

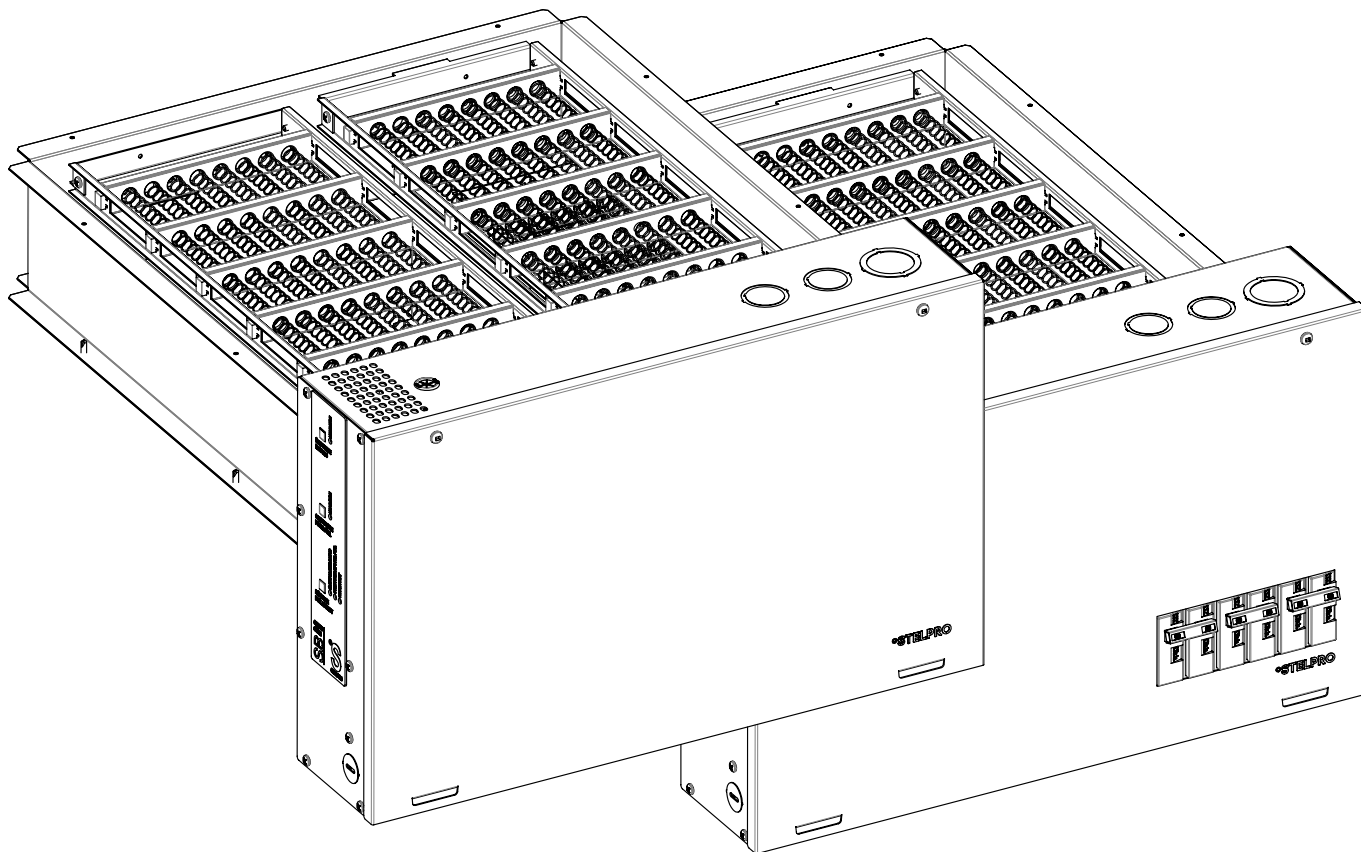


# USER'S GUIDE

## ASB/SB SERIES

## DUAL ENERGY DUCT HEATER

REPLACEMENT COMPONENT LIST INCLUDED



If you are viewing this guide online, please note that this product has been modified since its introduction. To obtain the guide corresponding to your model (manufactured before October 2015), please contact customer service.



E322241



This section must be read carefully by the user.



