

# **THERMOLEC**

***INSTALLATION  
INSTRUCTIONS  
FOR MINI MAKE-UP AIR  
MODEL FER***

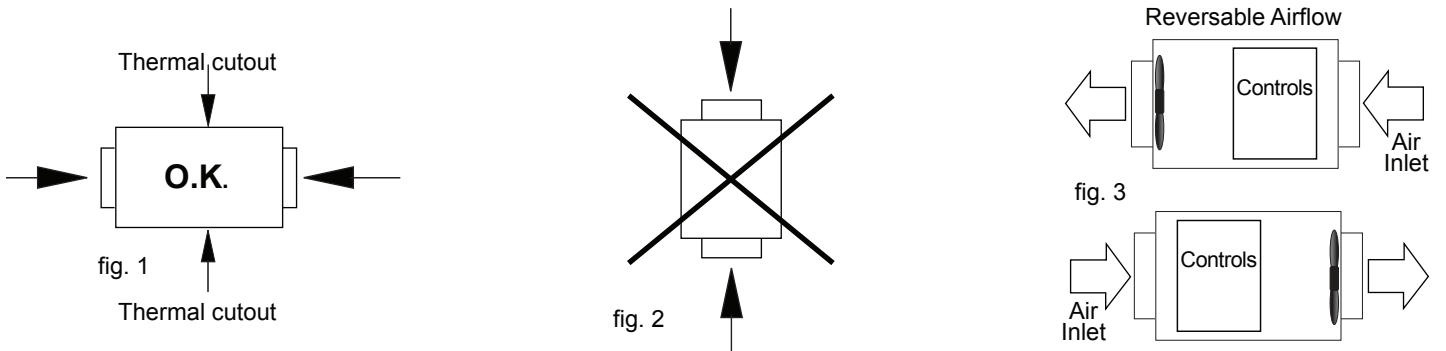
**Please read instructions carefully before installation.**

This unit is a complete fresh air make-up package with an integrated damper system, washable filter and fan with adjustable speed control which allows an easy setup with a minimum of connections. Only one power connection is required to power the entire unit. Please follow the wiring diagram included under the cover for specific electrical wiring. Thermolec FER mini make up air units are available in sizes up to 20 kW of heat at voltages ranging from 120V single phase to 600V three phase. Collar sizes range from 6" to 12" with fans capable of up to 600 CFM. Mini make up air models are specified as follows: **FER-collar-kW-voltage/phase**, e.g. a 20kW, 240V (single phase) unit with a 12" collar would be **FER-12-20-240/1**. For small 6" applications up to 3kW at 240/1 take a look at our **THERMO-X-AIR** units which include a room controller to control the operation mode of the integrated fan.

