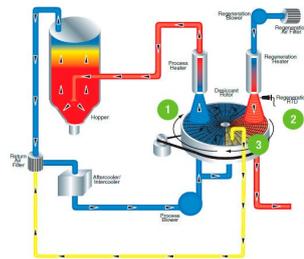


## Drying of plastic

### Facts & figures:

For more than 50 years, global production of plastic products had a continuous growth. In 2012 the production rose to 288 million tonnes - a 2.8% increase compared to 2011. However in Europe, in line with the general economic situation, plastics production decreased by 3% from 2011 to 2012.



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## Drying of plastic in general

### Basic requirements prior to processing plastic pellets

Non hygroscopic resins like PVC, Polystyrene and unfilled Polyethylene resp. Polypropylene can contain moisture only on their surface. But all engineering plastics are more or less hygroscopic. They can and will absorb moisture from the atmosphere into the pellet to contain it in their internal structure. If the pellets are not dried before processing, the water will react with the molten polymer at the processing temperature. The result is a change to the molecular structure of the polymer. This chemical reaction is known as hydrolysis and is reducing the molecular weight of a molded part. Products molded under these conditions will have lesser physical properties such



as reduced tensile and impact strengths. Polyamide for example is one of the most hygroscopic plastic materials in common use. The moisture content of nylon molding resins is a particularly important parameter with a direct effect on molding, mechanical properties, viscosity of the melt and the appearance of the molded parts. All plastic producers have to realize the importance of proper drying for molding high quality products!

### Drying of plastics by Hot-Air Systems

Basic plastics like for example PVC, Polystyrene or unfilled

PE resp. PP are carrying moisture on the surface of their pellets as a result of temperature and humidity. These materials can normally be dried by using only hot air. Hot-Air dryers take the ambient air and heat it up to the recommended drying temperature for a given resin and let the air circulate through the resin hopper.

### Drying of hygroscopic plastics by Desiccant-Dryers

All hygroscopic resins like ABS, PA, PC, PET, PMMA and other materials, can only be effectively dried by hot pre-dried (desiccated) air. They work absolutely independent from the conditions of the ambient air. The circulating air is passing a desiccant material like Silica gel or Molecular sieves.

## Why the need to measure humidity?

### Drying Time

For each resin, a specific drying time is given. The drying time is the time requested at a particular dew point and a particular temperature to dry the plastic material to a set degree of residual humidity!

If the drying time is shorter

than the given drying time, there is a risk for processing not properly dried material, leading to a final product with reduced optical and mechanical properties. On the contrary, a much longer time as the given drying time can cause a degradation of the physical performance and/or wasting

energy.

### Conclusion

Temperature, relative humidity and dew point measurements are very important in the drying process of plastic pellets to be sure the drying is working properly and satisfy the mold-part requirements

## What solution can Rotronic offer?

The heart of the latest humidity measurement products are the Rotronic capacitive humidity sensor, HygroMer IN-1, respectively the low dew point sensor HygroMer LDP-1. Both sen-

sors, with the best long term stability on the market, are ideal for the monitoring of the drying process.



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*



HF 5 Wall mount transmitter  
In combination with:

## Rotronic products:

### Humidity and Low Dew Point Probe:

- **HC2-LDP**  
-40...85 °C,  
-70...85 °C Td  
Ø G12 Thread  
± 2K Td (-50...20°C Td)
- **HC2-IC402**  
-100...200 °C,  
0...100 %rh,  
Ø15 mm  
±0.8 %rh and ±0.1K...
- **HC2-IC402-A**  
-100...200 °C,  
0...100 %rh,  
Ø15/25 mm,  
±0.8 %rh and ±0.1 K...

### Transmitters:

- **HF5 series**  
For interchangeable probes,  
Various analogue and digital  
outputs, Display,  
All psychrometric calculations  
available...
- **HF7 series**  
Stainless steel probe,  
-100...200 °C, 0...100 %rh  
3/4 wire configuration,  
Various analogue outputs,  
Display...
- **HF8 series**  
For 2 interchangeable probes,  
Various analogue and digital  
outputs, Display, relay outputs.  
All psychrometric calculations  
available...

### Data loggers:

- **HL-NT range**  
For interchangeable probes  
(up to 7 probes with docking  
station)  
32 MB flash card  
Large LC display,  
Conforms to FDA 21 CFR  
Part 11 and GAMP4...
- **LOG-HC2-RS**  
Wireless logger with single  
interchangeable probe input.  
Stores up to 500,000 data  
points. 6 Year battery lifetime  
Range 100 m free field  
Measurements: probe specific  
Conforms to FDA 21 CFR  
Part 11 and GAMP4...

## Customer benefits:

### Accuracy:

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

Precise humidity or dew point measurement enables the ideal controlling of the dryers and therefore ensure a top quality of the final product.

### Communication:

Networking with Rotronic is an easy affair! With the wide range of communication

interfaces available, from conventional analogue output signals to USB, RS-485, Wireless and Ethernet RJ-45, Rotronic can provide the required interface to your control unit, 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 multi-point calibrations.

### Calibration:

Rotronic offers a factory calibration certificate, and SCS certificate if required. The portable HygroGen temperature & humidity calibrator as well as unsaturated humidity salts are also available for on-site calibration.



LDP Low Dew Point Probe

HC2-IM402 Probe