



**STELPRO**

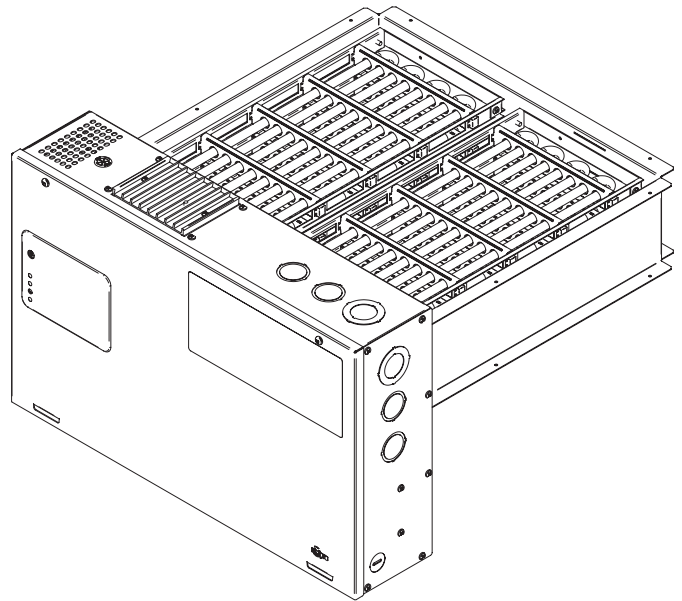
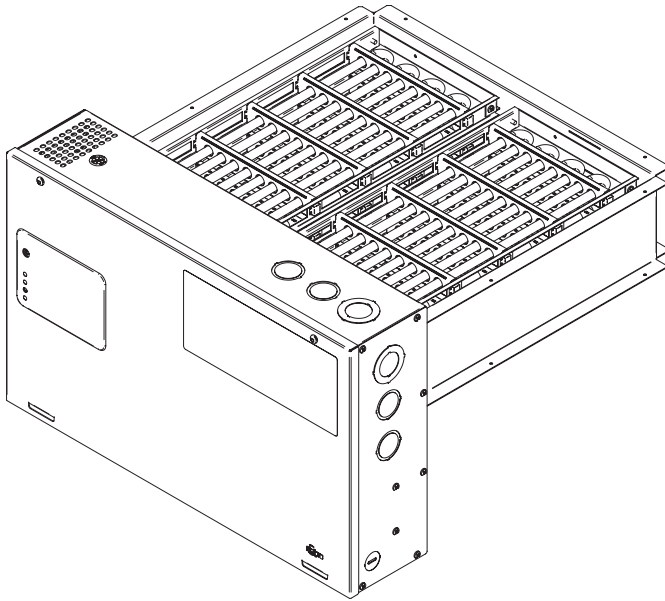
360 comfort

# INSTALLATION GUIDE

**SB SERIES / SB-M SERIES**

**DUAL ENERGY DUCT HEATER / MODULATING DUCT HEATER**

REPLACEMENT COMPONENT LIST INCLUDED



E322241



This section must be read carefully by the installer.  
The installer must also read the user's guide since it contains other important information.



## WARNING

Before installing and operating this product, the user and/or installer must read, understand and follow these instructions and keep them handy for future reference. If these instructions are not followed, the warranty will be considered null and void and the manufacturer deems no further responsibility for this product.

This product must be installed by a qualified person and connected by a **certified electrician**, according to the **electrical and building codes** effective in your region.

The following instructions must be adhered to in order to avoid personal injuries or property damages, serious injuries and potentially fatal electric shocks.

Make sure that all screws and electrical terminal connections are tightly secured before operating the unit in case they would have loosened during transportation.

Protect the heating unit with the appropriate circuit breaker or fuse, in accordance with the nameplate.

Make sure the line voltage (volt) is consistent with that indicated on the unit's nameplate.

This unit must be **grounded**.

Switch off the power at the circuit breaker/fuse before installing, repairing and cleaning the unit.

Make sure the unit is appropriate for the intended use (if needed, refer to the product catalog or a representative).

If the unit's capacity is insufficient for the size of the house, it will be in operation continuously, and may become defective earlier.

**Respect distances and positions** indicated in the installation section.

If the installer or the user modifies the unit, they will be held responsible for any damage resulting from this modification, and the UL certification could be void.

This unit must not come into contact with a water source and must be protected from splashes (e.g. a wet mop). Do not use it if any part has been immersed. Moreover, do not turn it on or off when standing in water or if your hands are wet.

When cutting a piece of steel for the installation of the return duct, do not damage electrical wiring of the unit.

Because this unit is hot when in use, it may pose risks even in normal operation. Therefore, be **careful** and **responsible** when using it. To avoid burns, do not let bare skin touch hot surfaces. Let the unit cool down for a few minutes before handling it (it stays warm for some time after shut-down).

Never block air vents. This obstruction could lead to overheating, which could result in a fire.

Do not insert or allow foreign objects to enter any air vent as this may cause electric shocks, fires, or damages to the unit.

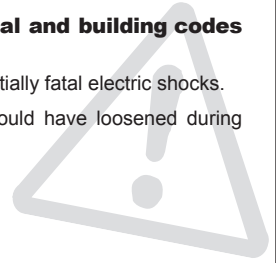
This unit has hot and arcing or sparking parts inside. It is not designed to be used or stored in wet areas or areas containing flammable liquids, combustible materials or corrosive, abrasive, chemical, explosive and flammable substances such as, but not limited to, gasoline, paint, chlorine and cleaning products.

Some areas are dustier than others. Thus, it is the user's responsibility to evaluate if the **filter must be changed** based on it. Accumulated dirt can lead to a component malfunction or discoloration (yellowing). It may cause a fire hazard if not installed and maintained in accordance with these instructions.

Thermal protection activation indicates that the unit has been subjected to abnormal operating conditions. If the thermal protection remains activated or activates and deactivates repeatedly, it is recommended that a qualified electrician or a certified repair centre examine the unit in order to make sure it is not damaged. (Refer to the limited warranty).

If the unit is damaged or defective, cut off power supply at circuit breaker/fuse and call a certified repair centre. (Refer to the limited warranty).

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.



**Note:** When a part of the product specification must be changed to improve operability or other functions, priority is given to the product specification itself. In such instances, the instruction manual may not entirely match all the functions of the actual product. Therefore, the actual product and packaging, as well as the name and illustration, may differ from the manual.

# SPECIFICATIONS

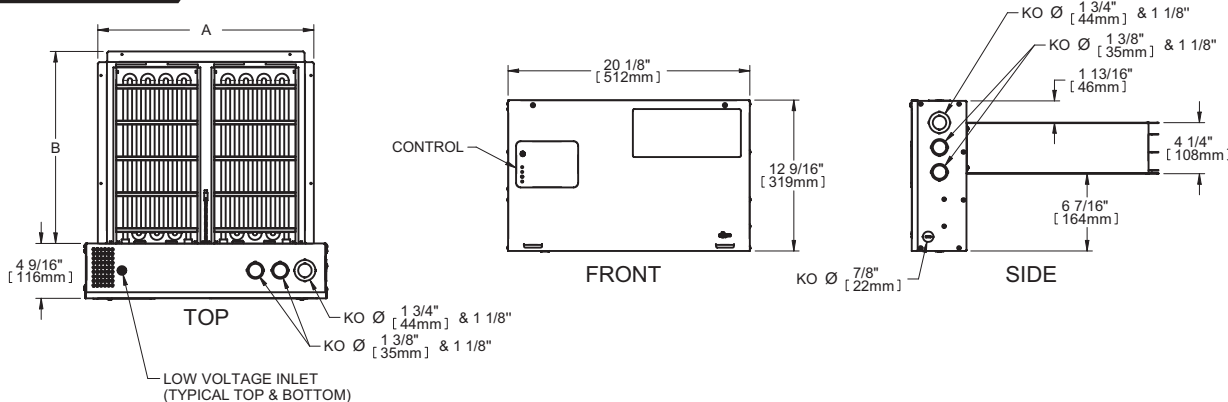
## SB DUAL ENERGY DUCT HEATER

TYPE	VOLTS	KW	AMPS	HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)	LB	KG
SB05	240/208	5.0/3.8	20.8/18.1	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB10	240/208	10.0/7.5	41.7/36.1	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB15	240/208	15.0/11.3	62.5/54.2	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB18	240/208	18.0/13.5	75.0/65.0	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB20	240/208	20.0/15.0	83.3/72.2	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB23	240/208	23.0/17.3	95.8/83.1	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB27	240/208	27.0/20.3	112.5/97.5	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
SB30	240/208	30.0/22.5	125.0/108.3	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5

**N.B. Please consult appendix 1 for more technical specifications.**

# TECHNICALS DRAWINGS

MODEL	A	B
16x18	18"	16"
19x19	19"	19"



# INSTALLATION

**N.B. Cut off power supply at circuit breaker/fuse before proceeding to the installation.**

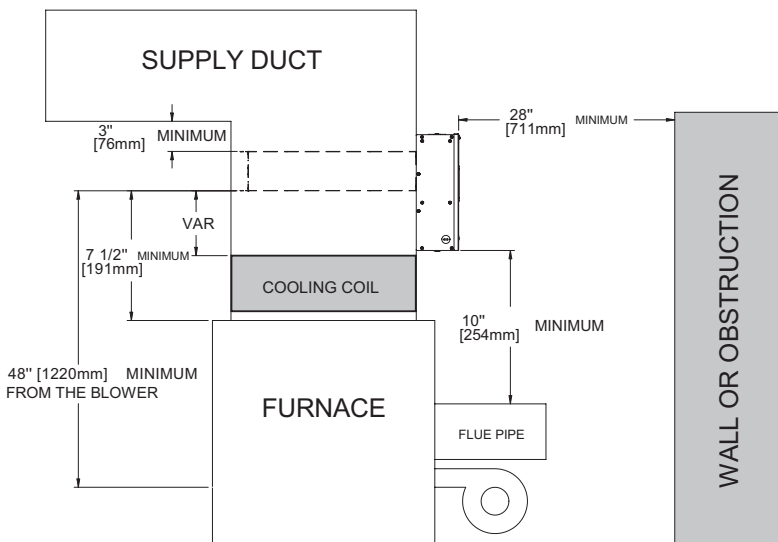
Please note that each SB duct heater is factory inspected before shipping in order to ensure that every component is operating efficiently.

