

IN-PROCESS / AT-LINE ANALYSIS

Nordson
MEASUREMENT & CONTROL



EMPOWERING
TRUE PROCESS AND
QUALITY CONTROL
TODAY AND BEYOND



A New Era in Gauging for
Tobacco Industry Applications

NDC Products

Intelligence that transforms the world.

Maximizing Process Performance and KPIs

Through the Measurement of Moisture, Nicotine, Total Sugars and More

For more than 50 years, we have designed and built measurement solutions specifically developed to meet the manufacturing challenges faced by the tobacco industry.

Our leading position in process measurement has been achieved by working closely with our customers and developing solutions that meet their needs – for better process insight and quality control. We set the bar in the industry for best-in-class performance with our TM710e on-line tobacco gauge and InfraLab e-Series at-line analyzer. Our legacy of innovation continues with the TM9000 gauge.

By solving process-specific application challenges, we play a dominant role in supporting the tobacco industry and forging successful relationships with the leading manufacturers.

Today, tens of thousands of Nordson gauges are in service around the globe. That's because we are trusted not just to meet process needs, but to uncover new efficiencies, ensure quality and add value wherever our products are installed.



Stay Ahead with the TM9000 On-Line Gauge

The Only On-Line Sensor on the Market that can Simultaneously Measure Sugars, Nicotine, Humectants, Basis Weight, Total Volatiles and Color...Out of the Box

The TM9000 gauge is a best-seller in the tobacco industry. It is specially engineered for 24/7 duty, helping manufacturers to meet product quality demands and efficiency goals.

Installed directly on-line, it delivers unparalleled measurement performance while maintaining simplicity and versatility in design and operation. It doesn't require special operator skills or expert knowledge.

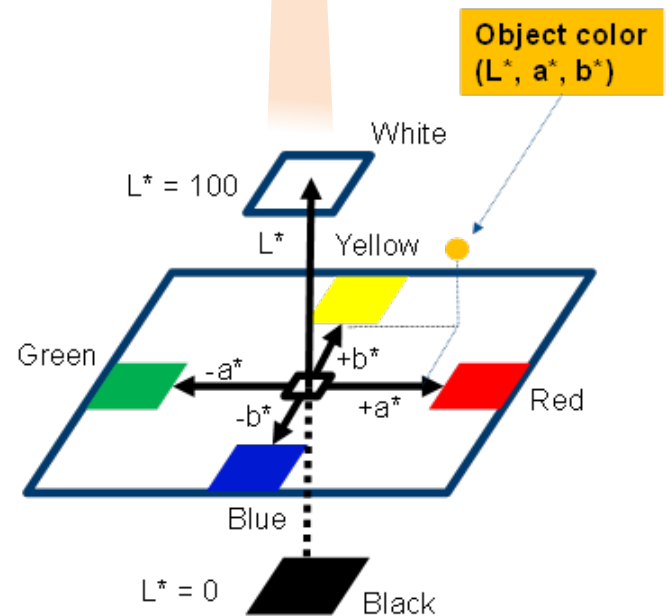
The TM9000 can simultaneously measure key constituents such as Moisture, Sugars, Nicotine and Humectants in tobacco products without showing sensitivity to ambient lighting, tobacco pass height or ambient temperature and humidity.

For sheet-based products we can measure Humectants, Basis Weight and Color as well as Total Volatiles, Nicotine and Sugars. Color can be measured across a wide range of standard scales, including CIELAB (L^* , a^* , b^*), Tristimulus (X, Y Z), RGB, CIELCh (L^* , C^* , h) ΔE^* & ΔE_{cmc} .

Tests have proven that Color readings, combined with other critical measurements such as Moisture, Humectants, Nicotine and Basis Weight in sheet products, can be confidently used as part of a process control strategy to deliver consistent product quality every time.

