to clarify unit installation, operation or maintenance information.

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**WARNING:** *Installation and servicing of this equipment can be hazardous due to system pressure and electrical components. ONLY trained and qualified personnel should install, repair, or service the equipment.*



**WARNING:** *The installation of the SideWinder Heat Pump and all associated components, parts and accessories that make up the installation shall be in accordance with the regulations of authorities having jurisdiction and MUST conform to all applicable codes. It is the responsibility of the installing contractor to determine and comply with ALL applicable codes and regulations.*



**WARNING:** *Disconnect all electrical power including remote disconnect and discharge all energy storing devices before servicing. Follow proper lock out/tag out procedures to ensure that power cannot be turned "ON". When working with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow this warning could result in death or serious injury.*

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## INFORMATION

### HANDLING

Care must be taken in handling the unit and other accessories to ensure that this equipment does not sustain any damage.

The protective shipping and packaging should remain on the unit until it is ready for installation. During construction, the unit must not be run and shall be sheltered from contaminants and debris such as drywall dust, wood chips, and paint that could damage the fan or block the cooling/heating coil which may result in diminished performance.

### STORAGE

The unit must be stored in an upright position at all times.

Failure to maintain the unit in an upright position may result in permanent damage to the unit. Dropping the unit or exposing it to extreme shock or vibration may also result in permanent damage to the interior components and piping.

The unit should be stored in a non-corrosive environment sheltered from conditions of extreme temperature or humidity. Subjecting the unit to conditions of this nature may result in significantly reduced performance, reliability, and operational life.

The unit is intended for interior use only and should be stored indoors at all times to protect it from the elements and to help eliminate the potential growth of indoor air quality (IAQ) contaminants.

### REFRIGERANT CHARGE

Unit Model	008	010	012	015
R410A Charge (oz.)	27	27	30	35

### WEIGHT/DIMENSIONS/CLEARANCES

Weight & Dimensions:

Model	008	010	012	015
Weight (lb) with Hanging Bracket & Front Panel	190 lbs			
Dimensions (WxHxD)	44 1/2" x 17 1/2" x 45 1/4"			

**Note: Service Clearance = Width of Unit, See Detailed Drawings for more details**

## DELIVERY AND GENERAL INSTALLATION CHECKLIST

The list below summarizes the steps required to successfully install a SideWinder unit.

1. Remove packaging and inspect the unit. Check for shipping damage or material shortage; file a freight claim and notify your sales representative if damage or found deficient.
2. Verify the model.
3. Verify that the power supply complies with the nameplate specification.
4. Connect properly sized and protected power supply wiring to the disconnect (not supplied).
5. Install proper grounding wires to an earth ground.

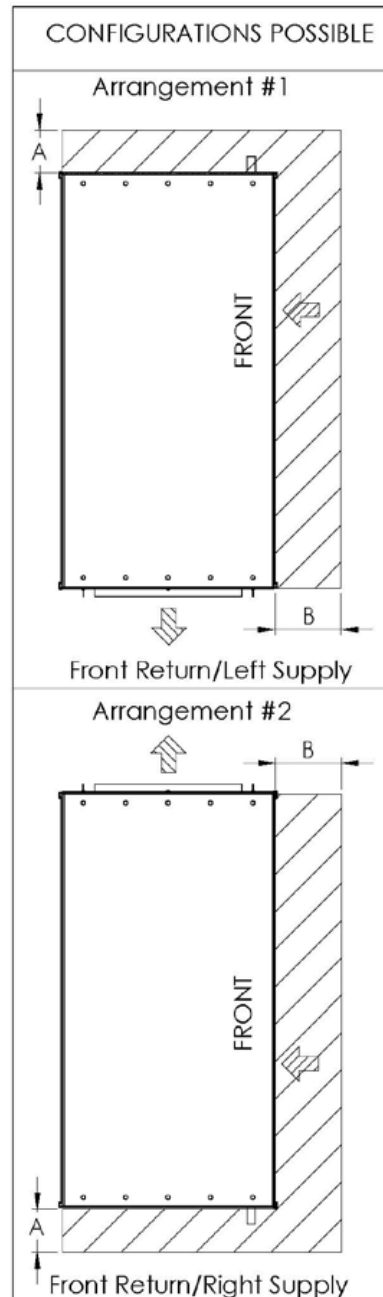


Figure 1

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## INSTALLATION

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The installation of BULLDOG SideWinder units and accessories must be in accordance with local codes and all regulations of all relevant governing authorities having jurisdiction. The following installation procedures are recommended by the Manufacturer. It is the responsibility of the installing contractor to comply with all applicable codes and regulations.

It is the responsibility of the installing contractor to comply with all applicable codes and regulations. It is the responsibility of the installing contractor to ensure adequate service clearance for regular maintenance or for repair in place is exercised. The installing contractor will be responsible for removing the unit if it is not serviceable in place.

