Bio Smart Technologies

BioSmart® In-Wall Far Infrared Heaters. *Feel the Difference.*

BIOSMART®
Therapeutic Infrared Heat

Installation and Operator's Manual

Therapeutic infrared heating systems for a green, healthy environment

In-Wall Series

Bio-1000F

Bio-1200F

Save these Instructions

Includes:

- Product information
- Thermostat options
- Installation guidelines
- Operating Instructions
- Technical Specifications
- Warranty & Service instructions

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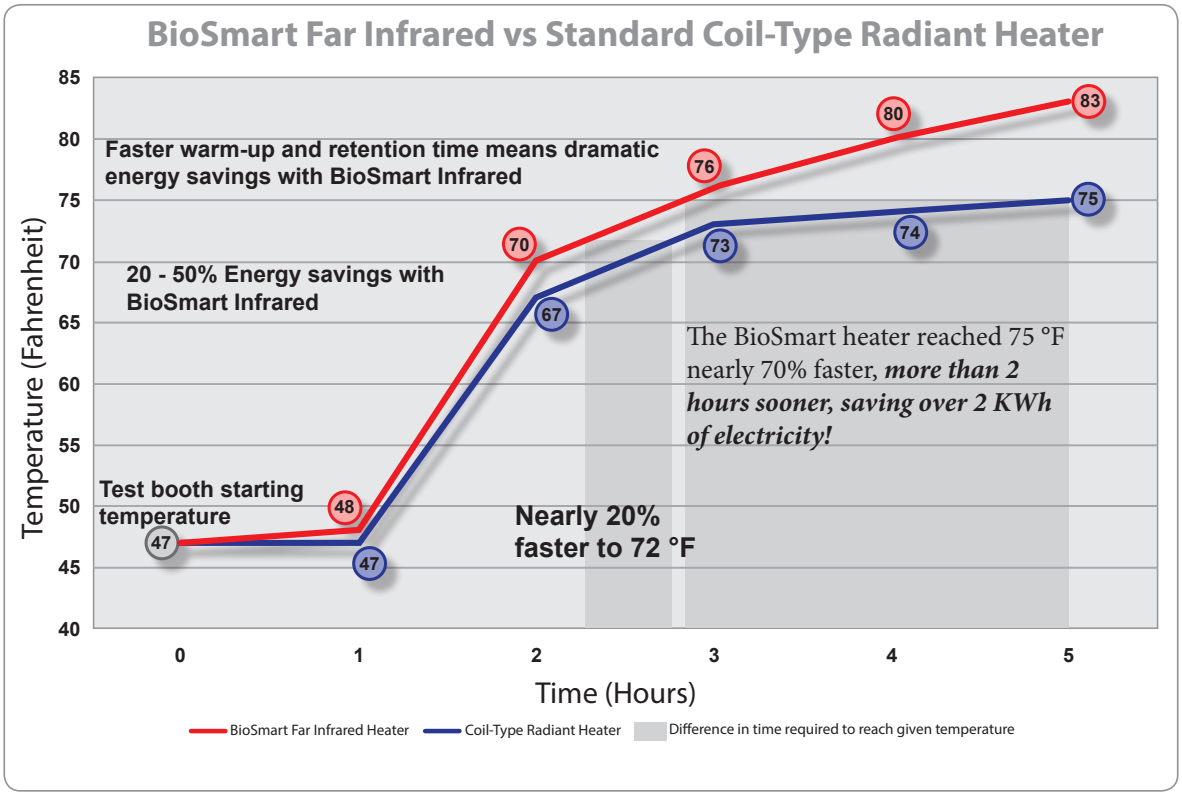
Section 1 - Understanding BioSmart Infrared Technology

Infrared technology is not new, however, the use of commercial infrared technology for zoned interior applications is relatively new. BioSmart Technologies was the first U.S. company to obtain a U.S. patent for modular infrared heating systems that utilize industrial grade ceramic plates. The use of ceramic plates to generate infrared heat produces a specific wavelength that allows the heat that is generated to be absorbed much faster by objects in the room. The chart below shows the actual rise in temperature in an infrared test booth measuring 8'×8'×30'. The test provides a comparative analysis between several conventional radiant heaters and a BioSmart in-wall infrared heater.