The TM9000 Color Gauge keeps you ahead with:

- Evolutionary technology that is flexible, adaptable and scalable to meet your changing needs
- Enterprise-level intelligence compatible with Industry 4.0
- Easier operation and maintenance
- Lower cost of ownership over a long lifetime of operation



Leverage the Power of At-Line Analysis

The **NEW** InfraLab Series 9 – benchtop analyzer to the Series 9 on-line gauge – is the latest leading at-line analysis solution on the market. Designed to be used anywhere in the process, the InfraLab Series 9 offers an expanded range of features and capabilities that will help you elevate your quality assurance process. Benefit from rapid, accurate and consistent measurements for a wide variety of tobacco applications. Learn more about this powerful analyzer on page 12.



Improve your Process with Immediate and Long-Term Advantages

We understand your process challenges



Continuous control in primary and leaf processing

Primary processing departments are required to deliver a consistent tobacco blend to the secondary department. To achieve this, parameters such as moisture content, fill value and particle size must be controlled.

The TM9000 on-line gauge meets the industry challenge by providing reliable moisture measurements that are not affected by process, environmental and product variables.

The TM9000 gauge is engineered for the very best long-term stability without the need for systematic re-calibration, making it the most reliable gauge available for tobacco process control.



Recon tobacco sheet

We also provide a system specifically designed for manufacturers of reconstituted sheet tobacco that accurately measures moisture, nicotine, sugars, sheet basis weight or grammage, and thickness. Our TM9000 solutions include fixed-point and scanning systems to measure across the product sheet.



Reduced risk and other solutions

As the tobacco industry innovates to produce next-generation products, such as non-combustibles, reduced-risk and other tobacco solutions, Nordson has been working closely with manufacturers to deliver application-specific measurement solutions.

Our TM9000 and InfraLab Series 9 tobacco gauges accurately and reliably measure not only moisture, nicotine and sugars, but also glycerol (humectants) – key components that need to be measured in reduced-risk products.

Other capabilities include measurements for product thickness, mass per unit area and length and speed. With immediate access to data, our gauges take you one step further towards maximizing the performance potential of your process. As a result, you'll realize the following benefits:

- Enhanced product quality
- Controlled in-pack moisture
- Optimized making speeds
- Reduced waste
- Continued brand loyalty



Operate your process at peak performance with single- or multi-component measurements of:

- Moisture
- Total volatiles
- Product temperature
- Nicotine
- Total sugars
- Glycerol
- Propylene glycol
- Eugenol oil (Kretek tobacco)
- Menthol

Refer to the list of applications later in this brochure to see where the TM9000 delivers value to your process.



Engineered with your process in mind

Greater processing power to perform more advanced measurements and gauge operations

- Powerful, dual-core processor with large on-board storage

Unparalleled process vision

- 12 hours of measurement trending and embedded product calibration adjustment tools

Expansive measurement database to meet your needs

- Every Nordson application is fully documented

Hygienic, seamless stainless-steel enclosure with sapphire window

- 316L stainless steel, sealed to IP67

Integrated Air Purge Window shield to keep window clean from process environment

- Advanced window contamination monitoring with an optional air flow monitor



Simple slide-on sensor mounting



Integrated Air Purge Window



Removable service backplate

Innovative removable backplate for easy service and maintenance

- Remove gauge internals while leaving enclosure in place

ATEX certification for safe use in dust hazardous environments

- DUST: II 1 D Ex Ta IIIC T288°C Da Ta
-20°C to 50°C and II 2D Ex Tb III C T80°C Db

Versatile connectivity for flexible integration into production networks

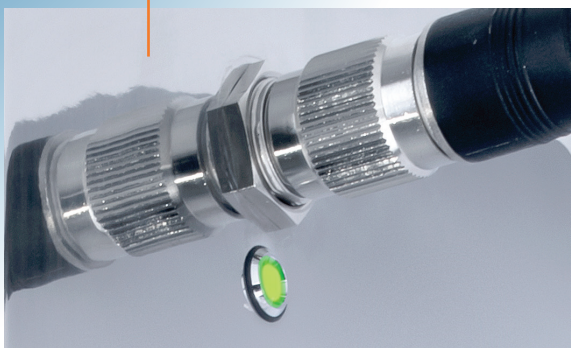
- Ethernet and fieldbus networking with digital and analog connectivity