### LOCATION

1. Determine future horizontal mounting location with clearances shown in the dimensioned drawings.
2. Locate the unit in an indoor area. The air temperature surrounding and being supplied to the unit must be above 45°F (7°C) at all times. Do not locate the unit in areas subject to freezing.

### PLACEMENT

1. Meet specified clearances to provide room for removal of all access panels.
2. Provide access to water valves and fittings, as well as screwdriver access to the unit side panels, discharge air collar, and all electrical connections.

## INSTALLATION STEPS

1. Screw discharge plate onto hanging bracket prior to mounting. Unscrew the front stop screws on the flanges of the hanging bracket while leaving the rear screws installed. Prepare to mount hanging bracket to ceiling using the 3/8" holes along both sides as shown below.

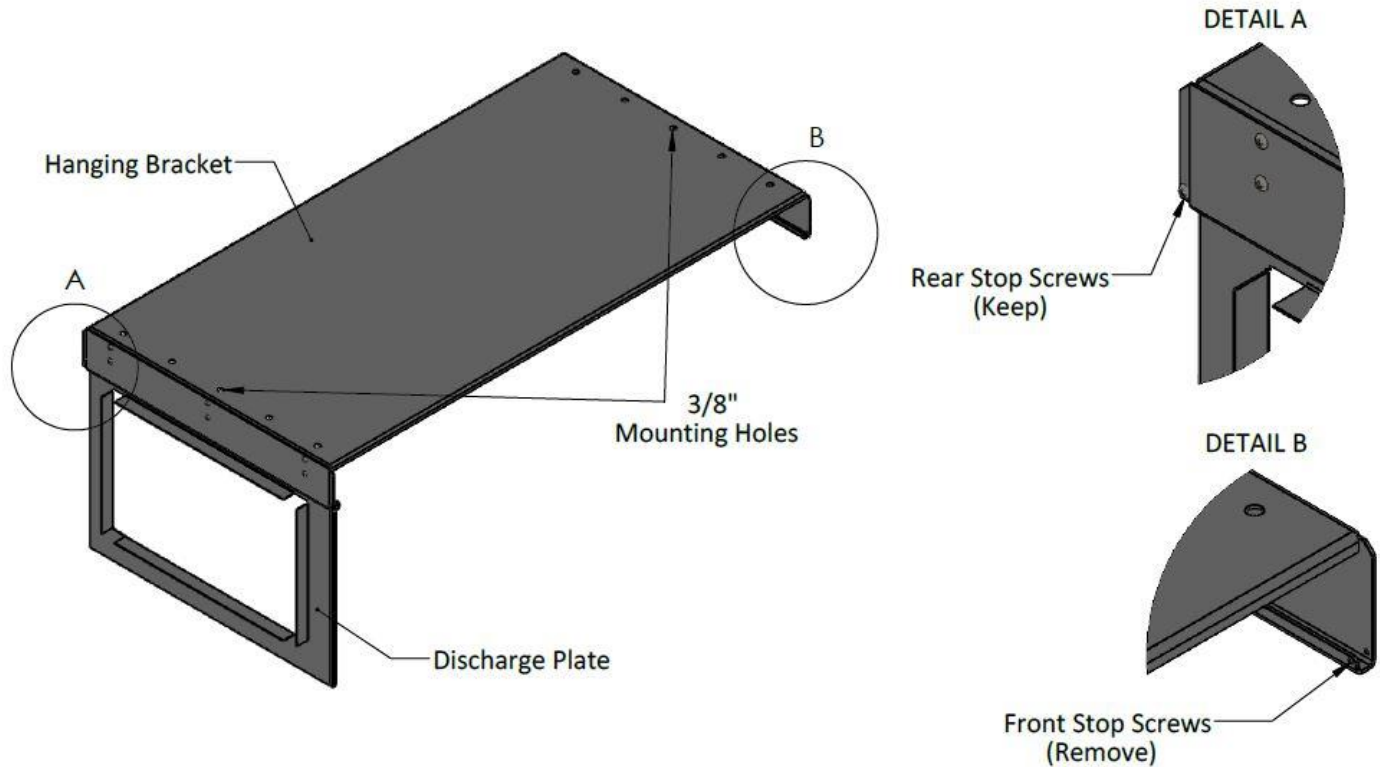


Figure 2



Figure 3

## BULLDOG SideWinder – Installation, Operation, and Maintenance Manual

- Align frame (with panel & hinges assembled) to be centered upon the hanging bracket. Horizontal distance is to be a minimum of  $5 \frac{5}{8}$ " between finished wall and the front edge of hanging bracket. This alignment will ensure the edge of the hinged panel is flush with the finished wall when closed.

