

Experion MX Q4000 Scanner

Product Information Note

Experion MX will help improve your business performance in today's challenging economic environment. This fully integrated quality control and process knowledge system provides superior visibility into the papermaking process while it simplifies your operational efforts and is easy and cost effective to maintain and service. Improve paper quality, reduce raw material, energy, services and maintenance costs, and increase production efficiency with a package of solutions that provides the lowest total lifecycle cost available.

O-Frame Scanner

The Experion MX Q4000-80 O-Frame Scanner provides a high-speed, accurate and robust platform for the full-line of Honeywell quality sensors.

The Q4000 builds on more than 40 years of leading the industry with breakthrough measurement technology, including enhanced mechanical performance, significant improvements in signal handling, state of the art engineering tools and advanced diagnostics. The net result is a scanner that is easier and more cost-effective to operate service and maintain. The Q4000 scanner can deliver full-width, high-resolution profiles at high scanning speeds for every key quality parameter important to the papermaker. It can scan every ten seconds, or faster, on most paper machines, enhancing your business performance by improving paper quality, reducing raw materials and energy consumption, and increasing production efficiency.



FEATURES & BENEFITS

- Engineered aluminum beams with integrated thermal equalization channels provide a rigid foundation for precise measurement for the widest processes and most extensive sensor complements.
- Heavy-duty, stainless steel beam covers with individually removable sides allow easy access to internal components while protecting them from dust, moisture, process spray and heat.
- Superior measurement head stability and alignment is achieved with a robust track, head carriage and vector drive system, ensuring reliable operation and easy maintenance.
- Precision signal processing ensures highly accurate profiles with narrow measurement zones and fast scanning rates. Full-width, fast-scanning at up to 1,200 mm/sec [48 in/s], detects profile changes many times faster than legacy scanners
- A comprehensive set of maintenance tools and diagnostic displays simplify service and maintenance.
- Redundant Ethernet communications provide fast, easy, low-cost scanner installation and bring system reliability to a new level.
- Experion MX leverages the full-width fast-scan capability of the Q4000 to simultaneously support the needs of advanced MD & CD multivariable process control, process diagnostics and SPC analysis, high resolution profile displays, site-specific quality & MES reporting, and data collection for mill-wide historian systems, etc., all without changing the scanning "mode". In addition to normal full-width scanning mode, single point, narrow scan and variable scan speed are available.
- Measuring heads are designed for continuous operation in hostile paper machine environments to ensure reliable, low-maintenance operation and provide the optimum environment for accurate measurements under any process conditions.
- Flexible mounting arrangements for self-identifying sensor modules within and around the measuring heads accommodates all desired on-line measurements even in confined process spaces.
- Dynamic Z-axis (vertical) correction continuously eliminates residual error in weight measurement for sheet gap changes.
- Dynamic X-and Y-axis alignment measurements continuously monitor the alignment of upper and lower measuring head enclosures, providing at-a-glance verification of the overall physical performance.
- Accelerometers integrated into the upper and lower measuring heads provide immediate visibility of any abnormal behavior or drive system mechanical problems.
- The integrated Thermal Equalization System (T.E.S.) effectively eliminates thermally-induced beam deflection and enhances measurement accuracy in non-uniform or changing thermal environments.

Stable Support for Measurements

The Q4000 O-Frame Scanner is an integral component of the Experion MX quality control system. It is designed for fast, accurate, measurement with any complement of sensors, for the widest processes and most hostile production environments.

The scanner spans the process with highly engineered aluminum beams which have integrated thermal equalization channels. Steel roller bearings ride on replaceable bearing inserts set into a track engineered to constrain travel to a linear motion. The wear resistant track and roller design provides a stable and long lasting base for measuring head movement. During scanner manufacturing, the carriage tracks are laser aligned with exacting tolerances; in the field, dynamic X-Y-Z-axis displacement and three axis accelerometer measurements track changes in head alignment on-line and in real-time. A unique configuration of load-bearing and "capture" wheels effectively lock the carriages onto the tracks to counter lateral forces and maintain precise machine-direction sensor alignment. Smooth but fast motor speed ramping is provided by a state-of-the-art vector drive and steel-reinforced, stretch resistant drive belts, which minimize cross-direction measurement head misalignment. Individually removable covers with integral seals exclude dust, moisture and other contaminants, minimize process-heat induced thermal gradients across the beams, and also allow the pressurization of beam covers and end columns in extreme environments.