Easily connect to Series 9 via hand held tablet

- Connect from any location wirelessly or via internet for sampling and configuration

Advanced diagnostics for maximum uptime

- Includes Status indicator light for at-a-glance confirmation with integrated Auto-Check feature for total piece of mind



Status indicator light

Easy to Install,
Integrate and Operate

Connectivity and Interfacing to Enhance Process Insight and Control

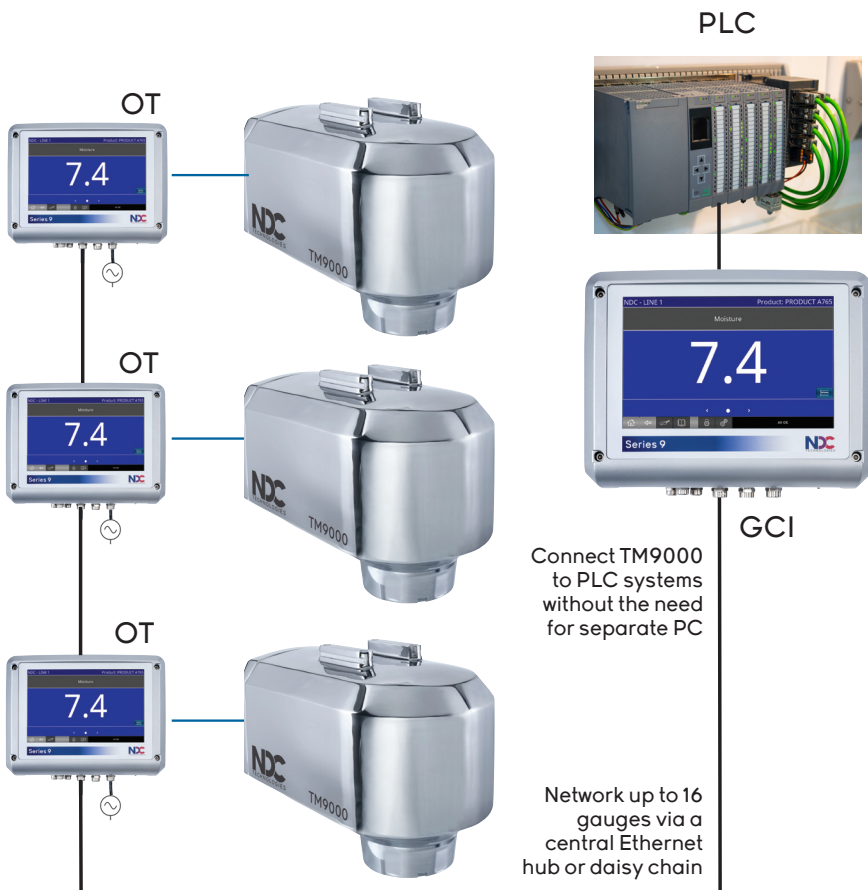
A flexible and scalable in-process gauging system for the tobacco industry



Gauge Control Interface (GCI)

TM9000 gauge control interface

- 10-inch, touch-screen GCI
- Three Ethernet ports and RJ45 external port
- Interfaces up to 16 gauges
- Multi-lingual interface



Portable interface

Accessing your TM9000 gauge is even easier with our portable operator terminal. It can be docked in the control room or operated near the gauge (wirelessly or via Ethernet cable) for sampling and configuration.

TM9000 devices

TM9000 peripheral devices all run on 24V DC power and include:

- Operator Terminal
- Gauge Control Interface
- Gauge Control Port
- Power Hub



OT

Operator Terminal

The OT provides 24V DC to a single gauge and operator-level interaction access to its measurement, data trending, sampling and diagnostic functions. Three (3) Ethernet ports are available for convenient networking configurations.

