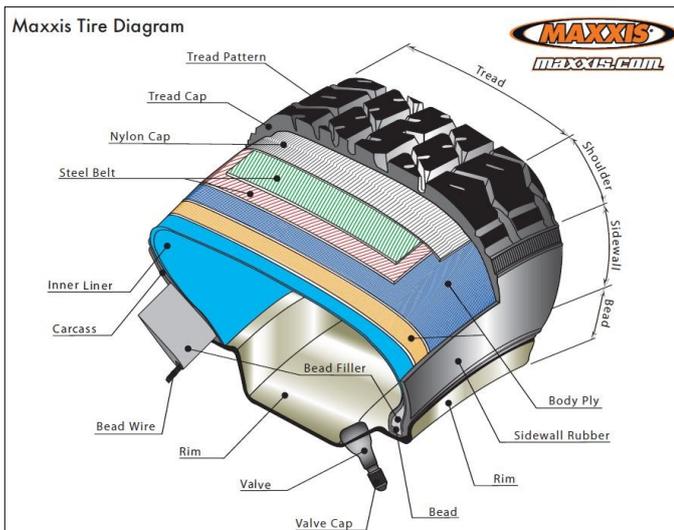




Tyres

Tyre manufacturing Tyres in general



Maxxis Tyre Diagram

Each and every one of us knows what a tyre is: a rubber tube, placed around the wheel of most vehicles that are commercially available today.

However the tyre is much more complicated than a simple rubber tube: a tyre is composed of many various layers, the only visible one being the rubber that we all know. The

layers consist of, the outside rubber with the tread, the nylon cap, the steel belts, the body ply, and the inner liner as can be seen on the Maxxis Tyre Diagram.

Each part of the tyre has a complex manufacturing procedure that involves the monitoring of temperature and humidity.

Why the need to measure relative humidity?

The manufacturing starts with the preparation of the raw materials for the different layers: rubber bales, chemicals, textiles and steel. The relative humidity and temperature measurement is critical in the first three steps of the production phase.

Step 1 Rubber compound mixing operation: the rubber bales are mixed with fillers and chemicals, depending on the characteristics that the rubber requires. After this a "cure package" is added to form the tyre and give it its elasticity. Once the "cure package" is added the maximum temperature in the process is 110°C.

Step 2 Fabric and steel cord preparation: The fabric cord and the steel cord are used to

reinforce the rubber compound and provide strength. The fabric is hygroscopic and will shrink or stretch depending on the level of relative humidity, thus the fabric cord has to be kept in a temperature and humidity controlled room. The steel cord is brass coated and the metal will expand and contract with fluctuating temperatures. High levels of relative humidity (above 70%rh) will cause corrosion. Additionally if dust or grime is left to accumulate on the steel, there will be a retention of humidity which may induce corrosion even when the relative humidity level is not that high. Therefore the steel wire forming area must respect the following requirements: 23°C ±3°C and 55%rh ±8%rh.

Step 3 Belt and play calendaring: the rubber compound is pressed on and into the cords. This process is critical as the bonding of fabric to rubber or steel to rubber will relate to the performance of the tyres. The production area must be controlled at 22°C ±2°C and a relative humidity below 50%.

The steps remaining, inner liner calendaring, bead component preparation, tyre tread and sidewall extrusion operations, tyre tread extrusion, tyre sidewall extrusion, tyre building, tyre curing and tyre inspection are also key steps in the development of a perfect tyre. However, there is a lesser requirement for a temperature and humidity controlled environment.

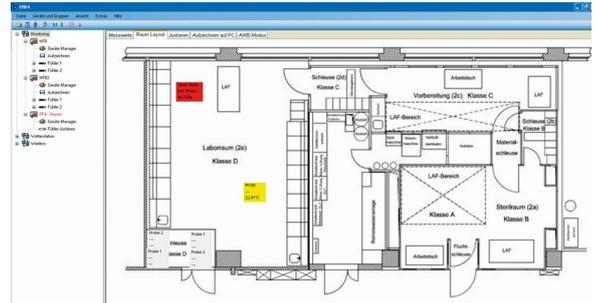
Discussed in this edition:

Tyres in general	1
Why the need to measure relative humidity?	1
What solutions can Rotronic offer?	2
Rotronic Products	2
Customer benefits	2
Contact us	3

What solutions can Rotronic offer?