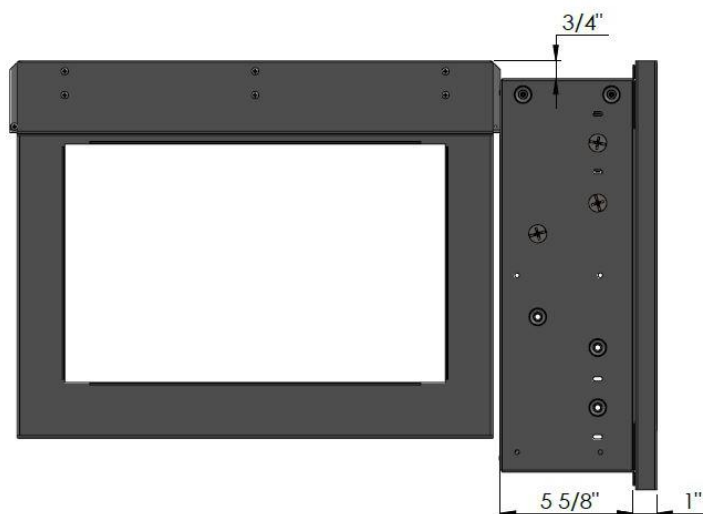


Figure 4

Vertical distance is to be a minimum of  $3/4$ " from the top of the hanging bracket. This alignment will ensure the hinged panel is not impeded by the ceiling when opened.

- Install isolation valves at each unit to permit unit removal for servicing.
- Open the hinged panel and proceed to slide Sidewinder chassis onto the hanging bracket rails. Rear stop screws will ensure the chassis is located in the correct position.

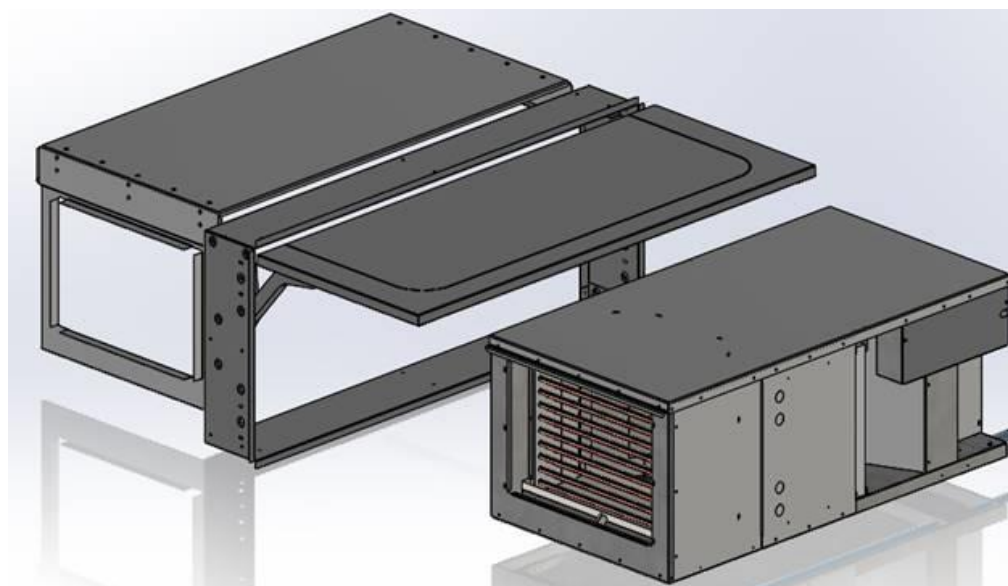


Figure 5

- Proceed to make water & electrical connections via the side of the chassis, and close hinged door.



## PIPING



**CAUTION:** Piping must comply with all applicable codes and regulations

DO NOT bend or kink supply lines or hoses (If supplied). Supply and return ultra flex hoses (3 & 4) available from the factory are fitted with swivel joint fittings at one end to allow removal for future servicing.

NOTE: Insulation of the water piping loop is not required except where piping runs through unheated areas or areas on the exterior of the building. The normal loop operating temperature range is 85°F (29°C) to 120°F (49°C).

