

Safe and efficient technology for
spray dryer applications

HICOSYS

H₂O measurement
and CO detection

H₂O measurement and CO detection system

The safety and efficiency of spray drying has become increasingly important for manufacturers operating in the food and feed industry, due to increasing demand, energy prices and environmental requirements. Manufacturers therefore face the challenge to improve efficiency, while keeping their operations continuous, cost effective, and most importantly safe.

Key drivers for H₂O analysis and CO detection

Efficiency

Flow, temperature and humidity are very important parameters used in maximizing the efficiency of the spray drying processes. The measurement of absolute humidity in an accurate and reliable way has always been a challenge. The material balance calculation of H₂O depends on too many parameters and is often imprecise. Moreover the dew point measurement technology has proven to be insufficient due to many depending factors and complicated calculations. It is general considered to be imprecise and will not meet the maximum efficiency demands in the spray drying process.

Safety

Coagulation and lump formation in a processed product, caused by undesired and uncontrolled process conditions, will bring a significant risk into the drying process. Coagulation and lumps with an increased residence time can cause undesired smoldering reactions, which create a significant risk of fire, or even an explosion. Therefore CO detection, as a pre-warning system, is worldwide used as a safety system for companies using spray dryers.

Hobré HICOSYS

The HICOSYS CO & H₂O detection system, developed by Hobré instruments, is the first analyzer system on the market, which secures safety and efficiency at the same time. A well designed low-maintenance system with a start of the art laser technology analyzer, that provides real time data to the DCS for process efficiency control.

The HICOSYS offers outstanding measurements to monitor these parameters by means of one analyzer system. This provides a higher process optimization and reduces the chance of smoldering.

1. Accurate and direct measurement of absolute humidity for process efficiency
2. Reliable CO detection for optimum safety

Applications

Production technology

- Water-based liquids dried to powder using hot air with powder dryers
- Agglomeration towers
- Belt dryers
- Disc dryers
- Fluid beds
- Bag filters

Product groups

- Products showing smoldering effects when being dried, causing risk of fire and explosion.
- Organic products showing degenerating exothermic reactions under drying process conditions, like oxidation or Maillard reactions.
- Sticky products posing risk of lump and sediment formation.

Final products

Processed products including:

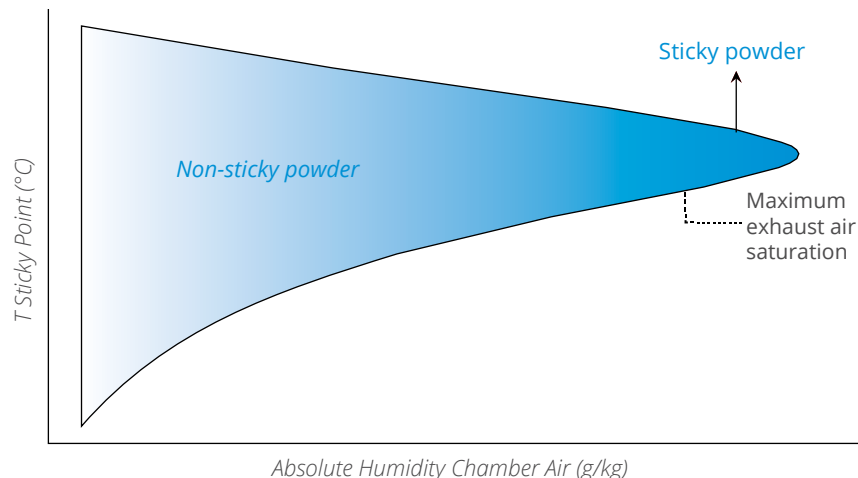
- Skimmed milk
- Whole milk
- Goat milk
- Infant formulas
- Whey permeate
- Coffee creamers
- Coffee
- Tea
- Organic flavors
- Vegetable-based products