Rotronic has the possibility of offering a complete system to all tyre manufacturers: a proven system that enables the tyre manufacturers to both, control and monitor their process and remain conform to their internal guidelines.

With the combination of both analogue outputs, controlling the air-conditioning, and digital outputs, linked up to the Rotronic HW4 monitoring software, the manufacturer has a clear overview of their manufacturing plant.



Rotronic HW4 monitoring system

Rotronic products:

Humidity and temperature probes:

- **HC2-S**
Standard humidity sensor,
-50...100°C,
0...100%rh,
±0.8%rh and ±0.1K...
- **HC2-SM**
Steel 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...

Transmitters:

- **HF3 series**
With a fixed probe
2 or 3/4 wire configuration,
Various analogue and digital outputs,
Display,
Low cost...
- **HF5 series**
For interchangeable probes,
2 or 3/4 wire configuration,
Various analogue and digital outputs,
Display,
All psychrometric calculations available...

Dataloggers:

- **HL-NT range**
For interchangeable probes
(up to 7 probes with docking station)
32MB flash card,
Display,
Conform to FDA21 CFR Part 11
and GAMP4



HF5 transmitter with a HC2-S probe

Customer benefits:

Accuracy:

Choosing Rotronic gives you the best accuracy on the market.

Precise humidity measurements can be obtained: meaning that as the quality of the tyres will remain outstanding with regards to the relative humidity and temperature requirements.

Additionally the accuracy will lead to lower electricity costs based upon the fact that the airconditioning system will

only be used when necessary.

Communication:

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

Long term stability:

A long term stability with a drift under 1%rh per year (depending on the environment).

Calibration and adjustment:

All of the Rotronic products are digital so the whole calibration procedure can be done via a PC, or directly from the device with the help of the Rotronic humidity standards. Rotronic can also offer an ISO-17025 calibration.