Infrared waves in the 4-12 micron range are absorbed rapidly by organic materials, especially water. Since the human body is composed mostly of water, a room heated with infrared heat of this specific wavelength will appear to be warmer than the same room at the same temperature warmed by radiant heat of a different wavelength. It works so well that infrared in this specific wavelength is used for all medical therapies and devices. In medical applications, this wavelength is usually produced in laser assisted devices. To produce this wavelength efficiently to heat a room, you need to use ceramic plate technology. This technology should not be confused with the technology labeled "ceramic" that is used in portable ceramic heaters or PTC plates. These devices produce internal temperature between 125-160°F. To produce infrared waves in the wavelength of 4-12 microns, the internal heater temperature needs to be between 350-400°F. Quartz tube infrared heaters produce a lot of infrared heat in this wavelength but they also produce a lot of visible light, which is wasted, which makes them less efficient than ceramic plate technology.

Infrared waves in the 4-12 micron range travel in a straight line and cannot be directed or channeled through a heat duct in a conventional HVAC system. For this reason they must be generated at their source in the room that they are heating. The internal cavity in the BioSmart heat exchanger is lined with a special copper liner which reflects the infrared out of the heat chamber in a straight line directly into the room. This is one of the reasons why BioSmart Infrared technology is so efficient.

Section 2 - Unpacking

It is important that you remove the packing materials and closely examine your unit before installing. Check to make sure that all the necessary installation hardware is included. Inspect the unit for any shipping damage that may have occurred. Once you have done this, it is best to review the first five (5) sections of this manual before proceeding to install the unit. You should have:

- The correct unit for your line voltage. Check the voltage and wattage for your application to make sure that your order was filled accurately.
- Two sets of mounting brackets. One set for new construction and another set for retrofit installations.
- Two sets hardware. One set includes the screws for the mounting brackets. The second set includes the screws for mounting the faceplate along with plastic inserts to cover up the screws.

Section 3 - For your Safety / Warnings

WARNING

ANY REQUIRED SERVICE SHOULD ONLY BE PERFORMED BY AN AUTHORIZED SERVICE REPRESENTATIVE

CAUTION: RISK OF ELECTRICAL SHOCK
DISCONNECT POWER BEFORE SERVICING

READ ALL INSTRUCTIONS BEFORE INSTALLING AND USING THE HEATER

- DO NOT alter the heater's design, or you will void the warranty.
- DO NOT block the front of the heater.
- DO NOT place anything directly in front of the heater.
- DO NOT cover the unit as this may block airflow and cause the heater to malfunction.
- DO NOT insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or damage the heater.
- Heater has hot parts inside. DO NOT use it in areas where gasoline, paint, or flammable liquids are used or stored.
- Do not block air intakes or exhaust in any manner.
- Use this heater only as described in this manual. Any other use not recommended by the manufacturer may cause fire, electrical shock, or injury to persons.
- Do not place objects directly in front of infrared wall units. Doing so will cause the unit to overheat, which will trigger the high temperature limit switch. If this should occur, remove any objects that are causing the obstruction before re-setting the High-limit switch

