

INSTALLATION & OPERATING INSTRUCTIONS



Total Comfort TC Series Air Handler

READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE OPERATING
YOUR SUMMERRAIRE TC SERIES AIR HANDLER

THIS UNIT MUST BE INSTALLED AND SERVICED BY A QUALIFIED
INSTALLER AND WHERE REQUIRED BY LAW, A LICENSED TECHNICIAN.

SUMMERRAIRE MFG.
PETERBOROUGH, ONTARIO
CANADA, K9J 6X6

FOR SERVICE CALL:

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1.0 IMPORTANT NOTES FOR THE INSTALLER

1.1 A Quick Check List

1. Are the water connections to the water heater oriented in a way to avoid trapping air in the heating circuit?
2. Is the purge valve installed on the return line from the air handler upstream from the isolation valve?
3. Is the air handler hung and isolated to avoid transmitting vibration through framing and duct work?
4. Are the isolation valves full-port? Restrictive valves will limit performance.
5. Is outdoor cooling unit contactor wired to screw terminals on controller to provide hard-start protection?
6. Are thermostat connections correct, including cooling and continuous run connections?
7. Have the packing materials been removed from the blower and the pump?
8. Is there an installation manual for the home owner?
9. Is the unit accessible? Are there clearances for service and component replacement?
10. Is the air stream sensor (required if cooling has been added) mounted downstream of the cooling coil?
11. Are the supply plenum and return duct/drop acoustically lined? (at least 6' of the return duct/drop must be lined in addition to the supply plenum)
12. Is the filter cover in place? Is a clean filter in place? Is the supplied filter rack installed?

2.1 The **Total Comfort Series** line of air handlers are designed for use with hydronic (boiler) systems, tank-less or on demand water heaters, or in combination space and domestic water heating systems (combo systems or aqua air systems). Combo heating systems use the home's water heater to provide both the space heating and domestic hot water, eliminating the need for a furnace.

The Total Comfort Series line of high efficient warm water air handler furnaces are designed to automatically adjust their output size based on the ever changing load of the structure. The automatic adjustments are made in heating as well as cooling. This minimizes selecting an oversized heating appliance just to accommodate the cooling load. The Total Comfort Series is always the right size.

3.1 **Cabinet**

All cabinets have a tough, durable polyester powder coat pebble finish on satin coat 20 ga. steel

3.2 **Heating Coils**

All heating coils are potable water grade copper suitable for use in plumbing systems. No lead solder is used in any component construction. All coils and internal piping conform to ASTM B-68, B-88 and/or B-743 standards.

High density aluminum fins provide maximum heat transfer for small coil surface.

3.3 **Fan and Motor**

All fans are wide body dynamically balanced for extra quiet operation. Multi-directional sleeve bearing motors allow mounting in any direction for maximum installation flexibility.

3.4 **Circulating Pump**

The circulating pump is matched for maximum performance. Air handlers come with internally mounted pumps for ease of installation. Externally mounted pumps can be added for long runs from the hot water source to the air handler.

3.5 **Check Valve**

A check valve is built into the Grundfos pump to protect against back-flow of water to avoid short circulating around water heater during domestic water use and protect against thermal siphoning. Check valves (1/2"), can have a maximum elevation of 25' (8 metres) above the water heater. Check valves (3/4") can have a maximum elevation of 50' (15 metres) above the water heater.

3.6 **Connecting to a Water Heater**

Any properly sized gas, propane or oil fired water heater will work in a combo heating system. Make sure the water heater being used is approved for combo applications. Tank-less water heater may reduce the capacity of air handlers due to the higher internal pressure drop. Use only approved and tested air handlers when using any tank-less water heater. Make sure the Tank-less water heater is approved for combo heating.

3.7 **Condenser Freeze Protection**

If the evaporator coil temperature is too low or operating outside of normal conditions, the control will shut off the outdoor condenser for 5 minutes. Evaporator coil freezing can cause slugging at the compressor. Dirty air filters or over sizing of a/c equipment can cause this or poor duct design/installation.

3.8 **Water Refresher**

If the circulating pump has not run in the previous 24 hours, the control will turn the pump on for 1 minute to flush the lines and heat exchanger. This will help ensure that the water lubricated pumps do not stick during long periods of inactivity.

3.9 **Home freeze Protection**

The TC series air handlers have a built in sensor which will help prevent the home from freezing due to a faulty thermostat. Should the temperature get too low, the control will turn the air handler on automatically and maintain the home at approximately 40 degrees F. Note: this feature will only work if the hot water source is turned on and the air handler has power.

