



Installation Operation Maintenance

SpaceKeeper Console
BULLDOG Heat Pump



SpaceKeeper Console
Models: SKC008 - SKC015



www.bulldogheatpump.com



No other heat pump does more, with less.

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INFORMATION

Handling

Care must be taken in handling the SpaceKeeper Console units and other accessories to ensure that this equipment does not sustain any damage. It is recommended that the units be transported individually on a two-wheel cart.

The protective shipping 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 shall 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.

If indoor storage is not possible, the equipment may be stored outdoors during the summer months only, if the following provisions are met:

The equipment must be placed on a dry surface, or raised off the ground in a manner which allows for air-circulation beneath the unit.

A waterproof tarp must be used to cover the equipment in order to provide protection from the elements.

Continuous ventilation to the units must be provided to help prevent moisture accumulation on the interior and exterior surfaces. Moisture buildup on, or within the unit's insulation may result in microbial growth that can lead to odors and serious health-related IAQ problems.

The units must be stored in their original packaging.

The individual units shall not be stacked on top of one another.

If the unit was previously in use, ensure that all water has been blown out and that all hose connections are plugged during storage.



REFRIGERANT CHARGE

Unit Model	008	010	012	015	018
R410A Charge (oz.)	27	27	30	35	45

Weight/Dimensions/Clearances

Weight & Dimensions:

Model	008	010	012	015
Weight (lb)	160	160	165	175
Dimensions (W X H X D)*	48 X 25 $\frac{1}{8}$ X 12 $\frac{3}{8}$			

*Dimensions with standard 5" base. Other heights available. Consult factory.

Unit Clearances:

The BULLDOG SpaceKeeper Console unit was designed with the idea of minimal service clearances. The manufacturer recommends keeping 24" clearance in the front of the unit.



INSTALLATION

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 when repair in place is exercised. The installing contractor will be responsible for removing the unit if it is not serviceable in place.

DELIVERY AND GENERAL INSTALLATION CHECKLIST

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 deficiency is found.
2. Verify the model.
3. Verify that the power supply complies with the nameplate specification.
4. Reinstall card board sleeve on unit to protect during construction.

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).

Installation Procedure

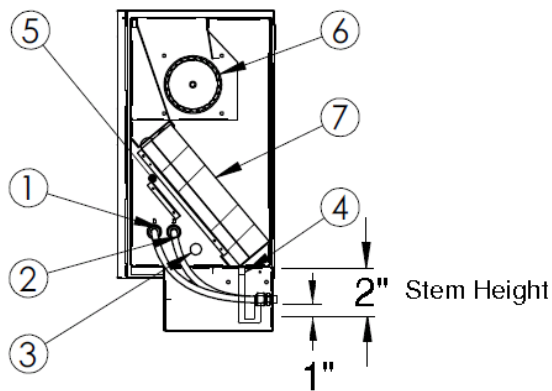
1. This heat pump unit is to be installed within an indoor environment. Locate the unit in an area where the surrounding air temperature is above 45°F (7°C) at all times. Do not attempt to locate the unit in an area that may be subjected to freezing conditions.
2. Determine the mount location of the heat pump unit in accordance with the clearances specified on page 4, as well as the location of the building's water and electrical supply lines. Receptacle, Electrical Box and Piping and Receptacle Plate are all sold separately. These components are optional and may be supplied by others.
3. Position the Piping-and-Receptacle Plate, when supplied; see **Figure 1 Piping and Receptacle Plate (optional)** over the building's supply, return, and condensate fluid lines. Install isolation valves on each of the pipes to facilitate removal and servicing of the unit in the future. Flush lines prior to installation of hoses to the building's supply and return lines. See Figure 2 and Figure 3.
4. Screw hanging strip to the drywall by locating the studs. Hanging strip design includes various holes to ensure that stud spacing and location isn't an issue during installation. The hanging strip must be level. See Drawing 1
5. Hanging strip must be mounted 23-1/8" high to ensure the console unit rests on the floor. Height tolerance of + or - 1/8".



