



MINERALS AND BULK MATERIALS APPLICATIONS



Precision on-line
NIR moisture
measurements

- ▶ Enhance Product Quality
- ▶ Improve Production Efficiency
- ▶ Reduce Fossil Fuel Consumption
- ▶ Automate Drying Processes

NDC & the Minerals, Mining & Bulk Materials Industries

As fuel and power become more costly, the need to accurately and reliably measure, monitor and ultimately control the moisture content in energy-intensive industrial and mining processes has become a critical endeavor.

NDC has worked closely with industry over the last 40 years to develop the accurate, stable and robust measurements that these processes require for quality and process control.

NDC moisture gauges are used around the world to control the quality of construction materials and engineered wood products; to optimize the sinter process in steel making; to help biofuel consumers maximize combustion; and to insure the quality of materials as diverse as ceramics, synthetics and explosives.



www.ndc.com/minerals

The Need for Quality & Process Control

Using accurate moisture control to improve product quality & reduce energy consumption

Measurements:

- ▶ **Moisture content of:**
- Powders & Aggregates
- Flakes & Granules
- Slurries & Pastes

Applications:

- ▶ **Ceramics and Clay Products**
- ▶ **Fibers and Polymers**
- ▶ **Nitrocellulose**
- ▶ **Mineral Powders and Ores**
- ▶ **Sand, Cement Meal and Aggregates**
- ▶ **Gypsum**
- ▶ **Industrial Textiles**
- ▶ **Wood and Cellulose Products**
- ▶ **Biofuels, Organic Waste and Biomass**

The challenge is to introduce into the process a measurement that will be robust and stable enough to withstand the environmental conditions, yet accurate and reliable enough to be trusted for process control.

Instrument design must further ensure that changes in the measurement output are due solely to varying levels of the moisture and not because of product or process variables.

Once installed in the process, the instrument must transmit its output values in the required format, digital or analog, to the process PLC or SCADA for closed loop control.

NDC industrial moisture gauges have been installed and are in daily use around the world in heavy industrial processes, helping users to optimize quality and process performance.



CM710e Moisture Gauge:



The CM710e Moisture Gauges

Rugged and robust CM710e is built for the processing environment...

The **CM710e On-Line Industrial Moisture Gauge** uses precision NIR (near infrared) measurement technology to make a continuous non-contacting measurement of moisture in the process.

With a measurement speed of 7.5 milliseconds, the patented "light engine" uses optical components manufactured in NDC's own optics facility, to deliver the highest resolution on-line NIR measurements available today.

The CM710e can be incorporated conveniently into closed-loop control systems. Its connectivity options include:

- ▶ **Digital**
- ▶ **Analog**
- ▶ **Industrial Ethernet**
- ▶ **Fieldbus**

Using industry-standard Ethernet communication hardware such as hubs, cables, repeaters and routers, installation and integration of the modular MM710e gauging system is straightforward.

For network integration, the Gauge can be configured for the following industrial Ethernet protocols:

- ▶ **EtherNet IP**
- ▶ **PROFINET**
- ▶ **Modbus/TCP**

If Fieldbus connectivity is required, the OWS, HMI and User Port can be supplied with Network Gateways for:

- ▶ **PROFIBUS DP**
- ▶ **DeviceNet**
- ▶ **CANbus Open**

CM710e with Standard IP65 Cast Alloy Housing ▼



CM710e with IP65 Stainless Steel Housing with optional Vortec air cooling ▼



CM710e: Key Features

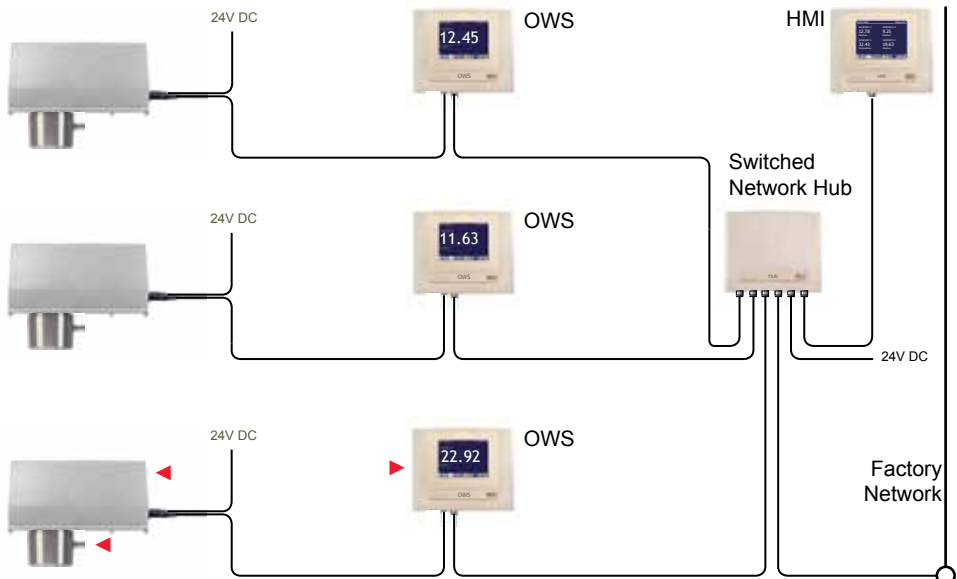
The CM710e is available with a choice of housings and accessories designed to withstand the process environment while enhancing performance, including:

- ▶ **Series 710e devices** for interfacing, connectivity and networking
- ▶ **Ethernet, Fieldbus and analog connectivity** options for networking and integration
- ▶ **Auto reference standard** for routine stability checks and standardization after source change
- ▶ **IP65 & IP67 housings** cast alloy or stainless steel
- ▶ **Air and water cooling** options for > 50° C ambient temperatures
- ▶ **PowderVision sampler** for products in enclosed ducts
- ▶ **Air Purge Window Shield** for dusty or steamy atmospheres
- ▶ **ATEX certified system** or dusty or steamy atmospheres
- ▶ **316 Stainless Steel Housing** ATEX 3D Zone 22 rated

710e Devices and Networks

Convenient interfacing: what you need, where you need it

Easy to install, integrate and operate, the CM710e is the most flexible in-process gauging system available...



► The NDC CM710e recommended gauge configuration comprises: **Stainless Steel Sensor Housing, Air Purge Window Shield & Operator Workstation**

710e HMI



- ¼ VGA color touchscreen
- Analog and Ethernet connections
- Controls up to 16 gauges
- Multi-lingual interface

710e Devices

Series 710e Peripheral Devices available include:

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

The OWS provides operator-level interaction with an individual gauge with access to sampling and diagnostic functions.

The HMI provides supervisory access to up to 16 networked CM710e gauges to enable gauge set-up, calibration adjustment, and product management, with analog and digital connectivity as well as network access. Both HMI and OWS feature high definition multi-lingual colour touch screen displays.

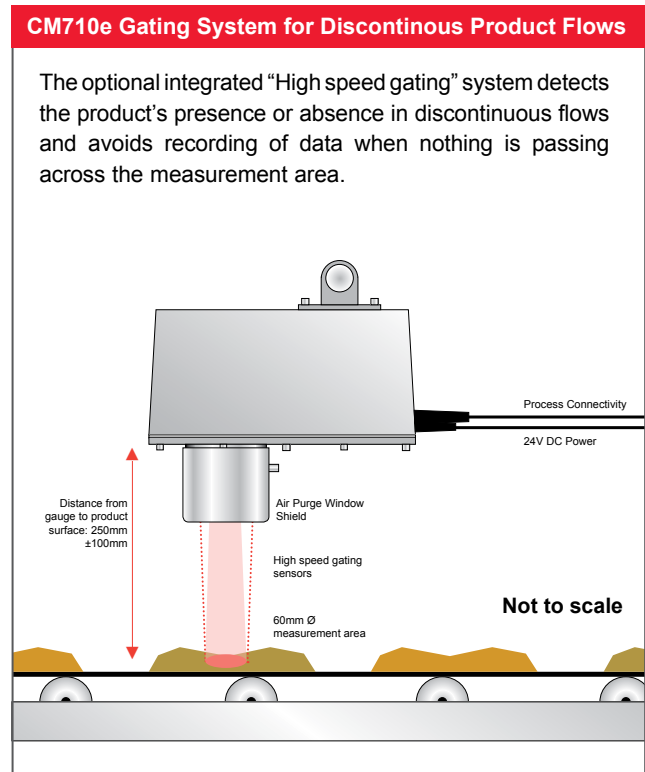
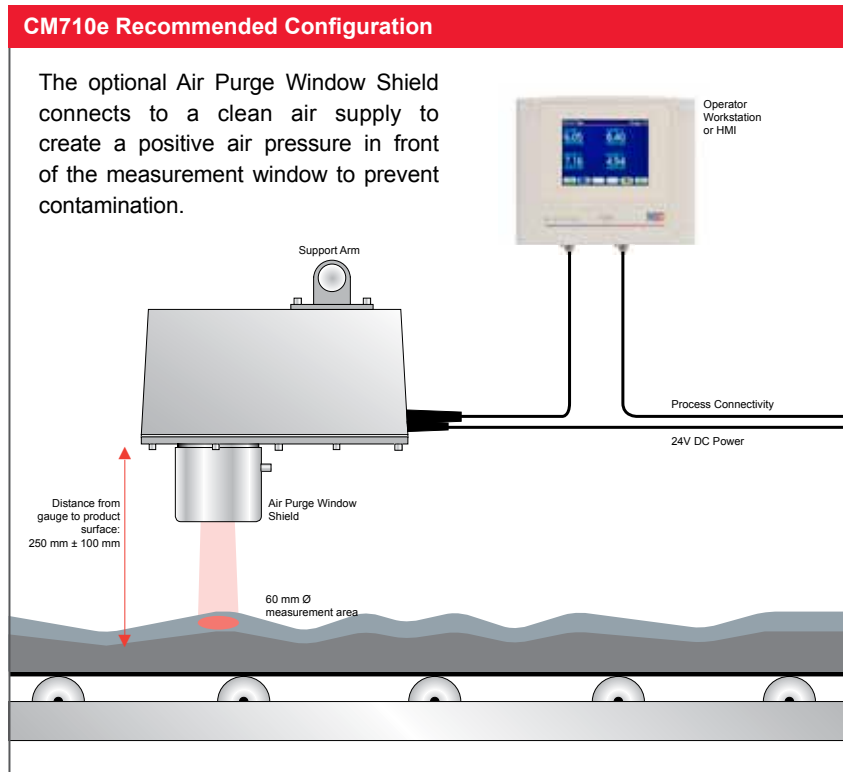
The User Port provides additional analog outputs and digital I/O for any connected gauge. The Switched Network Hub enables convenient networked arrangements of multiple 710e gauges and devices, with its 7 network connections.