3.10 **Alarms**

Should service problems arise the TC Series will notify the user with an audible alarm, flashing light or dry contacts which can be connected to a warning light or home security system.

3.11 **Set Back Recovery**

If a setback thermostat is used or incidental increase in temperature is required, the control will ramp the air handler quickly to maximum output to recover, then the next cycle will run at normal size.

3.12 **Indicators**

A bicolor LED indicator is included and is used to indicate alarm, test mode, and normal operation. The indicator will display temperature readings of the sensors during normal operation.

3.13 **Test Mode**

A push button will allow the installer a 20 minute window to set up the TC Series air handler for cooling and heating mode. After 20 minutes the unit will return to normal operation. Pushing the test button before the 20 minutes is completed, will return the unit to normal operation.

3.14 **Main Control Beeper Alarm**

In the event of a temperature sensor failure the alarm beeper will sound. Beeper can be silenced for 24 hrs only by turning power OFF and back ON. Beeper will continue to sound after 24 hrs of power on until fault condition is corrected.

3.15 **Maximum and Minimum Temperatures**

Maximum heating return temperature and minimum cooling return temperatures can be selected. This allows efficient use of energy in rental properties by acting like a duct limiter.

3.16 **Dehumidifying / Cooling**

The Total Comfort TC Series air handlers use a modulating blower fan to regulate the amount of humidity. When humidity is high the blower fan runs slower to provide rapid removal of moisture. When conditions are normal the fan speeds up to provide optimal cooling. The balance between dehumidifying and cooling is always met. By maintaining optimal humidity levels the home owner can set cooling temperatures higher, thus saving on electrical costs as well as improved comfort. This also helps to prevent mould growth by targeting a 50-55% relative humidity.

3.17 Heating

The strategy in heating is to allow the TC Series air handler to change output to match the loss. By automatically changing fan and pump speeds, the output of the air handler can be increased or decreased to match the loss of the home. This provides better comfort for the occupants as the longer run times provide less stratification and improved air filtration.

3.18 Customizing

The cooling and heating features can be field customized to provide maximum comfort for almost any home or location. See manufacturer for instructions.

4.0 EQUIPMENT SELECTION AND SIZING

Proper sizing of systems components is crucial for proper operation.

1. Obtain room by room heat loss and/or heat gain
2. Determine heating water temperature
3. Determine duct layout

Make sure a proper room-by-room heat loss and heat gain for the dwelling is calculated using Manual J, HRAI, ASHRAE or other approved sizing method.

5.0 INSTALLATION

5.1 The installer shall adhere to all local, state and national code requirements pertaining to the installation of this equipment.

5.2 The TC Series air handler can be mounted in most directions. Upflow, counterflow, horizontal left and horizontal right. You cannot install the air handler on it's back or suspended with front cover facing down.

5.3 For other mounting positions please contact the manufacturer. The return air can be installed on the bottom of the unit or the left or right hand side. Make sure you cut and remove the metal jacket on the cabinet. Make sure you position the filter rack so that the filter is easily accessible.

5.4 The air handler can be suspended by securing straps to the corner $\frac{1}{4}$ - 20 machine screws provided. Do not install your own screws as damage to the heating coil may occur. Install the air handler with the door screwed in place to avoid racking of the cabinet.

5.5 Provide at least 2 feet (0.75 meters) of clearance from the front of the cabinet for service and maintenance. Zero clearance is acceptable on the other sides.

6.0 DOMESTIC WATER PIPING

6.01 A webstone ball valve with drain/purge valve must be installed. The drain valve must be located downstream of the pump and check valve, and upstream of the isolation valve (if isolation valve is present). With this arrangement, any air trapped in the system can easily be flushed out following the instructions in the Start-up & Troubleshooting sections.

6.02 Isolation valves are recommended, but not required. Installing isolation valves facilitates easy servicing and ensures positive purging of the system during startup.

6.03 For combo systems all joints in copper pipe must be lead-free solder. All piping must be suitable for potable water use.

6.04 Maximum pipe lengths for all TC series air handlers should be 24 feet for 1/2" piping or 120 ft for 3/4" piping. Pipe lengths indicated are actual lengths. Allowance has been made for a reasonable number of valves and fittings. For distances that are greater, a second circulator may be added or pipe size may be increased in diameter.

6.05 When both top and side connections are provided on the water heater, the side connections should be used for the space heating loop.

