

## Paper industry



### Facts & figures:

The US and Canada are the world's largest producer of paper and paper products. The next largest are Finland, Japan and Sweden.

The world's annual paper consumption was in 2009 391 million tonnes.

Papermaking was brought to Europe by the Arabs.

Before the final papermaking step of pressing, there is 90% of water in the paper.

### Paper in general

The ancestor of the pulp paper making process that is used today is considered to be developed by a Chinese named Tsai-Lun during the early 2nd Century.

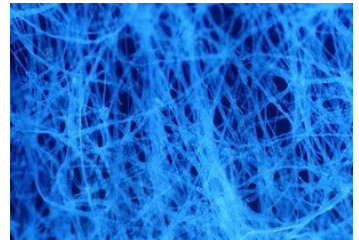
Paper and similar products like cardboard are made from cellulose fibre that comes from various sources (wood, rags, grasses). The cellulose fibre is extracted with either chemical or mechanical plumping or a mix of both. After the wet fibres have undergone various

treatments it is ready for pressing and drying.

Today's highly sophisticated printing, drawing or packing machines process this thin and sensitive material at an incredible speed. That's why it is essential for a continuous process to adjust these high performance machines to the individual characteristics of the paper type used. Deviation of the paper properties must be avoided at any cost.

Because of that, a constant environment and a well-conditioned paper fibre is crucial!

That's where humidity and temperature measurement plays an important role.



The microscopic structure of paper: The individual fibres in this sample are around 10  $\mu\text{m}$  in diameter.

### Why the need to measure humidity?

Controlling humidity in the paper industry is essential for many factors. An incorrect level of %ERH in the paper will have the following effects on product and process:

#### Static electrification

From time to time printers experience difficulties due to static electricity phenomena (paper sheets stick together etc.). This happens mostly when both paper and the ambient air are too dry.

#### Dimensional changes

Vegetable fibres are highly hygroscopic and therefore absorb and desorb humidity

resulting in a swelling or shrinking of paper fibres. At approx. 50%ERH, a humidity change of  $\pm 10\%$ RH results in a length change of typically 0.1 - 0.2% of the paper. Such a humidity variation would give a 1 to 2mm variation on a 1 x 1m sheet of paper and therefore inaccurate printing results (poor positioning of paper).

#### Dust

Too dry paper generates dust that will lead to a layer of dust which then affects the printing quality.

#### Deformation

If too much moisture is ex-

changed with the surrounding atmosphere through the edges of the stack or roll. This uneven distribution of moisture will eventually lead to rippled paper.

#### Ink drying time

High values of %ERH as well as low temperature result in long drying times after printing which will slow down the following processes.

#### Best humidity level

Paper with an humidity level between 50-60%ERH is most suitable to work with. The ambient air should not defer more than  $\pm 8-10\%$ RH from that level

### Discussed in this edition:

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## What solution can Rotronic offer?

Rotronic was in 1967 among the first producers of humidity and temperature devices especially designed for the paper industry. The heart of the latest humidity measurement equipment comes with

the Rotronic capacitive foil sensor: HygroMer IN-1.



The AirChip3000 is the brains:

All products with this logo contain

an AirChip3000.

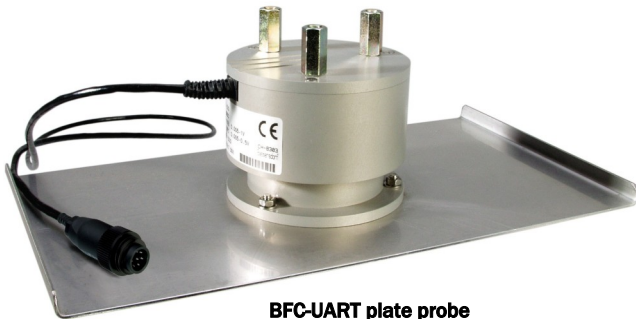
AirChip3000 advantages:

- Relative humidity, temperature and dew point outputs
- Can store 2'000 points
- Sensor self test function

## Rotronic products:

### Humidity and temperature probes:

- **HC2-HS Series**  
-40...85°C,  
0...100%rh,  
4mm x 18mm,  
±0.8%rh and ±0.1K
- **BFC-UART plate probe**  
-40...85°C,  
0...100%rh,  
l: 278mm w: 150mm h: 85mm  
±0.8%rh and ±0.1K



BFC-UART plate probe

### Transmitter:

- **HF5 series**  
For interchangeable probes,  
Various analogue and digital  
outputs, Display,  
All psychrometric calculations  
available...
- **HF8 series**  
For 2 interchangeable probes,  
Various analogue and digital  
outputs, Display, Relais outputs  
All psychrometric calculations  
available...

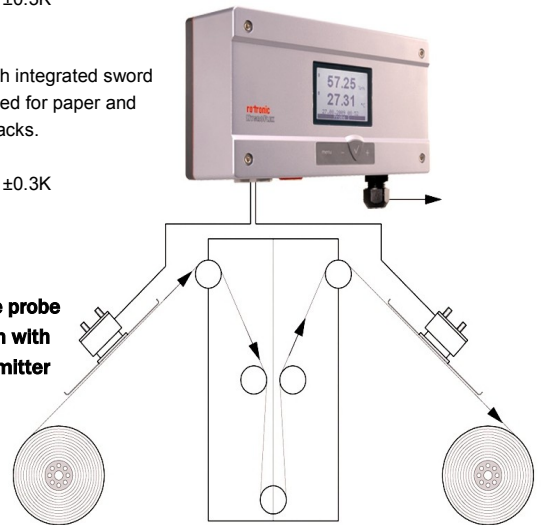
### Handheld instrument:

- **HP22**  
For interchangeable probes,  
Dew point and other psy-  
chrometric calculations,  
Display
- **S1**  
Handheld with integrated sword  
probe designed for paper  
stacks.  
5...99.9%rh,  
±1.5%rh and ±0.3K
- **GTS**  
Handheld with integrated sword  
probe designed for paper and  
cardboard stacks.  
0...100%rh,  
±1.5%rh and ±0.3K



HC2-HS28 sword probe  
in combination with the  
HP22 handheld device

BFC-UART plate probe  
in combination with  
the HF8 transmitter



## Customer benefits:

### Accuracy:

Choosing Rotronic gives you the best accuracy on the market.