The SB series dual energy duct heater is available in several models of various heating capacity (from 5 to 30 kW). All these models are designed to be installed downstream of the furnace, this is to say, on the supply side.

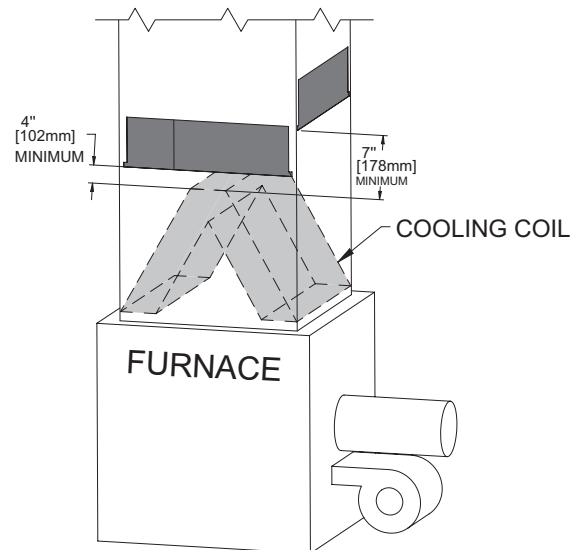
## INSTALLATION CLEARANCES

When performing the installation, respect clearances given by the following daigrams 2A or 2B.

A 28" front panel clearance is required to facilitate servicing.



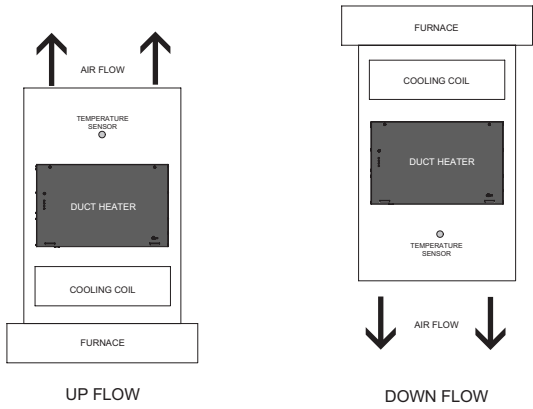
**FIGURE 2A**



**FIGURE 2B**

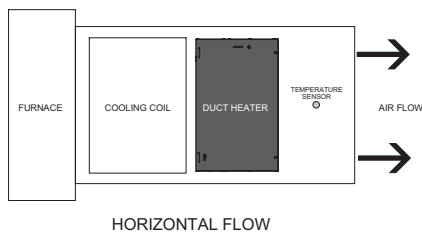
## DUCT HEATER ORIENTATION

The SB & SB-M duct heaters can be installed in a vertical or horizontal conduit (see figure 3). In the case of a horizontal installation, the control panel should not face the floor or the ceiling (see figure 4). A wrong installation affects the safe and reliable operation of the unit.

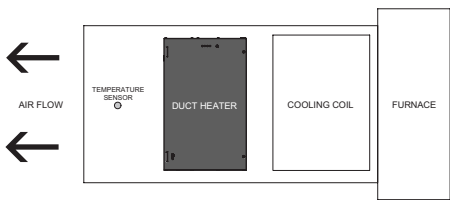


UP FLOW

DOWN FLOW

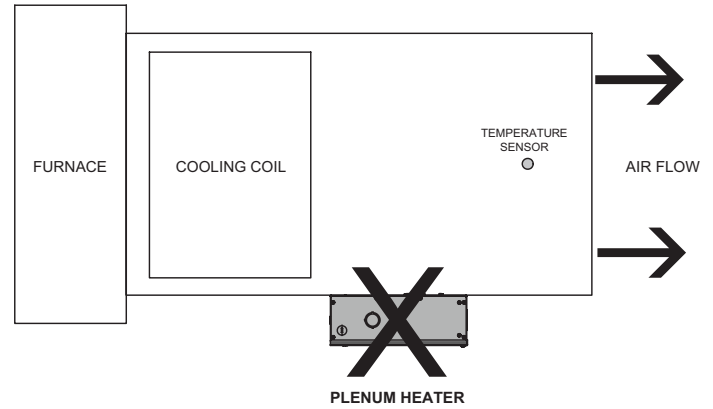


HORIZONTAL FLOW



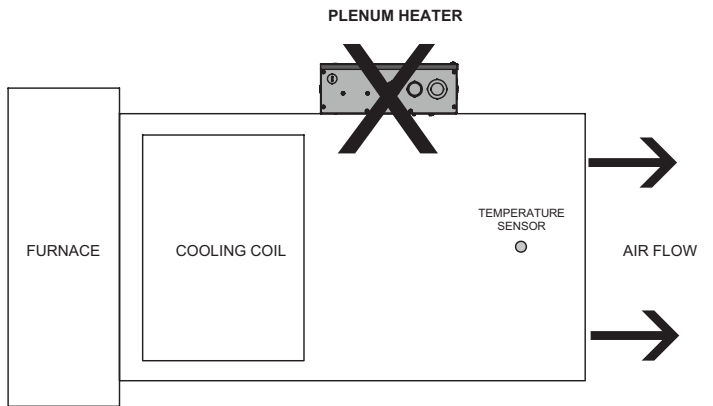
HORIZONTAL FLOW

FIGURE 3



PLENUM HEATER

HORIZONTAL FLOW



PLENUM HEATER

HORIZONTAL FLOW

FIGURE 4

## DUCT CUT-OUT

Installer must cut an opening in the duct in order to install the duct heater unit. Consult the following diagram for the dimensions of that opening. If the baffles are to be used, the installer must cut a slot on each side of the opening. These slots have to be wide enough to avoid interference with the baffles at the insertion of the unit into the duct.

**N.B :** The duct cut-out must be positioned accordingly to figures 2A & 2B.

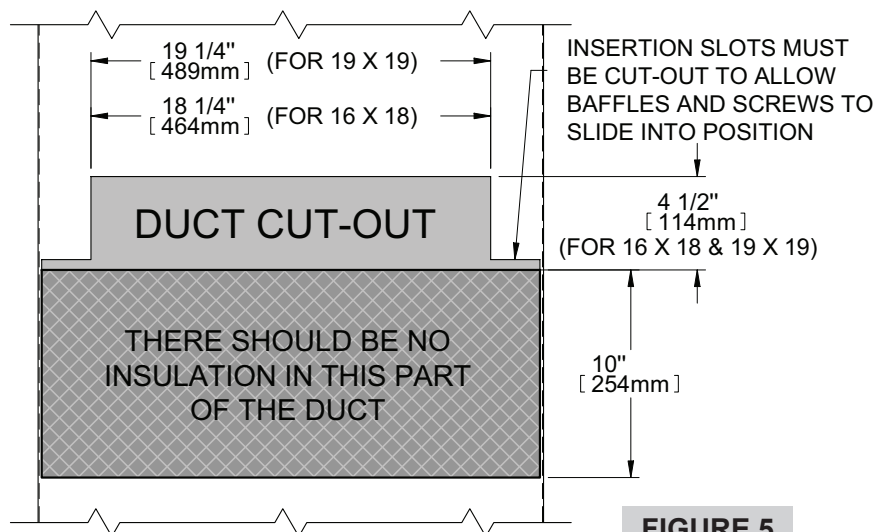


FIGURE 5

## BAFFLE INSTALLATION

Baffles have to be installed by matching the clips on the baffles to the holes on the heat body and by securing them with self-tapping screws. Then, they have to be cut in order to fit in the duct with a gap of 1/8" between the duct lining and the baffle edge.