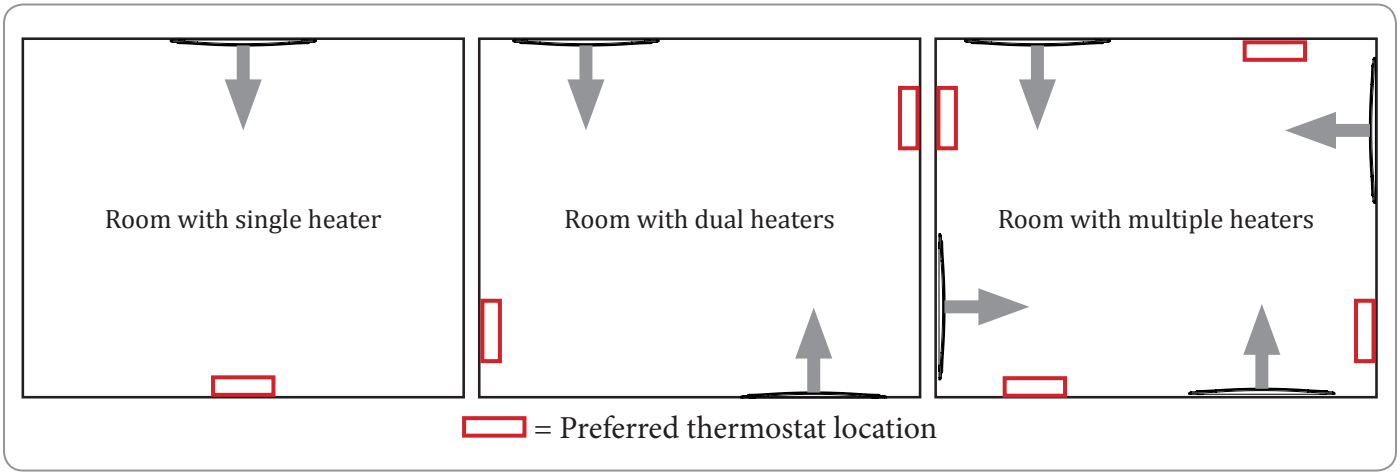
Section 4 - Installation Requirements

Installation requirements for a BioSmart infrared wall heater are as follows:

- The heater requires a power supply consisting of two power leads and a ground.
- The heater also requires two thermostat wires running from the small terminal block inside the heater to a remote millivolt thermostat.
- If a WiFi compatible thermostat or standard programmable HVAC thermostat is being used it is important to remove the small ceramic terminal block and install the BioSmart conversion module. The new module will require a four (4) wire hook-up. Two wires supply 24VAC to the thermostat; the other two wires supply 24VAC to the relay that triggers the millivolt circuit inside the heater.

Heater Location

For best performance it is recommended that the air flow pattern in the room becomes circular. This is accomplished by mounting the heater to one side of the room, as per the illustration, in order to create a circular flow around the room. Where multiple units are installed in larger rooms, this circular pattern can be maintained by positioning the units to complement the air flows. This is accomplished by positioning them in opposite corners of the room.



Thermostat Location and Requirements

- The thermostat should be located on an adjacent wall or on the opposite wall facing the heater. The thermostat wires are standard 24VAC wires (sometimes called “bell wire”) with a load capacity of about 1-2 Amps. Usually a 22 gauge wire will be sufficient.
- The thermostat of your choosing may require two or four (4) wire hook-up as explained above. The thermostat and Romex (power line) are run through the wall prior to application of the sheetrock in new construction. Retrofit installations require a little effort to run the power and thermostat wires up the wall into the ceiling and back to the fuse panel and thermostat location.

Thermostat Options

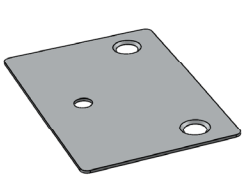
BioSmart infrared heaters are activated via a solid state relay. The relay is triggered by completing a millivolt signal that is generated through the heaters control board. Closing the millivolt circuit can be accomplished in any number of ways including:

- The use of a simple millivolt thermostat
- The use of a programmable millivolt thermostat
- The use of any 24 volt HVAC thermostat. A 24 volt BioSmart conversion module is required and is installed inside the heater to supply the power requirements of the HVAC thermostat.
- The use of any WiFi programmable thermostat. A 24 volt BioSmart conversion module is required and is installed inside the heater to supply the power requirements of the HVAC thermostat.
- The use of any smart thermostat including the NEST or EchoBee. A 24 volt BioSmart conversion module is required and is installed inside the heater to supply the power requirements of the HVAC.
- The use of any computerized or WiFi controlled PC board. BioSmart carries a range of wireless controllers capable of controlling as many as 150 units on a single board. This provides practical applications for institutional spaces including, offices, schools, hotel rooms, assisted living centers, and any other zoned heating requirement that is to be controlled from a single point of administrative control. Administrative controls can also be used to override individual thermostat settings during certain hours of the day.

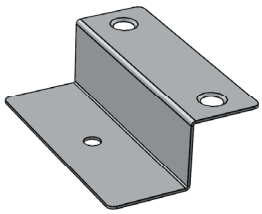
As you can see, when choosing the thermostatic controls that are right for you, there is a broad range of features and price ranges when it comes to choosing a thermostat.

