

Maintenance Matters

BUILDING MAINTENANCE BULLETIN



Maintaining Your Heat Recovery Ventilation System

New homes are built to be airtight to reduce heat loss and potential moisture damage to the building envelope. This also minimizes the amount of fresh air flowing in and stale air flowing out of the home through unintentional cracks and openings. To compensate, airtight homes require the use of a mechanical ventilation system to ensure that adequate fresh air is available for occupants.



Incorporating a heat recovery ventilator (HRV) or energy recovery ventilator (ERV) into a home's ventilation system is an effective way to meet code requirements, achieve a healthy indoor environment, and reduce energy consumption. HRVs and ERVs are very similar with regards to system design, operation and maintenance. Both simultaneously supply and exhaust equal quantities of air to and from a house while transferring heat between the two air streams to reduce energy consumption and improve thermal comfort. The difference between HRVs and ERVs is that in addition to recovering heat, ERVs also transfer

moisture between the two air streams. Deciding between an HRV and an ERV will depend on your local climatic conditions, expected building occupancy and other factors.

This bulletin explains the basics of HRV based systems along with operation and maintenance guidelines to help ensure they operate as intended. Most of the information is also applicable to ERVs. More details on ERVs and HRVs can be found in the *Heat Recovery Ventilation Guide for Houses*, published by the HPO.



Maintenance Matters is a series of bulletins and companion videos designed to provide practical information on the maintenance of residential buildings.

Produced by the Technical Research & Education branch of BC Housing, this bulletin was prepared by Remi Charron Consulting Services in collaboration with Canada Mortgage and Housing Corporation, and other industry partners.

Regular maintenance, such as cleaning grilles, filters, and ductwork, is required to help ensure your system operates as intended.





Figure 1:
Example HRV System installed in a home.

Note: The condensate drain forms a loop to create the desired water trap.

HRV Basics

An HRV preheats incoming outdoor air with warm exhaust air by passing both air streams through a heat exchanger as illustrated in Figure 2. When heat is transferred from the exhaust to the outdoor air stream during the heating season, condensation can form inside the heat transfer core. For this reason, drain pans are located inside the HRV to capture any water buildup, and discharge the water through a condensate drain pipe to a sanitary drain.

HRVs preheat incoming outdoor air with warm exhaust air by passing both air streams through a heat exchanger.

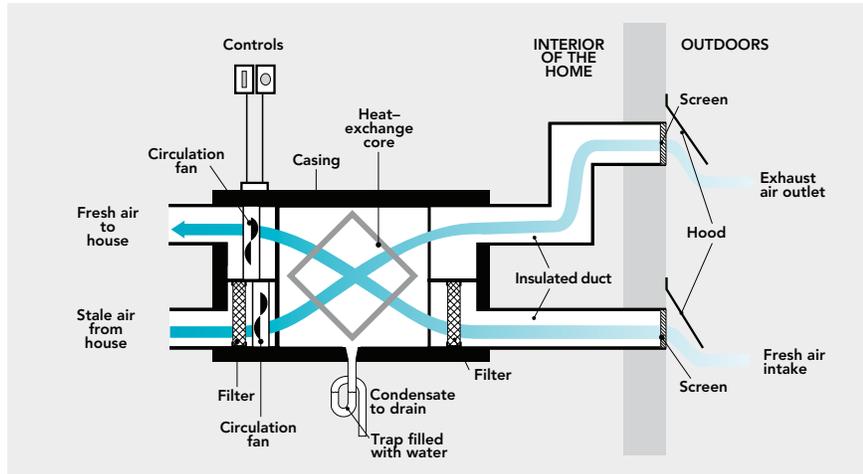


Figure 2:
Components of a ventilation system using an HRV.¹

Note: Your HRV may not have all the parts shown here.

In colder winter conditions, the condensation inside the core can freeze and block the exhaust air stream. Some HRVs are designed to protect against freezing and clear the core of ice by going automatically into defrost mode. This is typically accomplished by a damper that closes off the outdoor air supply and allows warm indoor air into the HRV to heat the core and melt any ice on the exhaust side. Some HRV installations include a pre-heater, which may be applicable in very cold climates where some lengthy defrost may be anticipated. However, preheating air can use considerable energy and decrease the efficiency of the heat exchange.

¹ Reproduced with permission from Natural Resources Canada, 2011. *Heat Recovery Ventilators*, M144-234-2011E*, available at <http://oee.nrcan.gc.ca/infosource>

Operating an HRV

Whether you get a new HRV installed in an existing home, or you purchase a home that includes an HRV, it's important to get all the information related to the system, including product data, warranty information, and the HRV Operation and Maintenance (O&M) manual. Make sure you also get a brief hands-on demonstration on how your particular system should be operated and maintained.