**N.B. : If the clips are too tight to slide, they can be opened with a flat screwdriver.**

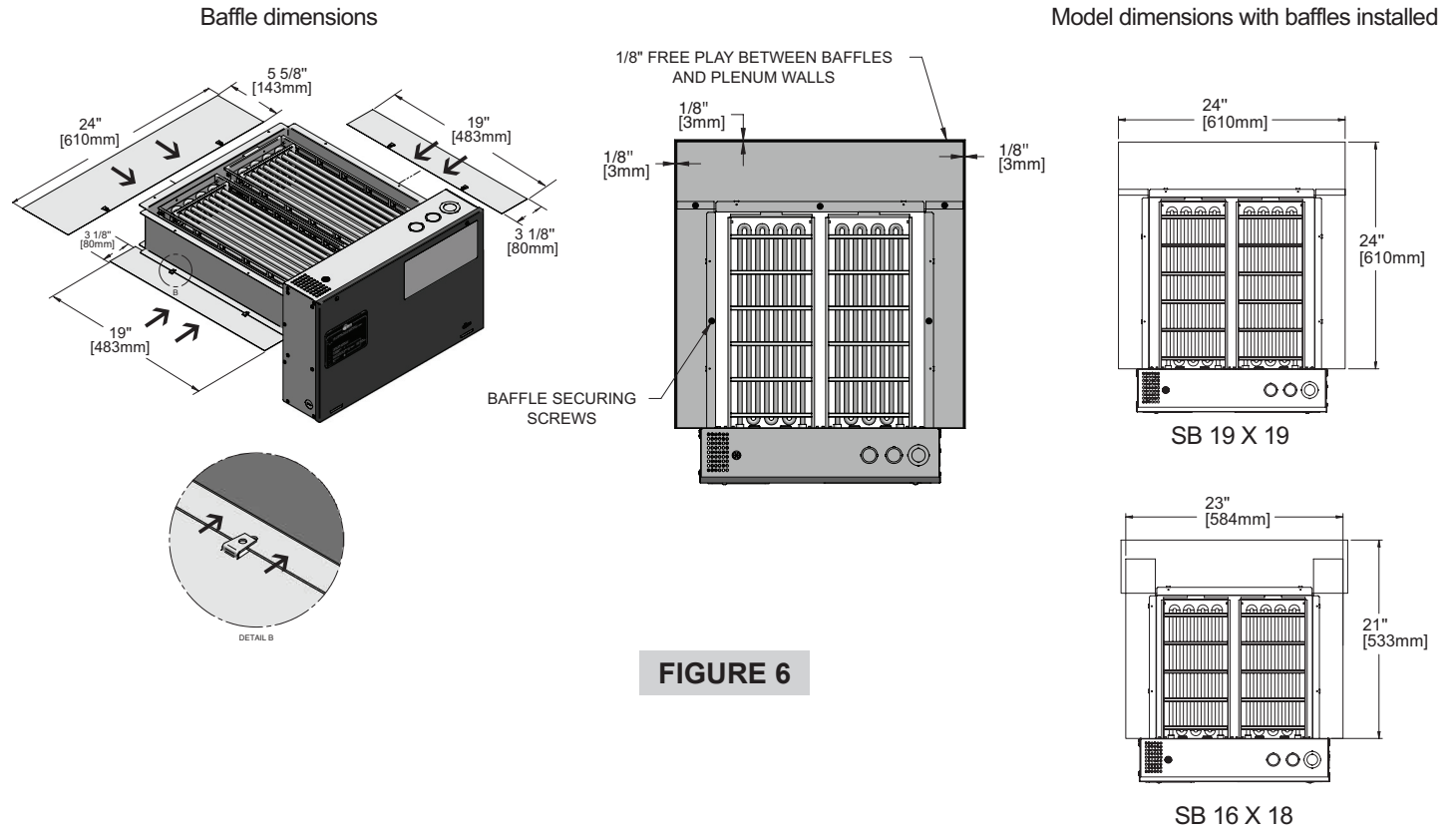


FIGURE 6

## HEATER INSTALLATION

Insert heat body through the opening in the duct and secure it with six self-tapping screws in the pre-drilled holes inside the electrical enclosure. Seal the baffles slots and the enclosure perimeter in order to avoid air leaks.

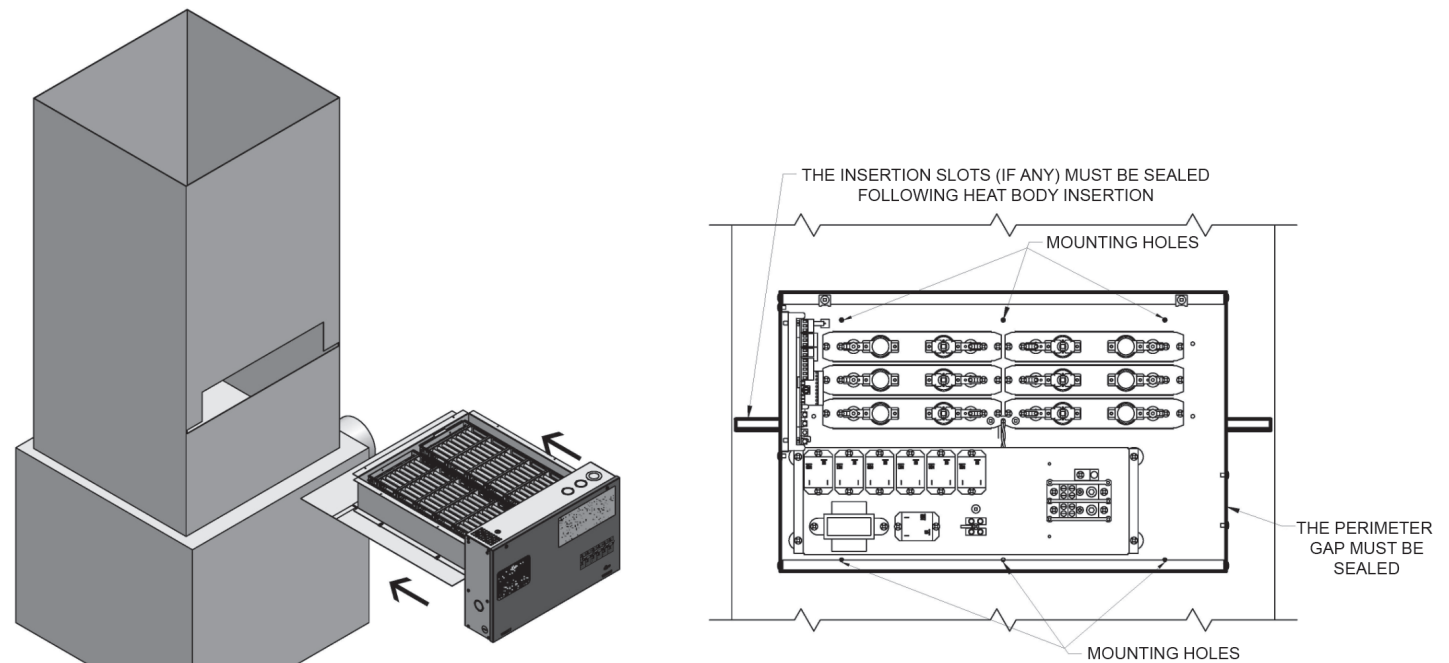
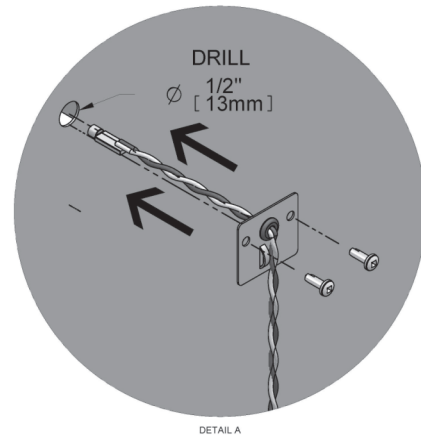
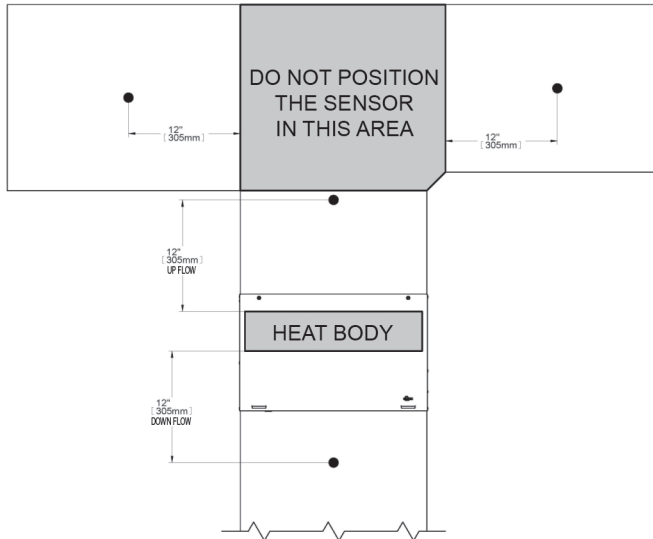


FIGURE 7

## POSITIONING THE DUCT TEMPERATURE SENSOR

The temperature-sensor of the duct must be placed on the supply side at a good distance from the duct heater in order to avoid as much exposure as possible from the radiation of the elements.



## ELECTRICAL CONNECTIONS

### ELECTRICAL POWER SUPPLY

**Note that a qualified electrician must wire this product according to the electrical and building codes effective in your region.**

The duct heater must be connected to a 240/208VAC power supply source. Note that the nominal power values calculated are based on a supply voltage of 240VAC.

The connection of the unit itself is made to a power block installed inside the control panel. Knockouts are punched on both sides of the unit to allow power entry.

Please refer to the national and local electrical codes for selecting the proper cable size as well as the appropriate circuit breakers or fuses.

Before installing the unit, the installer must make sure the distribution panel is adequate to permit the connection of the duct heater. The available power must be verified to ensure that it is sufficient to support the additional load.

The installer must make sure the heating power of the duct heater does not exceed the nominal power of the furnace burner.

## SB SERIES OPERATION

Upon a call for heat from the thermostat, the SB dual energy duct heater is designed to activate either its own built-in heating assembly or an external heating unit; The decision to activate one or the other is based upon the selected operating mode and/or outdoor temperature. To this end, the heat demand signal is conveyed by the thermostat to the duct heater via terminals "W" and "R" while the SHQ\* outdoor sensor will provide the outdoor temperature signal.

\*Outdoor sensor provided and installed by Hydro-Québec

A selector switch on the duct heater allows for 3 operating modes: Dual Energy Mode, Electric Mode and Fossil fuel\* Mode (or gas). Simply press the selector switch to scroll through the 3 operating modes; accordingly the selected mode will be indicated by means of either the "Fossil fuel" or "Electric" indicator light or both (Dual Energy).

\*NOTE: the term fuel refers here to both gas and heating oil.