Section 5 - Mounting Instructions

The BioSmart heater was designed for installation in a standard 2"×4" wall with either 1/2" or 5/8" sheetrock. There are two sets of mounting brackets:



Retrofit Installation Bracket



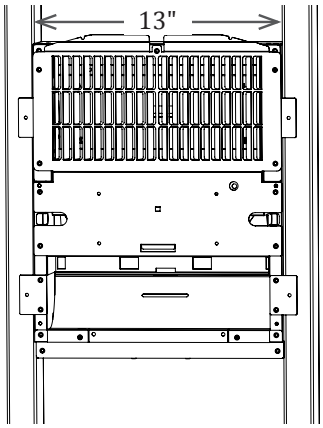
New Construction Bracket

New Construction

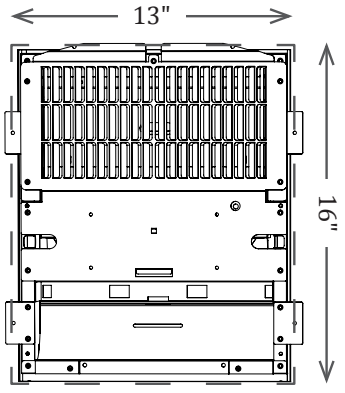
If the new construction brackets are to be used, the heater is installed before the sheetrock is applied to the wall. See diagram below for proper measurements. The mounting studs should be thirteen (13) inches apart.

Retrofit Installations

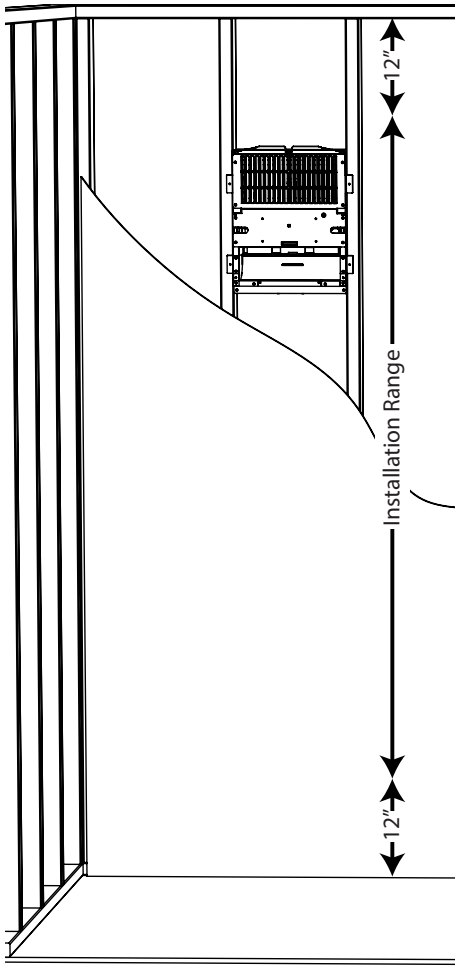
If this is a retrofit installation the cut out for the installation should be between two wall joists and should measure 13" W × 16" H. The retrofit brackets will require 4 butterfly screws or similar to hold the heater in place.



New Construction
Stud Spacing



Retrofit Construction
Hole Size



Installation Range

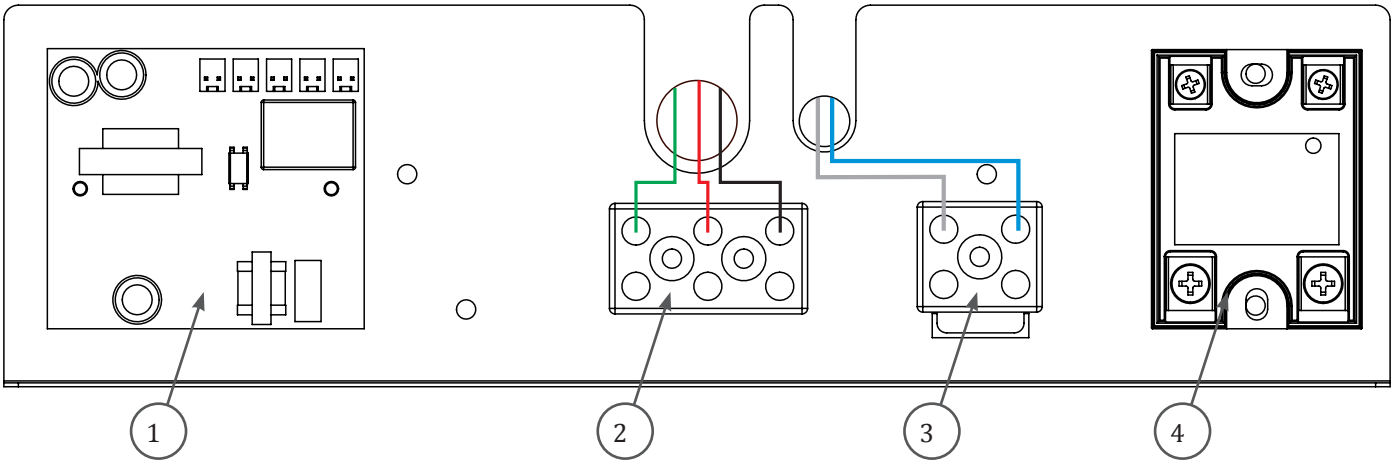
Warning: The heater is always mounted with the heat vent on top and the cold air intake at the bottom. Never mount the heater up-side down.