The HRV system provides the primary source of outdoor air for the house. In order to ensure that indoor air quality is maintained at the desired level, keep the following key points in mind:

- Although windows can be opened at any time of the year, they will not necessarily enhance indoor air quality and, in many cases, will lead to increased heating and cooling costs.
- The HRV is intended to operate on a continuous basis to remove moisture and pollutants generated by normal human activities.
- Shutting off the HRV for prolonged periods can lead to a build-up of indoor air pollutants and humidity, which can lead to the growth of mould and mildew, and can potentially void your warranty insurance policy.

Here are some basic operational tips:

- *Basic operating modes:* Units may be specified with a range of operating modes (see below). You should know which operational options are available for your system and what they can control.
- *Programming the humidistat:* If a central humidistat is used to raise or lower the ventilation rate of an HRV system, it can be programmed and/or manually adjusted to respond to seasonal changes in climates where humidity control is a concern. For example, the humidistat can be set to a higher relative humidity (RH) percentage during warmer months if desired. The setting should be based on what you find comfortable, but should always be low enough to prevent condensation from forming on the windows. The typical range is between 30% and 60% relative humidity.
- *Scheduling:* A timer may be used and programmed to occupants' schedules. For hourly schedules, daylight savings time will typically require reprogramming twice per year.

Keeping these key points in mind will ensure that indoor air quality is maintained at the desired level.



MODES OF OPERATION

- **Manual Operation** requires the occupant to turn the ventilation system on and off. All ventilation systems must include manual controls, even if the unit is equipped with automatic controls.
- **Automatic Operation** uses controls such as timers, humidistats, and occupancy sensors to operate the ventilation system. The occupant needs to understand which sensor or timer is activating the system.
- **Continuous Operation** ensures that the house is always ventilated, but may result in over- or under-ventilation at times.
- **High/Low Operation** uses a two speed fan which normally operates on low speed, but the fan switches to high speed when increased ventilation is called for. High speed operation may be initiated by manual and/or automatic controls.



Maintenance

Your heat recovery ventilator (HRV) can help make your house a clean, healthy living environment, while keeping fuel bills down. But your HRV can't do this without your help. It only takes seven simple steps **every three months** to keep your HRV in good working order²:

Step 1: Turn off your HRV: First, turn off your HRV and unplug it.

Step 2: Clean or replace air filters: Dirty or clogged filters can lower ventilation efficiency. Try to clean your filters at least every three months. Filters in most new HRVs can be easily removed, cleaned with a vacuum cleaner, and then washed with mild soap and water. Older units have replaceable filters. If your HRV is easily accessible, this is a five-minute job.

Step 3: Check outdoor intake and exhaust hoods: Remove leaves, waste paper or other obstructions that may be blocking the outside vents of your HRV. Without this vital airflow, your HRV won't function properly. During winter, clear any snow or frost build-up blocking outside vents.

Step 4: Inspect the condensate drain: Check to see if your HRV has a condensate drain – a pipe or plastic tube coming out of the bottom – that connects to the sanitary drain. If it does, slowly pour about two litres of warm, clean water in each drain pan inside the HRV to make sure it is flowing freely. If there's a backup, clean the drain.

Step 5: Clean the heat-exchange core: Check your HRV owner's manual for instructions on cleaning the heat-exchange core. Vacuuming the core and washing it with soap and water will reduce dust that can build up inside the core.

Step 6: Clean grilles and inspect the ductwork: Once a year, check the ductwork leading to and from your HRV. Remove and inspect the grilles covering the duct ends, then vacuum inside the ducts. If a more thorough cleaning is required, call your service technician.

Step 7: Service the fans: Remove the dirt that has accumulated on the blades by gently brushing them. Most new HRVs are designed to run continuously without lubrication, but older models require a few drops of proper motor lubricating oil in a designated oil intake. Check your manual for complete instructions.

Please see the HRV maintenance checklist on page six.

² Reproduced with permission from Canada Mortgage and Housing Corporation's: *About Your House – Maintaining Your Heat Recovery Ventilator (HRV)*

Follow these seven simple steps every three months to keep your HRV in good working order.

Troubleshooting Common Operational Issues

The following table outlines several common operational issues, along with common fixes. If the issue persists, contact your service contractor for assistance.

Table 1: HRV operational issues and possible solutions.