## 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.

## OPERATION

The ASB/SB series dual-energy air heater duct heater is designed to drive activate, when the thermostat calls for heat, external heating equipment or its own heating elements. Depending on the selected mode and the external temperature, one of these two heating modes will be activated.

The call for heat from the thermostat is redirected relayed to the air heater duct heater through the "W" and "R" connectors while the SHQ probe sensor provides the external temperature information signal.

\*The SHQ external probe is provided and installed by Hydro-Québec.

The three push buttons located on the air heater duct heater allow to select the selection between the 3 available modes: dual-energy mode, electric mode and fuel mode. The selected mode is signaled by the LEDs "FOSSIL-FUEL", "ELECTRIC" or "DUAL-ENERGY".

For the dual-energy mode, one of the two LEDs will indicate the operating heating mode.

One The orange LED indicate indicates a call for heat.

The selected heating mode is kept in memory in case of a power failure.

In electric mode, the plenum temperature can be adjusted using the potentiometer located on the board, the setting is from 35°C to 60°C.

NOTE : the name term Fossil-Fuel refers to natural gas and fuel 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

### THIS SECTION ONLY APPLIES IN DUAL-ENERGY MODE

If a bad behavior malfunction is detected in the active heating mode while the air-heater duct heater is in dual-energy mode, the air-heater duct heater will bypass the active mode and activate the other heating mode as backup.

The bad behavior malfunction is detected using the plenum temperature sensor provided with the ASB/SB series dual-energy air-heater.

Based on this information, the duct heater Using this information, the air-heater is able to detect that the heating system (electric or fossil-fuel) is defective. When the thermostat calls for heat, the air-heater duct heater starts heating using one of the two available heating modes depending on the external temperature signal provided by the SHQ probe sensor. Each time a new heating cycle is initiated, a 15 minutes minute countdown is started.

Once this countdown has expired, if the plenum temperature did not reach the auto-transfer override temperature (see Auto-transfer override temperature section) and the call for heat is still present, the active heating mode will be deactivated and the other mode will be activated. I.e. if the Electric mode was activated when the call for heat was received, the auto-transfer override will activate the Fossil-Fuel mode and vice-versa.

While the auto-transfer override is active, the blinking LED is showing the defective heating mode.

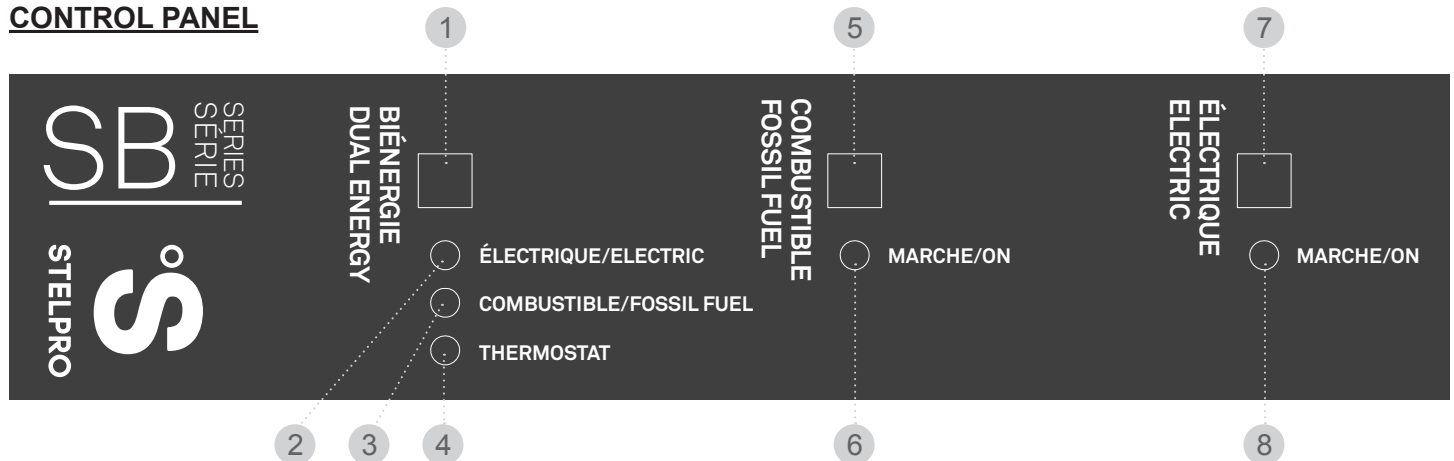
The user may cancel the auto-transfer override at any time by pressing one of the 3 buttons and select the desired heating mode.

