

## Measuring Humidity in Your Home

### STRAIGHT FACTS ABOUT HUMIDITY

Humidity is the amount of moisture or water vapour in the air. You, your family, and your pets produce moisture when you breathe or perspire. Even your indoor plants produce moisture. We add water vapour to indoor air through routine household activities: cooking, showering, bathing, doing laundry, and dishwashing. More moisture can enter your home from the surrounding soil through a basement or crawl space.

### When is humidity a problem?

We need humidity for our comfort and health. But too much or too little humidity can produce a host of difficulties for householders (see *Humidity hassles*). Some of the problems are no more than nuisances; others could be far more serious. Many are familiar to Canadians, often occurring during the heating season when it is very cold outside, our windows are closed and indoor air circulation and ventilation are reduced.

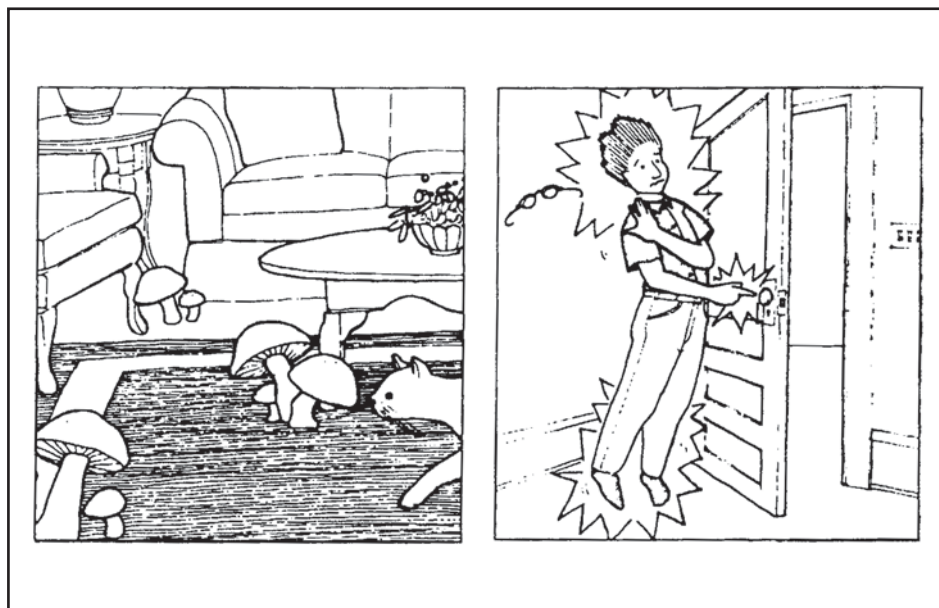


Figure 1 Do you have a humidity problem?

Table 1 Humidity hassles

|                   | Too Much Humidity   | Too Little Humidity  |
|-------------------|---|--|
| Typical Symptoms  | Condensation on windows<br>Wet stains on walls and ceilings<br>Moldy bathroom<br>Musty smells<br>Allergic reactions | Chapped skin and lips<br>Scratchy nose and throat<br>Breathing problems<br>Static and sparks<br>Problems with electronic equipment |
| Long-Term Effects | Damage to the house and its contents<br>Ongoing allergies<br>Other health problems                                  | Continuing discomfort<br>Damage to furniture and other items   |

### DIAGNOSING THE HUMIDITY PROBLEM

Instead of guessing whether or not you have a humidity problem inside your house, why not find out for sure?

A small, inexpensive and easy-to-use instrument called a **hygrometer** (sometimes referred to as a **humidity sensor** or **relative humidity indicator**) can measure the humidity level in your house and confirm whether the house has too much or too little humidity. Once you know for sure, you can decide whether any action is required and, if so, what to do.

#### Relative humidity

Humidity is normally measured as relative humidity (RH). RH is a percentage that indicates the

amount of moisture in the air relative to the maximum amount the air can hold at that temperature. For instance, when air at a given temperature contains all the water vapour it can hold at that temperature, it has a RH of 100 per cent. If the humidity exceeds 100 per cent, moisture will begin to condense from the air. If the air contains only half the water it can hold at that temperature, the RH is 50 per cent.