Basis weight measurements are corrected for sheet gap height changes by the dynamic Z-axis sensor. Accelerometers integrated into the heads provide immediate feedback of any abnormality in the measuring head transport system. For high-temperature gradient environments, the embedded T.E.S. provides closed-loop liquid circulation within the beams to prevent thermally induced beam deflection by moving heat from high temperature locations to cooler temperature locations.

Two versions of measuring head enclosure support either four or six sensors inboard, with the flexibility to mount up to four additional sensors outboard, in machine-direction and/or cross-direction positions enabling a full complement of measurements even in confined process spaces. The measurement heads' internal temperature is stabilized, ensuring accurate measurement under all conditions. Heated sheet guides and heated air wipes prevent condensation in the sheet gap and ensure accurate standardization of measurement.



The 4- & 6-Pack Measuring Heads are designed to provide the optimum environment for sensor operation. The powder-coated aluminum enclosure is well insulated. Internal heat management is provided through a water cooled alleyway cold plate and heat exchanger system. This convective and conductive heat management strategy provides stable internal head temperature regulation throughout the rated external ambient temperature variations. Adjustable internal air purge continuously creates a stable, dry and non-corrosive environment for sensor operation. Closed loop temperature control of sheet guide heaters prevent condensation and minimize heat flux differences experienced by sensors when subjected to on-sheet or off-sheet conditions. Additionally, adjustable heated air wipes provide the correct air-gap temperature for sensor standardization, enhancing on-sheet measurement accuracy.

Fast, Precise Measurement

Self-identifying modules enable any sensor to be located in any mounting slot, providing maximum flexibility combined with ease of maintenance. The system detects where each sensor module is, and automatically prevents sensor module mismatches which could cause unsafe operation.

Each sensor head signal is anti-alias filtered and then oversampled at 1 MHz providing a 16-bit averaged sample every 250 μ s [4 kHz]. This technique effectively integrates 100% of the sensor module signal while precisely preserving visibility of the smallest, high-frequency process variations. Experion MX accurately allocates readings to measurement databoxes using the measuring head position encoder data stream and each sensor module's time constant, spot size and physical position within the measurement heads. Strict synchronization of sensor module and head-position-encoder sampling ensures superior precision.

The resultant raw-signal values are communicated from the sensor module across the measurement LAN to the Experion MX Application Server, where profile values are calculated and engineering unit conversions are made to end-user units. These form measurements for display, control, reporting, alarming and other applications. The redundant Ethernet communication system ensures outstanding reliability.

To provide the clearest picture of the process, the entire web is presented in 2-5 mm [0.08-0.20 in] databoxes to reveal the narrowest streaks. The profile is also available in wider mapped zones to reveal gross profile characteristics. The Q4000 scans up to 1,200 mm/sec [48 in/s] to resolve profile changes many times faster than slow scanning systems. This results in faster measured profile response to profile changes, enabling faster control actions and increased productivity.

The fast response of Experion MX measurements, coupled with the Q4000 scanner's unique signal processing, enables the sensor modules to scan off the sheet edge, providing the industry's clearest picture of sheet-edge quality for improved profile control, where rejects are typically the highest. To accommodate any measurement strategy or process constraint, separate measuring head turn-around criteria can be defined by the user for both sheet edges, including turn-around at a specified position, a specified distance before the sheet edge, or a specified distance past the sheet edge.

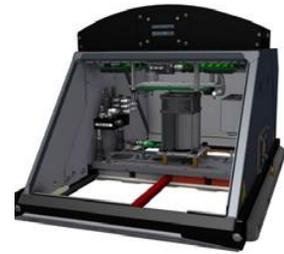
Lowest Lifecycle Cost

The Q4000 Scanner design leverages well-proven techniques to deliver reliable performance. New technologies have undergone extensive testing before implementation, including extended operation in an environmental test chamber.

