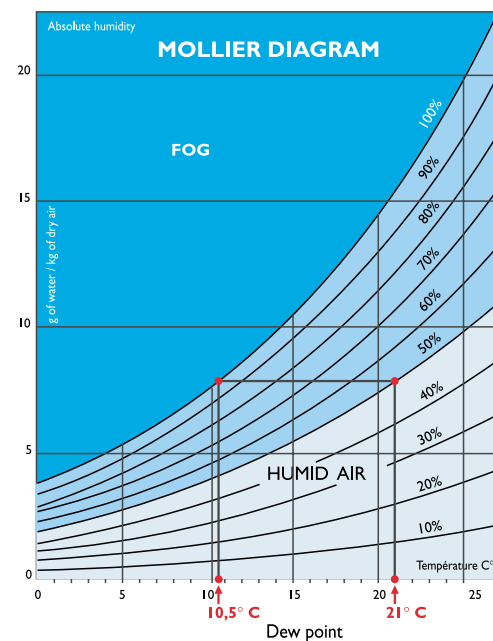


# WETSYS

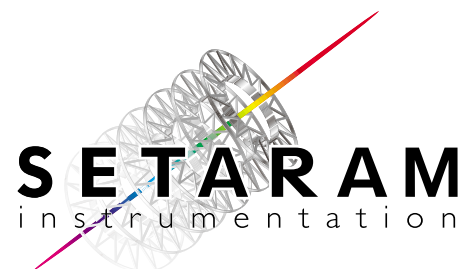
## Characteristics

Pre-calibrated for various gases	Air, He, N <sub>2</sub> , CO <sub>2</sub> , Ar
Heated transfer line	Ambient to 100°C
Gas humidity	
Ambient to 50°C	5-95% RH
50°C to 70°C	5-90% RH
Humidity profiles generation	Constant RH, steps and ramps up or down
Output flow rate	1 to 50 ml/min
Autonomy	>1000 hours at 70°C 90% RH, 20ml/min
Accuracy	± 1,5% RH ; ±0,3°C
Stability	± 0,3% RH
Programmer	Up to 20 profiles
Operating in dry gas	Electrovalves for saturator isolation
Interface	Eurotherm 2704
Dimension	420x350x530 mm
Weight	22 kg

### • Mollier diagram



For a gas at 21°C and 50% relative humidity, the dew point is 10.5°C.



Excellence in thermal analysis and calorimetry  
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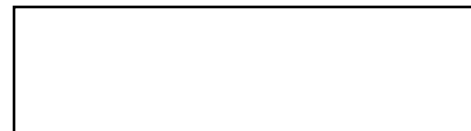
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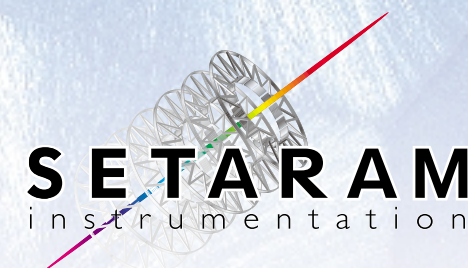


# WETSYS

## Controlled humidity generator



Technical specifications are given as indications only and are not contractual.  
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# WETSYS

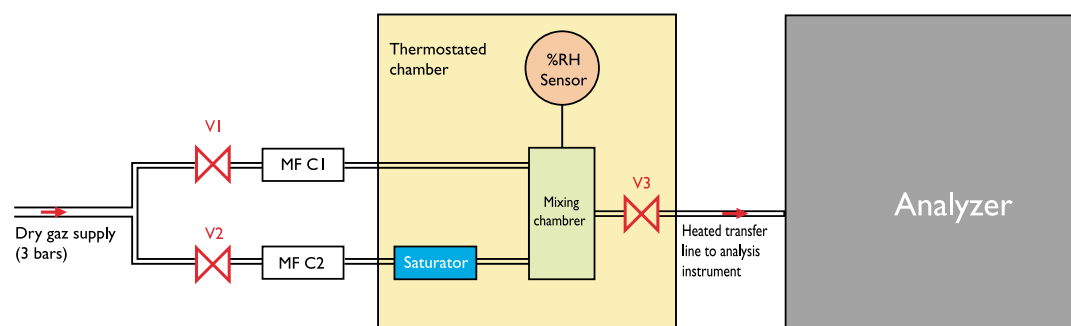
## Controlled humidity generator

Humidity is known to considerably affect the stability of many products such as pyrotechnical materials, polymers, pharmaceutical products, foodstuffs, plasters, cements, metals and alloys, etc.

### • Principle of operation

The operation of WETSYS is based on a very simple principle of mixing dry and humid gases. The gas circuit (dry gas at the inlet) is divided into two parts:

- A dry gas circuit equipped with an electro valve and a mass flow controller MFC1
- A gas circuit also equipped with an electro valve V2 and a mass flow controller MFC2, and a saturator to make the gas 100% humid.



