

# ROTRONIC APPLICATION NOTE

Application note: N°F047

April 2014

## Indoor pools

### Facts & figures:

According to the Guinness World Records, the largest swimming pool in the world is San Alfonso del Mar Seawater Pool in Algarrobo, Chile. It is 1,013 m (3,323 ft) long and has an area of 8 ha (20 acres). At its deepest, it is 35 m (115 ft) deep!

The "Great Bath" at the site of Mohenjo-Daro in modern-day Pakistan was most likely the first swimming pool, dug during the 3rd millennium BC. This pool is 12 x 7 m, it is lined with bricks and was covered with a tar-based sealant.

### Indoor pools in general

Swimming pools are used for a variety of applications. Starting from recreational use for kids and adults to competitive swimming and also therapeutic use for faster recovery from injuries.

Unfortunately, the use of an outdoor pool is not possible all year round in most regions of the world. To overcome this issue the British national swimming society was among the first in the early 1800's to introduce man-made indoor pools in London.

Ever since the first natatorium was built, the issues resulting from having a large volume of water in a closed building structure appeared quickly.

The continuous moisture load that swimming pools generate challenges the mechanical system and creates multiple opportunities for structural damage. The combination of humidity and chlorine not only attacks the building material, but also provides a breeding ground for mould and bacteria which can affect occupants' health and comfort. A sad ex-

ample of a severe consequence was in May 1985 in Uster, Switzerland where the collapse of the ceiling at a public indoor pool killed 12 people. One of the reasons for this tragedy was that the humid and chlorine packed air condensed on the steel and entered micro-cracks in the stainless steel holding bows of the ceiling and made them corrode. An accurately controlled HVAC system can help to prevent very high humidity levels and therefore reduce the risk of condensation.



### Why the need to measure humidity?

#### Humidity control

To help prevent condensation, protect the building from structural damage and provide a comfortable environment for swimmers, humidity must be carefully controlled. For this to be achieved, the maximum humidity levels within a pool hall should be held between 50 %rh and 60 %rh.

To maintain these levels, an indoor pool requires a form of moisture extraction to control relative humidity by removing unwanted water vapour from the building. This is usually

done by a dehumidifier or by bringing in fresh outside air via a ventilation unit. In both cases a humidity sensor that can survive the high chlorine concentration climate is vital.

#### Temperature control

The air temperature is normally controlled at around 1°C warmer than the water temperature. This

**The recommended conditions for pools as indicated in the ASHRAE Applications Handbook and Humidity Control Design Guide:**

Type of Pool	Air Temp °F	RH%	Water Temp °F
Recreational	75 to 85	50 to 60	75 to 85
Therapeutic	80 to 85	50 to 60	85 to 95
Competition	78 to 85	50 to 60	76 to 82
Diving	80 to 85	50 to 60	80 to 90
Whirlpool/Spa	80 to 85	50 to 60	97 to 104

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they leave the water. However, this raised temperature is not normally necessary when the pool is covered and the pool is "unoccupied". In that situation the usual "set back" temperature is normally between 23 °C and 24 °C and allows a significant amount of energy to be saved resulting in lower energy costs.

## What solution can Rotronic offer?

The heart of the latest humidity measurement products is the Rotronic capacitive sensor: HygroMer IN-1. This thick-film sensor, with the best long term stability on the market is ideal for

applications where probes don't usually get calibrated frequently.

All products with this logo contain an AirChip3000.



AirChip3000:

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



**HF1 duct mount transmitter**

## Rotronic products:

### Humidity and temperature probes:

- **HC2-S**  
Standard humidity sensor  
-50...100 °C,  
0...100 %rh,  
±0.8 %rh and ±0.1 K
- **HC2-IC402**  
-100...200 °C,  
0...100 %rh,  
Ø15 mm  
±0.8 %rh and ±0.1 K
- **HC2-IC402-A**  
-100...200 °C,  
0...100 %rh,  
Ø15/25 mm,  
±0.8 %rh and ±0.1 K

### Transmitters:

#### • HF7 series

Stainless steel probe,  
-100...200 °C,  
3/4 wire configuration,  
Various analogue outputs,  
Display...

#### • HF5 series

For interchangeable probes,  
Various analogue and digital  
outputs, Display,  
All psychrometric calculations  
available...

#### • HF1 series

0...50 °C, 5...95 %rh  
±3 %rh and ±0.3 K  
Various analogue outputs,  
Display...

### Handheld instruments:

#### • HP22

For interchangeable  
probes,  
High accuracy relative  
humidity and tempera-  
ture measurement,  
Dew point and other  
psychrometric calcula-  
tions, Display

#### • HP23

Same functionality as HP22  
plus: two interchangeable probe  
inputs, 20,000 data point  
memory with real-time clock,  
Data capture of 250 data points  
each for up to 8 defined loca-  
tions



**HF7 duct mount transmitter**



**HF5 wall transmitter in combina-  
tion with probe / extension cable**

## Customer benefits:

### Accuracy:

Choosing Rotronic products gives you the best accuracy on the market.