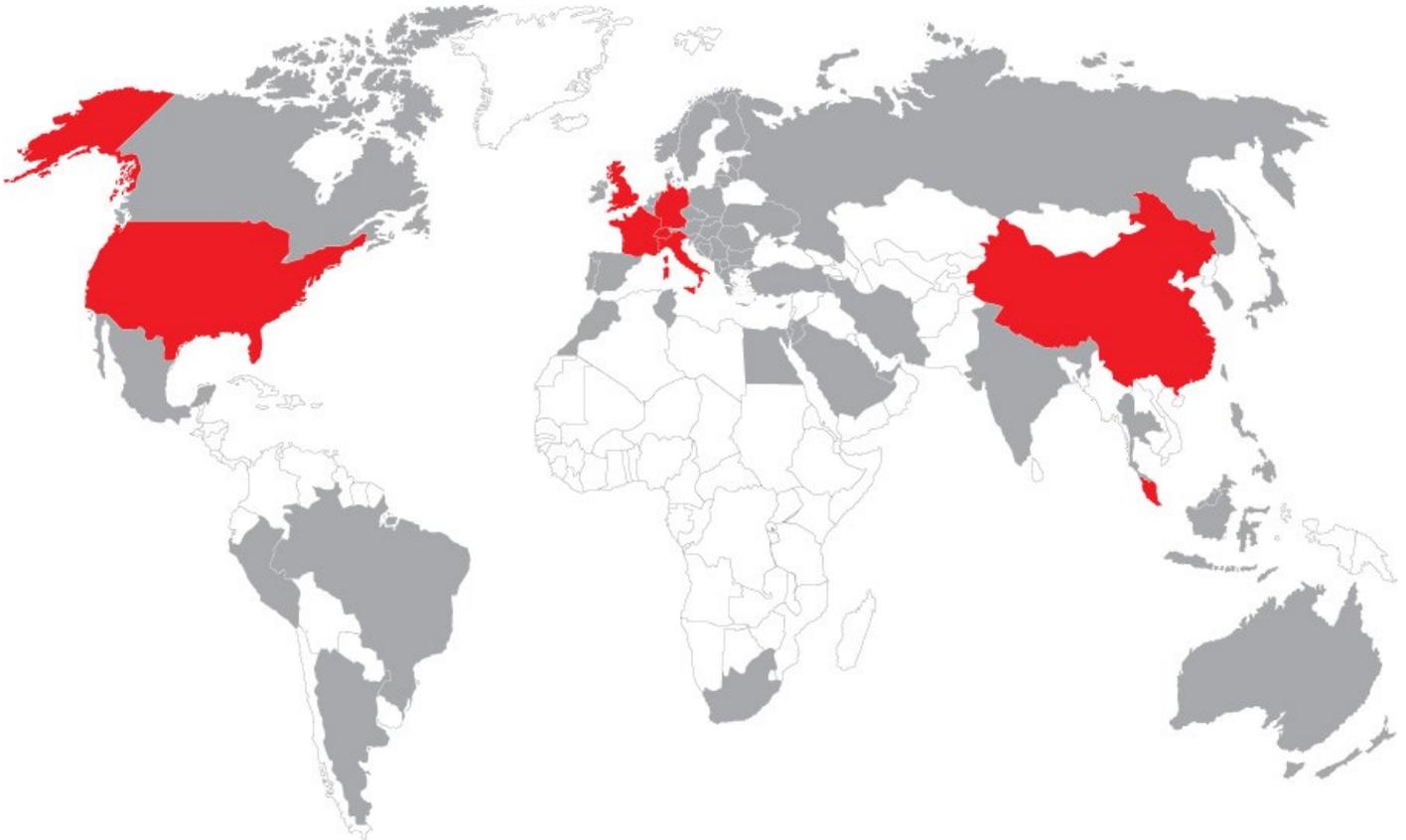
HL-NT data logger



HF3 transmitter

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



SWITZERLAND

ROTRONIC AG

Grindelstrasse 6,
CH-8303 Bassersdorf
Phone: +41 44 838 11 44
Fax: +41 44 837 00 73
www.rotronic-humidity.com

FRANCE

ROTRONIC Sarl

56, Bld. De Courcerin,
F-77183 Croissy-Beaubourg.
Phone: +33 1 60 95 07 10
Fax: +33 1 60 17 12 56
www.rotronic.fr

SINGAPORE

ROTRONIC Instruments PTE LTD

Inno Centre, 1003 Bukit Merah Central
#06-31
Singapore 159836
Phone: +65 6376 2107
Fax: +65 6376 4439
www.rotronic.sg

GERMANY

ROTRONIC Messgeräte GmbH

Einsteinstrasse 17-23
DE-76275 Ettlingen
Phone: +49 7243 383 250
Fax: +49 7243 383 260
www.rotronic.de

UK

ROTRONIC Instruments UK Ltd.

Crompton Fields, Crompton Way
Crawley, West Sussex, RH10 9EE
Phone: +44 1293 57 10 00
Fax: +44 1293 57 10 08
www.rotronic.co.uk

ITALY

ROTRONIC Italia srl

Via Repubblica di San Marino, 1
I-20157 Milano (MI)
Phone: +39 02 39 00 71 90
Fax: +39 02 33 27 62 99
www.rotronic.it

USA

ROTRONIC Instrument Corp.

Suite 150, 135 Engineers Road,
Hauppauge, NY 11788
Phone: +1 631 427 38 98
Fax: +1 631 427 39 02
www.rotronic-usa.com

CHINA

ROTRONIC Shanghai Rep. Office

2B, Zao Fong Universe Building, No. 1800
Zhing
Shan West Road, Shanghai 200233
China
Phone: +86 21 644 03 55
Fax: +86 21 644 03 77
www.rotronic-humidity.cn