Warm air can hold more moisture than cool air, so that the RH of a sample of air will change as the temperature changes, even though the actual amount of moisture in the sample air does not. For example, as a sample of air cools the RH rises.

#### Buying a hygrometer

The two types of hygrometers that are most suitable for household use are mechanical hygrometers and electronic hygrometers. The table *Your choices* highlights important characteristics of each type. For most households, either type will perform satisfactorily if properly used and calibrated. See *Getting accurate readings* on page 3 for information about calibration.

Hardware stores, department stores, building supply stores and electronics stores often carry hygrometers. In fact, hygrometers are usually sold wherever you would buy a room thermometer. Hygrometers and room thermometers are often combined into a single piece of equipment.

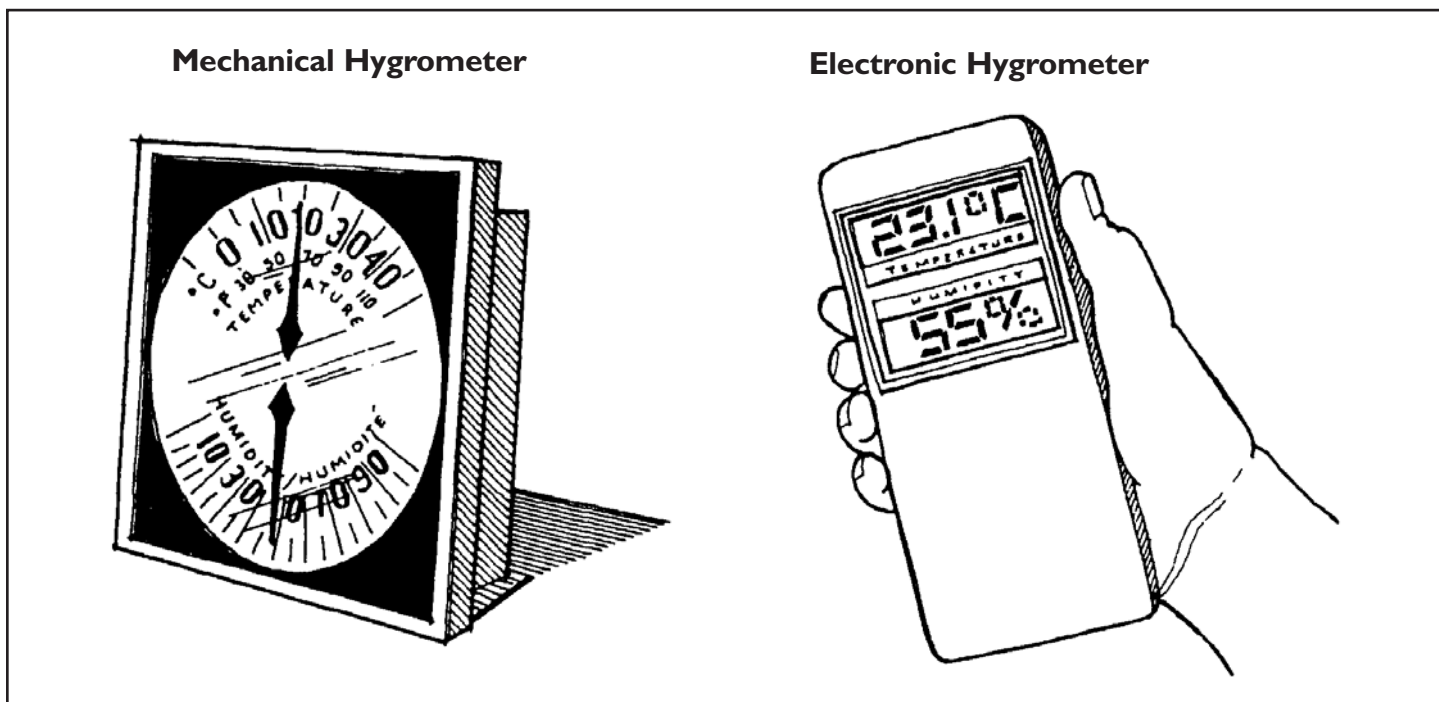


Figure 2 Suitable types of hygrometers

Table 2 Your choices

|                         | Mechanical Hygrometers                                       | Electronic Hygrometers  |
|-------------------------|--|---|
| Cost                    | \$10 to \$20   | About \$30 to \$60  |
| Appearance              | Plastic or wood; often round with a pointer and dial display | Plastic construction, LCD display   |
| Batteries Required      | No   | Yes   |
| Sensitivity to Humidity | May “stick” if humidity does not change for a long time      | Sometimes slow to respond to changes in humidity  |
| Accuracy                | Reasonably accurate once calibrated                          | Usually accurate in the mid-to-high humidity ranges; inaccurate in the lower ranges (below 30 per cent relative humidity) |
| Ease of Calibration     | Some can be physically corrected by adjusting the pointer    | Cannot be physically corrected  |