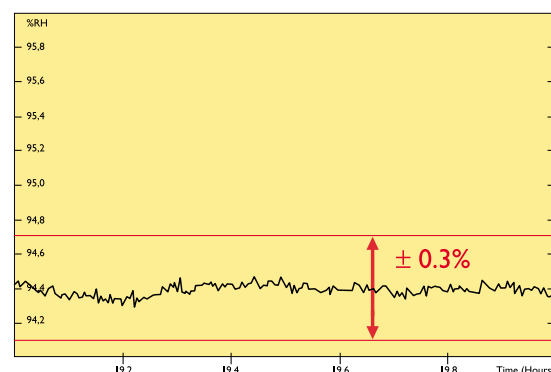
Take the example of an active pharmaceutical ingredient containing an amorphous phase. When the relative humidity increases, the vitreous transition temperature of the pharmaceutical product and the crystallization temperature of the amorphous phase decrease, completely changing the product's properties.

To evaluate the influence of humidity on the long-term stability of these products, it is necessary to specifically study their behaviour under relative humidity. Thus SETARAM has developed a new accessory called WETSYS designed to offer you the following possibilities:

- Generation of precise and controlled humidity,
- Use with SETARAM thermal analyzers and calorimeters, as well as with other analysis instruments,
- Ease of use, automation and autonomy,
- A good performance/price ratio.

These two circuits end in a thermostated regulated mixing chamber, itself linked to a humidity probe. This probe, chosen for its excellent quality/price ratio can be calibrated and certified by the BNM (Bureau National de Métrologie). A third electro valve V3 is located at the outlet of the mixing chamber. The humidity generator can be totally isolated.

The temperature, humidity rate %RH, measured by the humidity probe, and the gaseous flows controlled by MFC1 and MFC2, are integrated in a PID regulation loop that permits adjustment of the humidity rate at the outlet with excellent stability (better than  $\pm 0.3\%$  RH).

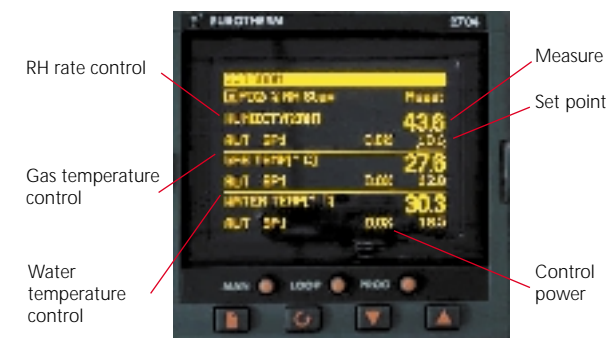


# WETSYS

## Controlled humidity generator

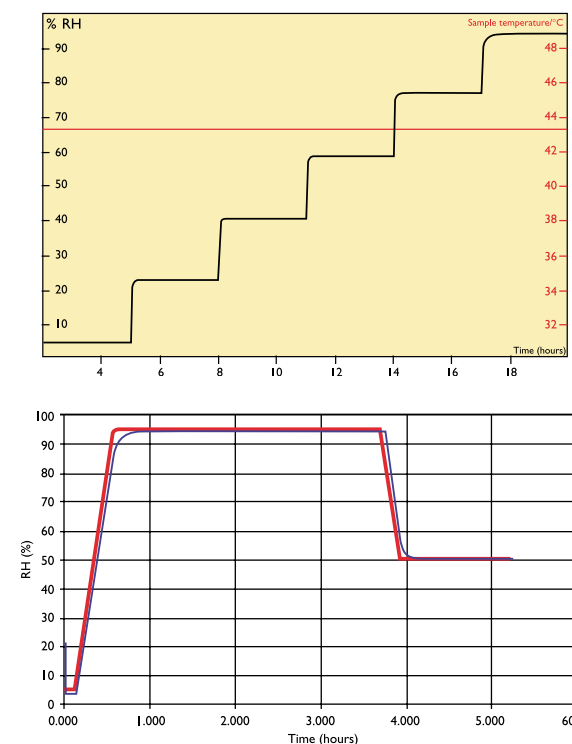
### • Programming humidity steps

A user-friendly EURO THERM interface equipped with a digital screen permits programming varied and complex humidity profiles (plateau, ramp, stepped), capable of comprising up to 100 segments. Furthermore, up to 20 humidity profiles can be stored in memory (500 segments maximum).



Display of the EURO THERM / Main programming screen

### • Example of humidity step generation



### • Performances and advantages

- You can also work with different gases such as He, Air, Ar, N<sub>2</sub>, CO<sub>2</sub>...
- The volume of the water tank is 237 ml, providing more than 1000 hours of autonomous operation for the humidity generator at 70°C, 90% RH, and 20 ml/min
- The temperature of the saturator water tank and that of the mixing chamber are set at the same value to avoid condensation phenomena.
- A heated, regulated transfer line (up to 100°C) permits transferring the humid gas to the analysis instrument by avoiding condensation phenomena between the WETSYS and the transfer line and the transfer line and the analysis instrument. It is equipped with a Swagelock 1/8 " connection for easy linking with the analysis instrument.

WETSYS is equipped with two analog outputs for RH and temperature. These signals can be stored in the experiment files of the analysis instruments thus the relative humidity and temperature can be traced with the other signals measured, as shown in the following diagram. It shows a thermogravimetric study (performed with the SETARAM TG-DSC111) of the adsorption of water on a sample of silicagel (88.67 mg). Kept at constant temperature, the relative humidity of the analysis chamber was progressively increased by steps.