Benefits

Control process efficiency

- Control the sticky point by accurately measuring absolute humidity
- Maximize throughput
- Reduce energy consumption per kg of product
- Optimize tower and fluid bed operation
- Extend production cycles and prevent formation of lumps and sediment
- Control product quality



Improve process safety

- Fast and accurate detection of CO from smoldering and Maillard reactions
- Ensure reliable CO detection by reducing complexity and avoiding false alarms
- Use preventive measures to minimize downtime
- Built-in automated alarms and I/Os for optimal safety of the powder drying plant

Reduce operational costs

- No use of pressurized air, drying, refrigeration or heating
- No user maintenance
- Minimal use of spare parts
- Lower operational costs compared to conventional technology

Key features

Sample probes for the various applications

- Low, mid and high powder concentrations
- Reliable and continuous sampling of air streams in the powder dryer installation
- Hygienic design for low fouling, mounted with hygienic flanges and detachable filters for easy offline cleaning

Low pressure sample system

- High linear flow for short lag times
- No heating and no drying required
- Robust one-piece stainless steel sample lines

Tunable Diode Laser Analyzer

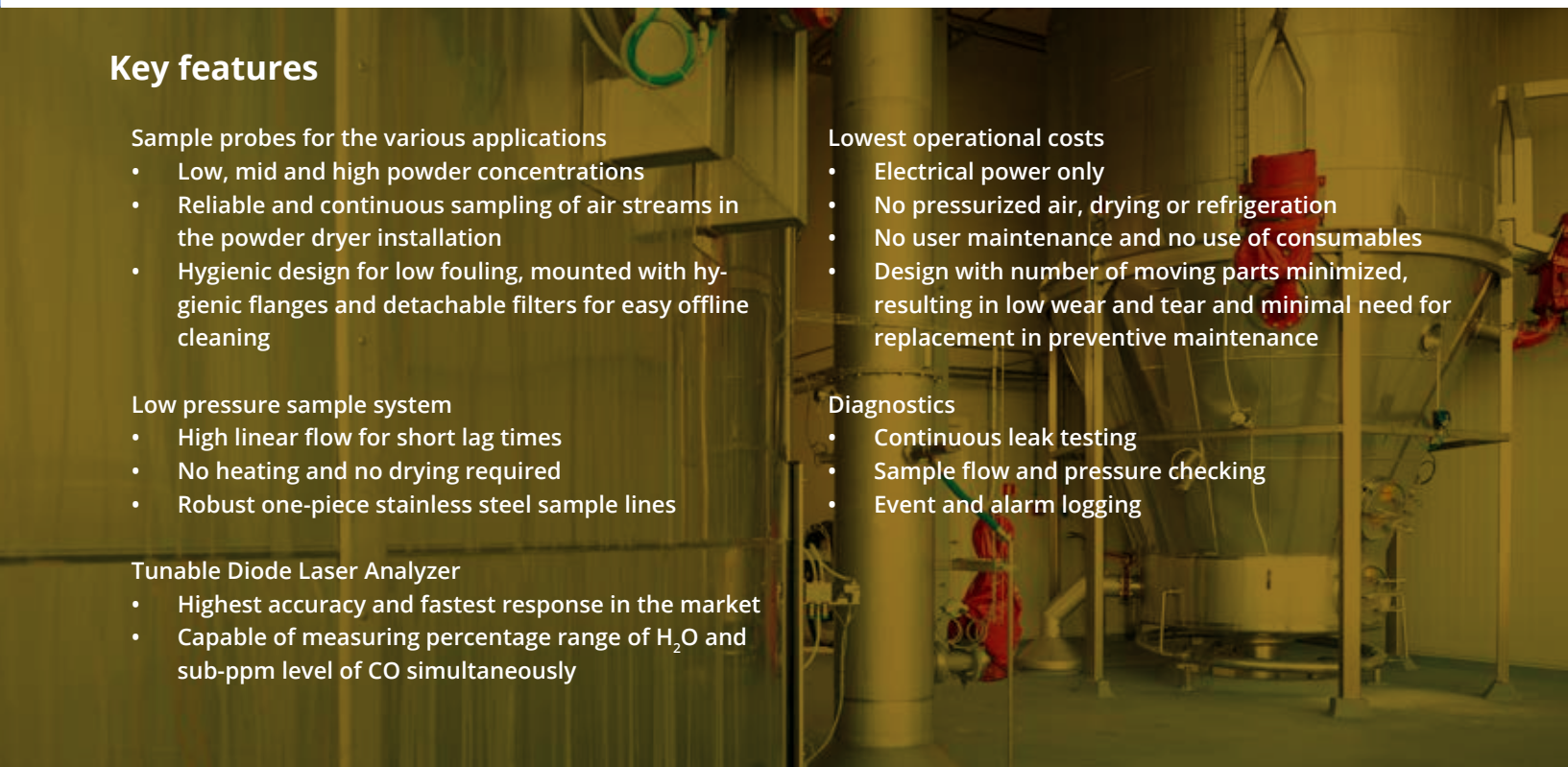
- Highest accuracy and fastest response in the market
- Capable of measuring percentage range of H₂O and sub-ppm level of CO simultaneously

