TOBACCO INDUSTRY APPLICATIONS

Precision on-line and at-line NIR measurements

- ▶ Enhance Product Quality
- ▶ Control In-pack Moisture
- ▶ Optimize Making Speeds
- ▶ Reduce Waste
- ▶ Develop Brand Loyalty

- ▶ Moisture
- ▶ Nicotine
- ▶ Total Sugars
- ▶ Temperature
- ▶ Total Volatiles

NDC TECHNOLOGIES

Measured by Commitment

NDC & the Tobacco Industry

Accurate moisture control has a strategic impact both in Primary and GLT processes: controlling blend moisture is critical to achieving the fastest making speeds and the target in-pack moisture content.

With its very wide moisture range and multiple measurement points, the primary process demands instruments that can be applied in any location with minimal adjustment and that agree with the laboratory quality testing methods.

In addition, the influence of process variables (such as product height variation), environmental variables (such as ambient lighting, relative humidity or temperature) and product variables (such as the naturally varying characteristics of the leaf blend) must not affect the measurement.

The stability, accuracy and robustness of our TM710e on-line tobacco gauge and InfraLab at-line tobacco analyzer, the result of over 40 years' development, enable you to measure and monitor production quality and consistency with confidence, while flexible connectivity options enable process integration for automated closed-loop control.

NDC tobacco instruments are used in hundreds of locations worldwide, supported by a global customer care network with trained personnel in over 60 countries.

In the summer of 2014, NDC Infrared Engineering merged with Beta LaserMike to become NDC Technologies, a global force in process measurement and control.

www.ndc.com/tobacco

On-Line & At-Line Measurements

Optimize process capability in leaf and primary processing...

► **Moisture Content**

► **Nicotine Content**

► **Total Sugars Content**

► **Product Temperature (TM710e only)**

► **Total Volatiles**

► **Eugenol Oil (Kretek tobacco)**

► **Menthol**

Applications:

► **Whole Leaf in the GLT or Primary**

► **Strips**

► **Blended Strips (Lamina)**

► **Re-dried Cut Lamina**

► **Final Blend**

► **WTS Water Treated Stem**

► **CRS Cut Rolled Stem**

► **Re-dried Stem**

► **Expanded Tobacco**

► **Roll-Your-Own Tobacco**

► **Shorts**

► **Pipe Tobacco**

► **Cigar Filler**

► **Reconstituted Sheet Tobacco**

The NDC TM710e on-line tobacco gauge is the world's most widely used in-process tobacco gauge with an installed base of many thousands, in both single component moisture and multi-component formats, measuring moisture, nicotine, sugars, temperature and other components.

The TM710e's unrivaled long-term stability and the use of multiple NIR wavelengths in its unique Dynamic Scatter Correction Measurement Algorithms lead to significantly lower cost of ownership through faster set-up and greatly reduced calibration requirements.

Complementing the TM710e's state-of-the-art measurement capabilities are flexible process connectivity options and intuitive operator and supervisory interfaces.

The InfraLab e-Series benchtop tobacco analyzer is designed to be used anywhere in the process as part of the quality assurance system.

Its accuracy and rapid 5 second measurement time mean it is ideal for routinely analyzing multiple samples taken from production.

The InfraLab complements the TM710e on-line tobacco gauges, providing non-skilled access to these complex analyses, with minimal or no sample preparation.

Connectivity via Ethernet to management information systems, LIMS networks or to a PC, and extensive integral memory capacity, ensure that key quality data is displayed, stored or transmitted at point of need.

TM710e:

InfraLab:
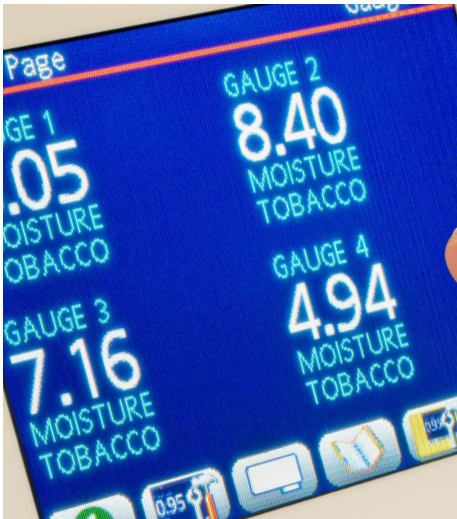
The TM710e Tobacco Gauge

A fully configurable measurement system that meets the specific needs of your process...