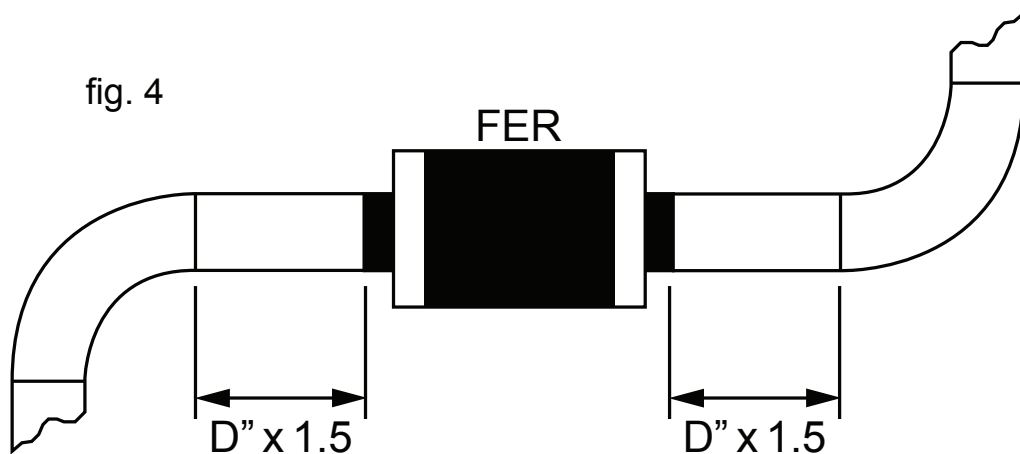
**Mechanical installation**

Thermolec FER heaters are designed to be installed for horizontal airflow only (fig. 1). **DO NOT install unit vertically** (fig. 2). This unit is equipped with thermal cutouts on both the top and bottom of the unit which allows it to simply be rotated 180° to change the direction of airflow with no modifications to the fan or wiring, as seen in fig. 3. The direction of airflow from the fan itself is fixed and cannot be reversed. Before mounting the unit, determine the direction of airflow required and rotate the unit accordingly.

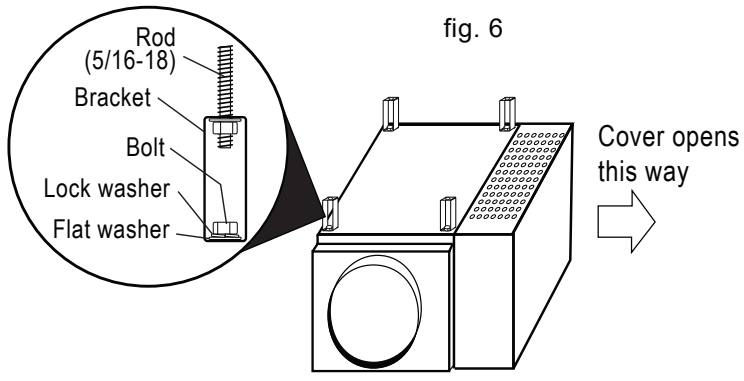
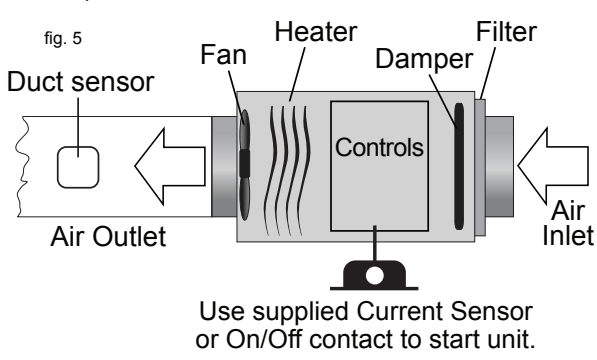
**NOTE:** This unit is designed to preheat fresh air and not reheat ambient air.



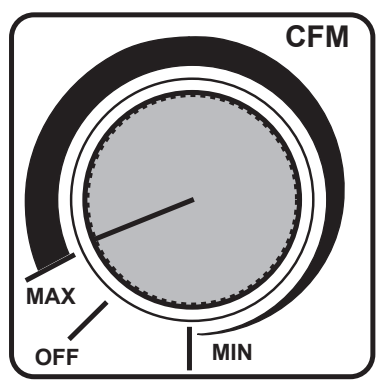
For proper airflow, a minimum distance between the unit and any elbow must be observed. This distance increases as the unit size increases. To determine the proper distance, multiply the collar size of the unit by a factor of 1.5. For example a unit with a 12" collar would require elbows to be installed at a distance of not less than 18" (fig. 4). Use round insulated duct for the inlet connection and uninsulated for the outlet while minimizing the use of elbows. When taking air directly from outside, install the inlet duct at an incline such that condensation or melted snow will not flow into the heater.



