

## Containers

### Facts & figures:

Caused by the steady growth of the globalized economies and a shift of production to Far East, there is an increasing need for containerized transportation of goods all over the world.

Today more than 15 million containers are on duty, trend upward

Forecasts see a doubling of container handling in the next 10 years.

### Containers in general

In its general meaning a container is a protective housing for safe transportation and storage of goods. Safe means in this context, that the characteristics of the containers content remain unchanged under all relevant mechanical and climatical conditions. The stress a substance might be exposed to is manifold:

- mechanical (static and dynamic)
- climatical (railway, truck and ship over various climate zones)
- chemical (aggressive gases and fluids)
- biological (insects, fungal attack, mildew, bacteria, microorganisms).

A container has to be equipped with special controls, restraints, protective gear or other parts to preserve the contents condition.

### Special forms

According to the area of application we have a vast multitude of container variants. Lets start with the Humidor, a taste and aroma preserving box



for storing precious cigars for the ultimate pleasure of the connoisseur.

Or think of the transportation of organs to be transplanted in climated cases and so on. All these examples have in common

the need for controlled environmental conditions in the surroundings of their contents. Mostly this means to ensure a given humidity



and temperature in all circumstances.

### Standard Containers

When they hear the word „Container“ most people think of specialized transportation cases of large dimensions for air, sea and road cargo. Here two formats are established. They have been standardized by the International Standardization Organization (ISO) under cooperation of the International Maritime Organization (IMO) to a length of 20 or 40 feet and a width of 8 feet. Their biggest advantage is the seamless integration in the different sections of a modern transport chain for decreasing transportation time and cost.

In every harbour of the world, in loading terminals for railway and truck transportation and on their way to the customers you can see thousands of them. Only at the first glance they seem similar. At a closer look you can find a big variety of implementations.



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## Why the need to measure the relative humidity temperature and Carbon Dioxide?

Besides ensuring a mechanical protection of its content, a container can maintain low temperatures or/and a certain controlled atmosphere in its interior. For example the transportation of dried, fresh or deep frozen food requires a mixture of different conditions – dry, cool and cold. So the relative humidity (%rh) and the temperature (°C) may vary over a wide range. Certain goods like fruit and vegetable produce heat and CARBON DIOXIDE and consume oxygen during the transportation. In such cases it is necessary to exchange the stale air in the container with fresh and well-temporised air or a special gas atmosphere in order to delay the ripening process.

For air cargo, special container formats have been developed to make optimal use of the round shape of an airplane’s loading space.

Besides the already mentioned examples there are hundreds of containers for the most specialized purposes: liquids, gases under pressure, aggre-



gates for power, water treatment, compression stations for gas pipelines, exhibition stands, sanitary and accommodation, workshops and so on. All of them have a common need – the control of specific parameters.

Rotronic can contribute highly precise and reliable products for measuring, logging and processing humidity, temperature and Carbon Dioxide.

A battery powered universal logger type for humidity, temperature, air pressure, luminance intensity and 3-axis acceleration is the ideal companion of a product on its probably long journey from manufacturer to customer. The log files are an incorruptible witness for all influences, that might threaten the integrity of the goods conveyed.

## History:

Already in the 18th century wooden packing cases were used. These forerunners of today’s containers accelerated the transfer of goods from railway to horse-drawn vehicles. In the 1920’s the British Railway Clearing House (RCH) defined a



kind of norm for containers to allow the exchange among different railway companies. 1956 the American Malcolm McLean shipped the first 58 containers with the ship Ideal X from New-

ark to Houston.

McLean († 2001) thus is regarded as the “Father of Containerization”. When he was a small-scale hauler at the end of the 1930s at the port of Hoboken, he had the idea to rationalize goods transport by avoiding the constant loading and unloading from one means of transport to another .

The benefits in terms of speeding up the shipping of containers were obvious and led to a revolution. So the new mode of container transport ultimately cut the cost of loading freight by 90 %.

1961 the International Organization for Standardization (ISO) defined the first internationally accepted dimensions for the ISO container still in use today.

In the year 2000, Malcolm McLean was awarded the title “Man of the Century” by the International Maritime Hall of Fame, just one of many awards for his achievements throughout his life.

## What solutions can Rotronic offer?

Rotronic offers a wide range of products for monitoring transportation system.

The range starts from small stand-alone humidity and temperature loggers like the HL-20 to the Universal loggers which is capable of measuring, apart from humidity and temperature, also light, G-force, pressure and provides also analogue inputs to monitor other

third party signals.

For a convenient read out of humidity and temperature data after a container arrival, Rotronic can offer a solution from its wireless portfolio.

Further more, the validated HW4 software makes it easy to analyse the gathered data or export the data into excel.



LOG-HC2 P1/R01

## Rotronic products:

### Humidity and temperature probes:

- **HC2-S**  
Standard humidity sensor, -50...100°C, 0...100%rh, ±0.8%rh and ±0.1K...
- **HC2-IM**  
Chrome nickel steel Industrial probe, -100...200°C, 0...100%rh, ±0.8%rh and ±0.1K...