Once the auto-transfer override is activated, the bypass duration is fixed to 1 hour for the first two fix attempts. The subsequent auto-transfer override duration is then set to 12 hours for all other fix attempts.

After each bypass period, the auto-transfer override is deactivated to verify if the defective mode has been fixed.

If both heating modes are defective, the auto-transfer override will be activated every 15 minutes until one of the two heating mode has been fixed.

## CONTROL PANEL



### LEGEND

1. **DUAL ENERGY** button: Allows the selection of the Electric or Fossil Fuel mode.
2. **ELECTRIC** LED: Indicates the Electric mode of the Dual Energy mode is activated.
3. **FOSSIL FUEL** LED: Indicates the Fossil Fuel mode of the Dual Energy mode is activated.
4. **THERMOSTAT** orange LED: indicates a heating demand from the thermostat.
5. **FOSSIL FUEL** button: Allows the selection of the Fossil Fuel mode.
6. **FOSSIL FUEL - ON** LED: Indicates the Fossil Fuel mode is activated.
7. **ELECTRIC** LED: Allows the selection of the Electric mode.
8. **ELECTRIC - ON** LED: Indicates the Electric mode is activated.

## AUTO-TRANSFER TEMPERATURE

The auto-transfer override temperature is defined as the minimum air temperature in the plenum under which the auto-transfer override function will be activated (after a 15 minute delay). The installer may adjust it with the potentiometer located on the board.

The installer must determine the proper value by performing a plenum temperature reading with the electric elements on, not the furnace burner. He must then adjust the potentiometer to a lesser temperature than the one from the plenum.

The following table describes the control board operation:

| CONTROL BOARD OPERATION |             |             |        |   |     |        |          |     |
|-------------------------|-------------|-------------|--------|---|-----|--------|----------|-----|
| MODE                    |             |             | INPUTS |   |     | BURNER | ELEMENTS | FAN |
| ELECTRIC                | FOSSIL-FUEL | DUAL-ENERGY | W1     | G | SHQ |        |          |     |
| 0                       | 0           | 1           | 1      | 0 | 0   | ON     | OFF      | OFF |
| 0                       | 0           | 1           | 1      | 1 | 0   | ON     | OFF      | ON  |
| 0                       | 0           | 1           | 1      | X | 1   | OFF    | ON       | ON  |
| 0                       | 1           | 0           | 1      | 0 | X   | ON     | OFF      | OFF |
| 0                       | 1           | 0           | 1      | 1 | X   | ON     | OFF      | ON  |
| 0                       | 1           | 0           | 0      | 1 | X   | OFF    | OFF      | ON  |
| 1                       | 0           | 0           | 1      | X | X   | OFF    | ON       | ON  |
| X                       | X           | X           | 0      | 1 | X   | OFF    | OFF      | ON  |
| X                       | X           | X           | 0      | 0 | X   | OFF    | OFF      | OFF |

## THERMOSTAT AND FURNACE CONTROL SIGNALS

The existing thermostat may be used to control the ASB/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.

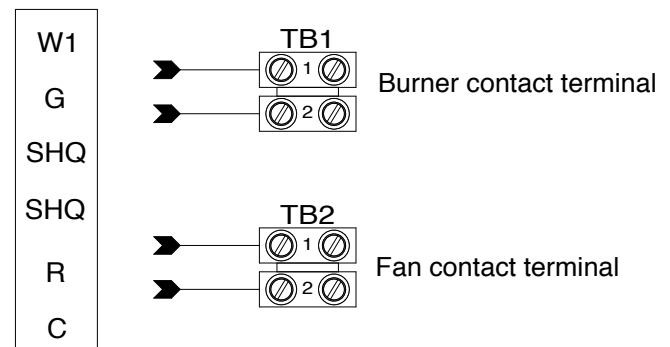


FIGURE 9

## SAFETY FEATURES

The ASB/SB duct heater is designed with several safety features to guarantee safe operation. The following paragraphs describe these safety features.