Lowest operational costs

- Electrical power only
- No pressurized air, drying or refrigeration
- No user maintenance and no use of consumables
- Design with number of moving parts minimized, resulting in low wear and tear and minimal need for replacement in preventive maintenance

Diagnostics

- Continuous leak testing
- Sample flow and pressure checking
- Event and alarm logging

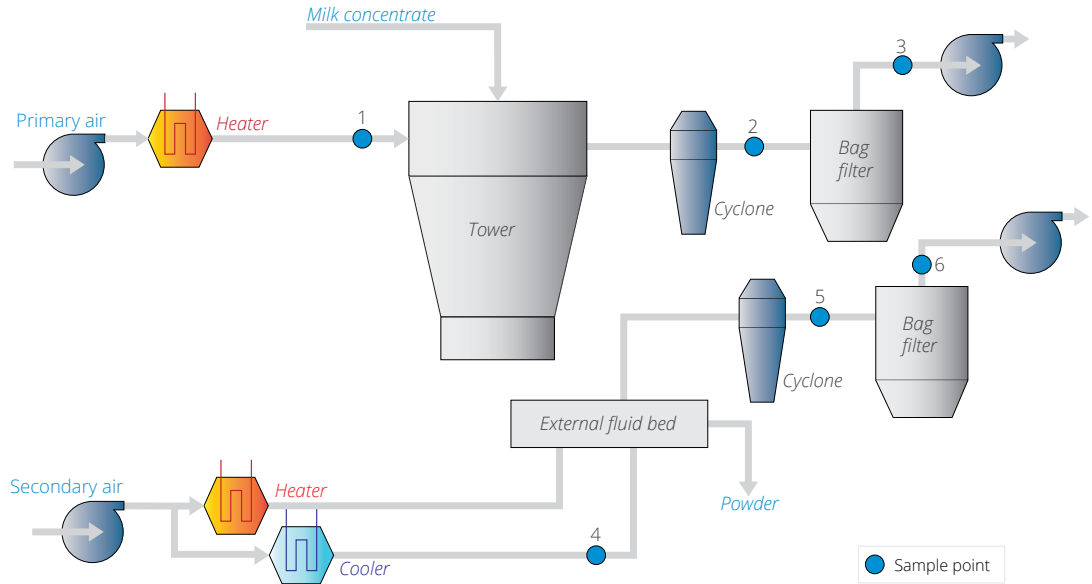


Principle of operation

Multipoint sampling is possible, enabling configuration of the HICOSYS to meet a wide variety of operational goals. The HICOSYS sequentially measures up to 8 sample points with a fast response of just 10 to 15 seconds per sample. CO and absolute humidity are measured simultaneously. Background CO from the environment or other sources is handled by measuring all relevant inlet air streams in the installation.

