Tobacco

- Moisture
- Temperature
- Nicotine
- Sugars

TM710e

The Measure of Quality™
The Strategic Impact of Accurate Moisture Control

In the quest for optimal process efficiency and product quality, the implementation of accurate, real-time, on-line moisture measurement and control is of strategic importance to the Primary Process.

Today’s making machines achieve ever higher outputs, with the result that controlling blend moisture in order to ensure fastest cigarette making speeds and target in-pack moisture content, has become a critical endeavour.

Process Challenges

With its wide moisture range and multiple measurement points, the process demands an instrument that requires the minimum of adjustment, that can be applied in any location.

Accurate Moisture Control is required to optimize process capability in leaf and primary processing...

The instrument also needs to be able to handle process variables (such as product height variation), environmental variables (such as ambient lighting effects, relative humidity or temperature) and tobacco product variables (such as naturally varying characteristics of the leaf blend).

In summary, the instrument must reliably ensure that changes in the moisture measurement output are due only to changes in the tobacco moisture.

The NDC TM710e Tobacco Gauge delivers measurable improvement in dynamic performance. The use of an increased number of wavelengths in the TM710e’s innovative Dynamic Scatter Correction Algorithm further reduces the influences of variations between blends and between grades. This in turn reduces demonstrably the calibration requirement.

TM710e’s state-of-the-art measurement capability, supported by intuitive operator and supervisory interfaces, enables the user to obtain the fastest return on investment.

INDUSTRY DRIVERS

- Blend Uniformity and Consistency
- Product Quality and Process Efficiency
- Legislative Issues
- Introduction of GMP
- Customer Retention

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The TM710e Tobacco Gauge

Precision Optics, High Speed Digital Processing and Ethernet Connectivity deliver a winning combination of measurement performance and stability...

TM710e, the Ethernet-Enabled NIR On-Line Gauge, combines the proven TM710 light engine with high-speed digital processing and Ethernet connectivity. This powerful combination produces the highly accurate, robust real-time measurements essential for use in closed-loop control, yet offers full flexibility and simplicity of installation and operation.

Designed specifically for process control and using industry-standard Ethernet communication hardware such as hubs, cables, repeaters and routers, the modular TM710e system offers low installation costs, low maintenance overhead and the lowest cost of ownership.

Key components of the TM710e Gauging System are the Gauge itself, the Operator Workstation (OWS) and the Human Machine Interface (HMI), offering choice of configuration for a wide variety of system structures.

The OWS enables local interaction with an individual gauge, while the HMI provides supervisory access to up to 16 networked TM710e gauges. Both units feature high definition multi-lingual colour touch screen displays. A multi-way Hub with advanced switching technology, enables convenient networked configurations. Digital inputs and outputs and scaleable analogue outputs are available to provide additional connectivity via the HMI or the versatile UserPort communications terminal.

Ethernet Communications and the option to extend to Ethernet IP, Profinet, Modbus TCP, Profibus DP, DeviceNet or CANbus, together with Automatic Device Discovery, ensure that the system can be readily integrated into existing factory networks and management information systems.

For simplicity and convenience, all TM710e components run on 24V DC, either from an on-site supply or from an in-line 24V universal power supply.
The Science behind the TM710e
The TM710 works on the principal that tobacco constituents, such as water, sugars or nicotine, absorb NIR (Near Infra-red) Light at specific wavelengths. When tobacco is exposed to this NIR light, it absorbs an amount which is related to the level of constituent present, and reflects the rest.

The TM710e generates and emits these specific wavelengths by using rotating optical filters to transform the energy from a QH lamp into sequential pulses of NIR light at the desired wavelengths.

It then captures the reflected NIR light, using a special multi-segment mirror to focus it onto a light-sensitive detector. Before leaving the gauge, a beam-splitter diverts a portion of the beam to the secondary detector, to form the reference signal against which the reflected light will be compared.