For simplicity and convenience, all CM710e gauges and devices run on **24V DC**, either from an on-site supply or from an NDC in-line 24V universal power supply.

Long term stability combined with industry-best performance, low installation costs and no routine maintenance requirements guarantee the **lowest cost of ownership** over the CM710e's many years of service.

The CM710e in the process

Fully engineered for continuous or discontinuous product flows & products in enclosed ducts



Installation





The CM710e 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 CM710e measurement window.

The gauge tolerates and the measurement is not affected by product height fluctuations of ± 100 mm.

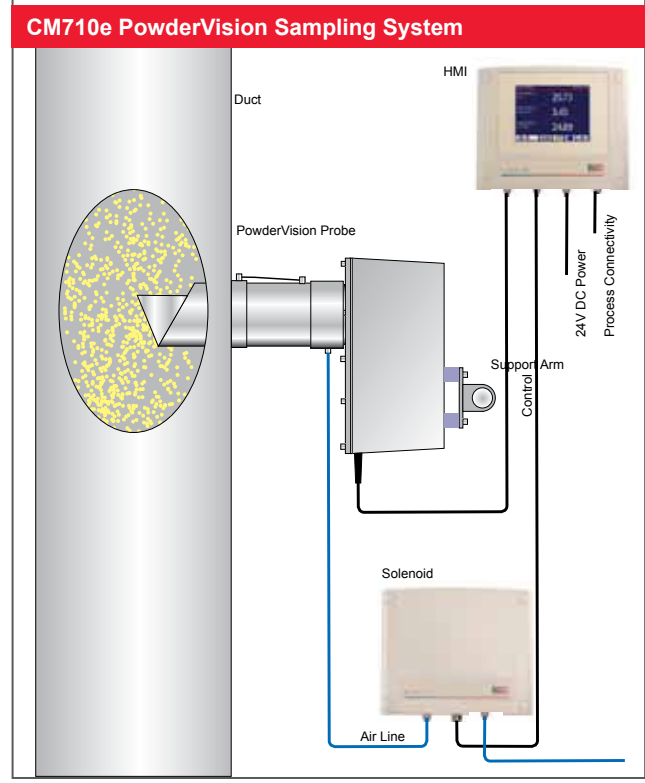
Measuring powders in ducts

For powders transported by gravity in enclosed ducts, the pneumatic PowderVision sampler is used. The device comprises a tube fitting with window and sample collection cup. The cup fills with the falling product and after a sample has been collected and measured, a jet of air ejects it and the cycle recommences.

Process Conditions

	
TEMPERATURE	DUST
	
AMBIENT LIGHT	HUMIDITY

Ambient lighting, temperature or relative humidity changes do not affect the CM710e measurement. The alloy & optional stainless steel housings are sealed to IP65 and can operate in ambient temperatures from 0° to 50° C. The stainless steel housing is also available in IP67 and ATEX certified versions. A vortex cooler or insulated air-cooled housing are available for ambient temperatures exceeding 50° C.