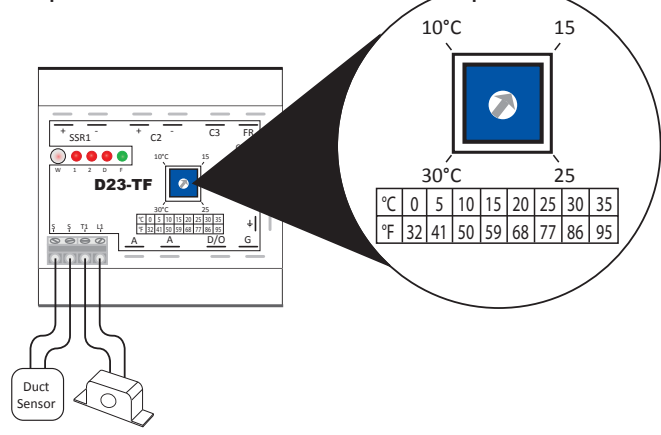
Attach the unit to a suitable support allowing a minimum 1/2" clearance above the heater. Always install the unit such that there is sufficient space to remove the cover and the damper assembly if necessary as well as to remove washable filter for cleaning (fig. 5). The hanger brackets provided (fig. 6) are designed to be used with 5/16-18 threaded rods (not included). Springs may be added to the rods as an option to reduce vibration (not included).



The minimum amount of air required (in cubic feet per minute) to operate the unit is 30 CFM per kW. A 10 kW unit will require 300 CFM. The fan is adjusted with the speed control knob located inside the control panel. Rotating the knob clockwise from the off position starts the fan at maximum speed and the speed reduces as the knob continues in a clockwise motion. Actual CFM is based on the static pressure in the duct, for best results measure the static pressure and then refer to the fan performance chart at the end of the manual for more detail.



When there is a demand from the current sensor (or a dry contact), the electronic controller will turn on the fan and start heating. The duct sensor must be installed in the duct downstream from the mini make up air unit for proper operation. Adjust the blue square potentiometer on the D23-TF electronic controller to control the output temperature. Use the chart below the potentiometer to convert the temperature from Celsius to Fahrenheit.



If the unit is equipped with an anti-freeze feature a temperature sensor will be connected to the A A terminals. This feature will occasionally cycle the unit at cold temperatures to prevent freezing and the buildup of condensation. Simply remove the wires to disable this feature.

The duct sensor must be wired to the 'S' 'S' terminals on the D23-TF. The controller monitors the outlet temperature and alerts of abnormal conditions with a flashing light (W) that can be seen on the D23-TF controller, see Table A below. In the event of a heater failure, such as a tripped manual cutout, the controller will shutdown the unit to avoid circulating unheated outside air and the warning LED will start flashing. If for some reason the output temperature is too hot, to avoid a potentially dangerous situation, the controller will also shutdown the

unit and flash the warning LED accordingly.

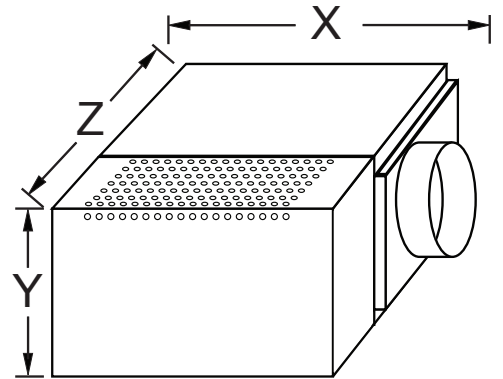
Table A

Number of Flashes	Problem
one	no heat or output temperature too low
two	output temperature too hot