The TM710e processes the detector signals through its “DSC” algorithm to generate a linear output proportional to the detected amount of measured constituent. The TM710e’s patented optics reject ambient light, RH & temperature influences to generate a highly stable measurement, irrespective of product height fluctuation.
Advanced Applications Engineering

NDC Applications Engineering combines in-depth process understanding with robust Near Infrared (NIR) technology to generate a solution which specifically meets the tobacco industry’s on-line measurement needs...

<table>
<thead>
<tr>
<th>Process</th>
<th>Moisture</th>
<th>Nicotine</th>
<th>Sugars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Leaf or Strips in the GLT or Primary</td>
<td>10 – 30%</td>
<td>1 – 5.5%</td>
<td>0 – 30%</td>
</tr>
<tr>
<td>Blended Strips (Lamina)</td>
<td>18 – 30%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-dried Cut Lamina</td>
<td>10 – 20%</td>
<td>1 – 3.5%</td>
<td>10 – 20%</td>
</tr>
<tr>
<td>Final Blend</td>
<td>12 – 16%</td>
<td>0.5 – 3%</td>
<td>10 – 20%</td>
</tr>
<tr>
<td>WTS Water Treated Stem</td>
<td>30 – 50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRS Cut Rolled Stem</td>
<td>20 – 30 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Re-dried Stem</td>
<td>0 – 20%</td>
<td>0.2 – 1.5%</td>
<td>8 – 30%</td>
</tr>
<tr>
<td>Expanded Tobacco</td>
<td>0 – 3%, 7 – 15%</td>
<td>0.5 – 2.5%</td>
<td>0 – 16%</td>
</tr>
<tr>
<td>Roll-Your-Own Tobacco</td>
<td>12 – 20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shorts</td>
<td>10 – 15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipe Tobacco</td>
<td>12 – 25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cigar Filler</td>
<td>10 – 25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tobacco Temperature</td>
<td></td>
<td>0 – 120 Deg. C</td>
<td></td>
</tr>
</tbody>
</table>

The measurement ranges in this table are indicative of typical measurement ranges over which we measure using the TM710e. Please consult NDC with your specific needs.

Best Practice Support NDC’s global Customer Care network offers local solutions to ensure you derive full benefit from your investment over its lifetime. As your company, products and processes develop to meet market demands, NDC’s Customer Care Team offers a range of support products and services to help maintain Best Practice...

www.ndctobacco.com

The Measure of Quality™
TM710e Installation Guidelines

Installation
The TM710e should be attached to a sturdy support and suspended over the conveyor or process line at a distance from the mean product height to the TM710e measurement window of 250mm, ±100mm. The optics are designed to accommodate product height fluctuations of ±100mm, without affecting the measurement. The Operator Workstation should be installed close to the gauge in an accessible position where the display is clearly visible.

Ambient Conditions
The tobacco processing environment can be dusty and steamy. NDC supplies an Air Purge Window Shield, which is connected to a clean air supply to create a positive air pressure in front of the measurement window, to prevent dust or steam deposits. Ambient lighting will not affect the TM710e. The TM710e is sealed to IP65 standards and can operate in ambient temperatures between 0 and 50°C without cooling. IP67 and ATEX certified housings are available for aggressive or hazardous areas. The OWS is sealed to IP65 and is suitable for ambient temperatures between 0 and 50°C.

Cabling
As standard, NDC provides a 10m power cable and 10 m connecting cable to the Operator Workstation. For more details on cable lengths, consult the “Series 710e Gauge Overview” and also the “Series 710e Configuration and Connectivity Guide”.

Connectivity
The gauge measurement output is available in digital and analogue forms. The response time (measurement integration period) is user adjustable from 0.2 to 1000 seconds, typically set between 0.5 and 10 seconds, to provide a measurement output to the PLC or process control system.

Calibration
The TM710e is delivered with NDC’s “SpeedCal” pre-calibration ready for use for the specified measurement(s) and range(s) shown in the Applications Chart. On installation it is simply adjusted to agree with the local reference method. The GaugeToolsXL software provided simplifies this process by enabling comparison of TM710e values (collected on-line using the SAMPLE function on the OWS) with laboratory results.

Support
Please consult your local representative or consult NDC’s Customer Care and Applications Technical Support Teams (see website for details).