Applications

Comprehensive applications engineering for high performance process measurements

NDC Minerals and Bulk Materials Applications		
Industry Sector	Moisture	Application Areas
Ceramics & Clay	✓	ball clay, refractory clay, china clay (kaolin), spray dried ceramic powders, red clay spray dried ceramic powders, clay for roofing tiles
Fibers and Polymers	✓	cellulose acetate tow, yarn or chips, glass fiber chips, nylon granules, rubber crumb, PVC powder
Nitrocellulose	✓	nitrocellulose chips, nitrocellulose with nitroglycerine
Minerals – mining	✓	bauxite (aluminum oxide), calcium fluoride (fluorspar), copper concentrate, copper ore powder or granules, copper tailings, crushed dolomite (calcium magnesium carbonate), gold ore, gypsum (calcium sulphate), ilmenite, kaolin granules, molybdenum sulphide, peat, phosphates, refined potash, potassium fluoride, powdered talc
Minerals – industrial	✓	ash (power station and fly ash), coke breeze (powdered), crushed or powdered coal, milled furnace slag, raw sinter mix, sinter mix (mixture of iron ore + coke breeze + limestone) [not pure iron ore], Laponite, bentonite (Wilkinite)
Minerals – building and construction materials	✓	cement meal, concrete mixes, roofing tile chips, washed sand, sand for roofing tiles
Industrial Textiles	✓	cotton: Input – prebalancing – pre-ginning, neoprene rope, rayon fiber, textile fibers, wool
Wood & Cellulose Products	✓	cellulose pulp sheet, cork chips and sheet, paper fiber pulp, particle board, fiber board, OSB, sawdust, wheat straw, wood veneers, woodchips (frozen or unfrozen), wood fiber
Organic Waste & Biofeed	✓	sewage sludge
Other	✓	lead acid battery paste

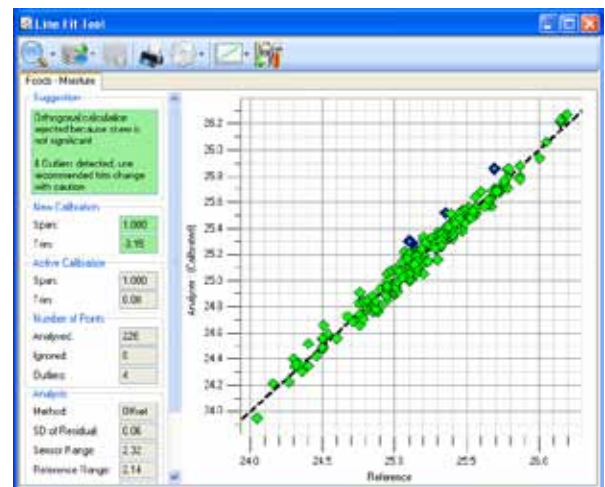
Measurement Ranges and Calibration

Recognizing that there can be no such instrument as a "generic" moisture, the CM710e is supplied with a factory pre-calibration which covers the required moisture range. The pre-calibrations are based on our extensive applications engineering history and are designed to require the minimum of adjustment to achieve agreement with your laboratory primary reference technique.

The GaugeToolsXL software provided simplifies this process by enabling comparison of instrument values with laboratory results and features the following tools or 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)

Thanks to their Ethernet connectivity, in many instances, the instruments can be interrogated and communicated with via the internet to provide diagnostics, updates and other support functionality.



For applications in chemicals and pharmaceuticals, consult the Chemicals and Pharmaceuticals brochure.



Company Overview

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

NDC, headquartered in Irwindale, California, USA, develops and manufactures measurement and control systems for a wide range of industrial applications, supporting its global customer base through its three centers of excellence:

- ▶ USA (for scanning profile display and control systems or the web industries)
- ▶ UK (for infrared gauging and applications development)
- ▶ Belgium (for metal industry gauging systems)

There are also direct sales and customer support operations in China, Japan, Germany, France, Italy, Singapore and India.

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

NDC has two key product groups:

NDC Systems: 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 is part of Spectris plc, the leading supplier of productivity-enhancing instrumentation and controls.



NDC is represented in over 60 countries worldwide. ISO9001:2008

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a spectris company

NDC Infrared Engineering Inc
Tel: +1 626 960 3300
Email: enquiries@ndcinfrared.com

NDC Infrared Engineering S.A.
Tel: +32 4 239 90 10
Email: info@ndcinfrared.be

NDC Japan
Tel: +81 3 3255 8157
Email: info@ndcinfrared.jp

NDC France
Tel: N° Azur: 0810 600 400
Email: info@ndcinfrared.fr

NDC Singapore
Tel: +65 9199 4120
Email: apacsales@ndc.com

NDC Infrared Engineering Ltd
Tel: +44 1621 852244
Email: sales@ndcinfrared.co.uk

NDC China
Tel: +86 20 2887 3860
Email: info@ndcinfrared.com.cn

NDC Germany
Tel: +49 1801 977112
Email: info@ndcinfrared.de

NDC Italy
Tel: +39 0331 454 207
Email: info@ndcinfrared.it

NDC India
Tel: +91 9890 800 697
Email: ndcindia@ndc.com

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