**NOTE:** Maximum discharge temperature for FER models is 90 °F (32 °C).

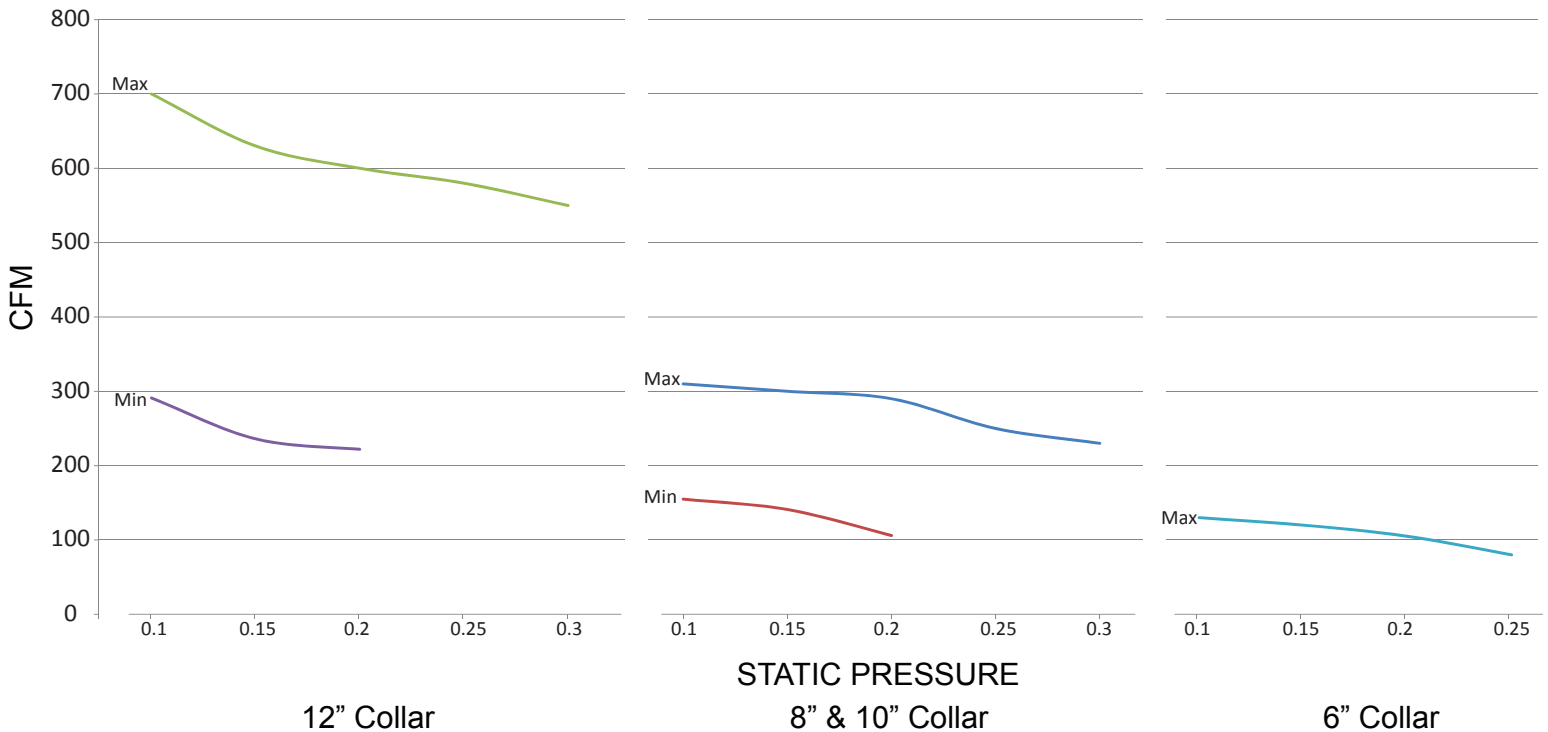
**Mechanical dimensions and weights:**

Collar size	6" (3 Ø)	8"	10"	12"
Weight (approx)	45 lbs	70 lbs	70 lbs	110 lbs
Width (X)	31.5"	35.5"	35.5"	43.5"
Height (Y)	10"	15"	15"	16"
Depth (Z)	13.75"	15"	15"	21"
Max. kW	3	6	10	20
Max. CFM	100	300*	300	600



**NOTE:** Dimensions and specs are approximate and may change without notice.  
 \* 300 CFM when interlocked with an exhaust fan

**FAN PERFORMANCE:**



## Fan specifications

Unit size	CFM @ 0	VAC	Hertz	Power (W)	dBA	Max Amb. Temp C	Bearing Type
6" collar	263	115	50/60	46	60	70	Ball
8" collar	607	115	50/60	80	61	75	Ball
10" collar	607	115	50/60	80	61	75	Ball
12" collar	1100	115	60	175	73	50	Ball

**Note:** All data as supplied from fan manufacturer.

To convert CFM to liters/second multiply CFM value by 0.47.