The TM710e combines the proven TM710 "light engine" with high-speed 32-bit digital processing and Ethernet connectivity to produce the highly accurate, robust measurements essential for use in closed-loop control, without the need for any routine re-calibration:
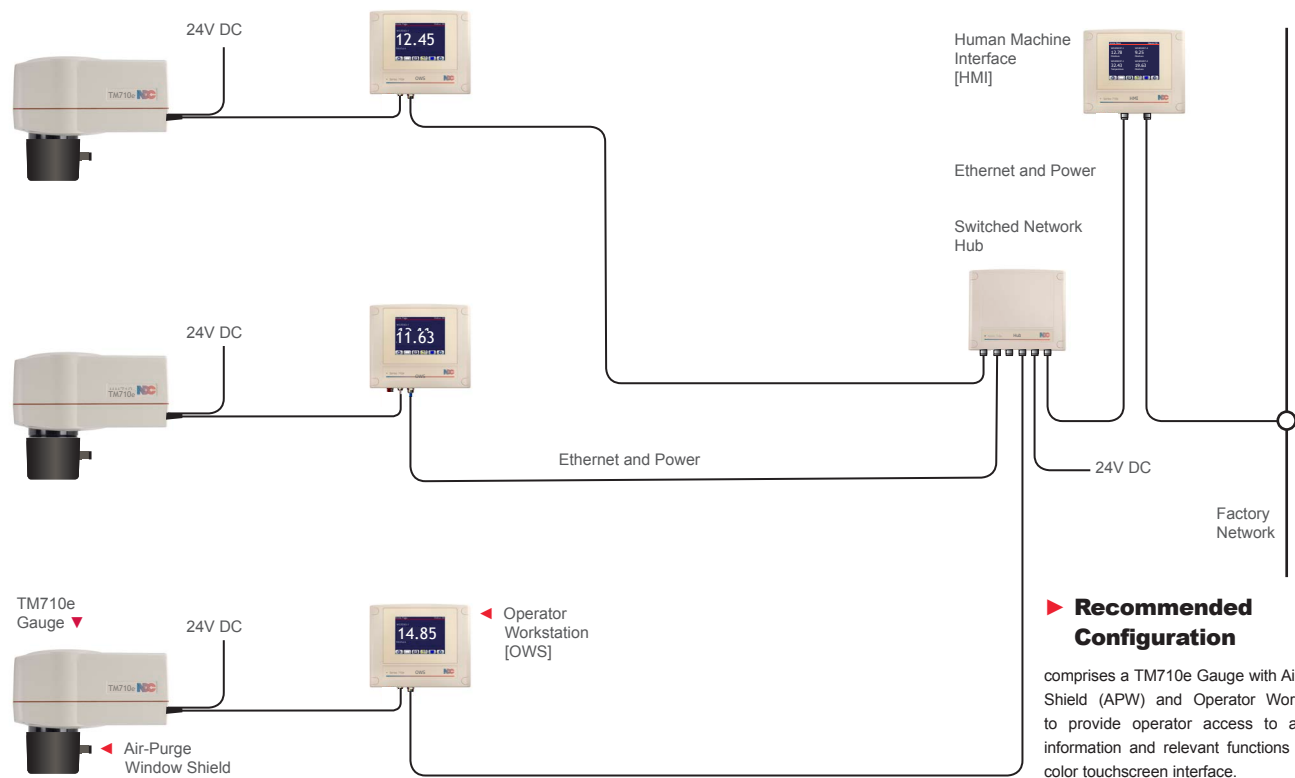
► **Moisture**
► **Nicotine**
► **Sugars**
► **Temperature**

The TM710e is designed for flexibility and simplicity of installation, using industry-standard Ethernet communications hardware such as hubs, Cat5E cables, repeaters and routers and a 24V DC power supply.