6. Slide Console cabinet lip over the hanging strip. Hanging strip ensures console unit is held flush against the wall and to prevent the unit from tipping. It is not meant to carry the weight of the unit. It is the responsibility of the installers to make sure the unit weight is supported by the floor. See Drawing 2
7. The electrical receptacle outlet that may be included as part of the optional Piping-and-Receptacle Plate must be preinstalled in the designated cavity. See **Figure 1 Piping and Receptacle Plate (optional)**. Note the electrician must take out the outlet and reinstall after wiring. For receptacle and box supplied by others, the installer must ensure the electrical box is installed within reach of the console unit's power plug. See Drawing 3
8. Firmly grasp the front panel cover of the console and remove it by lifting it up and away from the heat pump unit.
9. For the console to be properly connected to the supply, return and condensate pipes the unit must be located in a position where these pipes are easily accessible through the black mounting base with the front panel removed.
10. With the front panel cover removed, locate the three fluid hoses that are attached to the unit's supply, return, and condensate connections. Carefully remove these hoses. The heat pump end of the supply and return hoses have swivel connectors. The condensate hose has a hose clamp.
11. Permanently affix the threaded end of the supply and return hoses (NOT the swivel connector) to the building's supply and return lines which protrude through the back mounting base. Ensure that the supply and return pipes have isolation valves.
12. The three hoses that have been affixed to the building's supply, return, and condensate piping should at this point be accessible through the bottom of the heat pump unit. Using the swivel connectors, re-connect the supply and return hoses to the appropriate locations on the heat pump unit. Attach condensate hose to drain pan of unit and attach with hose clamp provided.
13. Ensure that the condensate drain connection is positioned so that there is adequate Stem height to generate a water seal when the fan is operating on high speed. This should be approximately 2". See below. Slide condensate hose over condensate line and attach with hose clamp supplied.
14. Connect the room thermostat to the electrical panel as indicated on the wiring diagram. For thermostat wiring, see **Drawing 4**. Plug the unit's electrical cord into the supply outlet that is located behind the unit.