## Electrical installation

Disconnect all power sources before opening the control box and working within. Please conform to all local and national electrical codes for wiring. The system should be supplied by a separate cable, of appropriate gauge, and with appropriate protection. Use only wires suitable for 75°C. Wires shall be sized accordingly to the Canadian Electrical Code requirements. All wires must be brought through knock-outs. Install a disconnect switch close to the unit according to the code unless a disconnect switch is already built into the heater.

To quickly calculate the heater amperage use the following formulas:

**Single phase:** Amperage = Watts / Voltage.

e.g. 20 kW at 240V would be:  $20,000/240 = 83.3$  A

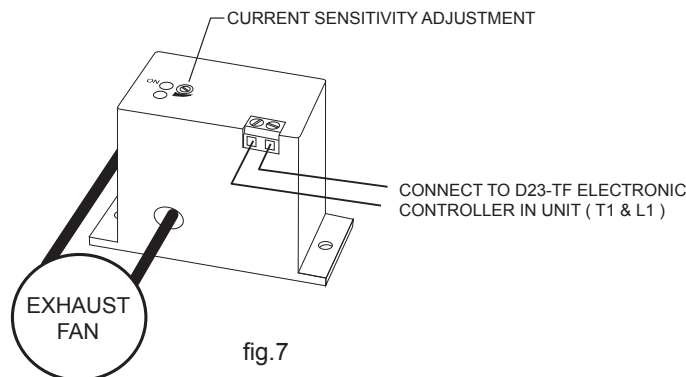
**Three phase:** Amperage = Watts / (1.732 x Voltage).

e.g. 10 kW at 600V/3 phase would be:  $10,000/(1.732 \times 600) = 9.6$  A

After installing and wiring the system, use the potentiometer on the electronic controller to adjust the desired temperature and the fan speed control to adjust the air volume. The fan speed should be adjusted according to the application to compensate for the specific static pressure of the installation.