### DUAL ENERGY MODE

In this operating mode the duct heater will decide to activate either its own heating assembly or the furnace heat output in accordance with the outdoor temperature sensor's signal.

More specifically, while the thermostat calls for heat, as the outdoor temperature drops to  $-12^{\circ}\text{C}$  or  $-15^{\circ}\text{C}$  (depending on the climatic zone in which you live) the outdoor sensor's signal will trigger the duct heater to deactivate its heating assembly and trigger the furnace burner. Conversely, while the thermostat calls for heat, as the outdoor temperature rises to  $-12^{\circ}\text{C}$  or  $-15^{\circ}\text{C}$  (depending on the climatic zone), the outdoor sensor's signal will trigger the duct heater to deactivate the furnace burner and subsequently, following a 5 minute delay, trigger simultaneously its heating assembly and the furnace blower.

### ELECTRIC MODE

In this operating mode, regardless of the outdoor temperature sensor's signal, the duct heater triggers its own heating assembly in response to the thermostat signal.

### FUEL MODE (OR GAS)

In this operating mode, regardless of the outdoor temperature sensor's signal, the duct heater redirects the thermostat call for heat to the furnace.

## AUTO-TRANSFER OVERRIDE

In the event that a malfunction of the activated mode is detected, the duct heater will systematically override the activated mode and revert to its alternate mode. More specifically, the SB dual energy duct heater control board is equipped with a "duct" temperature-sensor. This device enables the controller to detect a malfunction in the heating system (electric or fuel). When the thermostat sends a demand for heat to the duct heater controller, it starts the heating cycle of one of the two heating modes (electric or fuel) depending on the heating mode selected by the user and/or the condition of the outdoor-temperature sensor's signal. Every time a heating cycles starts whether in electric mode or in fuel mode, a 15 minutes countdown begins.

When the countdown has finished, if the temperature of the duct does not exceed the temperature of the auto-transfer and the thermostats demand for heat is still present, the heating mode activated at the beginning of that cycle will be deactivated and the opposite mode will be activated. For example: When the thermostat sends the demand for heat, the controller activates the electric mode, the auto-transfer will be the fuel mode and vice versa.

At the same time the diagnostic pilot light (red) starts to blink every second indicating the auto-transfer is activated. The green pilot light also indicates which heating mode is taking over (for example, fuel, if we were heating in electric mode), as it starts to blink in alternation with the red pilot light the other heating mode's green pilot light is off.

**Note that if the fuel mode is selected and the burner does not function for lack of fuel for example, in this situation the heating mode will automatically switch to the electric mode, add the five minutes delay during which the elements will not be activated due to the fact that the burner has just finished operating.**

While auto-transfer is activated, at any time the user can press the heating mode selector button to reinitialize the auto-transfer and return to the heating mode of his choice.

Auto-transfer will remain active for a 12 hour period after which, the controller will try again to activate the faulty heating mode which initially activated the auto-transfer. This function is useful if corrective measures are taken before the auto transfer is re-initialized.

If both heating modes are defective, the auto-transfer will activate every 15 minutes until corrective measures have been carried out to one or the other.

## AUTO-TRANSFER TEMPERATURE

The auto-transfer temperature is defined as being the minimal air temperature of the duct, which starts the auto-transfer (after a 15 minute delay). The installer can adjust this by using the rotary button located on the control board. This is directly accessible by the cover of the electrical compartment without having to disassemble the unit. The rotary button consists of a scale in degrees Celsius and offers an adjustable temperature range between 25°C and 50°C.

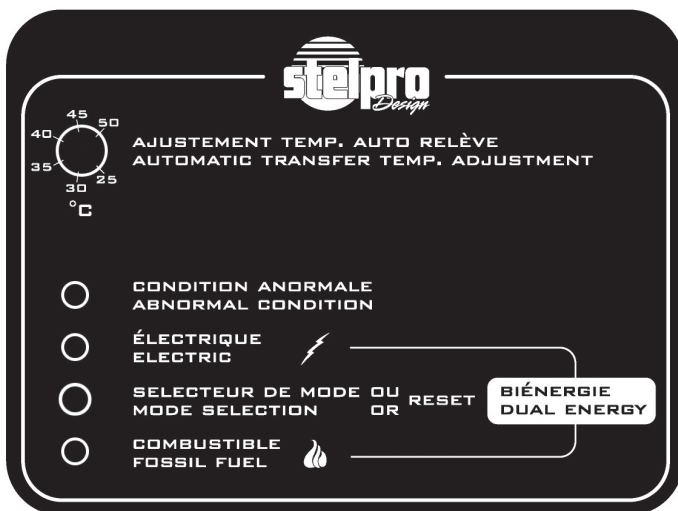
The automatic transfer temperature adjustment is a two-fold procedure. The installer must first measure the duct air temperature while the SB heating elements are on and the fuel furnace is not providing any heat output. The installer then sets the rotary dial to a temperature less than the duct air temperature measurement. For instance, the installer could set the automatic transfer temperature adjustment to 45°C after taking a duct air temperature measurement of 55°C.

## JUMPER SETTING - SB SERIES

The programming jumpers must never be changed under any circumstance, except for the W3 jumper, which selects the temperature display on a multi-meter in °C or °F. If the jumpers are changed by error, their correct positions can be found using the chart below.

JUMPER	POSITION
W1	B
W2	H
W3	°C OR °F ACCORDING TO PREFERENCE
W4	R
W5	O OR B (OF NO IMPORTANCE)
W10	NO JUMPER
W14	2

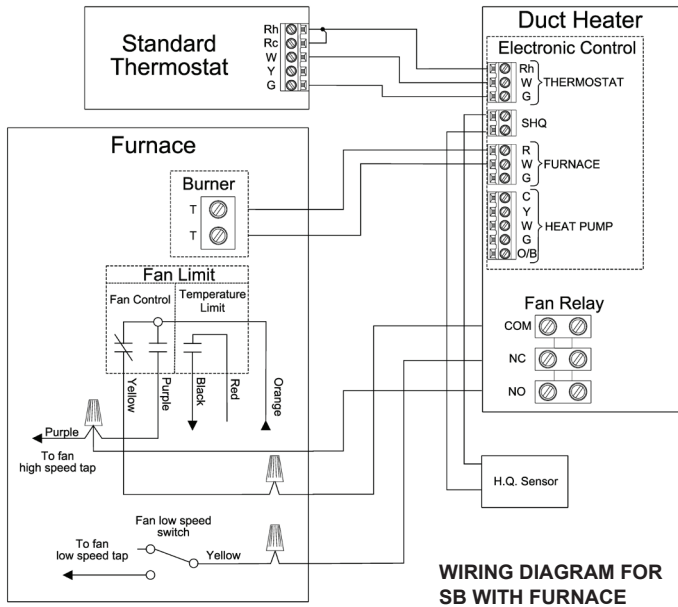
## SB SERIES USER INTERFACE



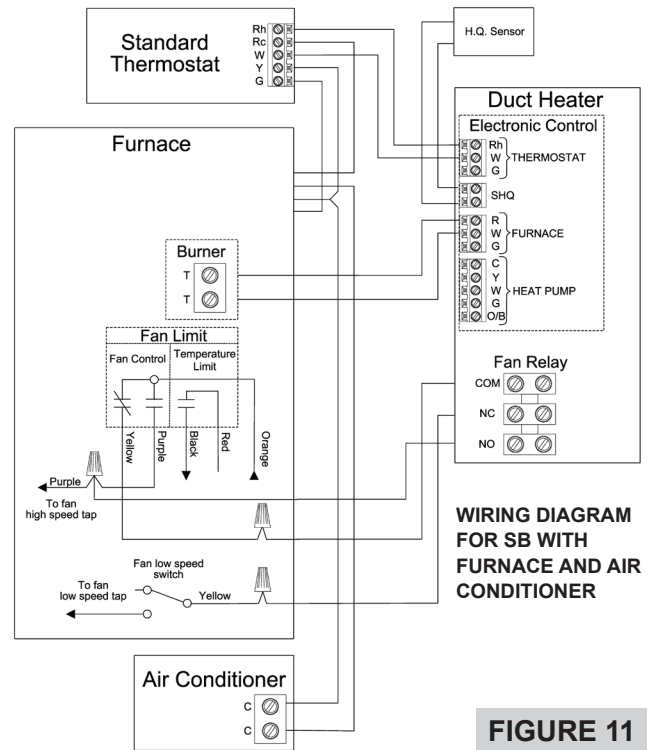
**FIGURE 9**

## THERMOSTAT AND FURNACE CONTROL SIGNALS (SB SERIES)

The existing thermostat may be used to control the SB dual energy duct heater. The duct heater includes a control terminal block connection located directly on the circuit board. This makes it possible to connect the thermostat and the furnace control wires (R, W and G). Please refer to the following wiring diagrams to connect the thermostat and the furnace to the duct heater.