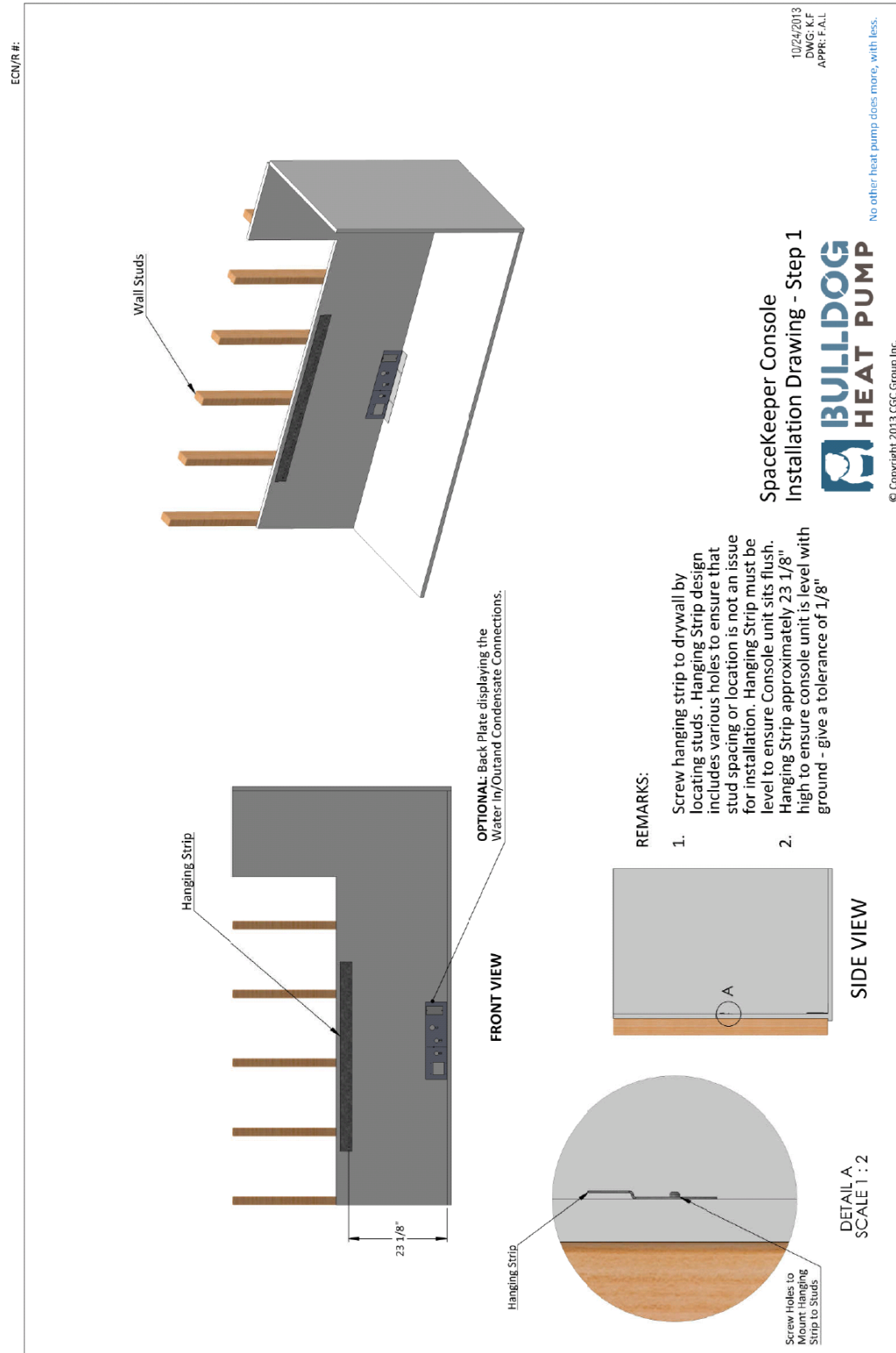
15. Re-attach the heat pump unit's cabinet cover and front panel cover. Installation of the unit is now complete.



- ① Water In - 1/2" FPT
- ② Water Out - 1/2" FPT
- ③ Power Cord Access
- ④ Condensate Drain - 3/4" ID hose
- ⑤ Filter Location
- ⑥ Fan Housing
- ⑦ HW and DX Coil