6.06 When the space heating loop connections are made to the domestic water connections.

- The heating loop connections should be positioned horizontally in a vertical section of the domestic water line for both inlet and outlet. Refer to the piping schematic for details.
- Connect the heating loop to the domestic water connections as close to the water heater as possible.

6.07 Avoid sections of pipe in the heating loop that can trap air where possible. It is usually impossible to install a system, without having at least one part of the system or heating coil able to trap air. This will not be a problem if the connection to the domestic water lines is made properly, and the system is properly purged on setup:

- The circulating pump is capable of removing small amounts of entrained air from the heating loop.
- Following the flushing procedures in the Start-up section will ensure that there is no air in the system after initial set-up.
- Proper connections between the domestic water lines and the heating loop will ensure that any air that collects in the water tank, does not make its way into the heating loop.

6.08 If connected to a water heater, air bleed valves at high points of the heating system are not required and NOT recommended.

6.1 **Anti-Scald Valve**

Anti-scald valves are not required for normal operation, but may be used for installations where the local, state, or national code demands it or the home owner wishes a lower domestic water temperature than 140F (60C). It is not recommended that anti-scald valves be installed unless required. If an anti-scald device is to be installed, it must comply with ASSE standards no. 1016 and 1017.

6.2 **Boiler Piping**

Use a primary, secondary piping arrangement to de-couple the flow through the boiler from the flow through the air handler. Make certain the supply and return connections for the air handler heating loop are not more than 4 pipe diameters apart. Make certain the supply connection is upstream of the return connection for boilers operating at or below 160F (71C). Maximum length of piping to and from the Air Handler shall be as per paragraph 6.04.

6.3 **Water Heater or Boiler**

Follow the manufacturer's instructions for installation and start-up of the water heater or boiler. Make sure the heating device is turned off during air handler installation and service. Ensure system has been refilled, and all air is purged from the system before turning on the heating device.

6.4 **Duct Work**

To minimize fan noise in the living space, it is recommended that the first six feet of supply and return air duct be lined with acoustic insulation.

Return and supply air duct work should be the same size as the air handler openings up to the first branch, fitting or transition.

7.0 START-UP PROCEDURES

Do not start the air handler or water heater until ALL Air has been purged!

1. Fill the boiler loop or water heater with water, but do not start it.
2. Purge all air from the heating boiler or domestic hot water system.
3. Purge all air from the space-heating loop by closing the isolation valve on the return leg of the loop and open the drain to purge air. Open the return leg isolation valve and then close the drain valve.

4. Start the boiler or water heater according to the manufacturer's instructions. Set the design water temperature and wait for the system to shut off. You can check that the water heater is set properly by running hot water from a faucet into a glass. Using a thermometer measure the temperature of the water as soon as the water heater burner shuts off. If the set-point temperature is too low or is above 140F, reset the tank control, run water until the burner starts again and repeat the measurement.
5. Turn on the power to the air handler and set the room thermostat for heat to energize the fan and pump. If a gurgling sound is present, it should subside within one minute. If noise is still present after one minute, repeat step 3 to purge air as necessary.
6. Check supply and return pipes for temperature differences to make sure there is flow. There should be a noticeable difference in temperature between supply and return lines. **Warning, use caution** when supply water temperature is above 120 degrees F.

8.0 SERVICE AND MAINTENANCE

8.1 Filter

The TC Series of air handlers are provided with a reusable washable filter media. This filter should be inspected monthly and removed and vacuumed or rinsed as required. Use water only to clean filter. The filter is designed to last for many years, but replacements can be purchased from any hardware store and cut to fit the filter rack.

8.2 Coils

Air conditioning and heating coils should not require cleaning if the filter maintenance schedule is adhered to. If a filter is damaged or collapses from plugging, dust may foul the coils. If this happens, replace the filter and carefully vacuum the heating coil. The fan may need to be removed to gain access to the face of the heating coil.

8.3 Pump

The circulating pump is water lubricated and should require no regular maintenance. The system control has a cycle timer to exercise the pump even during prolonged periods of no heat to avoid seizing from long idle periods.

9.0 TROUBLESHOOTING

9.1 Pump does not run

In areas where hard water is present the pump may stick and fail to run. Often, closing the isolation valve on the return leg and opening the drain port so that water flows through the pump can free this. For Grundfos pumps, remove the screw-on cover from the face of the pump, and rotate the shaft one turn with a slotted screwdriver. If either method fails to free the pump, removal for cleaning or replacement is necessary. The daily pump exercise will help prevent pump sticking.