GCI

Gauge Control Interface

The GCI provides 24V DC power to a single gauge. It enables you to perform multi-gauge setup (up to 16 gauges), calibration adjustments and product management. Both the GCI and OT feature high-definition, multi-lingual, color touch-screen displays.

GCP

Gauge Control Port

The GCP provides three (3) Ethernet ports, allowing multiple gauges to be networked (daisy chained). It also has additional options for analog outputs and digital I/O for any connected gauge.

PH

Power Hub

The PH provides 24V DC power to a single gauge. It also enables convenient networked arrangements of multiple Series 9 gauges and devices via three (3) Ethernet ports.

Industry
4.0

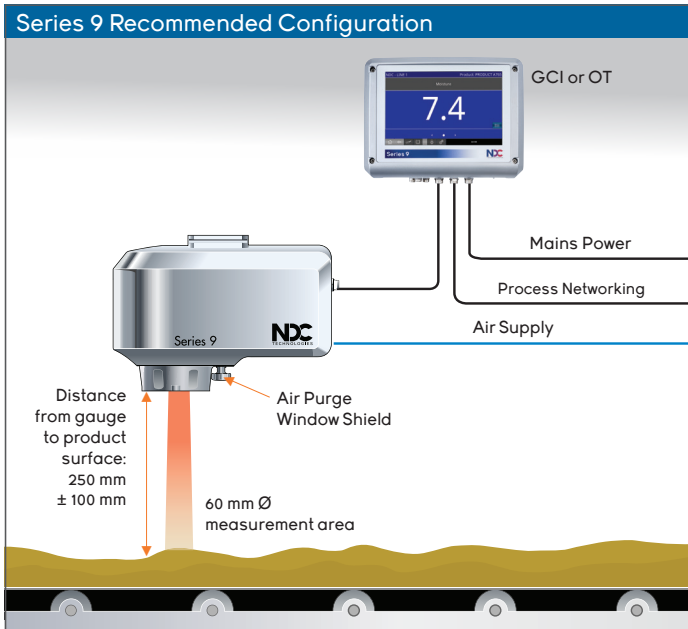
Scalable solution to meet your plant configuration

TM9000's flexible building-block architecture enables you to scale Nordson's gauging system to meet current and future site requirements.

- Keep pace with changing demands
- Meet the needs of your plant
- Protect current investment while realizing additional benefits
- Maintain a competitive edge



Fully Engineered to Deliver Accurate, Reliable Measurements



Installation

The TM9000 gauge measures over a 60 mm diameter standard beam patch size and is suspended over the process line with the measurement window at a distance of 250 mm from the mean product height.

The gauge tolerates product height fluctuations of ± 100 mm without affecting the measurement.

Ambient lighting, temperature or relative humidity changes do not affect the TM9000 measurement.

Additional technical information sources

For additional technical information about installation, calibration, networking and process connectivity, and to learn more about the TM9000 gauge generally, please consult the product manuals.

Ready for any process condition

The TM9000's stainless-steel hygienic housing is sealed to IP67 requirements and optionally ATEX certified. Its seamless hygienic design is a must for tobacco industry applications and allows operation in ambient temperatures from 0-50°C without cooling.

For higher ambient temperatures, cooling options using a novel heat exchanger arrangement are available:

- **Vortec air cooling:** with an optional air control solenoid to optimize air consumption and reduce operating cost
- **Water cooling**



TEMPERATURE



DUST



AMBIENT LIGHT



HUMIDITY

Why our tobacco measurements are better

The NIR measurements used in the TM9000 and InfraLab tobacco analyzer have been generated over many years using thousands of tobacco samples to create robust linear calibrations to the compendial methods or primary reference techniques.

Such techniques are well established in the industry and each producer has its preferred methods and specifications.

The TM9000 and InfraLab have been designed specifically to be calibrated to the preferred method. They feature Nordson's unique factory calibrations that have been developed through rigorous comparisons of gauge and lab values making them linear over the entire measurement range.

