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IsoTherm Scanner Model 2100

Highlights

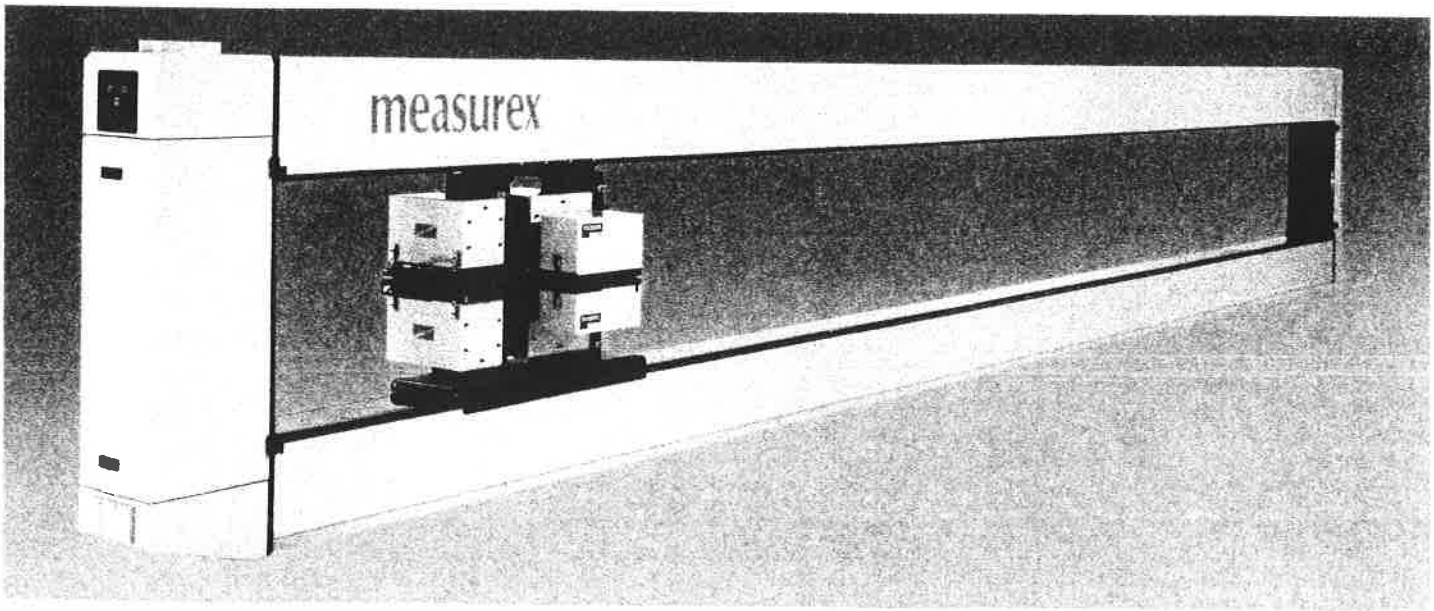
The Measurex IsoTherm™ Scanner, Model 2100, combines revolutionary design innovations with Measurex's proven scanning technology to provide papermakers with superior profile measurement accuracy and reliability.

The IsoTherm scanner's Thermal Equalization System[1] equalizes the temperature across the height of each of the scanner's beams, eliminating thermally induced beam warping for the most accurate profile measurements. IsoTherm's Rigid Sensor Platform maintains precise alignment of the upper and lower sensor platform, ensuring unsurpassed measurement accuracy.

The IsoTherm scanner was designed with the goal that it will not fail in service when the recommended preventive maintenance is performed. This superior reliability provides papermakers with the ability to consistently achieve the highest level of product quality.

- Innovative Thermal Equalization System™, with HelicalFlow[2] guides, eliminates scanner beam deflection caused by heat from the process to provide superior measurement accuracy across the full web, under all operating conditions.
- Unique Rigid Sensor Platform™ — with short-lever sensor support arms and twin I-beam structure — provides 190 times greater rotational stiffness at the measurement gap to ensure precise sensor alignment.
- Designed with reliability as a primary engineering goal, IsoTherm provides increased system utilization.
- Proprietary Environmental Scanner Seal/Air Purge System protects the scanner interior from heat, chemicals, moisture and dust.
- Removable scanner beam enclosure covers, quick-access Quadrapac® panels, and swing-open access-doors allow fast accessibility to all internal components.
- The Quadrapac Sensor Platform supports Measurex's full line of compact sensors, including the advanced color and strength sensors, for total, on-line quality measurement.
- Flexible sensor mounting design and unique sensor software capabilities allow sensors to be mounted in a variety of machine-direction (MD) and cross-direction (CD) configurations to accommodate limited space.
- Dynamic Measurement Gap Compensation[3] continuously corrects for any changes in the gap between the upper and lower sensor platform to ensure the ultimate in measurement accuracy.
- Continuous high-speed 30 cm/second (12 inches/second) scan capability ensures faster measurement and tighter control.
- Interactive video displays simplify scanner set-up and maintenance.

[1] Patent Pending
[2] Patent Pending
[3] Patent # 4,678,915



Description

The IsoTherm scanner was engineered for maximum accuracy and superior reliability. It combines new design innovations with Measurex's proven measurement technology to support the industry's largest complement of scanning sensors, while maintaining exact alignment at the measurement gap.

Thermal Equalization System

Heat from the process and the hot sheet can create temperature gradients across the height of the scanner beams, regardless of the shape or size of the scanner beam. The side closest to the hot sheet will become hotter and expand, becoming longer than the side of the scanner beam further away from sheet. These temperature gradients cause the scanner beams to bend or deflect toward the sheet. This effect, if uncorrected, undermines the basis weight profile accuracy. IsoTherm's Thermal Equalization System eliminates this effect.