Precise humidity measurements enables the printing unit to work always on their maximum possible performance.

### Communication:

Networking with Rotronic is an easy affair! With all of the different communication methods, from conventional analogue output signals to RS-485, Wireless or Ethernet RJ45, Rotronic can provide the needed interface to your printing, drawing or packing machine.

### Long term stability:

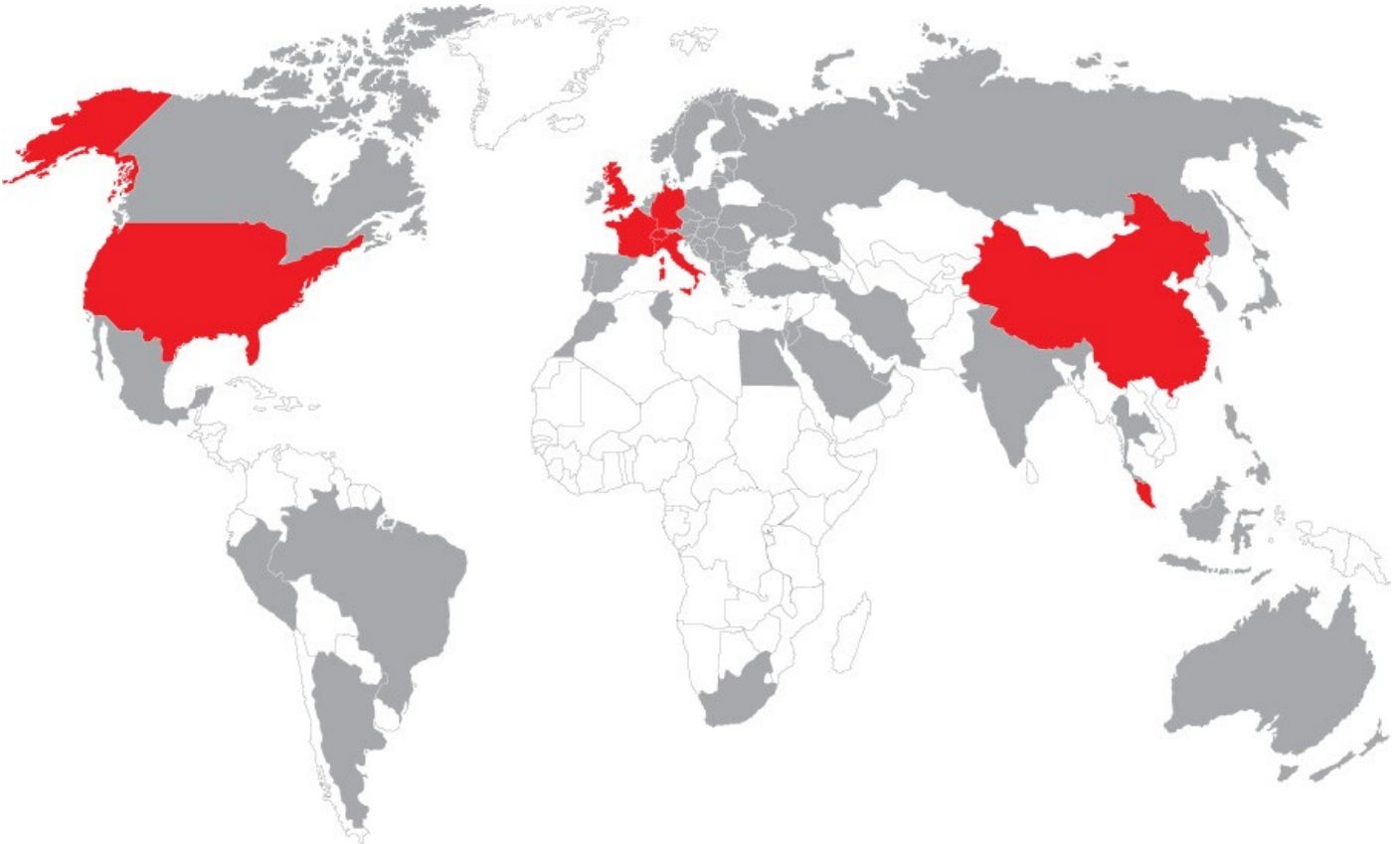
With a long term stability of under 1%rh per year (depending on the environment), Rotronic offers the possibility to "plug & play": install the device and leave it. We would recommend frequent spot checks in-between calibrations.

### Calibration:

measurement devices, we can offer a factory calibration certificate or even an SCS certificate if this is required. We can also supply a humidity and temperature generator, the HG2-S as well as unsaturated salts for on-site calibration.

## Contact us:

Rotronic is represented in more than 40 countries around the world. An up to date list of all our partners is available at [www.rotronic.com](http://www.rotronic.com)



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