

Humidity Sensing Cell Accessory for the MFP-3D™ AFM

The Humidity Sensing Cell independently measures humidity conditions with a sensor located within a sealed sample cell. This accessory also allows for rudimentary humidity control. It is ideal for experiments where relative humidity plays an important role, such as crystal growth.

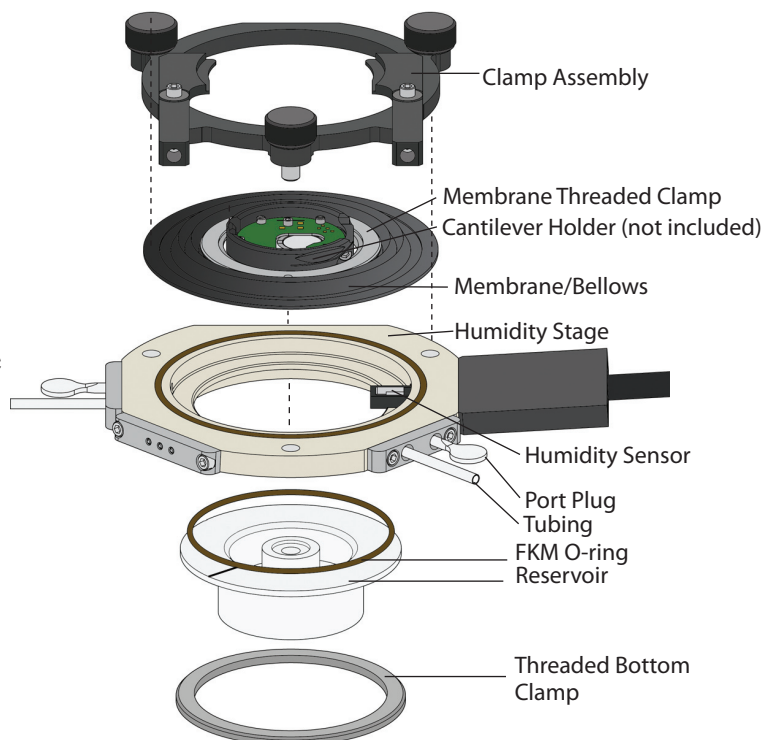
The Humidity Sensing Cell is a small sealed sample chamber with a dedicated side access port for the solid state humidity sensor. The sensor measures the relative humidity of the air surrounding the sample and transmits it back to the AFM controller. The MFP-3D software displays humidity as a function of time and saves a value with every stored image. The sample cell is based on the Closed Fluid Cell (Model CCELL) and accepts samples of up to 30mm in diameter. Samples are mounted on a glass disc which forms the bottom of the cell. Optical access is available from above and below the sample. A clamp and FKM (Viton® equivalent) membrane fit on top of the cell for an airtight seal.

Temperature Correction

A temperature sensor built into the exterior of the sample stage monitors laboratory temperature and allows the MFP-3D software to make a small correction to the measured relative humidity (RH) value. Note that temperature is not measured inside the sample cell.

Humidity Control

Humidity control can be accomplished in either of two ways. The kit includes a Teflon® cup which takes the place of the glass cell bottom. The cup can be filled with concentrated salt solutions which, depending on the type of salt, provides a controlled,



Schematic of the Humidity Sensing Cell assembly.

relatively humid environment. For example, a concentrated solution of NaCl leads to 75% RH which is almost independent of laboratory temperature. The sensor reading is used as a confirmation of the RH value. Other salts can span a range from nearly zero to nearly 100% RH.

A second method for controlling humidity is by flowing a mixture of dry and wet gas through one of the access ports. The sensor is used to confirm the RH value of the supplied gas and serves as a guide for adjusting the valves to the desired RH level.

The cell has four available 1/16" diameter access ports and three 0.036" ports. These access ports may be used with tubing to fill and drain the salt cup with various solutions or attach a gas supply.

Precise Measurement with the Environmental Controller

The Environmental Controller (purchased separately) is a state-of-the-art digital controller that is required for use with the Humidity Sensing Cell. All measurement functions are fully programmable through the IGOR Pro software interface. SmartStart™ allows plug and play operation without the use of parameter files.



The Environmental Controller easily interfaces with the Humidity Sensing Cell and ARC2™ Controller.

Specifications

Humidity Sensing Cell Model HUMIDSC

The Humidity Sensing Cell includes the Humidity Stage and a variety of accessories for installation and imaging. Requires the Environmental Controller (purchased separately).

- Humidity Stage assembly 1
- Salt solution reservoir 1
- Humidity sensor 2
- Sensor calibration certificates 2
- Sample magnet assembly 2
- Membrane clamp assembly 1
- 35 x 1mm glass disk 5
- Port plugs 10
- 12mm cover slip holder 1
- FKM membrane/bellows 4
- Membrane threaded clamp 1
- 25mm top and bottom cover slip clamp 1
- Cover slips 12mm, 25mm* 10
- 5ml syringe 2
- 1/16", 1/32" tubing and tubing sleeve provided for injecting and withdrawing salt solutions 5'
- A variety of O-rings
- Misc. dowel pins and fittings*
- Assembly tools, tweezers, cleaning brush

*Not pictured on schematic

0-100% humidity range (non-condensing)

Humidity control (% RH)

- 2% accuracy
- 0.5% repeatability
- 3% hysteresis

Gas flow through

Sample size

- 30mm diameter, 15mm when mounted on salt cup
- 2mm thickness

Pressure

- 0 minimum
- 0 maximum (very small when flowing gases at 1-10cc/sec)

Access Ports

- 1/16" diameter ports 4
- 0.036" diameter ports 3 (20 gauge needle sealed)

Cleaning

- Easy and complete disassembly
- Autoclavable (everything but sensing element)

Materials

- Base: PEEK
- Cup: Teflon
- Membrane: FKM

Environmental Controller Model ENVIRO

- Closed loop operation
- SmartStart for plug and play operation
- Operates at 110 or 220 VAC
- CE tested
- Built-in microprocessor for temperature control (for use with other environmental accessories)
- Fully programmable through the MFP-3D software



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