Fast and flexible sequencing ensures highly accurate measurement of even the most difficult CO concentration profiles at the inlet. Three levels of Δ CO alarming can be set up over the entire installation or parts such as the tower, fluid beds or bag filters. For full safety coverage of the dryer installation, the HICOSYS system is equipped with all necessary I/Os to connect to the factory's DCS and safety system.

Example of a configuration and sample sequence



Sample points	Time (in seconds)	H ₂ O	CO	DCO
1	15	Inlet tower	Inlet tower <i>Reference</i>	
2	30	Outlet tower <i>Drying performance</i>	Outlet tower Bag filter	Tower
3	45	Outlet bag filter	Outlet bag filter	Bag filter
4	60	Outlet cooler <i>Cooler performance</i>	Inlet fluid bed <i>Reference</i>	
5	75	Outlet fluid bed <i>Product moisture</i>	Outlet fluid bed Inlet bag filter	Fluid bed
6	90	Outlet bag filter	Outlet bag filter	Bag filter

Certification

- IP56 probes for cleaning
- Designed according to the guidelines of the BGN in Germany
- Design compliant with VDI 2263 section 7 and 7.1
- ATEX certification (optional)

TECHNICAL SPECIFICATIONS

General

Measuring	H ₂ O and CO in gaseous streams
Service	Process optimization and safety in powder drying food and feed, and other drying processes
Sampling system	Vacuum, fast multi-stream selection, high-capacity filter probes
Measuring principle	Cavity enhanced absorption spectroscopy using an infrared tunable diode laser

Sample probes

Mounting	Varinline U F32/25
Applications	Low to mid and high powder concentration
Filtering	Static, 3µ, detachable and reusable
Optional classifications	Ex
Maximum process temperature	120 °C - 450 °C / 248°F - 842°F
Sample line	max 50 or 100 m, 1/4" or 1/8" diameter, no heating

Measuring ranges

Measuring range H ₂ O	0 - 20% vol, 0 - 160 g/kg
Measuring range	0 - 10 ppm, 0 - 50 ppm optional
Lower detectable limit CO	0.1 ppm
Zero and span drift	Negligible
Interference	None
Response time analyzer	Less than 15 sec
Precision CO	± 0.1 ppm or 1% of full scale
Precision H ₂ O	0.32 gram/kilo
Sample connections	Max 8

Outputs

H ₂ O	g/kg in each sampled stream
CO	ppm, absolute and delta CO
Alarm levels DCO	3, adjustable
Analogue outputs	4 - 20 mA
Digital outputs	Relais
Interface	Touch screen in cabinet or control room in Ethernet
Remote	Optional remote access through internet

Installation and utilities

Cabinet	IP56, RAL7035 powder-coated steel
Access	Front door
Weight	Approx 180 kg including packing
Mounting	Floor
Hoisting	4 lifting eyes
Dimensions cabinet	H x W x D = 1900 x 600 x 800 mm
Ambient cabinet	20 - 30 °C / 68°F - 86°F
Power	200 VA / 110 - 230 / VAC / 50 - 60 Hz / 400 Watt UPS optional

101-38-0917

*For more application-specific information do not hesitate to contact us.
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HOBRE INSTRUMENTS

HOBRE IS A LEADER IN THE DESIGN, MANUFACTURING AND MAINTENANCE OF ONLINE ANALYZERS, SAMPLE SYSTEMS AND COMPLETE TURNKEY ANALYZER SYSTEMS. ESTABLISHED IN 1978, OUR COMPANY FOCUSES ON PROVIDING SOLUTIONS FOR THE OIL AND GAS, (PETRO)-CHEMICAL, POWER GENERATION, STEEL AND FOOD AND PHARMA INDUSTRIES WORLD-WIDE.



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