Warning: Do not mount the heater in a flat ceiling.

The heater should be mounted at least twelve (12) inches above the floor but no higher than twelve (12) inches from the ceiling.

If the ceiling pitch is greater than a 4/12 pitch, as is the case with cathedral ceilings, the BioSmart unit may be mounted anywhere in the celling but no higher than 36" from the top of the ceiling. Once the unit has been mounted in the wall, the final wire connections to the heaters PC board need to be made before connecting the power line to the fuse panel.

Wiring Instructions



Legend

1. PC Board
2. Terminal block for power hook-up
3. Terminal block for thermostat hookup
4. High voltage relay

(See “Schematic” on page 8 for the full wiring diagram.)

Section 6 - Operating Instructions

The heater will function automatically based upon the thermostat settings that control its operation. Your thermostat settings will determine your comfort levels and energy savings. Be sure to familiarize yourself with your thermostats operations and features in order to get the most advantage from your infrared heaters technology.

Section 7 - Maintenance Requirements

It is important that the intake grill is periodically vacuumed off to prevent dust from accumulating on the fan blades. It is also a good idea once a year to remove the front panel and vacuum off the fan blades and ceramic plates. Air pressure from a can of PC board aerosol can also be used to clean the fan blades. The fans in your infrared heater are state of the art. They require about 4 watts each to operate, and are built to last at least 50,000 hours. Life expectancy is usually about 10 years.