**FIGURE 10**



**FIGURE 11**

## TROUBLESHOOTING SB SERIES

PROBLEM	DEFECTIVE PART OR PART TO CHECK
The unit does not work	<ul style="list-style-type: none"> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Open circuit breaker or fuse</li> <li>Faulty power supply connections</li> <li>Defective transformer</li> </ul>
The unit has power but the elements do not work	<ul style="list-style-type: none"> <li>Defective relay</li> <li>Tripped manual reset thermal cut-out</li> </ul>
The unit runs continuously	<ul style="list-style-type: none"> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Heat losses greater than the heating capacity of the unit</li> </ul>
Element operating and/or cycling continuously	<ul style="list-style-type: none"> <li>Defective 24V relay (contact probably welded)</li> </ul>
All the element operating and/or cycling when there is a heating demand	<ul style="list-style-type: none"> <li>Defective furnace fan</li> <li>Obstructed Return and/or supply air</li> </ul>
Unit is overheating	<ul style="list-style-type: none"> <li>Defective furnace fan</li> <li>Obstructed Return and/or supply air</li> </ul>
The breaker trips when the heater is turned on	<ul style="list-style-type: none"> <li>Faulty power supply connections</li> <li>Voltage higher than that indicated on the nameplate</li> </ul>
Unable to attain desired room temperature	<ul style="list-style-type: none"> <li>One or more defective elements</li> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Voltage lower than that indicated on the nameplate</li> <li>Heat losses greater than the heating capacity of the unit</li> <li>Defective 24V relay</li> <li>Tripped manual reset thermal cut-out</li> </ul>
The red "DIAGNOSTIC" pilot light is always on	<ul style="list-style-type: none"> <li>The duct's temperature-sensor is defective or wrongly connected</li> </ul>
The red "DIAGNOSTIC" pilot light blinks every second	<ul style="list-style-type: none"> <li>The control board has detected a malfunctioning on one of the two heating modes and has started the auto-transfer process</li> </ul>
The red "DIAGNOSTIC" pilot light blinks four times every two seconds and pause for two seconds	<ul style="list-style-type: none"> <li>The duct's air temperature is above 68°F- dirty air filter – worn fan belt</li> </ul>
The green pilot light "ELECTRIC" blinks every second	<ul style="list-style-type: none"> <li>The furnace burner was operating five minutes prior to a demand for heat in electric mode or there was a power failure within the last five minutes or a problem with the duct temperature-sensor</li> </ul>
The green pilot light "FUEL" blinks every second	<ul style="list-style-type: none"> <li>There was a power failure within the last five minutes or a problem with the duct temperature-sensor</li> </ul>

N.B.: If you do not solve the problem after checking these points, cut off the power supply at the main electrical panel and contact our customer service (see the "LIMITED WARRANTY" section to obtain the phone numbers).



# SB-M SERIES MODULATING DUCT HEATER

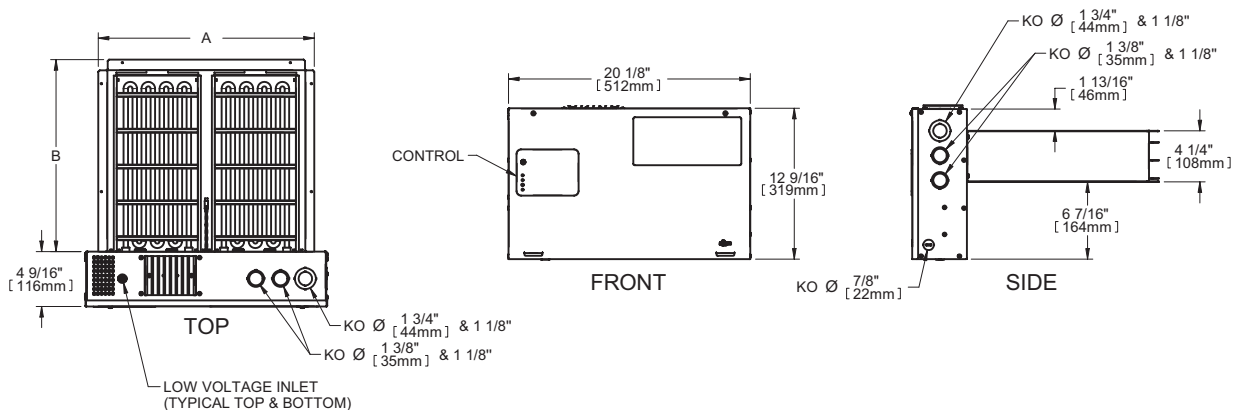
## SPECIFICATIONS

SB-M DUAL ENERGY DUCT HEATER								
TYPE	VOLTS	KW	AMPS	HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)	LB	KG
<b>SBM05</b>	240/208	5.0/3.8	20.8/18.1	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
<b>SBM10</b>	240/208	10.0/7.5	41.7/36.1	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
<b>SBM15</b>	240/208	15.0/11.3	62.5/54.2	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
<b>SBM20</b>	240/208	20.0/15.0	83.3/72.2	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
<b>SBM25</b>	240/208	25.0	104.2	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5
<b>SBM30</b>	240/208	30.0/22.5	125.0/108.3	12 9/16	20 1/8	20 9/16 - 23 9/16	33.4	15.5

**N.B. Please consult appendix 1 for more technical specifications.**

## TECHNICAL DRAWINGS

MODEL	A	B
16x18	18"	16"
19x19	19"	19"



## SB-M SERIES OPERATION

The SB-M series duct heater modulates the electric element's output according to the set point temperature in the duct. This model was specially developed to augment the heat from a heat pump. However, it is possible to use this unit alone, without any other heat source. In any case, the ultimate goal is to obtain a constant air temperature in the duct.

In order to achieve this, the control board reads the duct temperature and compares it to the set point chosen by the installer. The set point is adjusted via a rotating knob accessible on the front of the unit. If the temperature read is below the set point, the electronic control activates the elements until the set point is achieved. If the duct air temperature should pass the set point, the electronic control will deactivate the elements until the set point is reached.

Three types of operating modes are possible: ELECTRIC / ELECTRIC + HEAT PUMP, FOSSIL FUEL ONLY and ELECTRIC + EMERGENCY FOSSIL FUEL. The button on the control panel selects the heating mode. The modes, ELECTRIC / ELECTRIC + HEAT PUMP and FOSSIL FUEL ONLY are indicated by a light illuminated next to the text. When both lights are illuminated, the unit is in ELECTRIC + EMERGENCY FOSSIL FUEL mode.

## OPERATING OPTIONS

### ELECTRIC / ELECTRIC + HEAT PUMP

When ELECTRIC/ ELECTRIC + HEAT PUMP MODE is selected, the duct heater only controls its own heating elements. The duct heater, while the thermostat calls for a heat demand, modulates its heat output to attain the required (duct) temperature. **ELECTRIC + HEAT PUMP:** If the heating system incorporates a heat pump, both the heat pump and duct heater are controlled by the thermostat heat demand. The duct heater modulated output complements the heat-pump output to achieve the required (duct) temperature. **(When ELECTRIC/ ELECTRIC + HEAT PUMP MODE is selected, the "W" terminal on the duct heater terminal block labelled HEAT PUMP should be free of any connection). To enable the selection of the ELECTRIC/ ELECTRIC + HEAT PUMP MODE, the W14 (stage) jumper must be set to 1.**

### FOSSIL FUEL ONLY

When FOSSIL FUEL ONLY MODE is selected, the duct heater only controls the fossil fuel furnace heat output.

**To enable the FOSSIL FUEL ONLY MODE the W14 (stage) jumper must be set to 2.**

(See next page for wiring schematic)

## EMERGENCY FOSSIL FUEL

The EMERGENCY FOSSIL FUEL CONTROL MODE requires a one stage thermostat (W or Y signal) + EMERGENCY MODE (E signal). This control mode allows the thermostat to use the fossil fuel furnace as a supplemental heat source. **To enable the FOSSIL FUEL ONLY MODE, the W14 (stage) jumper must be set to 2.** As with the ELECTRIC/ ELECTRIC + HEAT PUMP MODE, the thermostat heat demands are conveyed to the duct heater (and heat pump if so equipped). However, if the duct heater/ heat pump combined heat output is still insufficient, the thermostat will redirect the heat demand to the fossil fuel furnace. The EMERGENCY FOSSIL FUEL MODE requires a double stage thermostat for the fossil fuel furnace heat output to be controlled by means of the thermostat's second heating stage (see figure 13).

## JUMPER SETTING - SB-M SERIES

The programming jumpers must never be changed under any circumstance, except for the W3 jumper, which selects the temperature display on a multi-meter in °C or °F. If the jumpers are changed by error, their correct positions can be found using the chart below.

JUMPER	"ELECTRIC"	"FOSSIL FUEL"	"AUTO EMERGENCY"
W1	M	M	M
W2	H	H	H
W3	°C OR °F	°C OR °F	°C OR °F
W4	T	T	T
W5	O OR B (ACCORDING TO HEAT PUMP)*	O OR B	O OR B
W10	NO JUMPER	NO JUMPER	NO JUMPER
W14	1	2 FOR 1 OR 2 STAGES	2

\* The W5 jumper should be set according to the heat pump's inversion valve function. If the inversion valve is activated in heating mode, the W5 jumper should be set in position "B". If it is activated during air conditioning mode, the W5 jumper should be in position "O".