### Using your hygrometer

Your hygrometer will show the relative humidity (RH) in your house. Although the RH will not be exactly the same throughout your home, one hygrometer per house is usually sufficient. You should place it where the humidity symptoms are most obvious, in the room that you are most concerned about, or where your family spends the most time. Because hygrometers are small, they can be moved around in your house from time to time.

Don't place your hygrometer near a radiator, a heat register, a chimney or in any other location where it could be affected by direct heat.

Remember that a hygrometer does not produce instant results. It may take up to two hours to provide a stable reading in a new location or to adjust to sudden changes in relative humidity.

### Getting accurate readings

You should make sure that your hygrometer provides accurate readings. The technical term for this is calibration. When you calibrate your hygrometer, you are testing its accuracy by comparing it with an independent standard.

### Calibration made simple

All hygrometers should be calibrated. Some are not properly set when they leave the factory. Others, even the best models on the market, may experience what is known as drift, which means that they do not hold their accuracy over long periods and need to be re-calibrated.

Calibration is easy. A step-by-step procedure using everyday household items is described in the next section. The basic principle is to create a small-scale environment where the relative humidity is known. You place your hygrometer in this environment and compare its reading to the known humidity level.

### How often should you calibrate?

Once you have calibrated your hygrometer, you can be confident that you are getting accurate readings. Even so, you should re-calibrate your hygrometer at least once a year, especially if it is a mechanical instrument, to make sure that it continues to work properly.