This convenient approach delivers low installation and maintenance costs and makes meeting future needs through expansion or re-configuration of a TM710e network straightforward and cost-effective.

TM710e Flexible Networking Architecture:

24V DC

12.45

Human Machine
Interface
[HMI]

Ethernet and Power

Switched Network
Hub

24V DC

11.63

Ethernet and Power

24V DC

Factory
Network

TM710e
Gauge ▼

24V DC

14.85

◄ Operator
Workstation
[OWS]

► **Recommended Configuration**

comprises a TM710e Gauge with Air Purge Window Shield (APW) and Operator Workstation (OWS) to provide operator access to all key process information and relevant functions via the intuitive color touchscreen interface.

◄ Air-Purge
Window Shield

Measured by Commitment

The Ultimate Tobacco Gauging System

Connectivity and interfacing to enhance process insight and control...

TM710e with Air Purge Window Shield and External Temperature Sensor

HMI in Panel Mount Format

HMI showing 4 measurement displays
[OWS shares the same housing]

Switched Hub with 7 network connections (plus 1x RJ45)
[UserPort shares the same housing]

TM710e Devices:

The TM710e Gauge is complemented by a range of Ethernet-enabled 710e Devices for interfacing and process & network connectivity, including:

► **OWS: Operator Workstation**
► **HMI: Human Machine Interface**
► **User Port**
► **Switched 7-Way Switched Hub**

The Operator Workstation (OWS) displays measurements and enables local operator interaction with an individual gauge.

The Human Machine Interface (HMI) provides supervisory access to up to 16 networked TM710e gauges. Both HMI and OWS feature high definition ¼ VGA multi-lingual color touchscreen displays.

The Network Hub's advanced switching technology enables convenient networked configurations.

Digital inputs and outputs and scaleable analog outputs are available for additional connectivity via either the HMI or the versatile User Port.

Ethernet communication comes as standard in the TM710e, with the option to change to:

► **EtherNet IP**
► **PROFINET**
► **Modbus/TCP**

Fieldbus communication requires an additional Gateway card fitted to an OWS, HMI or User Port, to provide:

► **PROFIBUS DP**
► **DeviceNet**
► **CANbus**

Integrated Temperature Sensor

TM710e: Key Features & Options

► **Auto reference standard**
for routine stability checks and standardization after source change

► **Air and water cooling**
options for > 50º C ambient temperatures

► **Air Purge Window Shield** for dusty or steamy atmospheres

► **Integrated or external temperature sensors**
to enable simultaneous temperature measurement. Values are displayed and output with the other parameters
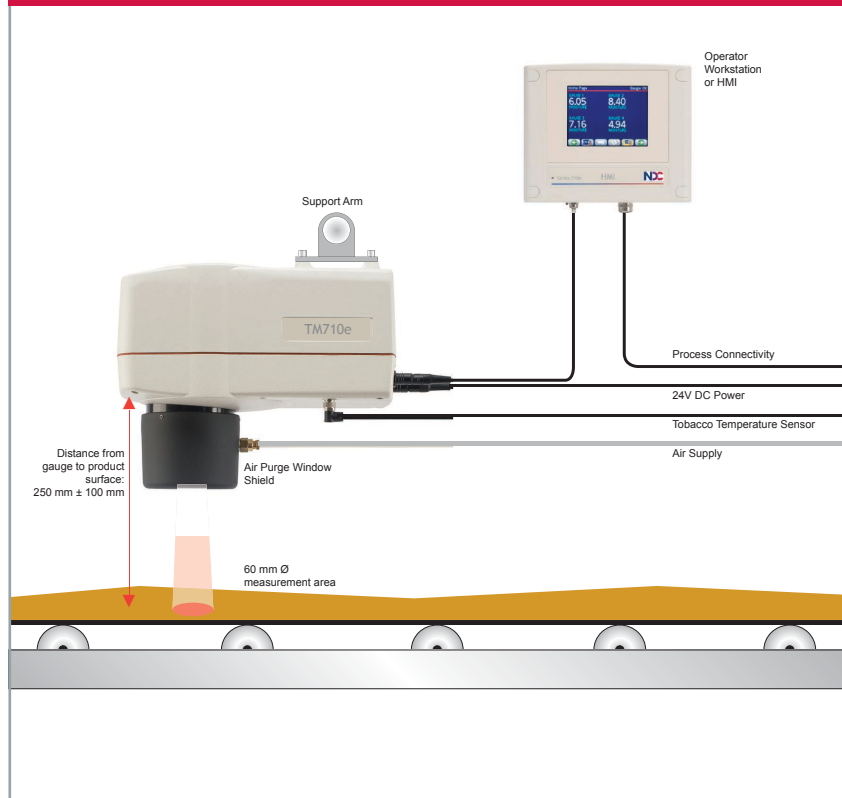
External Temperature Sensor with Cables