9.2 Pump is noisy at start-up

Air is present in heating loop. If sound has not diminished within 1 minute, purge air in accordance with the Start-Up procedures. If heat source is a water heater, check to make sure branch connections for heating loop are horizontal to prevent the collecting of air in the heating loop.

9.3 Water heater T&P is weeping

A check valve or back-flow preventer may have been installed in the system. Some form of pressure relief may be required. Options are:

- Install expansion tank (potable water safe)
- Install pressure relief valve; locate outlet over laundry tub or floor drain.
- Install combination toilet tank/pressure relief valve.

9.4 **Cold water at hot faucet**

When heat source is a water heater, the most probable cause is reverse flow through the heating loop from the stuck check valve; repair or replace valve.

9.5 **Insufficient or no heat**

9.5.1 Plugged air filter or coil. Refer to Maintenance section for filter care and coil cleaning.

9.5.2 Tank-less water heater inlet filter plugged. See manufacturers instructions

9.5.3 Air in heating loop; purge system.

9.5.4 Inlet and outlet connections to air handler backwards; reverse connections

9.5.5 Water heater supply tube (dip tube) is restricted or damaged; check and/or replace. Tank style water heaters only.

9.5.6 Supply water temperature set too low or not calibrated properly; check water temperature. In the case of water heater; If the temperature has been set too low because of homeowner preference, it may be necessary to install an anti-scald valve to control the faucet temperature and raise the operating temperature of the water heater.

9.5.7 Restriction in heating loop; remove restrictions, check valves stick, valves too restrictive, left partially closed after purging or closed valve.

9.5.8 Water heater supply temperature is unstable. Check water heater setting and temperature sensors for good contact on coil headers.

9.6 **Fan runs for cooling but not for heating**

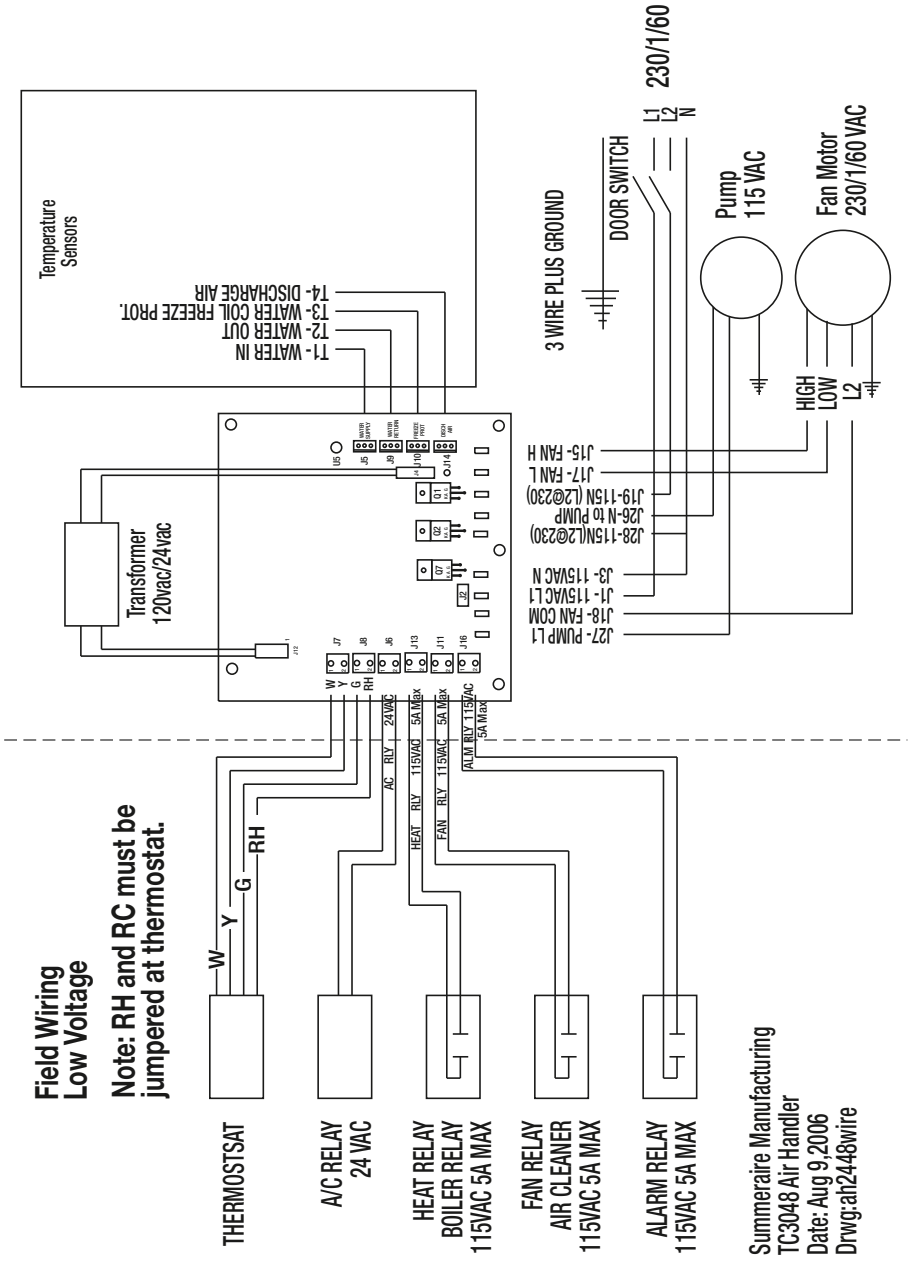
- Room thermostat may be connected improperly.