## WIRING DIAGRAM FOR DUCT HEATER SB-M SERIES WITH THERMOSTAT, FURNACE AND HEAT PUMP

WIRING DIAGRAM FOR SB-M WITH HEAT PUMP

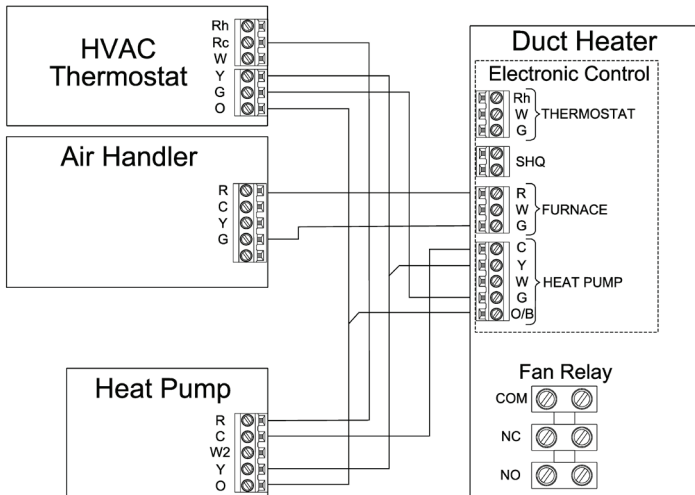


FIGURE 12

WIRING DIAGRAM FOR SB-M WITH HEAT PUMP AND FURNACE

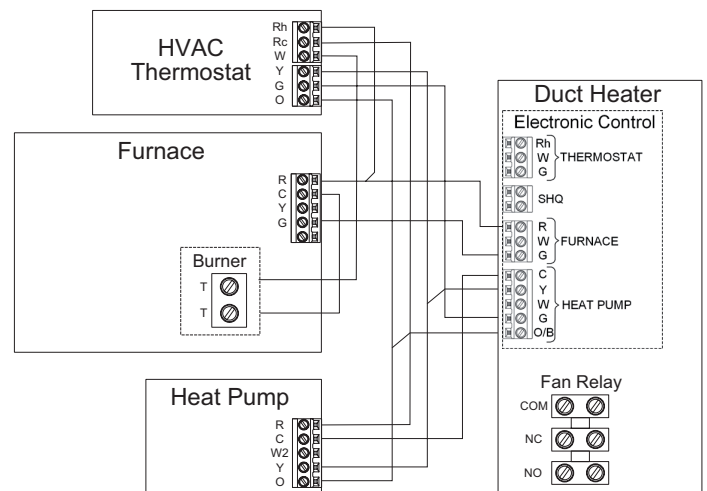


FIGURE 13

## SB-M SERIES USER INTERFACE

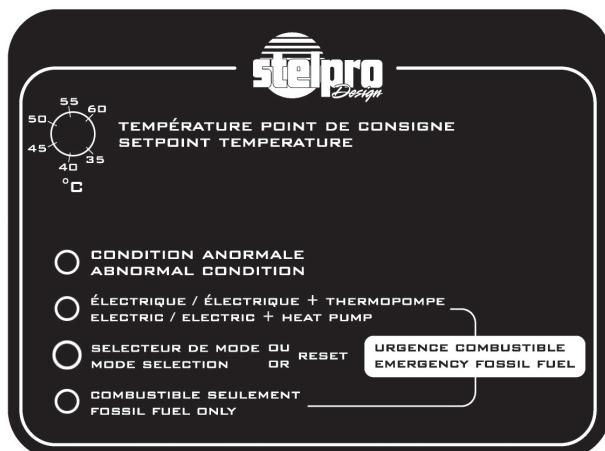


FIGURE 14

## TROUBLESHOOTING SB-M MODEL

PROBLEM	DEFECTIVE PART OR PART TO CHECK
The unit does not work	<ul style="list-style-type: none"> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Open circuit breaker or fuse</li> <li>Faulty power supply connections</li> <li>Defective transformer</li> </ul>
The unit has power but the elements do not work	<ul style="list-style-type: none"> <li>Defective relay</li> <li>Tripped manual reset thermal cut-out</li> </ul>
The unit runs continuously	<ul style="list-style-type: none"> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Heat losses greater than the heating capacity of the unit</li> </ul>
Element operating and/or cycling continuously	<ul style="list-style-type: none"> <li>Defective 24V relay (contact probably welded)</li> </ul>
All the element operating and/or cycling when there is a heating demand	<ul style="list-style-type: none"> <li>Defective furnace fan</li> <li>Obstructed Return and/or supply air</li> </ul>
Unit is overheating	<ul style="list-style-type: none"> <li>Defective furnace fan</li> <li>Obstructed Return and/or supply air</li> </ul>
The breaker trips when the heater is turned on	<ul style="list-style-type: none"> <li>Faulty power supply connections</li> <li>Voltage higher than that indicated on the nameplate</li> </ul>
Unable to attain desired room temperature	<ul style="list-style-type: none"> <li>One or more defective elements</li> <li>Defective thermostat, wrong thermostat setting, positioning or wiring</li> <li>Voltage lower than that indicated on the nameplate</li> <li>Heat losses greater than the heating capacity of the unit</li> <li>Defective 24V relay</li> <li>Tripped manual reset thermal cut-out</li> </ul>
The Red "DIAGNOSTIC" pilot light is always on	<ul style="list-style-type: none"> <li>The duct's temperature-sensor is defective or wrongly connected</li> </ul>
The Red "DIAGNOSTIC" pilot light blinks every second (n/a when "ELECTRIC" option is selected)	<ul style="list-style-type: none"> <li>The control board has detected a malfunction in the "fossil fuel" mode. Verify the burner and level of fuel.</li> </ul>
The Red "DIAGNOSTIC" pilot light blinks four times every two seconds and pause for two seconds	<ul style="list-style-type: none"> <li>The duct's air temperature is above 68°F</li> <li>Dirty air filter or worn fan belt</li> </ul>
The red "DIAGNOSTIC" pilot light blinks six times in 3 seconds and a pause for 3 seconds	<ul style="list-style-type: none"> <li>The "Y" signal is present along with the "W" signal</li> <li>Verify the thermostat programing</li> </ul>
The red "DIAGNOSTIC" pilot light blinks 8 times in 4 seconds and a pause for 4 seconds	<ul style="list-style-type: none"> <li>The relay is cycling between proportional mode and stage mode for 12 hours. The W4 jumper should be set to "T" and not to "R"</li> </ul>
The red "DIAGNOSTIC" pilot light blinks 10 times in 5 seconds and a pause for 5 seconds	<ul style="list-style-type: none"> <li>The W1 jumper is set to "B" instead of "M"</li> <li>There is a signal on the "W" screw thermostat control board terminal</li> </ul>
The red "DIAGNOSTIC" pilot light blinks 12 times in 6 seconds and a pause for 6 seconds	<ul style="list-style-type: none"> <li>The W14 jumper is set to "1" instead of "2"</li> <li>There is a signal from the second stage on the "W" screw pump control board terminal</li> </ul>

N.B.: If you do not solve the problem after checking these points, cut off the power supply at the main electrical panel and contact our customer service (see the "Limited warranty" section to obtain the phone numbers).

## SB SERIES / SB-M SERIES DUAL ENERGY DUCT HEATER / MODULATING DUCT HEATER

### SAFETY FEATURES (SB & SB-M)

The SB and SB-M duct heaters are designed with several safety features to guarantee safe operation. The following paragraphs describe these safety features.

#### DUCT OVERHEATING DETECTION

The SB and SB-M duct heater control board is able to detect if the temperature of the duct exceeds a certain critical point at which the operation could lead to premature wear of the elements and an overheating of the unit. For instance a dirty air filter could reduce the circulation of air in the conduits to the point where it becomes insufficient to dissipate all the heat generated by the elements or the burner of the furnace. As a result the temperature of the duct will rise above the first threshold point fixed at 68°C. In this situation the control board will only indicate the event by means of a diagnostic pilot light (red). The pilot light will blink 4 times in two seconds, followed by a two second pause. The indication of the problem can be re-initialized using the heating mode selector button. No action other than the indication of overheating will take place at this time.

In fuel mode, if the temperature of the duct exceeds 71°C for more than two minutes (most likely the result of a very dirty filter), the control board will switch from fuel mode to electric mode in order to lower the temperature.

In electric mode, if the temperature of the duct exceeds 71°C for more than two minutes, the electric elements (max. 4) will be deactivated progressively, by the minute, until the temperature of the duct is below 71°C. If the temperature drops below 54°C, the deactivated elements will be reactivated progressively until the temperature of the duct is above 54°C.

#### THERMAL PROTECTION

The SB dual energy duct heater is equipped with a thermo-mechanical protection, which provides the ultimate line of defence against any possible overheating. Each element has its own automatic reset thermal protection, which protects it from overheating. Moreover, a manual reset thermal protection has been installed in the duct heater in case the elements automatic protection should fail. The automatic thermal protection of the element activates at 71°C (140°F) where as the manual thermal protection activates at 60°C (165°F).

The thermal protection provide a 93°C (199°F) maximum temperature limitation on the air output.

## HEATING DEMAND INTERLOCK (SB ONLY)

The demand for heat received by the control board can only operate one heating mode at a time even if the microcontroller is damaged. Indeed, an electromechanical interlock built into the control board, prevents the two heating modes from operating at the same time as a result of a damaged microcontroller requesting erratic demands.

## MAINTENANCE



The SB & SB-M dual energy duct heater itself does not require any particular maintenance. However, it is important to carry out regular maintenance on the ventilation system overall. The air filter should be replaced when it is dirty and the ventilation shafts cleaned out when necessary. During the cleaning of the conduits, the ventilator of the furnace must be inspected and cleaned if necessary. A faulty maintenance of the ventilation system will reduce the performance of the duct heater.

**N.B. Never activate the duct heater if the ventilation system is not equipped with an air filter.**

## READING THE AIR TEMPERATURE OF THE DUCT WITH A DC MULTIMETER

The air temperature of the duct's temperature sensor can be read with a multimeter set to voltmeter mode on the 2VDC scale. To do this, connect the black test lead of the multimeter to the terminal (-) and the red test lead of the multimeter to the terminal (+) of the test connection point "VOLTMETER TEMPERATURE" on the control board.