In most cases, the SPAN value of the calibration will not require adjustment. Only the TRIM value may require adjustment to agree with the local methodology.

Nordson tobacco gauges provide a repeatability of $\pm 0.1\%$ and deliver high levels of accuracy when calibrated and compared to a primary method: moisture 0.1%, nicotine 0.2% and sugars 1.0%.

Also, our tobacco gauges lead the industry in reproducibility – thanks to Nordson's own manufacture of optical components.



The **NEW** InfraLab Series 9 Tobacco Analyzer

Raising the bar to give you the competitive edge for fast, accurate and easy measurements

The InfraLab Series 9 tobacco analyzer, designed for both at-line and laboratory use, measures samples taken from the process in less than 10 seconds. Available in single- or multi-component formats, InfraLab is able to simultaneously analyze:

- Moisture
- Nicotine
- Total sugars
- Total volatiles
- Glycerol
- Propylene glycol
- Menthol

InfraLab replaces routine loss-on-drying or gravimetric moisture testing, and continuous flow or HPLC analyses for nicotine or total sugars. Once calibrated to your preferred reference methods using the built-in calibration tools, its key advantages are: speed, minimal sample preparation and the fact that it measures a larger, more representative sample than other techniques. InfraLab is accessed via its intuitive, touch-screen interface and requires no special user skills in routine use.



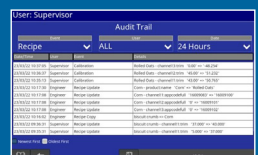
10-inch, high-resolution capacitive touchscreen display



Use encrypted USB sticks (BitLocker) for data download to spreadsheet programs



Reference standard for routine stability checks and standardization after servicing



History Audit Log and On-board data storage (up to 10,000 sample measurements)

The InfraLab Series 9 Advantage:

- Advanced high-accuracy, at-line tobacco analyzer designed for rapid analyses in process environments
- Direct replacement for time-consuming laboratory analyses or at-line instruments such as loss-on-drying or gravimetric moisture or testing which has inherent operator-dependent repeatability and reproducibility performance issues
- Intuitive to use with user-friendly reporting of measurement values for rapid monitoring of processes
- Reduces the burden on over-stretched QA Laboratory resources
- Enables cross-checking of on-line measurements
- Enables greater processing and measurement capability for deeper process insight, creating new and exciting opportunities for application development
- Significantly reduces your operational expenditure and delivers a strong return-on-investment over the lifetime of operation

What's NEW

The InfraLab Series 9 platform processing power enables it to deliver unparalleled capability to tobacco processors.

- **Fully-Featured**
 New, innovative processor allows the InfraLab Series 9 to perform more processing operations and includes embedded calibration tools, a comprehensive user interface with rich feature set of functions.
- **Unrivalled Performance**
 Ultra-high-speed measurement outputs capture changes in the process in real-time. The InfraLab Series 9 boasts a faster sampling rate and several filter wheel options for all current and future single- and multi-component measurement opportunities.
- **Intuitive Operation Consistent with Series 9**
 The InfraLab Series 9 includes a graphically rich software interface that's displayed on a large 10-inch, high-resolution capacitive touchscreen.
- **Enhanced Secure Data Storage**
 In addition to its speed and precision, InfraLab Series 9 benefits from substantial data storage (up to 100,000 sample measurements) and security features.
- **Advanced Diagnostics**
 Ready for Industry 4.0, the InfraLab Series 9 provides advanced warning of failures related to power supply voltages, lamp, motor and vibration.
- **Improved Robustness**
 The rugged InfraLab Series 9 is fit-for-purpose for a broad range of production environment. The technology has a serviceable lifetime of at least 10 years.
- **Compatibility**
 InfraLab Series 9 lamp and motor can also be used in our previous generation models. Sample bowls are also interchangeable. And we guarantee proven measurement equivalence.