9.7 **Heating during Standby mode**

Probable cause is thermal Siphoning. See check valve description for details; repair or replace check valve. Check elevation of the air handler above water heater to see if motorized valve required for positive shut-off.

10.0 ELECTRICAL

10.1 Wiring Diagram



Summeraire Manufacturing
 TC3048 Air Handler
 Date: Aug 9, 2006
 Drwg: an2448wire

10.2 Warning! Make sure unit is properly grounded. Locate air handler on a separate circuit.

All TC Series Air Handlers operate on 230v / 1 ph / 60hz line voltage. All controls are 24 volt.

10.3 Thermostat

Most standard heat/cool, setback, or electronic thermostats are compatible with the TC Series Air Handlers

Thermostat wire from the thermostat is connected to the screw terminals located on the control board inside the air handler. They should be connected as follows:

R – power (24vac)

W – heating

Y – cooling (if present)

G – continuous run fan (if present on thermostat)

If a/c is present, low voltage condenser wires should connect to ac relay on control board.

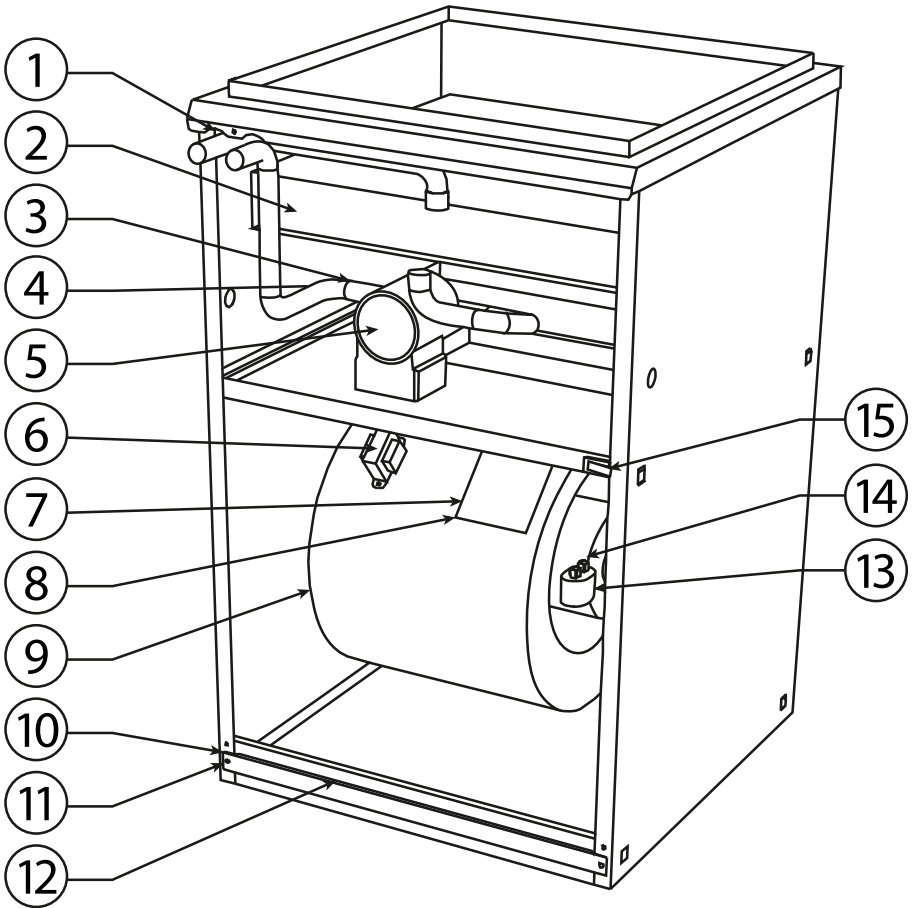
10.4 Electrical Information

Air handler wiring diagrams are located on the inside of the access panel for reference during installation and servicing. Name plate data is located on the front access panel.