The TM710e in the Process

Fully engineered for the tobacco processing environment...

TM710e Recommended Configuration

Operator Workstation or HMI

Support Arm

TM710e

Process Connectivity

24V DC Power

Tobacco Temperature Sensor

Air Supply

Distance from gauge to product surface: 250 mm ± 100 mm

Air Purge Window Shield

60 mm Ø measurement area

Installation

The TM710e measures over a 60 mm diameter area and is suspended over the process line at a distance of 250 mm from the mean product height to the TM710e measurement window.

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

Providing local Wi-Fi arrangements allow, measurement values can also be viewed in real time via the handy Android™ app, available for free download.

Additional technical information sources

For additional technical information about installation, calibration, networking and process connectivity, and the TM710e generally, please consult the manual.

The TM710e's cast alloy housing is sealed to IP65 and can operate in ambient temperatures from 0º to 50º C without cooling. For areas where ambient temperatures exceed 50º C, a vortex air cooler attachment or water cooling fittings are available.

The standard Air Purge Window Shield supplied connects to a clean air supply to create a positive air pressure in front of the measurement window to prevent contamination in dusty or steamy locations.

Factory ambient lighting does not affect the TM710e and no shielding or shrouds are necessary.

As standard, NDC provides a 10 m power cable and 10 m Ethernet network cable. Ethernet cables can be extended to 70 m or 100 m (with additional power supply). Consult NDC for details.

The gauge measurement output is available in digital (Ethernet or Fieldbus) and analog formats. The response time (measurement integration period) is user-adjustable from 0.2 seconds, and typically set between 0.5 and 10 seconds to provide a stable measurement output to the PLC or process control system.

Process conditions

TEMPERATURE

DUST

AMBIENT LIGHT

HUMIDITY

Process Layout

Use this page to sketch out the measurement locations needed in your process...

Show line names/numbers and TM710e gauge locations (including Operator Workstation and HMI).

Give a copy of this page to your NDC representative to receive a quotation based on your needs.

Measured by Commitment

The InfraLab Tobacco Analyzer

Fast, accurate & easy to operate, InfraLab is the ultimate benchtop tobacco analyzer...

The InfraLab e-Series tobacco analyzer is designed for at-line or laboratory use and measures samples taken from the process in just 5 seconds.

Available in single or multi-component formats, InfraLab is able to simultaneously analyze:

▶ Moisture
▶ Nicotine
▶ Total Sugars
▶ Total Volatiles
▶ Other components on request

InfraLab replaces routine loss-on-drying or gravimetric moisture testing, and continuous flow or HPLC analyses for nicotine or total sugars.

Once calibrated to the preferred lab reference methods, a process facilitated by the InfraLab Manager software, 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 color touchscreen interface and requires no special user skills in routine use.

Secure data storage: in addition to its speed and precision, InfraLab benefits from substantial data storage and security features.