HRV OPERATIONAL ISSUE	POSSIBLE SOLUTIONS
The HRV is not operating.	<ol style="list-style-type: none"> 1. Verify that the HRV control is turned on. 2. Ensure that the HRV is plugged in and the electrical cord undamaged. 3. Check for a tripped circuit breaker or blown fuse. 4. Check that the access door is fully closed.
The HRV is operating but there is little or no fresh air flow.	<ol style="list-style-type: none"> 1. Check the exterior hoods and associated ductwork for blockage and clean as required. 2. Check the filters and clean or replace as required. 3. Check the indoor ducts and registers in rooms for blockage (closed dampers, lodged items, etc.). 4. Check the core for freezing/frosting (see next issue).
The core has frozen.	<ol style="list-style-type: none"> 1. Open the access panel and let any ice melt. Some cores can be easily removed and thawed in a sink. 2. Check the filters and clean or replace as required. 3. With some HRV models, the preheating or defrosting mechanism can be checked by following the manufacturer's instructions in the owner's manual.
There are cold drafts coming from the fresh air grilles.	<ol style="list-style-type: none"> 1. Check to see if the exhaust or return air stream is blocked. 2. Check the core for freezing. 3. Check that adequate insulation is covering ducts running within unheated spaces.
There is poor air quality, excess moisture or high humidity throughout the house.	<ol style="list-style-type: none"> 1. Adjust the humidistat (if any) to provide more dehumidification. 2. Check the core for freezing. 3. Reduce sources of interior humidity through the following measures: <ol style="list-style-type: none"> a. Put lids on cooking pots and use the kitchen exhaust fan b. Clean dryer lint traps c. Store fireplace wood outdoors d. Don't hang laundry to dry inside except in bathrooms (where the HRV exhausts are located) e. For more tips on reducing interior moisture, read <i>Maintenance Matters 3 – Avoiding Condensation Problems</i> published by HPO: www.hpo.bc.ca 4. Ensure HRV is operating continuously or on sufficient cycle over 24-hour period; adjust flow rate upwards in small increments so the right amount (and not too much) ventilation is provided. 5. Check that condensate pans in HRV housing are clean and are draining properly. 6. If the problem persists, consult with a professional as the HRV's flow rate may be inadequate.
Air is too dry in the winter.	<ol style="list-style-type: none"> 1. Adjust the humidistat (if any) to provide less dehumidification. 2. Run the HRV on the lowest setting. 3. Consider installing an Energy Recovery Ventilator (ERV) instead of an HRV, which may increase winter humidity. Some HRVs can be converted to ERVs, at less cost than installing a new unit, by changing the core.
The unit gives off unusual noise and vibrations.	<ol style="list-style-type: none"> 1. Oil the fan motors (if not self-lubricating) using non-detergent motor lubricating oil and as recommended by the manufacturer. 2. Inspect and clean the fan blades and heat-exchange core as required. 3. Check filter and core condition – clean as necessary

If the HRV system in your brand new home is found to be defective or installed incorrectly, it may be covered under your home warranty insurance policy if a claim is made in writing to your home warranty insurance provider within two years of the policy commencing.

Table 2: This easy maintenance checklist can be attached directly to your HRV. Simply fill it in as you complete the indicated task. Extra rows are provided for the additional regular maintenance steps specific to your system.

HRV MAINTENANCE CHECKLIST						
MAINTENANCE TASK	RECOMMENDED	DATE MAINTENANCE WAS PERFORMED				
Clean or unblock outside hoods and screens	3 months*					
Clean or replace air filters	3 months*					
Inspect HRV drain tube	3 months*					
Clean fan blades	6 months					
Clean HRV drain pan	6 months					
Clean exhaust and fresh air grilles and inspect ductwork	12 months					
Lubricate fans if required	Annually					

* You may want to alter this schedule to meet your own needs, depending on the severity of your home’s indoor and outdoor environments or the manufacturer’s recommendations. More frequent servicing may be required if your home is in a location that is dusty, near a major highway, etc.

For More Information

1. Natural Resources Canada, 2011. *Heat Recovery Ventilators*, M144-234-2011E*, available at <http://oee.nrcan.gc.ca/infosource>
2. Canada Mortgage and Housing Corporation, 2010. *Maintaining Your Heat Recovery Ventilator (HRV)*, 62043, available at www.cmhc.ca
3. Homeowner Protection Office, 2006. *Avoiding Condensation Problems*, Maintenance Matters 3, available at www.hpo.bc.ca
4. Homeowner Protection Office, 2014, *Avoiding Exhaust Duct Problems*, Maintenance Matters 14, available at www.hpo.bc.ca
5. Homeowner Protection Office, 2015, *Heat Recovery Ventilation Guide for Houses*, available at www.hpo.bc.ca

Disclaimer

This bulletin is intended to provide readers with general information only. There are many types of HRVs on the market, as well as different installation strategies. The size of your house, type of heating system and geographical location, for example, can affect the kind of system you have and the way it has been installed. The diagrams in this bulletin are provided as examples for information purposes only. The bulletin is intended to supplement your HRV owner’s manual, not replace it. Readers are urged not to rely simply on this bulletin and to consult with appropriate and reputable professionals before taking any specific action. The authors, contributors, funders and publishers assume no liability for the accuracy of the statements made or for any damage, loss, injury or expense that may be incurred or suffered as a result of the use of or reliance on the contents of this bulletin. The views expressed do not necessarily represent those of individual contributors or BC Housing.

The regulations under the *Homeowner Protection Act* contain specific provisions requiring owners to mitigate and restrict damage to their homes and permitting warranty providers to exclude coverage for damage caused or made worse by negligent or improper maintenance. These apply to both new and building envelope renovated homes covered by home warranty insurance. Failure to carry out proper maintenance or carrying out maintenance improperly, either by yourself or through qualified or unqualified personnel, may negatively affect your warranty coverage. Refer to your home warranty insurance documentation or contact your warranty insurance provider for more information.



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