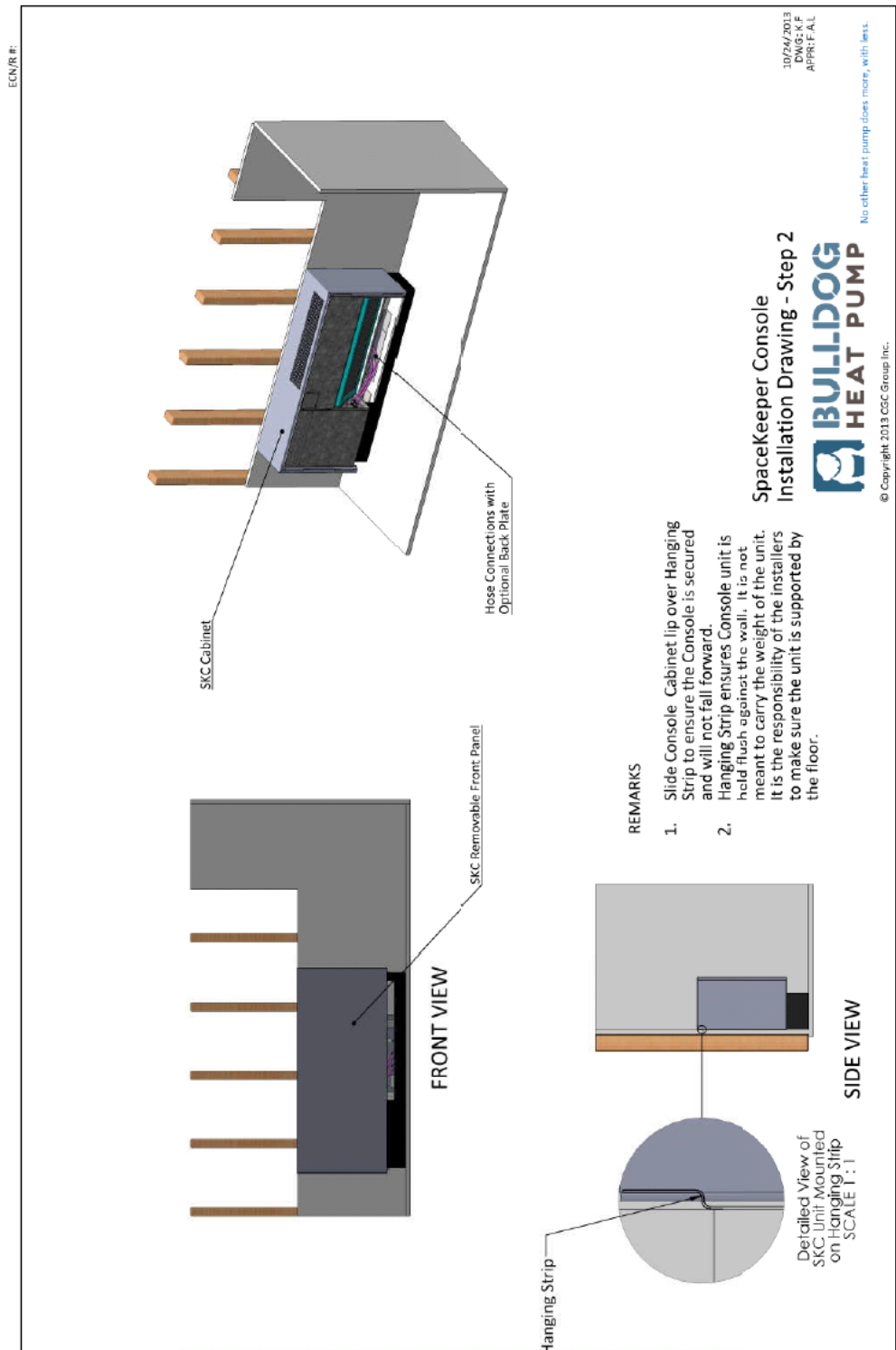
INSTALLATION



Drawing 1



SpaceKeeper Console (SKC) – Installation Operation Maintenance Manual



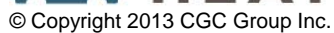
Drawing 2



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No other heat pump does more, with less.






Electrical Wiring

Main Wiring

Electrical box and receptacle supplied by others to be mounted and wired to the Piping and Receptacle Plate if supplied or mounted within reach of the console unit's power cord.

Receptacles required to match factory supplied cord are as follows.

Current (A)	Phase	Voltage (V)	Factory Part #	Configuration
15	1	208-230	PWR-0401	
20-25	1	208-230	PWR-0402	
30	1	208-230	PWR-0404	

Note: Ensure that the ground wire is fastened to the box **and** receptacle.