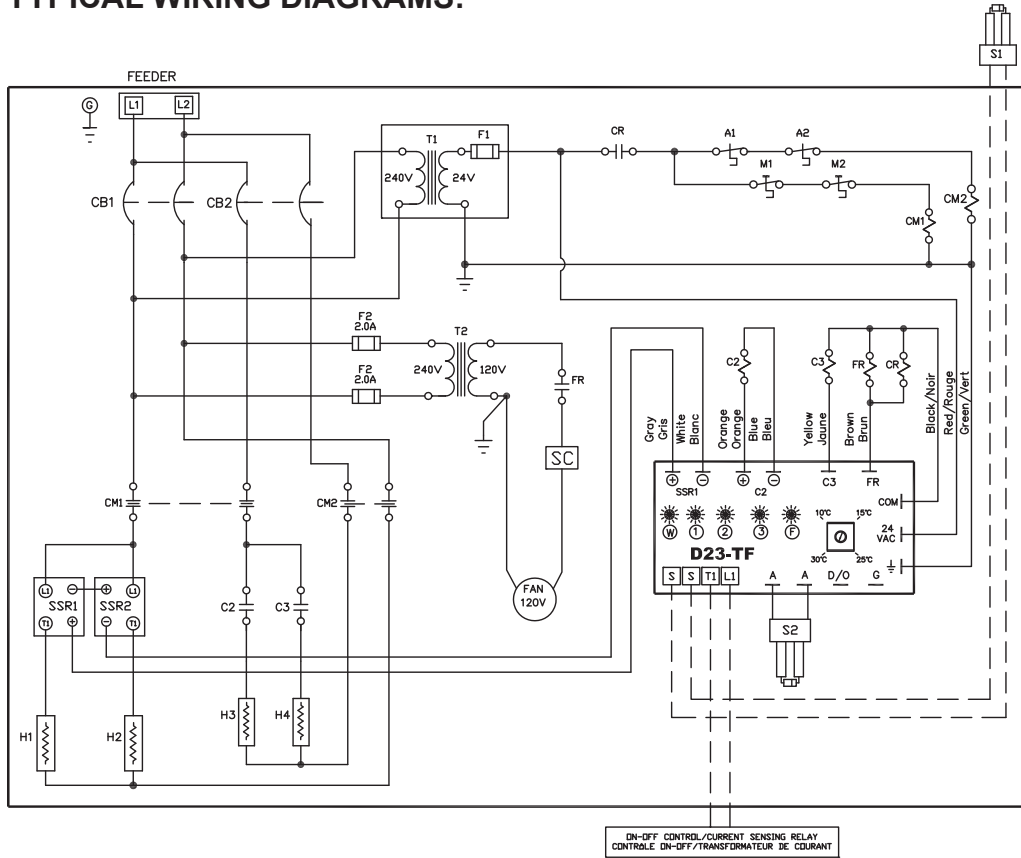
## Current sensor instructions

Use the included current sensor to interlock the make-up air unit with an exhaust fan. Simply run the hot leg (black wire) of the exhaust fan through the hole in the current sensor (Fig. 7). The lower the setting, the less amperage required to switch the unit on. To avoid excessive running of the FER installed with kitchen hoods equipped with lights, first turn on the lights only and turn the adjustment screw higher until the FER turns off. If the exhaust fan does not turn on the FER, simply turn the adjustment screw lower until the heater starts. For information on connections refer to the wiring diagram included with the mini make-up air.