### DUCT OVERHEATING DETECTION

The ASB/SB 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.

If the burner is on and the plenum temperature exceeds 71 °C (160 °F) for more than two minutes, then the electric mode will be forced, and the temperature will be set by the potentiometer.

In this situation the control board will only indicate the event by means of an orange pilot light. The pilot light will blink 4 times in two seconds, followed by a two second pause.

If the ASB/SB is on dual energy mode (fuel mode) and the temperature on the duct exceeds 71°C (160°F) for two minutes, the furnace burner will be deactivated and the electric mode will be forced until temperature of the duct is below 54°C (129°F). When the electric mode is forced, the orange indicator flashes 4 times in 2 seconds and then is off for the following two seconds.

### THERMAL PROTECTION

The ASB/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). For the new ASB/SB series (manufactured since October 2015) the manual protection is rated for 85°C (185°F).

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

### HEATING DEMAND INTERLOCK

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 ASB/SB 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.**

## AIRFLOW CALCULATIONS

The airflow in the ASB/SB 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

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

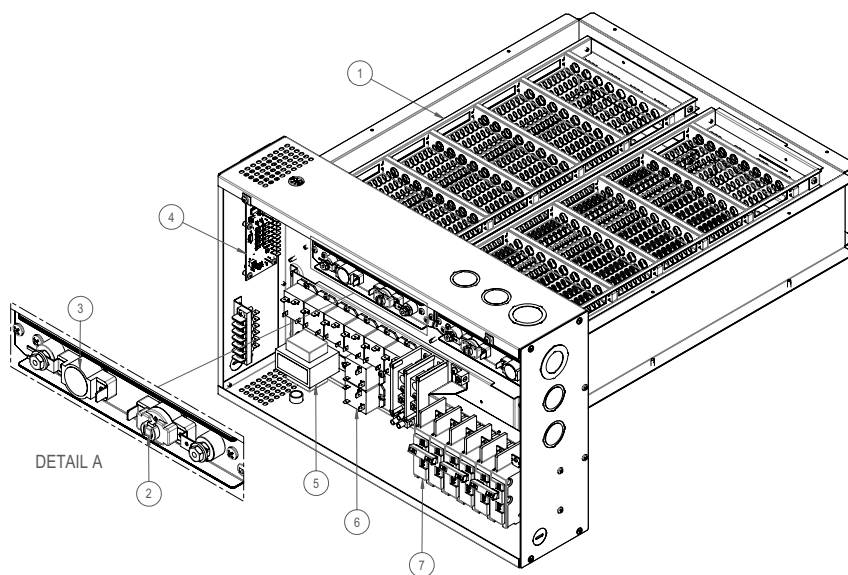
## TROUBLESHOOTING

| 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 orange pilot light blinks  | <ul style="list-style-type: none"> <li>The duct's temperature-sensor is defective or wrongly connected</li> </ul>   |
| The orange pilot light blinks four times every two seconds and pause for two seconds | <ul style="list-style-type: none"> <li>The air temperature of the plenum exceeds 71°C (160°F) - Dirty filter or worn fan belt</li> <li>Mode forced to electric</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).

## 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          |
| 2      | PROT-017     | THERMAL PROTECTION, 185°F, MANUAL RESET          |
| 3      | PROT-019     | THERMAL PROTECTION, 140°F, AUTOMATIC RESET       |
| 4      | CIR-023 SB   | ELECTRONIC BOARD FOR SB DUCT HEATER WITH PROGRAM |
| 5      | TRF200040D   | TRANSFORMER, 208-240/24/40VA, CL.2 CL.B          |
| 6      | REL-006      | RELAY, SINGLE POLE 30A/250VAC 24VDC              |
| 7      | BREA-001     | CIRCUIT BREAKER 120/240V 30A 2P                  |
| 7      | BREA-002     | CIRCUIT BREAKER 120/240V 40A 2P                  |
| 7      | BREA-003     | CIRCUIT BREAKER 120/240V 50A 2P                  |



## LIMITED WARRANTY

This limited warranty is offered by Stelpro Design inc. ("Stelpro") and applies to the following product made by Stelpro: ASB/SB model. **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: **3 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.