10.5 Cooling Sensor

When the cooling evaporator coil is installed above the air handler, the cooling sensor must be installed downstream of the coil approximately 12-24 inches and located in the main part of the air stream. The sensor can be attached to a heavy gauge wire or metal coat hanger to support it.

When the cooling coil is located on the return air side of the air handler, the sensor can be left attached to the control board, provided the coil is within 24 inches of the control board.



AIR HANDLER MODEL TC2540

ITEM NUMBER	DESCRIPTION	PART NUMBER
1	WATER LINE PANEL GROMMET	8.GMT34
2	WATER COIL	8.COIL2540
3	WATER PUMP CHECK VALVE	8.CV427
4	CHECK VALVE GASKET	8.CV427GSKT
5	WATER PUMP	8.PMP427
6	TRANSFORMER	8.TRAN1202430
7	MAIN CONTROL BOARD	8.BOARDCM68
8	BOARD STAND OFF	8.XN8S
9	BLOWER	8.BLWR1020
10	FILTER COVER PLATE	8.AHFLTCLR
11	FILTER COVER PLATE SCREW	8.AHFLTSC
12	FILTER COVER PULL	8.AHFLTPULL
13	MOTOR CAPACITOR	8.CAP3705
14	MOTOR	8.MTR1/23220
15	FAN DOOR SAFETY SWITCH	8.AHSW220V
	POWER DISTRIBUTION BLOCK	8.BLK327
	WATER IN TEMPERATURE SENSOR	8.SR1
	WATER OUT TEMPERATURE SENSOR	8.SR2
	COIL FREEZE TEMPERATURE SENSOR	8.SR3
	SUPPLY AIR TEMPERATURE SENSOR	8.SR4

12.0 SUMMERAIRE MFG. AIR HANDLER WARRANTY

All TC series Air Handler parts are warranted to be free from defect in materials or faulty workmanship for a one-year period from the date of original installation subject to the Conditions of Warranty set out below. Where the original date of installation cannot be determined, the warranty will be deemed to begin six (6) months after the date of manufacture. Replacement parts will only carry the unexpired portion of the warranty.

In addition, Summaire Mfg. will provide a five-year warranty from the date of installation for heating coils, piping and cabinetry, subject to the Conditions of Warranty set out below. Replacement parts will only carry the unexpired portion of the warranty.

12.1 Conditions of Warranty

Summaire Mfg. assumes no costs for warranty service or costs associated with the replacement of parts. This warranty does not include labor, including diagnostic labor nor any freight associated with the repair service, or sales tax that might be incurred by the purchaser under this warranty.

This warranty does not cover defects caused by improper installation, modifications, alteration, abuse or accident to, or misuse of the product or its operation in a manner contrary to the instructions included with this unit at the time of shipment, or failure to perform maintenance as detailed in aforementioned instructions. This warranty will not cover normal maintenance, equipment that has been moved from its original installation location, operated beyond rated capacity and at voltages other than the rate specified in the nameplate, acts of god such as floods, winds, fires and lightning, exposed to corrosive elements such as salt, chlorine, fluorine, or other damaging chemicals. This warranty will not cover part deficiencies due to lime or scale deposits.

This warranty will not apply to damage or defect resulting from operation with system components other than those specified in the installation instructions, which are not authorized in writing by Summaire Mfg.

12.2 Limitation of Warranties

Summaire Mfg. makes no express warranties other than the warranties set out above. All implied warranties including the implied warranties of merchantability and fitness for a particular purpose are excluded to the extent legally permissible, or are limited to a period of one (1) year. Should such exclusion or limitation of warranty be unenforceable, such implied warranties are in any event limited to the duration of the express warranty, set forth above. Liability for incidental, punitive and/or consequential damages, whether arising out of breach of warranty, breach of contract, negligence or otherwise, is excluded.

Keep your warranty working for you.
Please complete and mail your
Warranty Registration Card to:

Summaire Mfg
P.O. Box 4088, 2040 Fisher Drive,
Peterborough, Ontario, Canada, K9J 7B1



to register this warranty.