**TYPICAL WIRING DIAGRAMS:**

**240/1**



**LEGEND**

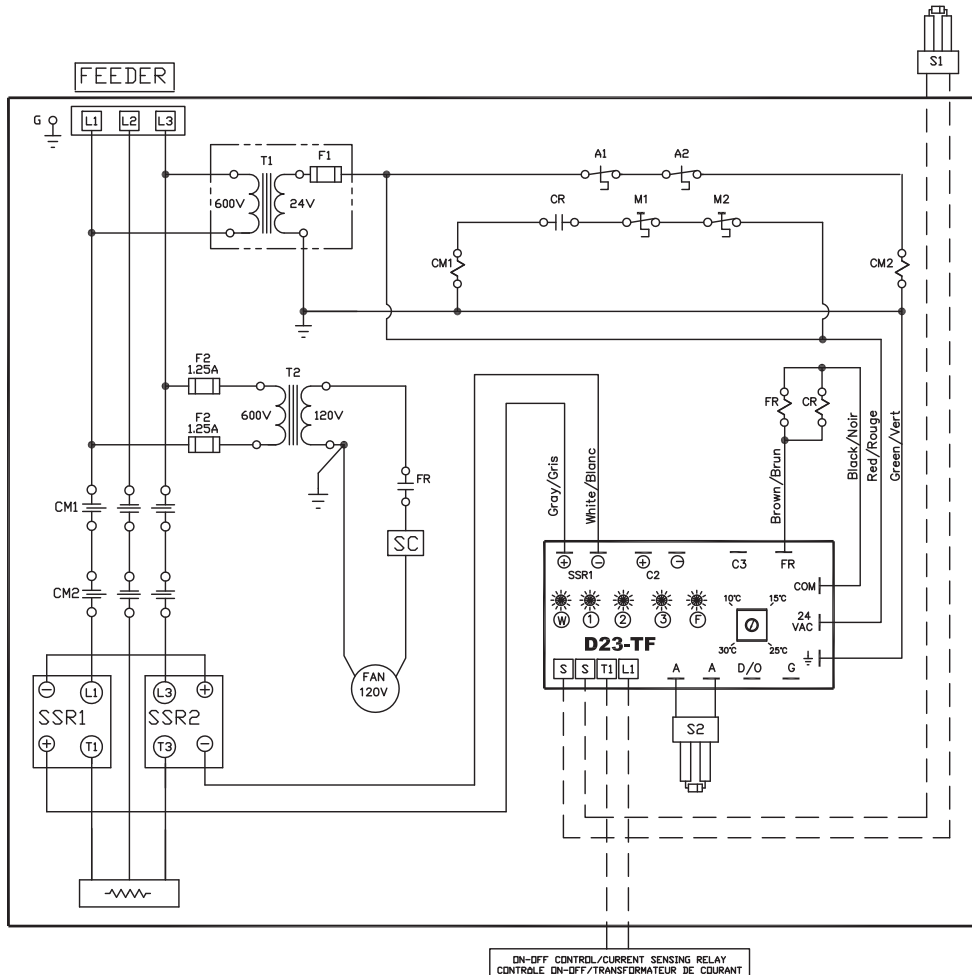
- CM1 Back-up Contactor to Manual
- CM2 Operating Contactor
- D23-TF Solid State Controller
- F Fuse Or Fuse Link
- A1, A2 Automatic Reset Cut Out
- M1, M2 Manual Reset Cut Out
- FR Fan Relay
- SSR Solid State Relay
- T1 Control Circuit Transformer
- T2 Transformer For Fan
- S1 Duct Temperature Sensor
- S2 Anti-Freeze Sensor
- SC Fan Speed Controller
- CR Backup Relay
- CSR Current Sensing Relay
- C2, C3 Operating Relays
- CB1, CB2 Circuit Breakers

**LEGENDE**

- CM1 Contacteur Secondaire
- CM2 Contacteur de Contrôle
- D23-TF Contrôleur Électronique
- F Fusible
- A1, A2 Sonde Thermiques à Réenclenchement Automatique
- M1, M2 Sonde Thermiques à Réenclenchement Manuel
- FR Relais de Ventilateur
- SSR Relais Électronique
- T1 Transformateur de Contrôle
- T2 Transformateur du Ventilateur
- S1 Capteur de Temperature de Gaine
- S2 Capteur Anti-gel
- SC Contrôleur de Vitesse du Ventilateur
- CR Relais Secondaire
- CSR Transformateur de Courant
- C2, C3 Relais de Contrôle
- CB1, CB2 Disjoncteurs

DN-OFF CONTROL/CURRENT SENSING RELAY  
CONTROLE DN-OFF/TRANSFORMATEUR DE COURANT

**600/3**



**LEGEND**

- CM1 Back-up Contactor to Manual
- CM2 Operating Contactor
- D23-TF Solid State Controller
- F Fuse Or Fuse Link
- A1, A2 Automatic Reset Cut Out
- M1, M2 Manual Reset Cut Out
- FR Fan Relay
- SSR Solid State Relay
- T1 Control Circuit Transformer
- T2 Transformer For Fan
- S1 Duct Temperature Sensor
- S2 Anti-Freeze Sensor
- SC Fan Speed Controller
- CR Backup Relay
- CSR Current Sensing Relay

**LEGENDE**

- CM1 Contacteur Secondaire
- CM2 Contacteur de Contrôle
- D23-TF Contrôleur Électronique
- F Fusible
- A1, A2 Sonde Thermiques à Réenclenchement Automatique
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- FR Relais de Ventilateur
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- S1 Capteur de Temperature de Gaine
- S2 Capteur Anti-gel
- SC Contrôleur de Vitesse du Ventilateur
- CR Relais Secondaire
- CSR Transformateur de Courant

DN-OFF CONTROL/CURRENT SENSING RELAY  
CONTROLE DN-OFF/TRANSFORMATEUR DE COURANT

## Maintenance

Even though Thermolec mini make up air units are designed to operate long term without problems we strongly recommend a yearly visual inspection. This precautionary step will help to keep your installation operating well. Note these eventual first signs of problems: signs of overheating on the heater frame, traces of water or rust on the control box.