The brushless AC drive motor, vector drive controller, and belt- and-pulley transmission are designed specifically for long life and low maintenance. The drive belts are horizontally oriented for low belt-tension operation and extended belt and bearing life.

The scanner end column enclosure design provides easy access to wiring terminations, electronics, drive motor and belts.

To allow easy access to all components, the scanner's heads have removable covers aligned to give easy access to each sensor without obstruction. Individual Experion MX sensor modules slide on mounting rails into the measuring heads for fast insertion and removal. Plug-and-play / self-identifying sensor modules can be installed into any location and the system automatically recognizes which sensor module is in a particular location. No messy cooling fluid connections are required for sensor modules.



Upper and lower measurement heads are easily separated to facilitate cleaning and service of sensor windows using a convenient end column mounted key switch. The Q4000 measuring head internal temperature and relative humidity are continuously monitored, with alarms for out of range conditions. Over temperature protection circuitry will disconnect power, if necessary.

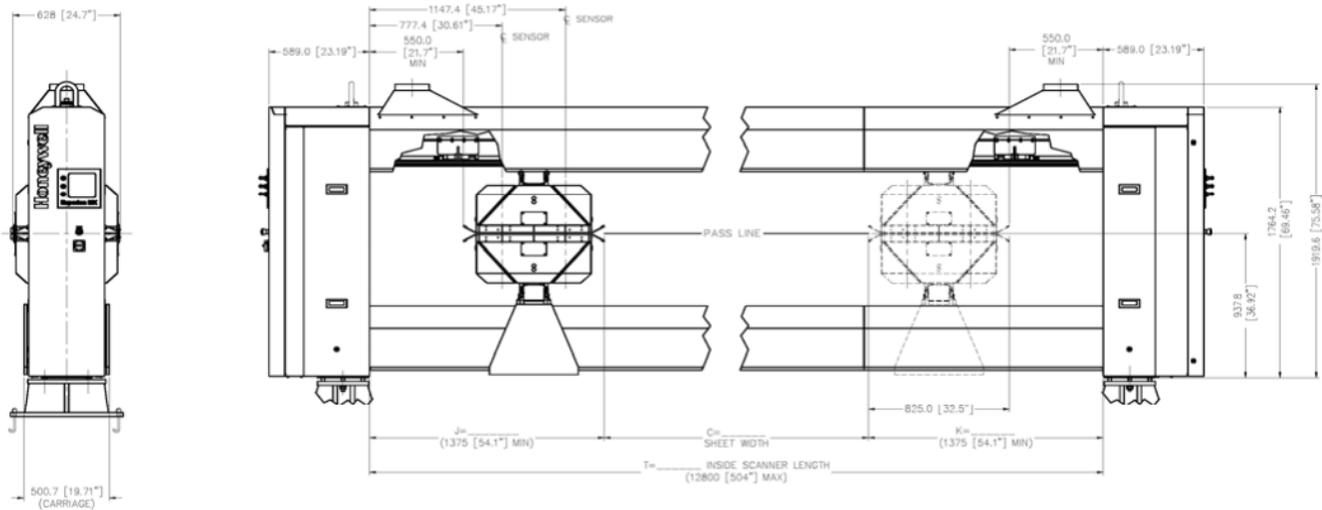
All scanners in a system communicate with the Experion MX Application Server via a standard Ethernet measurement LAN using TCP/IP protocol, making scanner installation inexpensive, fast, and easy. In addition to standard operator displays, all scanner and sensor module installation and maintenance functions, including setup and alignment, communications, signal monitoring, measurement calibration and verification and reports, are supported by interactive system-resident displays.