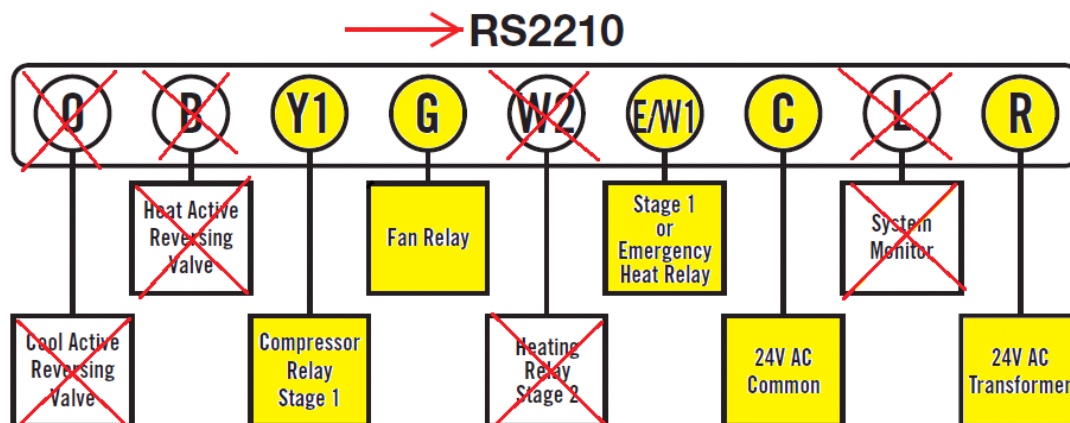
Control Wiring

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.

Wire **ONLY** to the Yellow marked connectors



Drawing 4

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.



SpaceKeeper Console (SKC) – Installation Operation Maintenance Manual

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.

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
- Low Pressure Switch
- 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 on multi speed units.
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 also 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 5 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 with the 5 minute 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 60°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 35°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 5 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 15 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 and a third shutdown within 24 hours 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 35°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 60°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 on LED 15 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 on LED 15 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 on LED 15 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 on LED 15. 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 3 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.



COMMISSION & START UP

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.**

Fan Rotation

Single phase units with EC motors always spin in the right direction.

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

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 _____	H EWT _____	C EWT _____	Fan Amps _____
Model No. _____	E EAT _____	O LWT _____	Compr Amps _____
Serial No. _____	A LAT _____	O EAT _____	Cond.Trap _____
Voltage _____	T Value <input type="checkbox"/>	L 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 _____	H EWT _____	C EWT _____	Fan Amps _____
Model No. _____	E EAT _____	O LWT _____	Compr Amps _____
Serial No. _____	A LAT _____	O EAT _____	Cond.Trap _____
Voltage _____	T Value <input type="checkbox"/>	L 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



MAINTENANCE

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 lift the front access panel up and away from the heat pump. Then pull the filter up and pull it out of the unit. Install new filter by sliding into the rack, then pushing it to the bottom.

Check Fan motors annually:

All BULLDOG Heat Pump fan motors 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.



FLASHCODE (LD15)
 1 - Cool Call In Place
 2 - Low Refrigerant Pressure (LP)
 3 - High Water Temperature (TW)
 4 - Low Discharge Air Temp (TA)
 5 - Low Refrigerant Pressure (LP)
 6 - High Refrigerant Pressure (HP)

TYPICAL 24VAC DIGITAL THERMOSTAT

OPTIONAL COMPRESSOR DISABLE (24V TO DISABLE)
 B/U
 L202

OPTIONAL REMOTE SHUTDOWN (24V TO SHUTDOWN UNIT)
 A/W
 L204

24VAC
 L201
 L203
 L204
 L205
 L206
 L207
 L208
 L209
 L210
 L211
 L212
 L213
 L214
 L215
 L216
 L217
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NOTE

- 1) Alarm OK = Alarm LED ON
- 2) Flash code will display most recent safety shutdown.

To reset flash code turn power off for 10 seconds.

LEGEND
--- = Field Wiring By Others



BULLDOG HEAT PUMP

Installation Operation Maintenance Manual is Subject to Change without Notice Last Revised Nov 15, 2019

No other heat pump does more, with less.