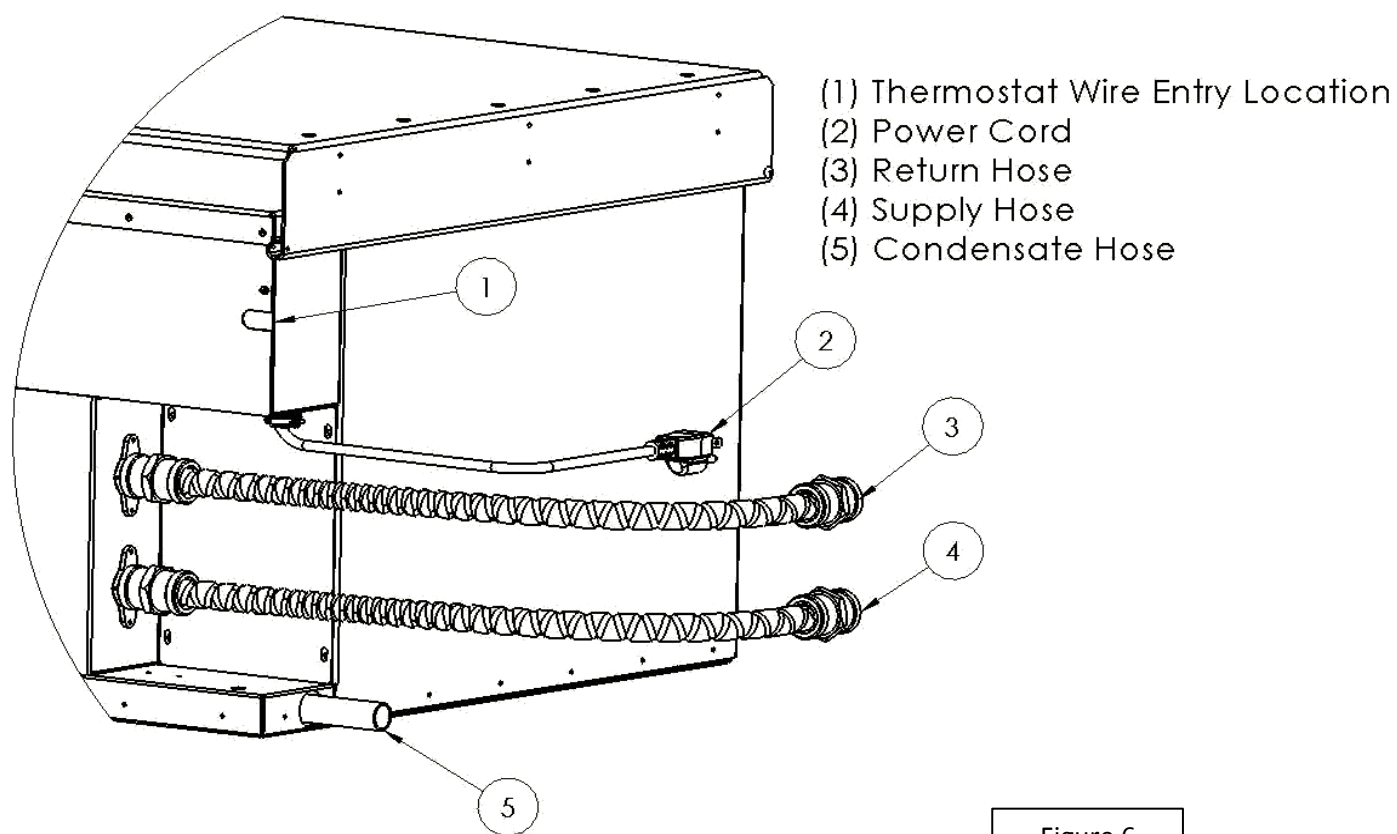
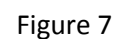


Figure 6

1. Wire room thermostat to electrical panel as indicated on the sample wiring diagram below.
2. Connect power.



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The BULLDOG Heat Pump does not have a reversing valve.

The compressor is **OFF** in heating use.

**DO NOT** use Heat Pump configuration on thermostats.

Set thermostat to Gas or ELC.

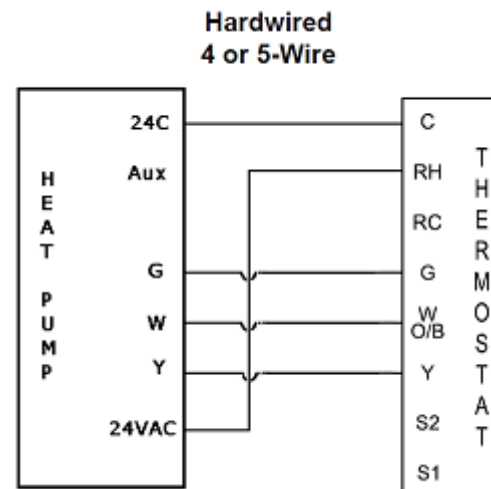


Figure 8

## OPERATION

### CAUTION:

**To avoid fouled machinery, extensive unit clean up, and void warranty, do not operate units without air filters in place, and do not operate units during the construction process.**

The BULLDOG Heat Pump provides year round cooling and heating as controlled by the unit thermostat or by a direct digital controller.

The BULLDOG Heat Pump provides cooling with a water-cooled refrigeration circuit, and provides heating using a hydronic coil. The compressor operates in the cooling mode only and shuts down during the heating mode providing for quieter operation, extended compressor life, and a reduction in energy consumption.

To ensure correct operation, centralized equipment located within the building mechanical room is automatically controlled to provide each heat pump unit with water that is at the appropriate temperature and flow rate.

