
**Tech Note**

# HS-100 Humidity Sensor

## Overview

The HS-100 is a sensor designed for measuring the relative humidity (RH) in environmental chambers, plant growth chambers, model ecosystems, or the atmosphere. The HS-100 can provide measurements of relative humidity from 0 to 100%, over a temperature range from -30oC to 60oC. This sensor is fast responding, unaffected by immersion in water, and easily cleaned with deionized water. The HS-100 can operate in many types of atmospheres that contain: salts from ocean spray; pollutants from combustion, like sulfur dioxide, hydrogen sulfide, ozone, nitric oxide, carbon monoxide, and carbon dioxide; chemicals from manufacturing, like soap, softener, sulfuric acid, hydrochloric acid, nitric acid, toluene, smoke, and insecticides; and more.

Figure 1: HS-100 Humidity Sensor

## How it Works

The sensor element in the HS-100 that responds to changes in relative humidity is a capacitor. A capacitor consists of two conductive electrodes that are separated by a thin film of polymer. The surface of the capacitor used in this type of sensor is also coated to protect it from contamination and condensation. The output of the sensor in the HS-100 is directly proportional to the relative humidity of the atmosphere. The HS-100 has a linear output of 26 millivolts per percent of relative humidity (RH) from 10 to 95% RH.

Capacitive sensors are limited by the distance the sensing element can be located from the amplifier or recording device because of the capacitive effect of the connecting cable with respect to the relatively small capacitance changes of the sensor. A practical limit is <10 ft.

HS-100 humidity sensors are interchangeable and have a range of variance less than ±2% relative humidity.

## Equipment Set-up

1. Insert the male DIN8 connector on the end of the HS-100 humidity sensor into female DIN8 connector on the end of a DIN8 extension cable.
2. Insert the male DIN8 connector on the end of this DIN8 extension cable into a DIN8 Input on an iWorx data acquisition unit or amplifier.


Figure 2: The HS-100 Humidity Sensor connected to an IWX/214, along with a TM-100 Temperature Sensor.

iWorx/CB Sciences
One Washington Street
Suite 404
Dover, NH 03820
(800) 234-1757
(603) 742-2492
Fax: (603) 742-2455
www.iworx.com

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## Calibration of the HS-100 Humidity Sensor

When recording with LabScribe software, the voltage output of the HS-100 sensor can be converted to the percentage of relative humidity by the following calibration procedure:

- Click on the **Start button** and record data for about ten seconds. Click on the **Stop button**. Two cursors should appear on the **Main window**.
- **Right-click** on the recording area of the **Humidity channel** to open the channel's **right-click menu**. Select **Units** from this menu and **Simple** from the submenu to open the **Units Conversion dialogue window**.
- Pull down the menu in the upper left corner of the dialogue window and select **slope & offset**. Set the **slope** equal to **38.92**, the **offset** equal to **-42.017**, and the **Name** of the units on the Y-axis equal to **% Relative Humidity**. Put a **check** in the box next to **Apply Units to All Blocks**. Click on the **OK button**.

## Operating the HS-100 Humidity Sensor

- Once it is calibrated, the HS-100 Humidity Sensor can be used in a wide variety of atmospheres. Place the HS-100 in the atmosphere from which the relative humidity is to be measured.
- The HS-100 is limited by the distance the sensing element can be located from the amplifier or recording device because of the capacitive effect of the connecting cable with respect to the relatively small capacitance changes of the sensor. A practical limit is <10 ft.
- HS-100 Humidity Sensors are interchangeable. They have a range of variance less than ±2% relative humidity.

## Care of the HS-100 Humidity Sensor

Since the surface of the sensor is coated and unaffected by immersion in water, the HS-100 can be washed with deionized water.

## Experiments

The HS-100 can be used to monitor the relative humidity during experiments where air moisture affects the outcome of the experiment. Some of the measurements that can be influenced by relative humidity include: the effects of exercise on core temperature of endoderms; the effect of apparent temperature on the behavior of ectoderms; and the effect of air moisture and temperature on water movement (transpiration) in plants.

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