The time and date of every measurement is automatically recorded, with the name of the operator who was logged in at the time of analysis.

A 5 year warranty is given on the source lamp, filter wheel motor and sample rotation motor. They can be exchanged quickly and easily on site without intervention from NDC.

Ethernet connectivity enables InfraLab to be integrated into LIMS or factory networks, or connected to a PC, when required, to take advantage of the features offered by the InfraLab Manager software.

Networking via Ethernet or LIMS

▶ **InfraLab Manager Software** provides user access to all measurement and calibration data and enables remote control of key functions. Up to 16 networked analyzers can be controlled and viewed centrally from a PC.
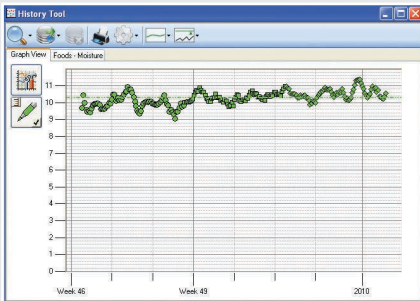
Measured by Commitment

At-line in the Process Area or in the Laboratory

Increasing speed and reducing costs
of routine sample testing...

InfraLab Manager Software
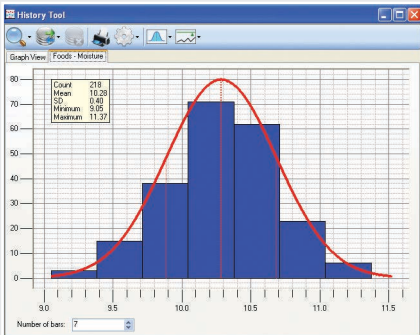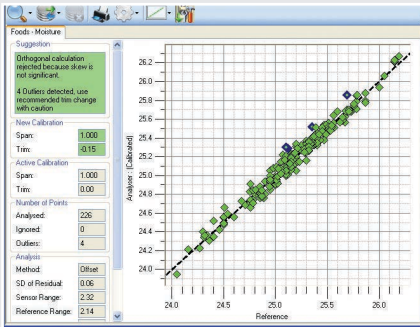

▶ **Histogram**

▶ **Data display**

▶ **Calibration**

Key Features and Options

▶ **Color VGA display** touchscreen user interface

▶ **InfraLab Manager software** for data management via PC

▶ **Ethernet and LIMS** connectivity

▶ **On-board data storage** of up to 10,000 sample measurement files

▶ **Up to 200 users** each with identifying pass code

▶ **Choice of sample bowl size** deep, shallow or petri-dish (static)

▶ **Product database** for up to 200 products with unique settings for each

▶ **USB data port** for data download to spreadsheet programs

▶ **Barcode reader option** making log-in and product selection even easier

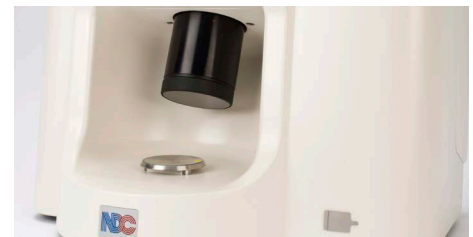▶ **Reference standard** for routine stability checks and standardization after servicing

Shallow Sample Bowl

USB Port

Deep Sample Bowl and Barcode Reader

External Reference Standard

Petri-dish and Adapter

Touchscreen Display

Measured by Commitment

Tobacco Industry Applications

Comprehensive applications engineering for high performance process measurements

NDC Tobacco Applications - Parameter and Range			
Processing Area/Product	**Moisture**	**Nicotine**	**Sugars**
Tobacco – General	0 – 60%		
Whole Leaf in the GLT or Primary or Strips	10 – 30%	1 – 5.5%	0 – 30%
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 – 120º C		