Specifications: Experion MX Q4000-80 Scanner

Category	Specification									
Beam Covers	2 mm [14 ga] brushed stainless steel (AISI 304)									
Maximum Beam Length	Standard: Up to 12.5m [492"] in 0.5m increments – Dim 'T' (max. 12.8m [504"]). Exact lengths available upon request See scanner dimension Dim 'J' & 'K' for Safety Clearances to determine Sheet Trim									
Passline	939 mm [36.9 in] from top of mounting pad									
Passline Angle	Up to $\pm 45^\circ$									
Drive System	<ul style="list-style-type: none"> • 38 mm [1.5"] wide, steel reinforced urethane head drive belts. • Belts are horizontally oriented • AC motor, 0.56 KW [0.75 hp] 									
Measuring Head MD Dimension	<ul style="list-style-type: none"> • 4 Pack: 460 mm [18.1"] include air wipes and static eliminator • 6 Pack: 645 mm [25.4"] include air wipes and static eliminator 									
Measuring Head Position Resolution	• ± 0.02 mm [± 0.0007 "]									
Sensor Signal Digitization	400 Hz 2nd order anti-alias filter, 4000 samples per second									
Signal Resolution	16 bits averaged with oversampling, output at 4kHz									
Scan Speed	Up to 1200 mm/s [48 in/s]									
Single Point Positioning Accuracy	± 1 mm [0.04 in]									
Profile resolution	2–5 mm [0.08–0.20 in] databoxes across full web width									
Communication	Redundant Ethernet, TCP/IP protocol									
Environmental Conditions at End Supports	Max. temp: 40°C [104°F] Max. temp: 80°C [176°F] with Cable End Cooling option (Model Q4000-CEC)									
Environmental Conditions for Sensor Enclosure	Max. temp: 100°C [212°F]* Up to 95% Rel. Humidity (non-condensing) * Temp is measured 50mm [2"] from the sheet and 600mm [24"] in from the edge of the sheet									
Electrical Power	208–240 Volts AC, 15A nominal, 50/60 Hz, single phase									
Head Air Requirements	Dry instrument air [per ISO 8573-1 222] 425L/min – 850L/min @ 4.8 BAR (15cfm – 30 cfm @ 70PSI)* <i>*Exact usage determined by sensor complement</i>									
Low Pressure Purge Air Requirements (Not intended for Endbell cooling)	<ul style="list-style-type: none"> • Filtered air $<10 \mu\text{m}$ [0.0004"] • Inlet max temp. 50°C [120°F] • Dewpoint $< 20^\circ\text{C}$ [68°F] • @ 25 mmH₂O [1 inH₂O] 									
	<table border="1"> <thead> <tr> <th>Environment</th> <th>Beam < 7m [23ft]</th> <th>Beam >= 7m [23ft]</th> </tr> </thead> <tbody> <tr> <td>Normal</td> <td>28.3 m³/min [1000 ft³/min] Single duct at cable end</td> <td>45.3 m³/min [1600 ft³/min] Split between ducts at both ends</td> </tr> <tr> <td>Dusty (e.g. tissue)</td> <td colspan="2">45.3 m³/min [1600 ft³/min] Split between ducts at both ends</td> </tr> </tbody> </table>	Environment	Beam < 7m [23ft]	Beam >= 7m [23ft]	Normal	28.3 m ³ /min [1000 ft ³ /min] Single duct at cable end	45.3 m ³ /min [1600 ft ³ /min] Split between ducts at both ends	Dusty (e.g. tissue)	45.3 m ³ /min [1600 ft ³ /min] Split between ducts at both ends	
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Head Coolant Requirements: (closed loop chiller)	<ul style="list-style-type: none"> • Coolant Fluid: 50/50 water* glycol mix (*distilled water) • Max. Pressure: 4.1 BAR (60 PSI) • Max. Temp: 30°C [86°F] • Flow 4 - 8 L/min [1-2 gal/min]* <i>* Exact flow varies with conditions</i>									
Weight	710 kg + 165 kg/m x Dim 'T' [1565 lb + 111 lb/ft x Dim 'T']									

The Q4000 O-Frame Scanner is offered for sale in a variety of configurations according to the requirements of each application.

Some features described in this document are considered optional and may not be necessary for every system. Please refer to the specific commercial proposal for a complete listing of features and options included in any offer.



For More Information

Learn more about how Honeywell's Experion MX O-Frame Scanner can improve business performance, visit our website www.honeywellprocess.com or contact your Honeywell account manager.

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Honeywell Process Solutions

1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Skimped Hill Lane Bracknell,
Berkshire, England RG12 1EB UK

Building #1, 555 Huanke Road, Zhangjiang Hi-Tech Industrial Park, Pudong New Area, Shanghai 201203

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