Section 8 - Diagnostic Information

Overview

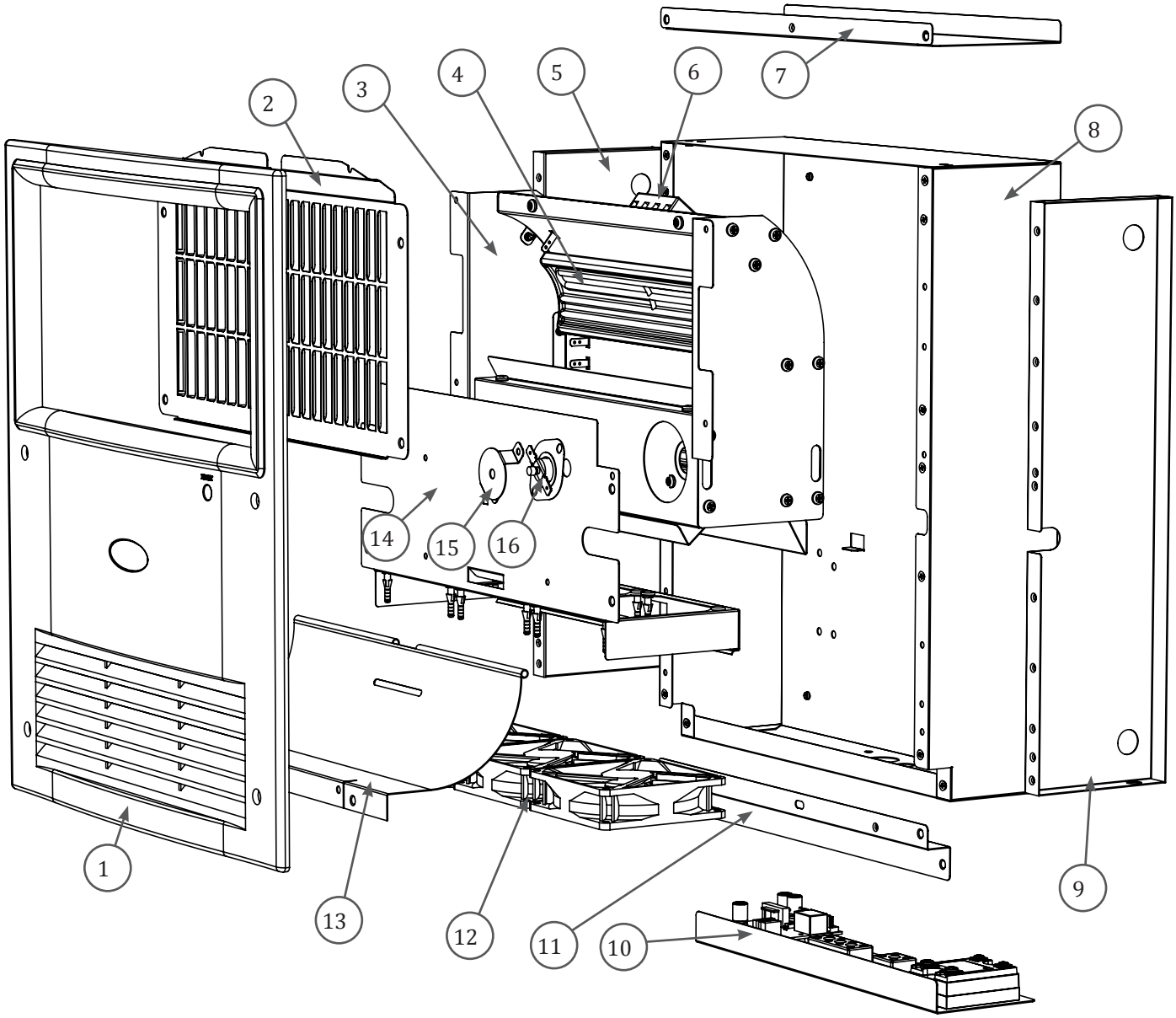
Your BioSmart infrared heater is powered by a state-of-the-art micro PC board. The latest advances in surge protection and reliability are built into your unit. If the heater should cease functioning as it is designed to do, we recommend the following diagnostic procedure in order to isolate any eventual problem that may be incurred.

Troubleshooting

It is recommended that step B should be performed by a knowledgeable service technician.

The heater does not turn on	A	Check the breaker in the fuse panel Check the thermostat batteries if so equipped Check the reset button on the front of the plastic cover and push to reset
	B	Remove the plastic front cover by removing the four screws and lifting up to disengage the top flange on the cover Remove the bottom fan baffle screws to expose the PC board and the solid state relay Inspect the wiring for obvious damage Use a volt meter to determine if there is power running into the large ceramic terminal block from the fuse panel Short the two thermostat wires that run to the board. This will activate the relay and start the heater. If this works the thermostat is bad. If not proceed With the thermostat wires connected together check to see if the red LED on the relay is on. If not, check the voltage to the relay with a volt meter. The voltage to the relay should be 12 volts DC. Make sure the meter is set to measure DC voltage. If there is voltage to the relay, then the relay is bad. If there is no voltage to the
Burning smell	A	Nothing inside the heater can burn, however, dust will settle during dormancy and when the heater is turned on in early fall the burning smell is dust on the plates. It will subside after a few minutes. It is recommended to vacuum out the front grill and the ceramic plates before putting the heater in service during the fall season.
	B	If the burning smell persists, the unit must be opened-up to determine the cause. Possible causes are overheating of the 24 volt thermostat module on systems that are so equipped. Another possibility is a faulty high-limit switch that shorts to ground but this also causes the heater to automatically shut-down.
The heater gets too hot causing the high limit switch to trip	A	One or more of the fans is not working. While the heater is on, use a flashlight to determine if all three fan motors are running. If not, further testing is required to determine whether you have a defective fan motor or a defective PC board.
	B	Remove the plastic front cover by removing the four screws and lifting up to disengage the top flange on the cover. Remove the bottom fan baffle screws to expose the PC board and the solid state relay. With the heater turned on, disconnect the suspected fan and measure the voltage pins on the PC board to see if there is 12 volts DC going to the fan. If not, you have a bad PC board. Note: The center fan does not turn on until 5 minutes after the heater has begun operations. The center fan continues to run 3 minutes after the heater has shut off in order to cool the heater down. This test must be conducted after the heater has been running for 5 minutes if you are checking the operation of the center fan.
Excessive fan noise	A	Check to see if the excess noise occurs at start up or after 5 minutes of operation, this will eliminate the two outside fans or the middle fan from the diagnosis. You must have the unit opened up to replace a fan if necessary.