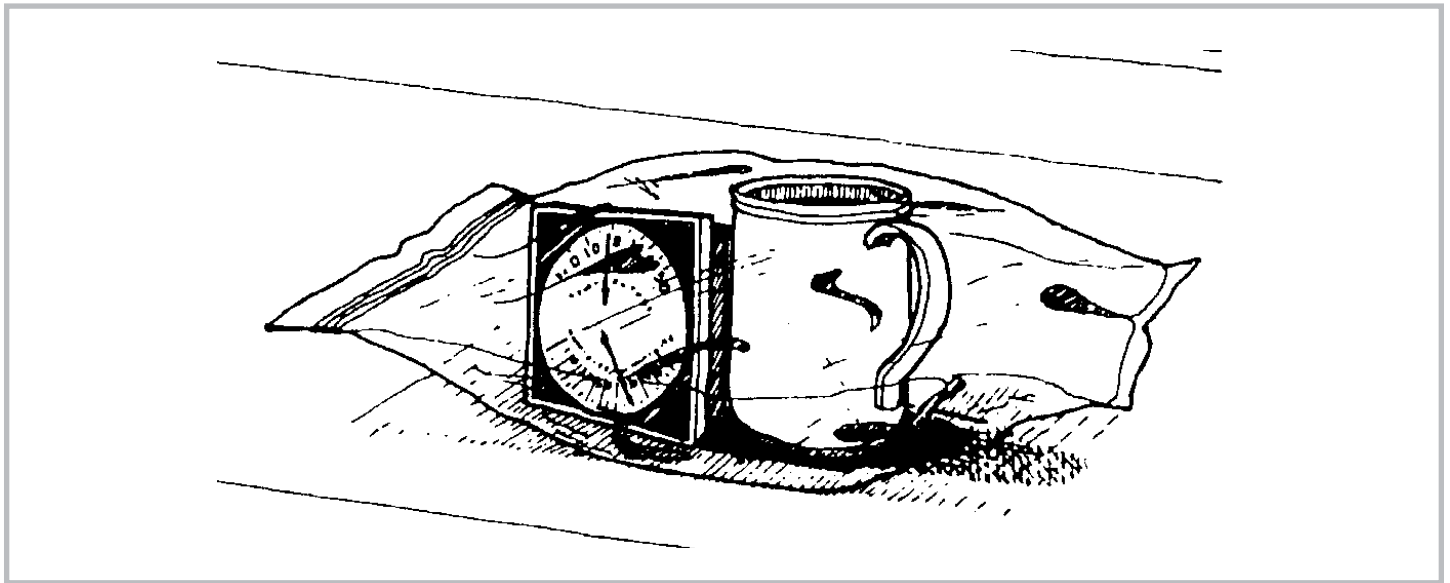


Figure 3 Hygrometer calibration using everyday household items

## CALIBRATING YOUR OWN HYGROMETER

### Ingredients

- 125 ml (about 1/2 cup) table salt
- 50 ml (about 1/4 cup) tap water

### Equipment

- hygrometer
- a coffee cup
- a 5-litre clear Ziploc™ bag or a well-sealed pressure cooker

### Step 1 - Get to know your hygrometer

If your hygrometer has a pointer, look for screws or knobs on it that will allow you to move the pointer. If there are none, or if you have an electronic hygrometer, physical adjustment will not be possible, but you can still calibrate.

### Step 2 - Prepare the mixture

Place the tap water and the table salt in the coffee cup and stir for about a minute.

### Step 3 - Set up

Put the coffee cup and your hygrometer inside the plastic bag or pressure cooker, and seal tightly. Note that salty water can damage your hygrometer if it comes in direct contact with it. Put the bag or pressure cooker in a draft-free place and out of direct sunlight, where the room temperature is likely to remain even.

### Step 4 - Check your RH reading

After 8 to 12 hours, note your hygrometer's RH reading. Your hygrometer should read about 75 per cent, the standard.

If it does, you do not need to adjust it. If it does not read close to 75 per cent, note the difference between your hygrometer reading and 75 per cent. Go to step 5.

### Step 5 - Correct to the standard

If your hygrometer is adjustable, immediately adjust the reading to 75 per cent. If your hygrometer cannot be adjusted, record the difference you noted in Step 4. In the future, each time you take a reading from your hygrometer, you will need to add or subtract that difference.

## HUMIDITY: HOW MUCH IS TOO MUCH, OR TOO LITTLE?

Experts have developed rules of thumb to help homeowners make decisions regarding humidity levels in their houses. The limits should be used as guides only. Acceptable or comfortable humidity levels will actually vary from season to season, from house to house, and even between rooms in the same house.

### Rules of thumb

To prevent window condensation during the heating season, the recommended indoor RH is 30 per cent to 50 per cent. When it is below  $-10^{\circ}\text{C}$  outdoors, recommended indoor RH is 30 per cent.

## TAKING ACTION

Humidity can be controlled. If the relative humidity in your home is too high, you can reduce it; if it is too low, you can increase it.

This may require simple changes in your family's habits, such as remembering to open or close doors or windows. Or you may need to install equipment, such as exhaust fans in bathrooms or kitchens, to remove excess humidity. Very low indoor RH levels in the winter may be due to cold, dry air leaking in from outside.

Sealing up the house by weatherstripping and caulking will improve humidity conditions indoors, and may reduce your heating bills at the same time.

Humidifiers—both stand-alone appliances and devices attached to your furnace—can be useful for increasing indoor RH levels. But remember that humidifiers, if not installed, used and maintained properly, can also be sources of excess moisture and mold in your home.

## FINAL ANALYSIS

Humidity levels in your home can be too high or too low. In either case, problems can result.

A hygrometer can provide the information you need to determine whether you have a humidity problem—but it must be accurate to be useful.

If you have a humidity problem, it can usually be controlled.

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