Precise humidity measurement enables the control units to work at their maximum performance

### Communication:

Networking with Rotronic is an easy affair! With the wide range of communication interfaces available, from conventional analogue out-

put signals to USB, RS-485, Wireless and Ethernet RJ-45, Rotronic can be relied upon to provide the required interface to your DDC control system, or any third-party monitoring system.

### Long term stability:

With long term sensor 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

regular spot checks between multipoint calibrations.

### Calibration:

Rotronic offers a factory calibration certificate, and SCS certificate if required. The portable HygroGen2 temperature & humidity calibrator as well as traceable unsaturated humidity salts are available for on-site calibration. All HygroClip2 probes can be set with two fixed %rh / °C values to validate the loop to the controller.

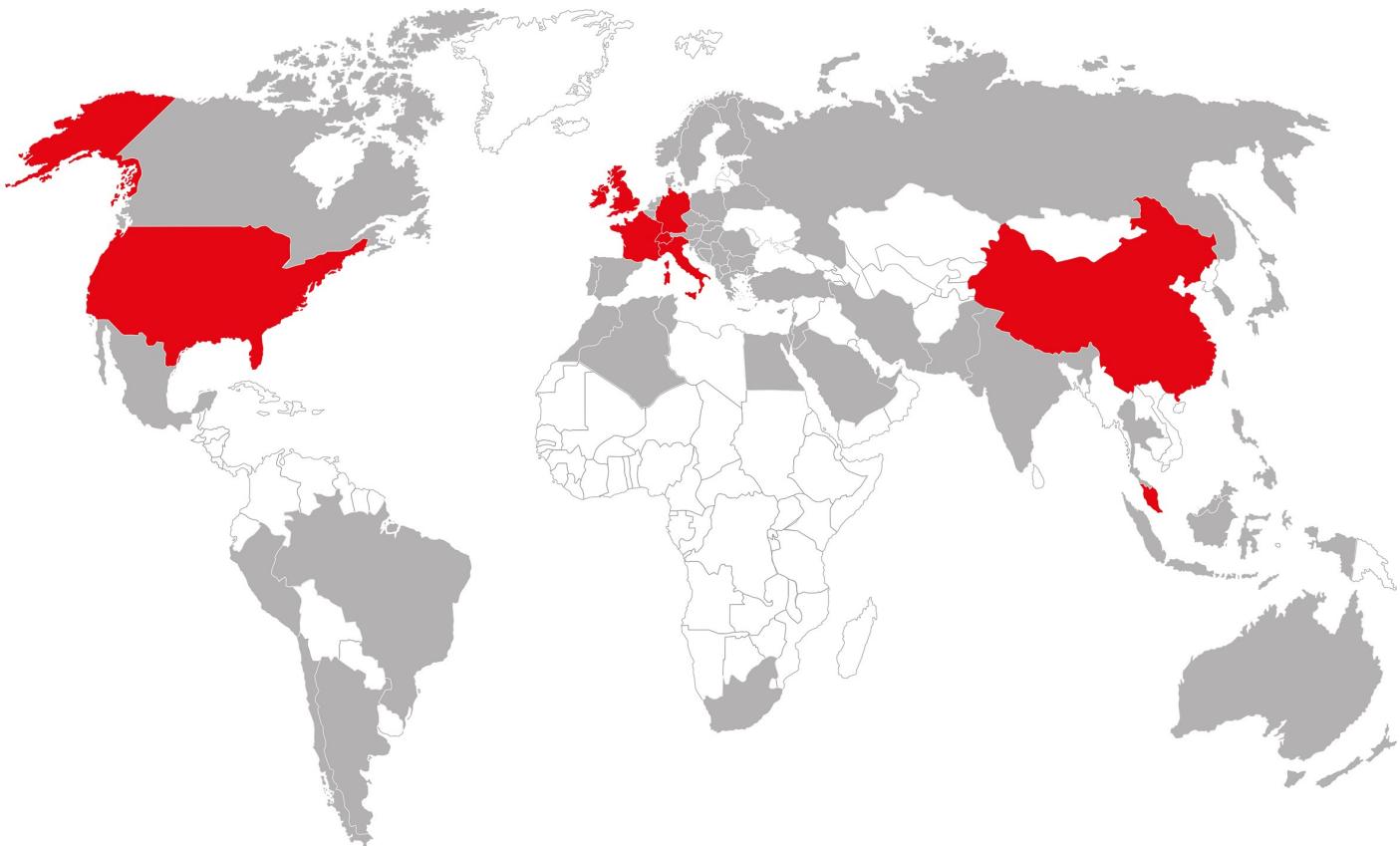


**HC2-IC402 probe**

# ROTRONIC MEASUREMENT SOLUTIONS

## 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/international](http://www.rotronic.com/international)



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