### Dataloggers:

- **HL-NT range**  
For interchangeable probes (up to 7 probes with docking station), 32MB flash card, Display.
- **HL-20**  
20'000 measurement pairs, Display, ±0.8%rh and ±0.2K, Conform to FDA21 CFR Part 11 and GAMP4...
- **LOG-HC2 P1/R01**  
Universal logger for %rh, °C, air pressure, illumination intensity, 3-axis-acceleration  
2 inputs for HygroClip probes  
2'000'000 data point memory, rechargeable lithium polymer battery, Display, USB-Interface, Software,  
0 ... 100 %rh, - 100 ... 200 °C, 0 ... 2'000 mbar, 0 ... 65'000 lux, ± 15 g  
IP60 protection

### OEM products:

- **HC2-ROPCB**  
Humidity & temperature module  
Airchip 3000  
digital UART output  
analog interface 0 ... 1 V
- **XB transmitters**  
Cable probe with PCB with/without housing  
digital UART output  
freely scalable analog outputs  
large choice of probes



Sensor HC2-S

## Customer benefits:

### Accuracy:

Choosing Rotronic gives you the best accuracy on the market. So, it doesn't matter what you are monitoring or controlling you can always rely on the measured data.

### Long term stability:

Apart of the exceptional long term stability of our IN-1 humidity sensor, that is better than 1%rh per year, Rotronic also selects only high quality state of the art sensors for other parameters. This ensures that we provide long living reliable products.

### Communication variety:

With all of the different communication methods, from conventional analogue output signals to RS-485, Wireless or Ethernet RJ45, Rotronic can provide the individual solution for each installation.

### User friendliness:

Since our HW4 software is used for almost all of our devices, it is extremely convenient to reconfigure or adjust the units. And it does not end there! With the HW4 software it is even possible to build up a professional validated monitoring system that fulfils all the requirements according to FDA 21 CFR Part 11.



HygrologL-NT datalogger

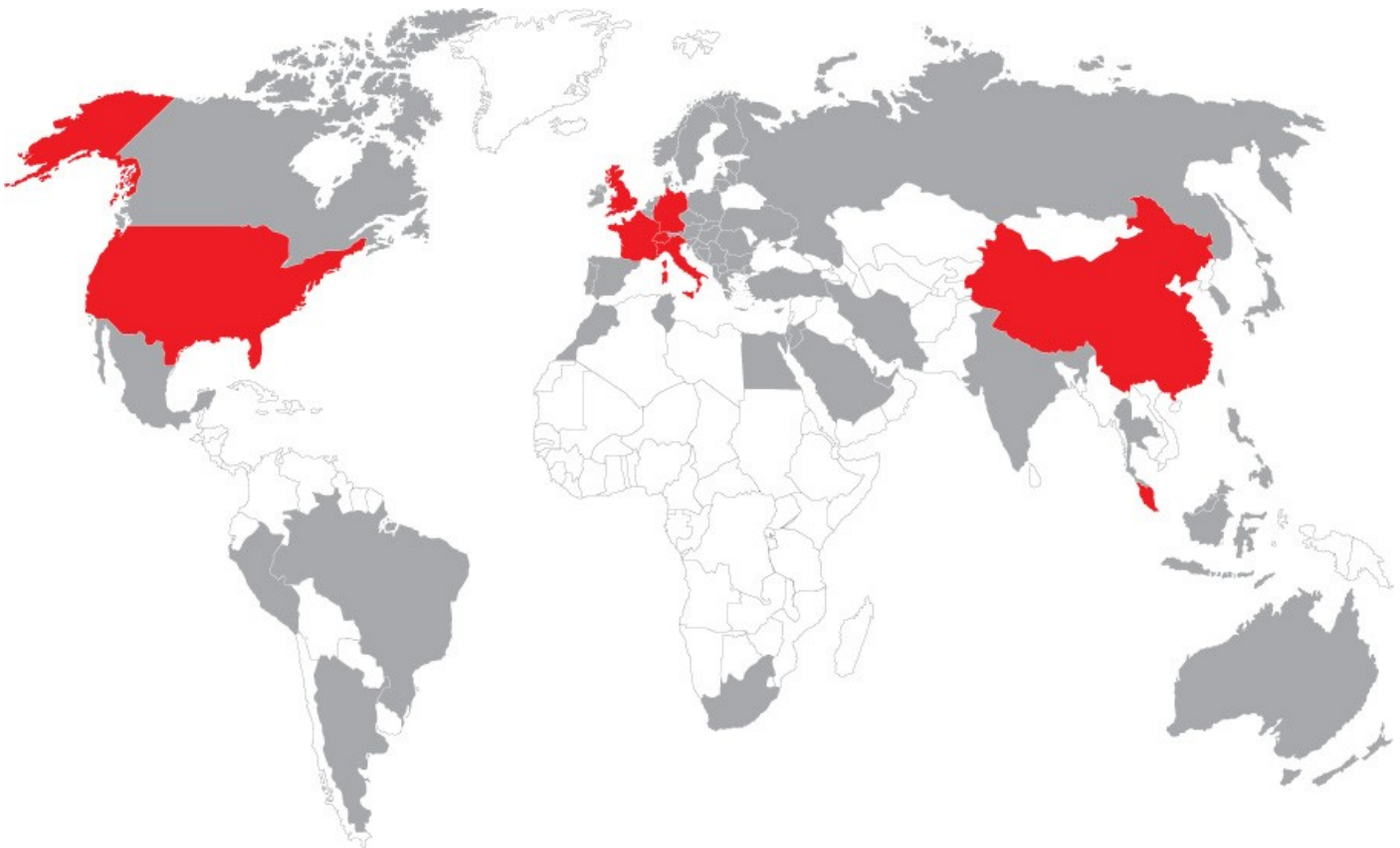


HC2-ROPCB



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



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