Calibration Software

The Series 9 and InfraLab are delivered with our unique factory calibrations that are ready for use for the specified measurements and ranges. On installation, they are adjusted to agree with the local reference method. The software simplifies this process by enabling a comparison of instrument values with laboratory results and features the following tools and functionality:

- Instrument setup and calibration
- Product management (product settings)
- Displays of measurement and other key parameters
- Data logging and export
- Diagnostic functions



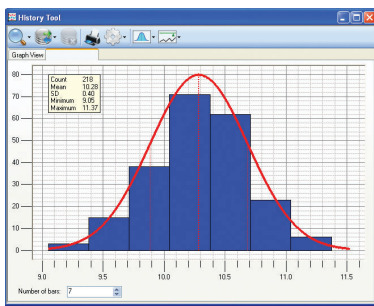
Infralab Manager Software

Network connectivity

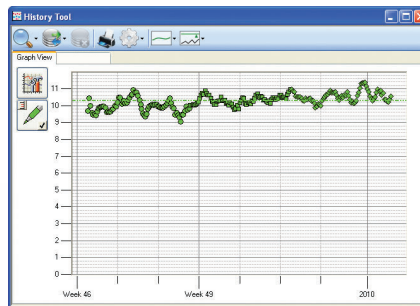
Optional communications interface for sending measurement data over Ethernet for capture and storage in a centralized database.



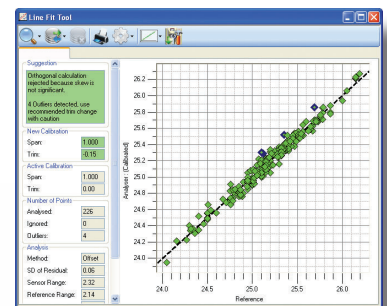
Advanced Data Analysis for Deeper Process Insight



Histogram



Data display



Calibration

With InfraLab Series 9, you realize a greater return on investment by reducing routine sample testing costs.



Get Unparalleled Performance in the Following Tobacco Applications

Processing Area/Product	Moisture	Nicotine	Sugars
Tobacco – General	0 - 60%		
Whole Leaf in GLT or Primary or Strips	10 - 30%	1 - 5.5%	0 - 3%
Blended Strips (Lamina)	10 - 30%		
Re-dried Cut Lamina	10 - 20%	1 - 3.5%	10 - 20%
Final Blend	12 - 16%	0.5 - 3%	10 - 20%
WTS Water Treated Stem	30 - 50%		
CRS Cut Rolled Stem	20 - 30%		
Re-dried Stem	0 - 20%	0.2 - 1.5%	8 - 30%
Expanded Tobacco	0 - 3% & 7 - 15%	0.5 - 2.5%	0 - 16%
Roll-Your-Own Tobacco	12 - 20%		
Shorts	10 - 15%		
Pipe Tobacco	12 - 25%		
Cigar Filler	10 - 25%		
Other Measurements	Range		
Total Volatiles	0 - 55%		
Eugenol Oil (in Kretek Tobacco)	8 - 15%		
Menthol	0 - 2%		
Tobacco Temperature	0 - 120°C		

The measurement ranges in this table are indicative of the typical ranges measured with the TM9000.
Please consult Nordson for your specific measurement needs. Temperature can be measured using the TM9000 only.

Optimizing Your Investment with World-Class Service and Support

Nordson's technical expertise comes from deep experience supporting thousands of products at the world's leading manufacturers. Our portfolio of support offerings leverages this expertise to assist you through the service lifecycle. We offer a complete range of cost-effective support solutions including commissioning, training, technical assistance and service agreements. Customers rely on our 24-7 availability via myNDC – the industry's most progressive service cloud portal. Whether it's configuring new equipment, training your technical staff or solving a technical problem, you can count on our experienced team to help maintain the health and performance of your Nordson product.

Visit myNDC service cloud at myndc.com.



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Document #: FB&T-BROC-SENS-Nordson Tobacco Industry-EN-2024MAR07
Date of Issue: March 2024
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Intelligence that transforms the world.