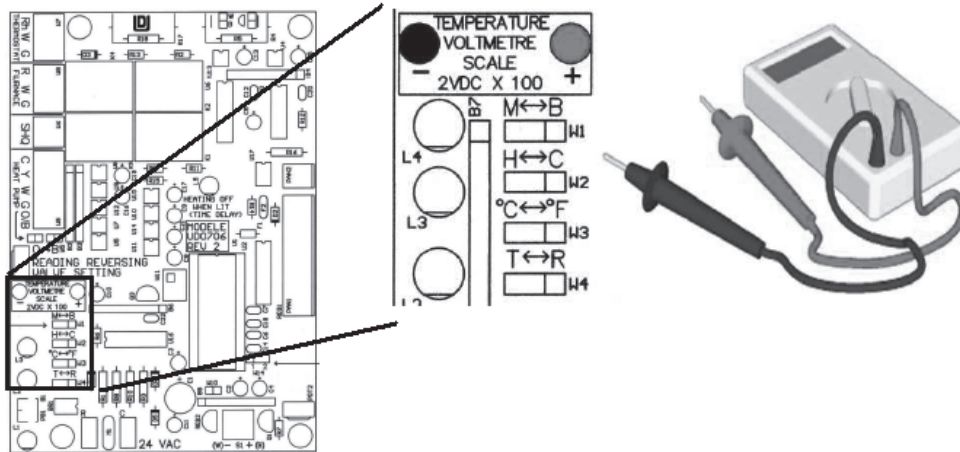


FIGURE 15

The value read on the multimeter must be multiplied by one hundred in order to convert it into a temperature value. The temperature unit can be read in °C or °F. To select which temperature is displayed °C or °F, the installer simply moves the W3 jumper to the desired position.

## AIRFLOW CALCULATIONS

The airflow in the SB and SB-M dual energy duct heater is bidirectional and the minimum air velocity is 300 FPM. It is possible to calculate the airflow of the ventilation system using the following two formulas:

$$\text{Airflow (cfm)} = \frac{\text{Watts} \times 1,72}{dT (^{\circ}\text{C})}$$

OR

Where  $dT = T_{out} - T_{in}$   
Watts = Device nominal power

$$\text{Airflow (cfm)} = \frac{\text{Watts} \times 3,1}{dT (^{\circ}\text{F})}$$

In order to calculate, the installer must initially take the air temperature reading of the duct with his multimeter (see above). The reading must be taken following at least five minutes of heating operation. It is important to make sure that all the elements are functioning. With a thermometer, the installer must also take an inlet temperature reading of the return air (at the return entry of the furnace). The inlet temperature must be  $25 \pm 2^{\circ}\text{C}$  ( $77 \pm 4^{\circ}\text{F}$ ). With these two temperature values, the installer is able to calculate the delta T (dT) that corresponds to the difference in temperature between the return air and the supply air of the duct heater. Enter the nominal output power (watts) of the unit into the formula. The value is displayed on the nameplate of the duct heater.

# LIMITED WARRANTY

This limited warranty is offered by Stelpro Design inc. ("Stelpro") and applies to the following products made by Stelpro: models SB & SB-M. **Please read this limited warranty carefully. Subject to the terms of this warranty.** Stelpro warrants its products and their components against defects in workmanship and/or materials for the following period from the date of purchase: **5 years**. This warranty applies only to the original purchaser; it is non-transferable and cannot be extended.

## CLAIM PROCEDURE

If at any time during the warranty period the unit becomes defective, you must cut off the power supply at the main electrical panel and contact 1) your installer or distributor, 2) your service center or 3) Stelpro's customer service department. In all cases, you must have a **copy of the invoice** and provide the **information written on the product nameplate**. Stelpro reserves the right to examine or to ask one of its representatives to examine the product itself or any part of it before honoring the warranty. Stelpro reserves the right to replace the entire unit, refund its purchase price or repair a defective part. Please note that repairs made within the warranty period must be authorized in advance in writing by Stelpro and carried out by persons authorized by Stelpro.

Before returning a product to Stelpro, you must have a Stelpro authorization number (RMA). To obtain it, call the customer service department at: **1-800-363-3414** (electricians and distributors - French), **1-800-343-1022** (electricians and distributors - English), or **1-866-766-6020** (consumers). The authorization number must be clearly written on the parcel or it will be refused.

## CONDITIONS, EXCLUSIONS AND DISCLAIMER OF LIABILITY

This warranty is exclusive and in lieu of all other representations and warranties (except of title), expressed or implied, and Stelpro expressly disclaims and excludes any implied warranty of merchantability or implied warranty of fitness for a particular purpose.

Stelpro's liability with respect to products is limited as provided above. Stelpro shall not be subject to any other obligations or liabilities whatsoever, whether based on contract, tort or other theories of law, with respect to goods or services furnished by it, or any undertakings, acts or omissions relating thereto. Without limiting the generality of the foregoing, Stelpro expressly disclaims any liability for property or personal injury damages, penalties, special or punitive damages, damages for lost profits, loss of use of equipment, cost of capital, cost of substitute products, facilities or services, shutdowns, slowdowns, or for other types of economic loss or for claims of a dealer's customers or any third party for such damages. Stelpro specifically disclaims all consequential, incidental and contingent damages whatsoever.

This warranty does not cover any damages or failures resulting from: 1) a faulty installation or improper storage; 2) an abusive or abnormal use, lack of maintenance, improper maintenance (other than that prescribed by Stelpro) or a use other than that for which the unit was designed; 3) a natural disaster or an event out of Stelpro's control, including, but not limited to, hurricanes, tornadoes, earthquakes, terrorist attacks, wars, overvoltage, flooding, water damages, etc. This warranty does not cover any accidental or intentional losses or damages, nor does it cover damages caused by negligence of the user or owner of the product. Moreover, it does not cover the cost of disconnection, transport, and installation.

The warranty is limited to the repair or the replacement of the unit or the refund of its purchase price, **at the discretion of Stelpro**. Any parts replaced or repaired within the warranty period with the written authorization of Stelpro will be warranted for the remainder of the original warranty period. This warranty will be considered null and void and Stelpro will have the right to refuse any claims if **products have been altered** without the written authorization of Stelpro and if the nameplate numbers have been removed or modified. This warranty does not cover scratches, dents, corrosion or discoloration caused by excessive heat, chemical cleaning products and abrasive agents. It does not cover any damage that occurred during the shipping.

Some states and provinces do not allow the exclusion or limitation of incidental or consequential damages and some of them do not allow limitations on how long an implied warranty lasts, so these exclusions or limitations may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from state to state or from province to province.