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The unit circuit board incorporates six relay outputs with the following functions:

- K1 – Auxiliary relay for cooling valve on a two-valve unit or heat valve on a dehumidification unit.
- K2 – Heating Relay
- K3 – Alarm Relay
- K4 – Compressor Relay
- K5 – Low Fan
- K6 – High Fan

Each of these relays have, in parallel, a *green* LED indicator that lights up when the relay is energized.

The circuit board incorporates digital inputs that are opto-coupled to a 24V AC source. These have amber LED indicators located near the input locations which are lit when the input is closed. The inputs include:

- High Pressure Switch (LED 11)
- Low Pressure Switch (LED 12)
- Heat Call (W on thermostat terminal)
- Cool Call (Y on thermostat terminal)
- Fan Call (G on thermostat terminal)
- Auxiliary (A on thermostat terminal)
- Compressor shutdown (24V AC signal thru O/O). Providing a continuous 24V potential to O/O will terminate and prevent compressor operation. This can be used for duty-cycling, minimizing power consumption during an emergency power period or during sufficiently low outdoor air temperatures which allow for free cooling – all while maintaining the heating function.
- Unit shutdown (24V AC signal thru A/O). Providing a continuous 24V AC potential to A/O will terminate and prevent unit operation. This can be used for a night shutdown. On both arrangements a single 24V AC signal can shutdown many units. ¼ VA is required per unit.

Finally, the board has four analog inputs provided via thermistors. These inputs are as follows:

- Ta – Discharge Air Temperature
- Tr – Refrigerant Temperature
- Tw – Outgoing Water Temperature
- Co – Condensate Level

Ta, Tr, And Tw are 10k Ohm NTP thermistors, while Co is a 100 Ohm NPT thermistor. These Inputs do not have LED indicators.

## FAN OPERATION

1. A call on “G” for fan on the thermostat terminal strip will cause the fan to operate continuously on low fan speed through K5.
2. A call on “W” for heat on the thermostat terminal strip will also cause the fan to operate on low speed. If the heating call is still present after a 10 minute period, the multi speed units will switch the fan to high speed through Relay K6.
3. A call on “Y” for cooling on the thermostat terminal strip will cause the fan on multi-speed units to immediately step up to high speed through Relay K6.
4. Fan operation will terminate whenever all calls are dropped.
5. When the fan is operating at high speed, both relays are energized along with their associated LED indicators.

## HEATING OPERATION

1. A call on “W” for heat will activate the fan at low speed. It will simultaneously energize the heat relay K2 and its associated LED. The relay K2 will provide 24V AC fused power directly to the heat valve.

## COOL START UP

1. A call on “Y” for cooling initiates a series of checks prior to the start up of the compressor. These checks include:
  - a. Power ON timer – Compressor operation is delayed for approximately 5 minutes after restoration of power. This prevents all units from coming on line at the same time when power is restored. It also prevents compressor jolting with intermittent power.
  - b. Anti-Recycle timer – There is a 5-minute anti-recycle delay timer that allows the refrigeration cycle to achieve pressure equalization so that the compressor is unloaded upon start up.
  - c. High Pressure Switch – The high refrigerant pressure switch must be closed prior to start. LED 11 will be ON.
  - d. Low Pressure Switch – The low pressure switch operates primarily as a loss of charge protector. It must be closed for compressor start up and its LED 12 will be ON. The pressure switch has a 1 minute time ignore subsequent to start-up. In some situations, particularly when the unit is cold, the pressure switch will open during start-up. If the switch does not remake within the ignore period, the compressor will immediately be stopped.
  - e. Air temperature sensor Ta – Sensor Ta will prevent compressor operation if the air flowing through the unit is below 55°F (15°C).
  - f. Water temperature sensor Tw – Sensor Tw will prevent compressor operation if the outgoing fluid temperature is above 125°F (52°C).
  - g. Refrigerant temperature sensor Tr – Sensor Tr will prevent compressor operation if the coil temperature is below 40°F (2°C).
  - h. Any of the above faults will be indicated with the Diagnostic Code described under the DIAGNOSTICS section.