The measurement ranges in this table are indicative of the typical ranges over which we measure with the TM710e. Please consult NDC for your specific measurement needs. Temperature can be measured using the TM710e only.
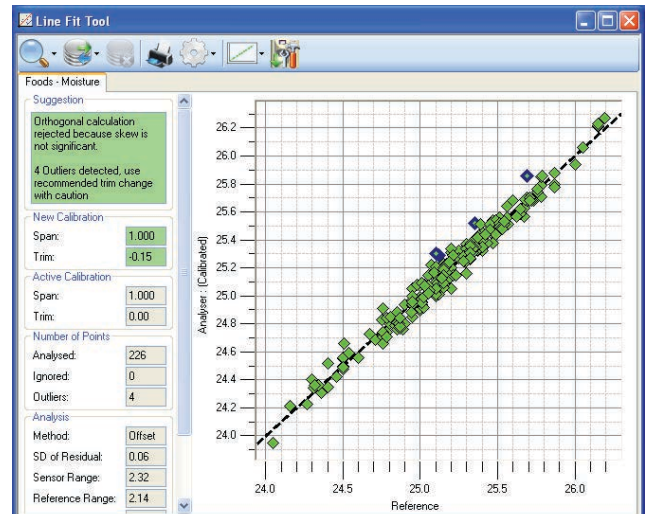
Measurement Accuracy

The NIR measurements used in the TM710e and InfraLab 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 TM710e and InfraLab have been designed specifically to be calibrated to the preferred method. They feature NDC's unique "SpeedCal" factory calibrations which have been developed through rigorous comparisons of gauge and lab values and are linear over the entire measurement range.

In most cases the slope or "SPAN" value of the calibration will not require adjustment. Only the intercept or "TRIM" value will require adjustment to agree with the local methodology.

Shown the same sample repeatedly, NDC instruments are stable to better than +/- 0.1%. Calibrated to a primary method, accuracy, when expressed as twice the standard deviation of the residual differences between instrument and laboratory, will be better than 0.1 for moisture, 0.2 for nicotine and 1.0 for sugars.

Calibration Software

TM710e & InfraLab are delivered with NDC's "SpeedCal" pre-calibrations ready for use for the specified measurement(s) and range(s). On installation they are adjusted to agree with the local reference method. The GaugeToolsXL (for TM710e) and InfraLab Manager software provided simplifies this process by enabling comparison of instrument values with laboratory results and feature the following tools and functionality:

► Instrument Set-up and Calibration
► Product Management (Product Settings)
► Displays of Measurement and other Key Parameters
► Data Logging and Data Trending & Export
► Diagnostic Functions
► OPC Server (optional)

Company Overview

Combining industry-best performance and reliability with a global support structure

NDC Technologies, headquartered in Irwindale, California, USA, develops and manufactures measurement and control systems for a wide range of industrial processes, supporting its global customer base through its four centers of excellence in California, USA (for scanning profile display and control systems or the web industries); Dayton, Ohio, USA (for lasers and ultrasonics measurements for wire, pipe and tube); Maldon, UK (for infrared gauging and applications development); and Alleur, Belgium (for metal industry gauging systems). There are also direct sales and customer support operations in China, Japan, Germany, France, Italy, Singapore and India.

Our global client base features some of the world's most successful manufacturers, who rely on NDCT to ensure that their product quality and performance meet the stringent standards demanded by their customers.

NDCT comprises four key product groups:

NDC Web Solutions: for the converting, extrusion, calendering, metals and nonwovens industries, delivering real-time measurement and control of key product parameters such as product thickness, coating thickness, basis weight, width, flatness and edge shape.

NDC Sensors: on-line gauges and at-line analyzers for the measurement of moisture and other key product constituents in the food, chemical, pharmaceutical, mineral, bulk materials and tobacco industries.

NDC Metals: rugged measurement systems for key parameters such as thickness, width, flatness, edge shape and coatings in the steel and non-ferrous metals industries.

NDC Lasers and Ultrasonics: Beta LaserMike gauges for the metals, wire, pipe, tube and fiber industries.

NDCT is represented in over 60 countries worldwide and is part of Spectris plc, the leading supplier of productivity-enhancing instrumentation and controls. US and UK operations are certified to ISO9001:2008

www.ndc.com/tobacco

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