# APPENDIX 1

## CONTROL CARD TOP VIEW

### Control card connections description

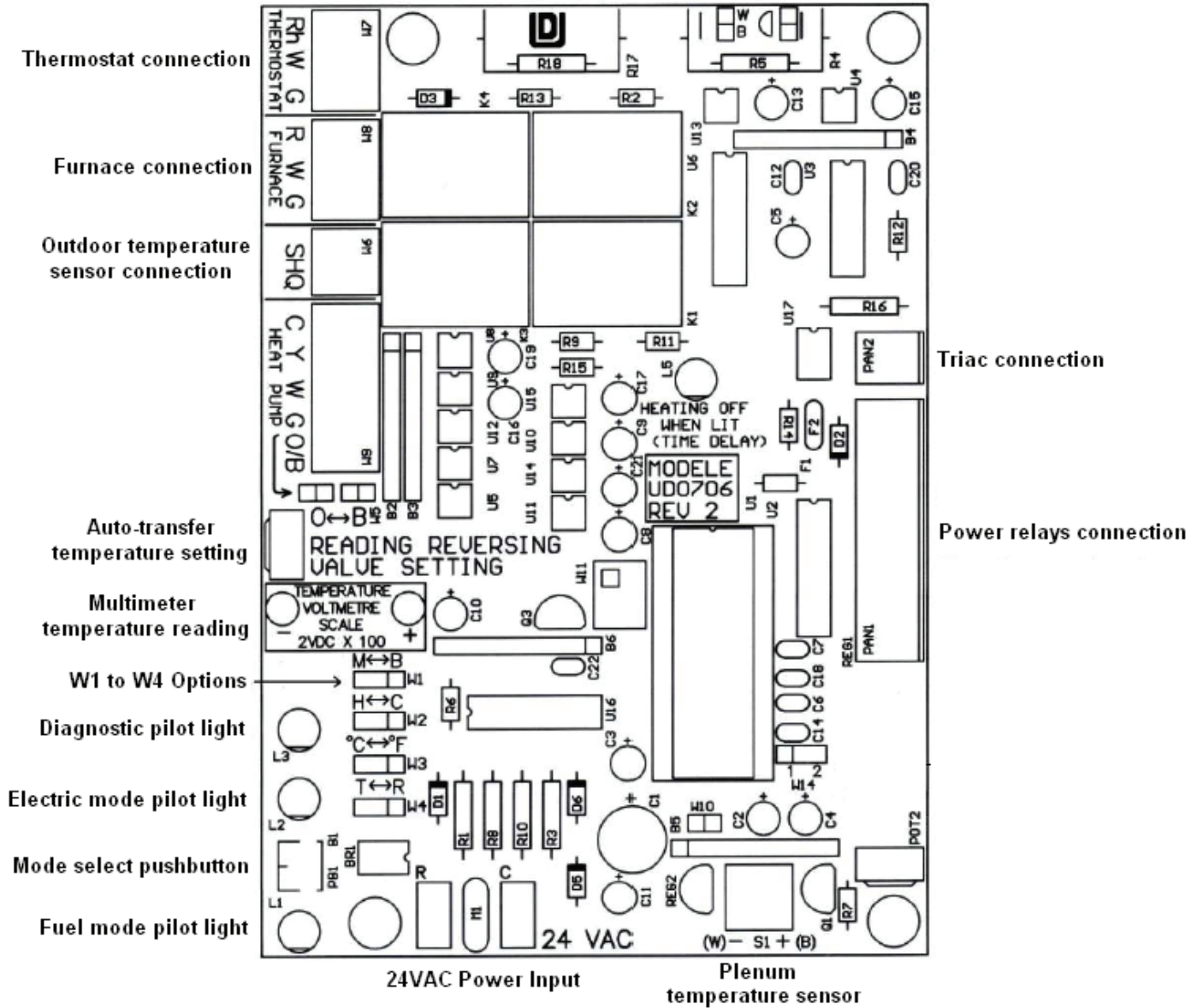
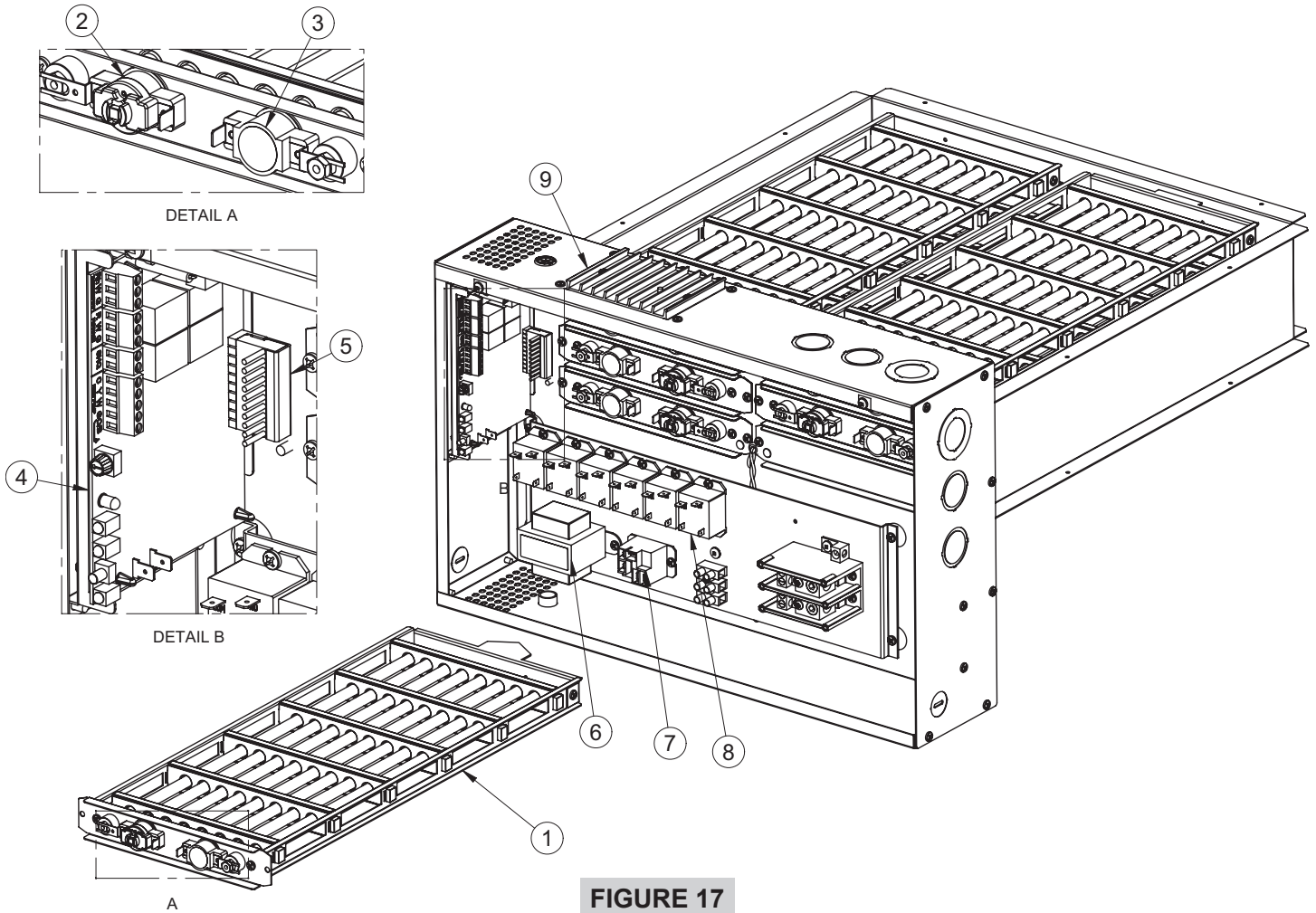


FIGURE 16

# APPENDIX 2

## SB/SBM CONTROL PANEL VIEW REPLACEMENT COMPONENTS LIST

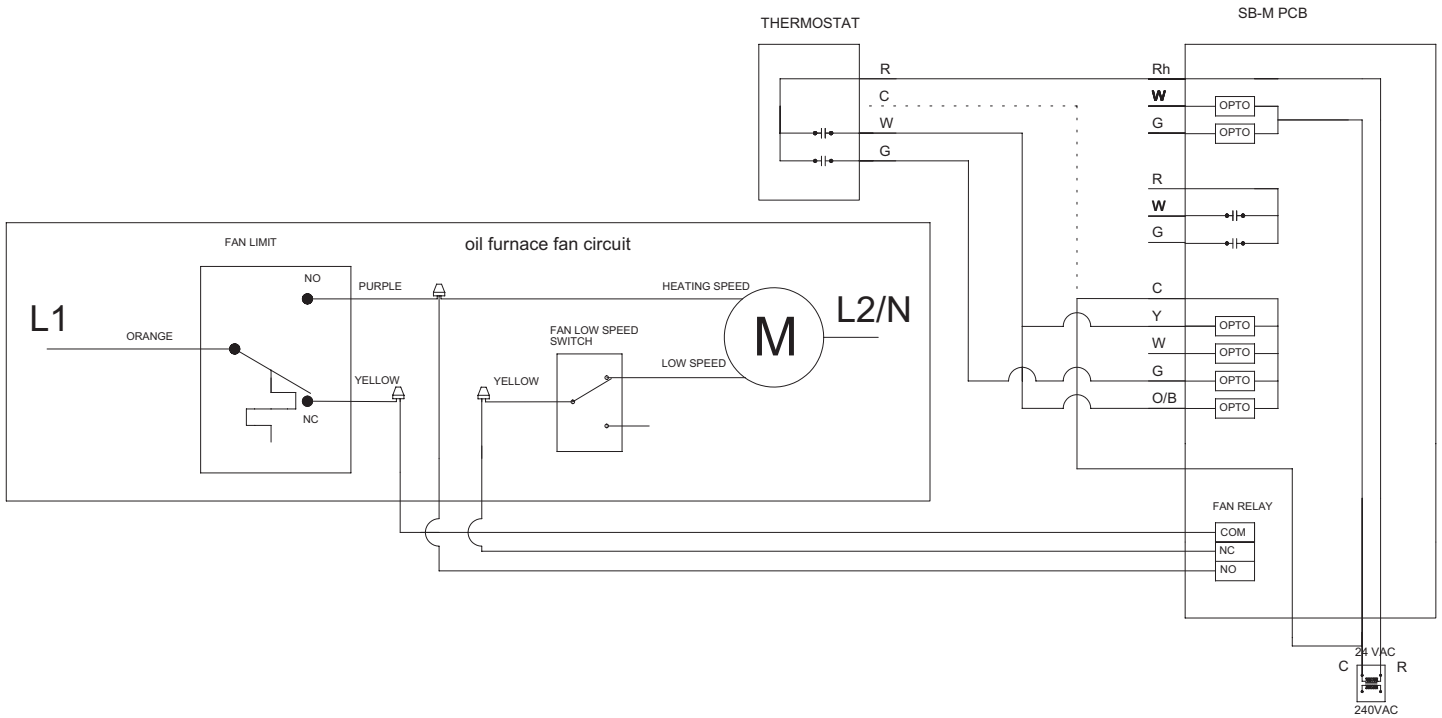


REF. #	PART #	DESCRIPTION
1	ELF-SB160521	SB ASSEMBLED ELEMENT, 16" LONG., 5 KW, 240 V
1	ELF-SB160421	SB ASSEMBLED ELEMENT, 16" LONG., 4 KW, 240 V
1	ELF-SB160321	SB ASSEMBLED ELEMENT, 16" LONG., 3.5 KW, 240 V
1	ELF-SB190521	SB ASSEMBLED ELEMENT, 19" LONG., 5 KW, 240 V
1	ELF-SB190421	SB ASSEMBLED ELEMENT, 19" LONG., 4 KW, 240 V
1	ELF-SB190321	SB ASSEMBLED ELEMENT, 19" LONG., 3.5 KW, 240 V
2	PROT-065	THERMAL PROTECTION, 165°F, MANUAL RESET
3	PROT-019	THERMAL PROTECTION, 140°F, AUTOMATIC RESET
4	CIR-001	SB ELECTRONIC CONTROL CARD
5	CON-010A	CONNECTOR/WIRES ASSEMBLY, RELAYS OUTPUTS SB
6	TRF200040D	TRANSFORMER, 208-240/24/40VA, CL.2 CL.B
7	REL-007	RELAY, T9AP5D52-2A - N.O. 20A; N.C. 10A
8	REL-006	RELAY, FR4A COIL DC 24V, N.O 30A/250VAC
9	TRI-001	TRIAC, 40A, 600V, PANEL MOUNT, BTA40

# APPENDIX 3

## SB-M WITH OIL FURNACE FAN CIRCUIT (R-W-G THERMOSTAT)

Heating elements and fan relay are activated when signals Y, O/B and G are applied to SB-M terminal block (heat pump section).



## SB-M WITH OIL FURNACE FAN CIRCUIT (R-W THERMOSTAT)

Heating elements and fan relay are activated when signals Y, O/B and G are applied to SB-M terminal block (heat pump section).

