

## New features

- The product temperature is not falsified due to the passive design
- Automatic identification and localisation of the sensors by RFID
- New hemispherical sensor design
- Improved data import in LPCplus
- Enhanced documentation possibility in batchrecord of WTMplus 2.0 sensor position
- Product sensor includes RFID chip for calibration coefficients and identification



Automatic identification by RFID and integration in LPCplus



NEW



Taking a Step Forward

WTMplus 2.0  
Wireless Temperature  
Measurement

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## A fully integrated PAT-solution

The product temperature is considered as an essential criterion for monitoring and control of the freeze drying process.

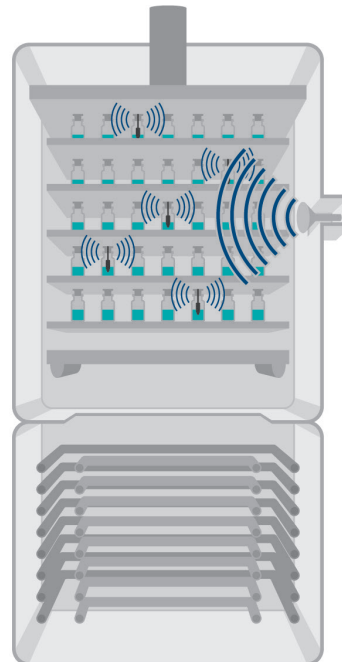
As measuring should be carried out in several – often small – vials, conventional wired sensors cause considerable handling problems.

WTMplus 2.0 is dedicated for Martin Christ pilot units as well as production units, particularly together with our autoloading systems LyoShuttle.

- Fully integrated in our automated systems and process documentation LPCplus
- GMP-design for best cleaning results
- Small and robust, also for 2R vials and bulk
- High accuracy  $\pm 1$  K, resolution 0.1 K
- Covers the entire process (temperature range  $-60$  °C ...  $+135$  °C, sterilizable)
- No plugs and wires with cleaning and contact problems
- Up to 16 sensors can be used in one freeze dryer everywhere on all shelves

## Functional principle

- Energy supply of the sensors by means of radio frequency within the 2.4 GHz range, i.e. no battery or other energy storing device necessary
- Intermediate storage of energy by stimulation of a quartz crystal
- High precision temperature-dependent detuning of quartz oscillation frequency
- Transmission of frequency modulation via an antenna to the evaluation electronics for temperature determination



Principle of wireless product temperature measurement

## Easy handling

The temperature-sensitive quartz is placed directly above the hemispherical part of the probe. The sensor antenna can be deformed during stoppering without failure. A mounting for the sensor is available. With a positioning tube the exact height of measurement spot can be fixed.

This could be:

- Inside the product cake
- Above the product (vapour temperature)
- On the vial bottom