## COOL OPERATION

1. Monitoring of the refrigerant cycle continues during operation of the compressor. The following malfunctions will cause the compressor to shutdown:
  - a. If the head pressure exceeds the set point of the high pressure switch, the switch will open and the control board will terminate the compressor operation within 10 seconds. At this time a flash code of 6 will be initiated on the red diagnostic LED 15. Compressor operation will be restored in accordance with the “Intelligent reset” algorithm.
  - b. If the suction pressure drops below the set point of the low pressure switch, the switch will open and if it remains open beyond the 1 minute ignore period after start up, compressor operation will be terminated within 10 seconds. Compressor operation will be restored in accordance with the “Intelligent Reset” algorithm. A flash code of 5 on the red diagnostic LED will be initiated at this time.
  - c. **Intelligent Reset Algorithm** – If a low or high pressure switch opens and remains open for more than 10 minutes, a hard lockout will be initiated and the cooling mode will be locked off until the controls are manually reset. At the same time the fault relay K3 will be set to alarm; however, if the open switch closes within 10 minutes a restart cycle is initiated. The restart cycle begins with a 10 minute delay after which if there is a cool call in place and all other enablers are within the start parameters, the compressor will again be put into operation. Should either of the pressure switches open again, the shutdown procedure will cycle again, followed by a restart. The intelligent reset will allow two open switch shutdowns and restarts in a 24 hour period. If a third shutdown occurs within 24 hours this will put the refrigeration system into a full and hard lockout, requiring a power down to reset. If two or less switch open shutdowns occur within a 24 hour period, they will be erased from memory and will not contribute to a future hard lockout. (A hard lockout will prevent compressor operation until the controls are powered down for at least 20 seconds, and the green power light goes out. A soft lockout is a compressor shutdown that will be restored once the condition causing the shutdown returns to normal.)
  - d. During compressor operation, refrigerant temperature, system fluid temperature and discharge air temperature are continuously monitored. If the **refrigerant temperature** drops below 40°F, compressor operation will be disabled. After 10 minutes an auto reset occurs and the compressor will be enabled as soon as the temperature rises above 65°F. Actual compressor restart will be delayed a minimum of 5 minutes by the anti-recycle timer. A flash code of 2 will be initiated upon a low refrigerant temperature shutdown.

- e. If during compressor operation the **condenser leaving temperature** rises above 140°F, compressor operation will be disabled. After 10 minutes an auto reset occurs and the compressor will be enabled as soon as the temperature drops below 120°F. The outgoing system fluid sensor is mounted on the leaving fluid pipe. Actual compressor restart will be delayed a minimum of 5 minutes by the anti-recycle timer. A flash code of 3 will be initiated upon a high outgoing system fluid temperature shutdown.
- f. If the **discharge air temperature** drops below 40°F, compressor operation will be disabled. After 10 minutes an auto reset occurs and the compressor will be enabled as soon as the temperature rises above 55°F. The discharge air temperature sensor is mounted on the fan housing. Actual compressor restart will be delayed a minimum of 5 minutes by the anti-recycle timer. A flash code of 4 will be initiated upon a low discharge air temperature shutdown.
- g. The condensate level sensor is a 100 ohm thermistor that is heated for 15 seconds every 4 minutes. Its temperature is measured at the beginning of the heat cycle, and again at the end of the heating cycle. If the condensate level rises above the sensor it will not warm up during the warm up cycle, and the temperature change will be insignificant. It is this lack of temperature change that the controller sees as an impending condensate overflow. When high condensate level is detected, compressor operation is immediately terminated, and at the same time the fan is stopped for 30 seconds, and then restarted. At this time a flash code of 7 will be initiated. The 4 minute cycle will continue until the cooling call is no longer in place. If the condensate level drops below the sensor, compressor operation will be returned to normal. However, if the condensate level stays above the sensor for more than 15 minutes, the fault alarm will be triggered. This fault signal will automatically reset once the condensate level goes below the sensor.

**Note:** The last flash code will be maintained in memory for 1 week or until the unit controls are powered down. The flash code will continue until the problem has cleared and the compressor has been put into operation. If a cooling call is in place, it must be disengaged before the cause of the last alarm shutdown can be identified.

## OPERATION ALGORITHM

There are several control algorithms to prevent cycling and problematic operation. These are:

1. Double Call – If thermostat connections or set up is incorrect resulting in a simultaneous call for both heating and cooling, the unit will not operate. This condition can be observed on the thermostat connection LEDs. (Note: A heat pump thermostat will present this scenario)
2. Reverse Cycle Call – Poorly located automatic changeover thermostats (i.e. thermostats mounted on a wall opposite a discharge grill, or a thermostat in a doorway to outside) can trigger heating and cooling mode changes many times an hour. The CGC controller has a 10-minute anti-mode change timer for both heating and cooling mode changes. The controller will not accept a change in mode until 10 minutes have elapsed since termination of the opposite call.