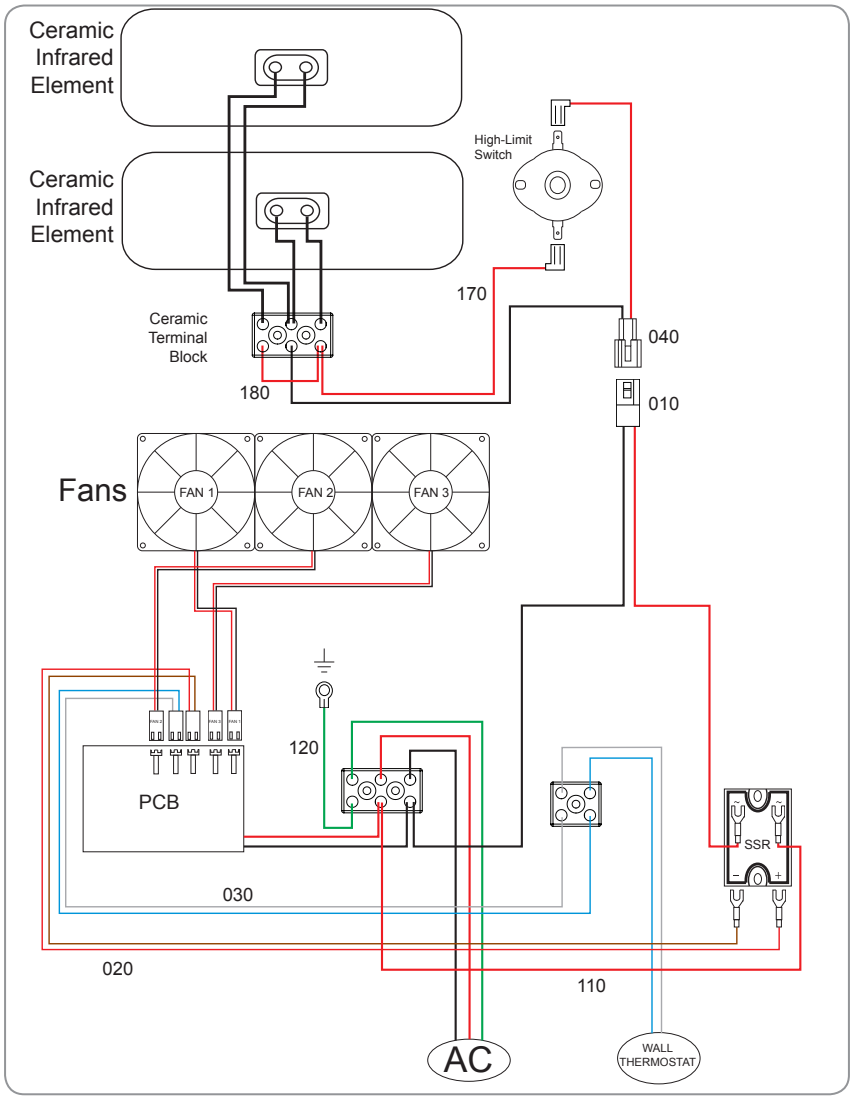
Component Diagram



Component Listings

1. Cover
2. Grill
3. Heat Chamber Assembly
4. Ceramic Element
5. Left Insulation Plate
6. Ceramic Terminal Block
7. Top Insulation Plate
8. Case
9. Right Insulation Plate
10. Electronics Mounting Plate
11. Bottom Cover
12. Fans
13. Intake Baffle
14. Fan Assembly
15. High Limit Cover
16. High Limit Switch