A basic checklist would include:

- Check all fuses
- Check the resistance to ground for each circuit
- Check the resistance phase to phase for each circuit
- Check the tightening of connections at all contactors and heating elements
- Check all contactors

Any defective components should be replaced only with approved original parts.

## Washable filter

Disconnect all power sources before doing any maintenance. This unit is equipped with a permanent filter that should be washed at regular intervals. Check the filter after a month of operation. To remove the filter, simply loosen the screw holding the retaining clip and pull on the plastic tab (Fig. 9). If the filter is extremely dirty, increase the frequency of inspection. Make sure that the filter is dry before replacing.

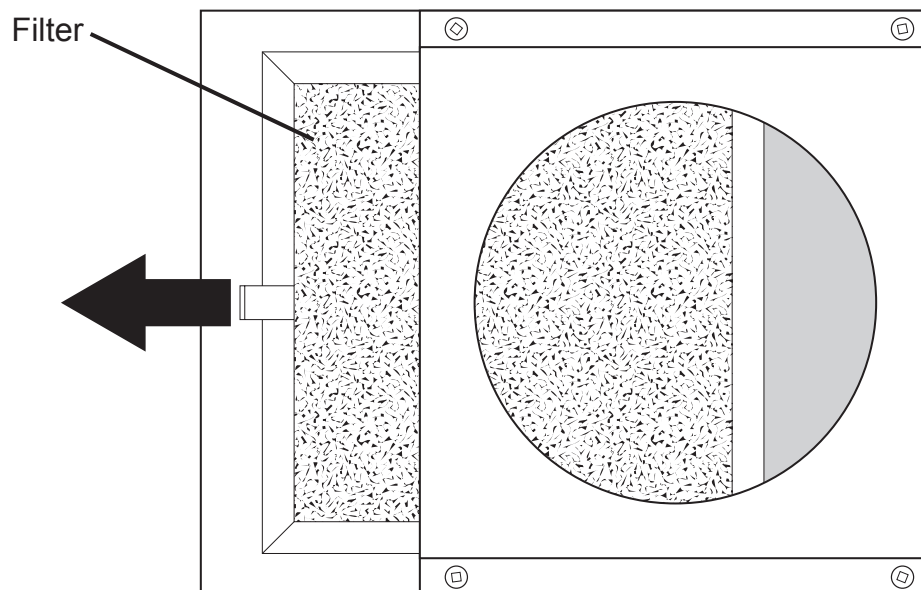


fig. 9

## Warranty

1 - **THERMOLEC LTD** guarantees its heater elements against any defect in workmanship and material for a period of ten years and other built-in components for a period of two years, starting from the date of shipment from its factory.

2 - **THERMOLEC LTD** will repair or replace without charge, in its factory or in the field at its own discretion, the unit or part, which upon manufacturer examination, is considered to be defective.

3 - Misuse of this product, or repairs made by others without **THERMOLEC LTD's** authorization, will void this warranty.

4 - **THERMOLEC LTD** shall not be held responsible for damage or delay and shall not be held liable for any charges resulting from the removal or replacement of the allegedly defective heater.

5 - **THERMOLEC LTD** shall not be held responsible for any incidental or consequential damage or delay due to workmanship or material. No additional charge will be accepted for repair, replacement or modification if prior written authorization was not obtained from **THERMOLEC LTD**.

6 - Any control device or accessory, supplied with the unit, to be mounted or connected remotely, will only be guaranteed by the manufacturer per conditions stated in paragraph 5.