## THERMOSTAT CONNECTIONS

The CGC control board has been designed to operate with most standard 24V AC thermostats. These are powered from the CGC board with 24V AC and simply switch power ON to each of the Heat (W), Cool (Y), Fan (G) or Aux (A). While most present day thermostats operate in this manner there are others that may or may not work properly. The following should be checked out for satisfactory performance prior to installation:

1. Heat Pump Thermostat – Some heat pump units do not have heat relays (therefore are not compatible with standard thermostats) and require “Heat Pump Thermostats”. These thermostats call for both heating and cooling on one of the signal wires. These thermostats are completely incompatible with CGC’s controller.
2. Battery powered thermostats – These thermostats were developed as replacements for old mercury bulb thermostats that had 4 wire connections while 24V electronic thermostats required 5 wires. These will work with a CGC board, although CGC does not recommend them. They require periodic battery replacement, which is something that should be avoided if possible.
3. Power stealing thermostats – This type of thermostat is electronic and was also developed as a replacement for old mercury bulb thermostats. These too are problematic in that they bleed a small amount of current down the signal wires and this may be interpreted as a signal for heat or cool.
4. Triac switched controllers – This is a commonly used switching device and all controllers tested to date have functioned flawlessly. CGC recommends that prior to installation of a third party supplied controller, it be checked for compatibility. CGC can confirm this.
5. Relay switched controllers – This type of controller works well with CGC devices.



## SHUTDOWN OUTPUT

The CGC board has an optional input terminal strip that allows for two types of remote shutdown. These are a) compressor shutdown and b) unit shutdown.

The advantage of these inputs is that many units can be connected in parallel and when powered by an independent 24V AC signal one or both of these actions can be implemented. Common uses are:

- a. Duty cycling for demand control
- b. Global night setback
- c. Heating only mode during emergency power periods

The CGC controller is also set up so these shutdown functions can be initiated individually with on board 24V power. This capability allows unit or compressor shutdown based on a door switch, a light switch, or occupancy switch. A separate 24V power supply is required if two or more units are being shutdown.

## FAULT ALARM OUTPUT

The CGC board is provided with a fault alarm indication and output. The fault alarm relay provides normally open and normally closed contacts for use in transmitting fault conditions.

NOTE: The fault alarm is energized for NORMAL, and de-energized for fault. As such, if the unit is not powered, if the board fuse is blown, or if the electronics are damaged, a fault condition will be indicated.

The fault relay is paralleled with the Fault LED which will be ON when no fault condition exists. Other fault conditions are:

- a. Hard lockout due to high or low pressure switch being open for 10 minutes or longer.
- b. Hard lockout due to three high or low pressure shutdowns in a 24 hour period.
- c. High level condensate for a period in excess of 15 minutes.

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## COMMISSION & START UP

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### SYSTEM FLUSHING:

Proper system cleaning and flushing is an important aspect of the commissioning and start up procedure for BULLDOG units. Ensure the system has been flushed properly. This prevents fouling of the unit's heat exchangers. It is common for debris to settle out in areas of the system where there is low flow or low fluid velocity. This causes nuisance alarms as a result of a fouling heat pump. It is necessary to flush these units out as they appear to contain debris build up. This is the responsibility of the contractor and not a heat pump defect.

**NOTE: Hydronic coils are not 100% drainable.**

### SYSTEM FLUID:

Ensure that system water temperature is within an acceptable range to facilitate start-up (80-120°F) for cooling and (100 – 140°F) for heating.

### SYSTEM WATER PH:

System water should have a neutral pH balance of approximately 7.5 which will extend the life of the hoses, heat exchangers, and other water side accessories.

### WATER FLOW RATE:

Open all isolation valves to the unit. Ensure that the entering and leaving fluid temperatures of the BULLDOG unit in operation are acceptable. There is typically an 8 to 12 degree drop or rise in temperature, depending on whether the unit is in cooling or heating. Under extreme conditions, slight variances in the temperature may be noted.

### FREEZE PROTECTION FROM WATER SYSTEM:

Ensure that freeze protection is provided for the outdoor portion of the loop water system. Inadequate freeze protection can lead to coil damage.

**NOTE: A potential issue may arise during construction where the system fluid loop is drained after being cleaned, flushed and tested. BULLDOG units will not completely drain and may hold fluid in the condenser or heating coil. Extensive damage may result to internal components if the system fluid freezes unless adequate glycol is added.**

### REMOVE AIR FROM SYSTEM FLUID LOOP:

Air in the system impairs unit operation and can cause erosion in the system piping.

### AIR BALANCING:

Air balancing of the system should be performed while the unit's fan is operating at high-speed. In order to ensure the fan is operating at high-speed, the unit must be placed into cool mode.

**CLEAN UNIT FILTERS:**

Confirm that the unit filters that are being used are clean. This contributes to the proper operation of the unit by ensuring that there is adequate air flow across the coil.

**SAFETY NOTE:**

**In the following part of the procedure it will be necessary to access the areas around the electrical wiring and the circuit board. Do not adjust or remove any board connections or wiring connections to other components without first powering down the unit. Disconnects are usually within reach of the unit. Exercise caution at all times.**

Inspect the fan section to ensure that it is clear of any debris and that the fan rotates freely.

BULLDOG (008-060) units come equipped with a single-phase fan and single phase compressors that are matched to each other as well as the other internal components.