DETAILS

Dimensional Diagram: Piping and Receptacle Plate

Note: The fresh air damper mechanism is optional

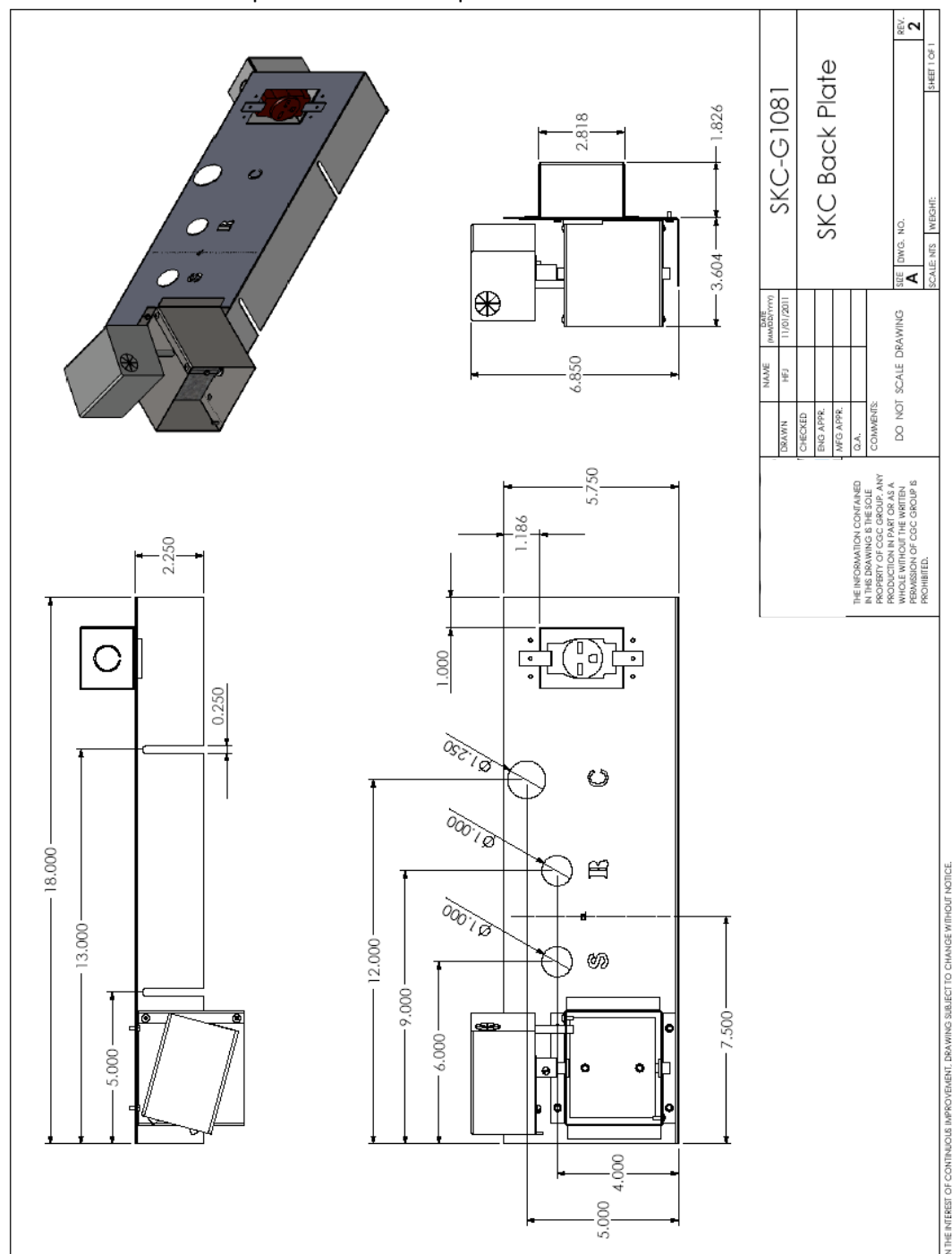


Figure 1 Piping and Receptacle Plate (optional)