Schematic



Section 9 - Technical Specifications

Model BIO-1000F, BIO-1200F

- Cabinet: All metal - 22 & 24 gauge with synthetic, paintable plastic front cover
- Weight: 13 lbs
- Dimensions: 12 5/8" × 4" × 16" (W×D×H)
- Power Requirements: 120 or 220 volt AC
- Power Consumption: 1000W - 9A @ 120 volt, 4.5A @ 220 volt; 1200W - 10A @ 120 volt, 5.5A @ 220 volt,
- Chassis Safety Insulation: Exceeds all government and independent laboratory standards for safety in an installed heating appliance (a safety standard that exceeds other manufacturer's specifications).
- Internal Ceramic Blanket: Provides R 45 insulation between the wall and the heater. The heater cabinet remains cool to the touch while delivering warm (105° C) far infrared heat into the room.
- Life Expectancy: 25+ Years
- Thermostat Type: Any standard digital, programmable, or smart thermostat is compatible
- Safety Cut-Off: High-limit switch with manual reset prevents damage to the unit
- Zoned Heating: Can be controlled singly or in parallel with multiple units by any low-voltage computer terminal relay board, control panel, or WiFi thermostat.
- Heat Type: therapeutic infrared heat
- Heat Chamber: Copper-lined for maximum ion transfer
- Heating Elements: 2 ceramic far infrared emitters
- Infrared Emitter Life Expectancy: 60,000 hours
- Heat Output: 4,000 - 4,800 BTU infrared heat
- Fan System: 3 high volume, low noise 90mm DC Fans
- Fan Noise Level: 18 dB - practically silent
- Listed Approvals: C-TUV-US (International UL Equivalent)
- Warranty: 5-Year limited

WARRANTY & SERVICE

- BioSmart warrants this product, to the original purchaser or gift recipient, to be free from defects in workmanship and materials under normal use and service for a period of **one (1) year** from date of purchase. During this period BioSmart shall supply at no cost, excluding shipping, to the original purchaser, replacement parts as required to maintain product in good working order.

- BioSmart further warrants the infrared heating elements and fan motors, to be free from defects in workmanship and materials under normal use and service for a period of **five (5) years** from the date of purchase. During this period BioSmart shall supply at no cost, excluding shipping, to the original purchaser, replacement elements or fans as required to maintain product in good working order.

- Service labor: During the **five (5) year** warranty period, BioSmart shall provide free in-house repair service. At customer's discretion, customer may return any unit requiring repair to the BioSmart service center. BioSmart will perform all necessary repairs and return the unit to the customer. Shipping cost to and from the service center will be covered at customer's expense. Any repair items not covered under the above warranty shall be billed to the customer.

- BioSmart will not be liable for any field service or labor costs or expenses related to the repair or replacement of any heater unit or part that is repaired in the field.

Limitations

- All warranties implied by law, including the implied warranties of merchantability and fitness for a particular purpose, are expressly limited to the duration of the warranty set forth above. Some jurisdictions do not allow limitations on the length of the implied warranty, so the above limitation may not apply to you.

- In no event shall BioSmart be liable for any incidental or consequential damages, loss of profit, or medical expenses caused by any defect, failure, misuse, or malfunction of the product. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. The Company will not be responsible for the damages or losses, direct or indirect, caused by misuse, abuse, accident, negligence, conditions of transportation or storage, or failure to follow instructions or install its products correctly.

- The Company will not be responsible for any statements that are made or published by its dealers or representatives, written or oral, that are inconsistent with this written warranty, or which are misleading or inconsistent with the facts as published in the literature or specifications by the Company.

Warranty Restrictions

- You will be required to provide proof of purchase to BioSmart before receiving warranty parts or service.

- This warranty is invalid if the factory-applied serial number has been altered or removed from the product.

Warranty Claim Procedures - To obtain warranty service, you must:

- Contact the Dealer or installer you purchased your equipment from. Provide proof of purchase, if requested, and serial no. on the heating unit in order to obtain warranty coverage.

- Alternatively, you can call BioSmart directly for parts replacement per the warranty terms. You will be required to provide the serial no. and proof of purchase to obtain warranty service.

Warranty Registration No.

Dealer/Installer Information

Bio Smart® Far Infrared Heaters
Green Technology for a Modern World

North American Distribution and Sales

Bio Smart Technologies

18324 Cook Road, Suite 1
Yelm, Washington 98597

Customer/Warranty Service:
800-595-9605

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