Although internal connections to the fan and compressor are made at the factory, variances in power supply in the field will require that components be tested for correct operation. The procedure is outlined below:

- Single phase fan motors will always turn in the right direction and are not phase rotation sensitive.

If the operation is correct, power OFF the unit and replace the thermostat block, the electrical panel cover, and the front panel of the unit.

**NOTE: This equipment is designed for indoor installation ONLY.**

# BULLDOG SideWinder – Installation, Operation, and Maintenance Manual

## START-UP

To register the unit warranty proper start-up is required by a factory approved technician. The following items must be recorded and returned to the factory to register the warranty. The factory reserves the right to refuse warranty if these details are not provided.

### Start Up Record

Page \_\_\_\_\_

Project: \_\_\_\_\_ Date: \_\_\_\_\_ Tech: \_\_\_\_\_

Location _____	<b>H</b> EWT _____	<b>C</b> EWT _____	Fan Amps _____
Model No. _____	<b>E</b> EAT _____	<b>O</b> LWT _____	Compr Amps _____
Serial No. _____	<b>A</b> LAT _____	<b>O</b> EAT _____	Cond.Trap _____
Voltage _____	<b>T</b> Valve <input type="checkbox"/>	<b>L</b> LAT _____	S/R Correct <input type="checkbox"/>
Remarks		Sight Glass <input type="checkbox"/>	Fan Rotation <input type="checkbox"/>
		Belt Tension <input type="checkbox"/>	Comp Rotation <input type="checkbox"/>

S/R = Supply and Return

Location _____	<b>H</b> EWT _____	<b>C</b> EWT _____	Fan Amps _____
Model No. _____	<b>E</b> EAT _____	<b>O</b> LWT _____	Compr Amps _____
Serial No. _____	<b>A</b> LAT _____	<b>O</b> EAT _____	Cond.Trap _____
Voltage _____	<b>T</b> Valve <input type="checkbox"/>	<b>L</b> LAT _____	S/R Correct <input type="checkbox"/>
Remarks		Sight Glass <input type="checkbox"/>	Fan Rotation <input type="checkbox"/>
		Belt Tension <input type="checkbox"/>	Comp Rotation <input type="checkbox"/>

S/R = Supply and Return

Location _____	<b>H</b> EWT _____	<b>C</b> EWT _____	Fan Amps _____
Model No. _____	<b>E</b> EAT _____	<b>O</b> LWT _____	Compr Amps _____
Serial No. _____	<b>A</b> LAT _____	<b>O</b> EAT _____	Cond.Trap _____
Voltage _____	<b>T</b> Valve <input type="checkbox"/>	<b>L</b> LAT _____	S/R Correct <input type="checkbox"/>
Remarks		Sight Glass <input type="checkbox"/>	Fan Rotation <input type="checkbox"/>
		Belt Tension <input type="checkbox"/>	Comp Rotation <input type="checkbox"/>

S/R = Supply and Return

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## MAINTENANCE

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**WARNING:**

**To prevent injury or death due to electrical shock or contact with moving parts, disable the unit using the disconnect before servicing.**

**INSPECT FILTERS:**

Establish a regular maintenance schedule. Clean filters frequently and replace as required. A vacuum can be used to clean filters, as well as the surface of coil components.

To remove the filter from the unit, slide out the filter when the front panel is opened or removed.

**CHECK FAN MOTORS ANNUALLY:**

All BULLDOG Heat Pumps are permanently lubricated when shipped from the factory. Do not oil fan motors.

**VISUAL INSPECTION:**

Visually inspect units and give special attention to hose assemblies. Note any signs of deterioration or cracking and repair leaks immediately.

**AMPERAGE CHECK ON COMPRESSOR AND FAN MOTOR:**

Current draw on this equipment should not exceed normal full load or rated load amps by more than 10 percent of the values noted on the unit nameplate.

**SAFETY CONTROL RESET:**

All BULLDOG Heat Pumps include high and low pressure switches to prevent the machine from operating under abnormal conditions of temperature or water flow. If multiple pressure alarms occur in 24 hours, the compressor operation will be permanently locked out until the unit is reset, or power is disconnected for 20 seconds.

**NOTE:** If the heat pump must be reset more than twice, check the unit for a dirty air filter, abnormal entering water temperature, inadequate water flow (delta T method), or internal malfunctions that may be causing high or low pressure conditions. If the unit continues to alarm, contact a trained service technician and ensure the problems are resolved before continuing use of the unit.

**ΔT Method:** The normal water temperature differential for a BULLDOG Heat Pump is 8-15°F (4.4-8.3°C) in heating and 10-15°F (5.5-8.3°C) in cooling.



**CAUTION:** Any time an abnormal issue arises that results in a decision to disconnect power, also shut off the water supply and return valves to isolate this heat pump from the building water supply. Failure to shut off the water supply and return isolation valves may lead to product and/or property damage.