SpaceKeeper Console (SKC) – Installation Operation Maintenance Manual

SpaceKeeper Console: Hose Assembly Connection

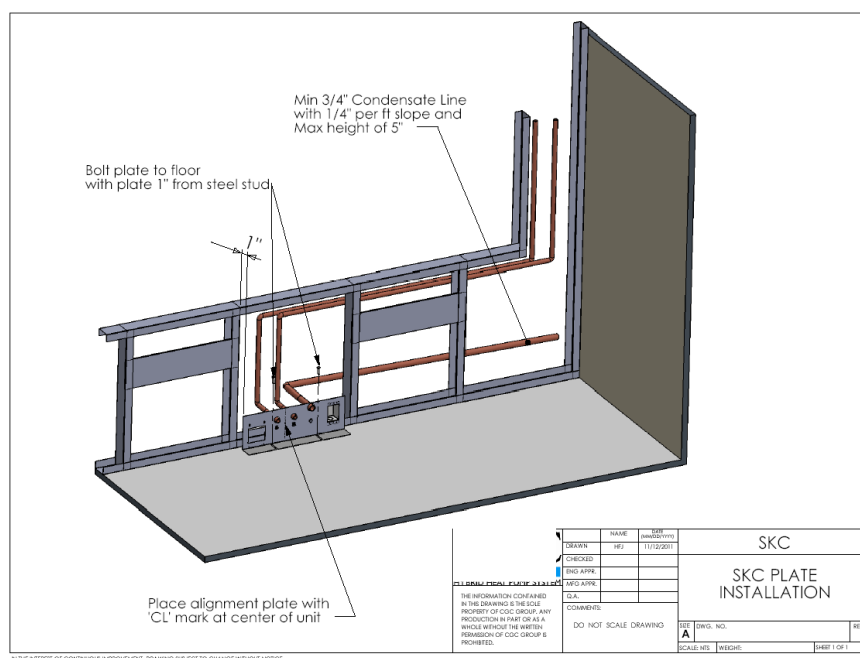


Figure 2

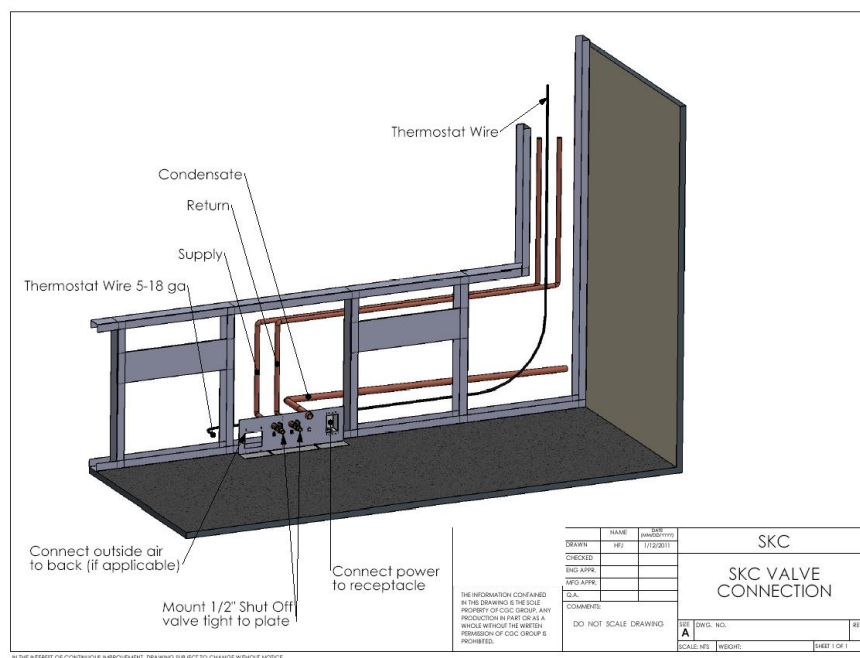


Figure 3