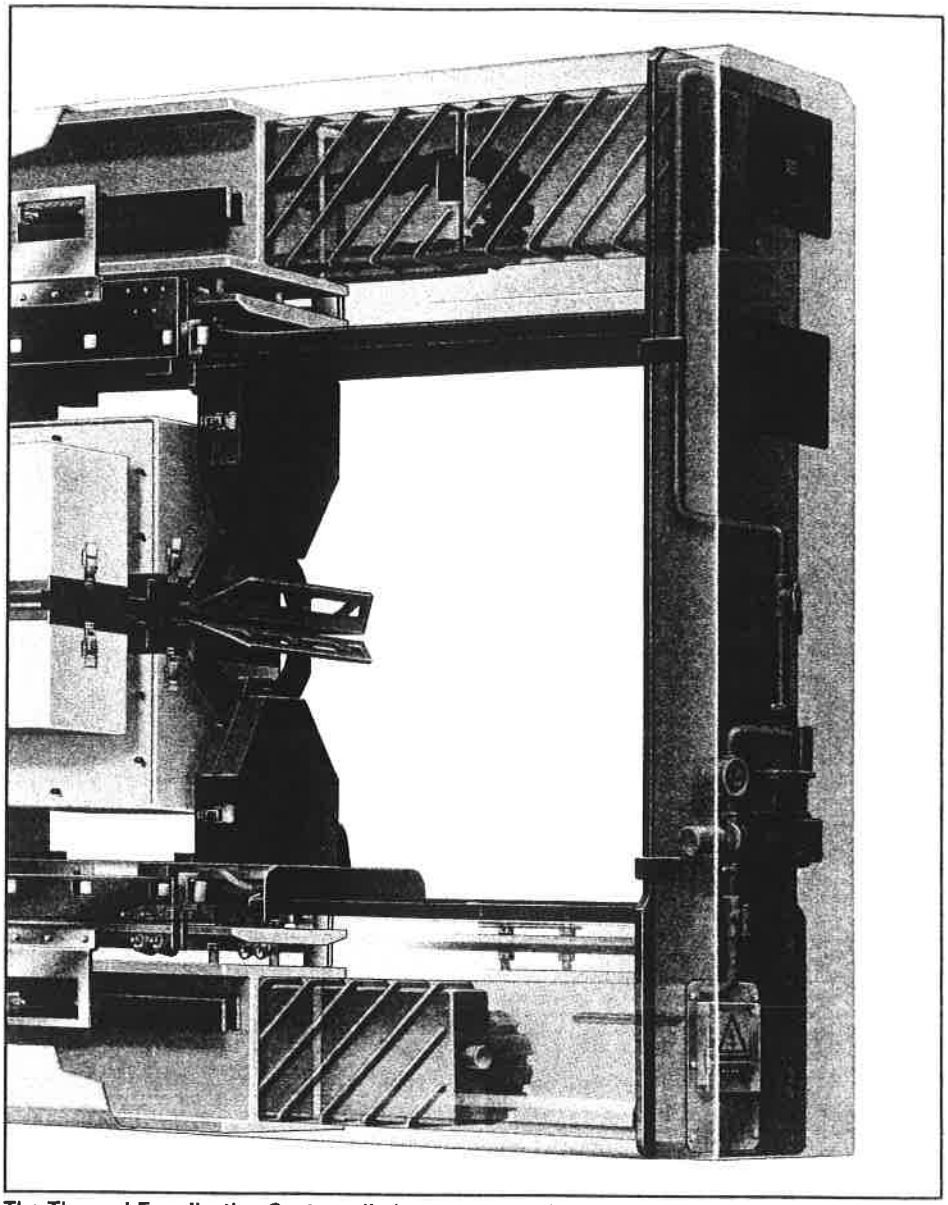
IsoTherm's Thermal Equalization System is a sealed, closed-loop, liquid-circulation system that equalizes scanner beam temperature by circulating liquid over specially designed HelicalFlow guides, inserted in the upper and lower twin I-beams. The HelicalFlow guides force the liquid to move in a circular manner through the upper and lower scanner beams, contacting all internal scanner beam surfaces, and, thus, equalizing the temperature gradients throughout the ght and length of the scanner beams.

The Thermal Equalization System keeps the scanner beams in constant alignment, despite the hot and variable conditions of the paper machine, ensuring the most precise measurement accuracy.

Rigid Sensor Platform

IsoTherm's heavy-duty mechanical design delivers 190 times greater rotational stiffness at the measurement gap to maintain the precise sensor platform alignment, regardless of the sensor payload or configuration.

The Rigid Sensor Platform's strength is provided by its:



The Thermal Equalization System eliminates scanner beam deflection by circulating liquid around HelicalFlow guides in the upper and lower beams.

- Twin I-beam steel structure;
- Single-rail fiberglass carriage track;
- 20-wheel, triple-axis sensor platform carriage, and;
- Short-lever sensor support arms.

IsoTherm's newly designed single-rail fiberglass carriage track is thicker and wider. The fiberglass track is permanently aligned using Measurex's precise Computer-Aided Scanner Alignment (CASA) system. The track has a beveled surface to accommodate the 20-wheel, triple-axis carriage that supports the Quadrapac Sensor Platform across the full web width.

This unique design greatly reduces the rotational torque on both the upper and lower scanner beams to provide stable transport of the Quadrapac Sensor Platform.

Although the Thermal Equalization System eliminates thermally induced scanner beam deflection, process heat can have a small, but measurable, effect on the scanner end-supports and the sensor platform support arms. IsoTherm uses the patented Dynamic Measurement Gap Compensation to measure and correct for these small thermal effects on a minislice-by-minislice basis, ensuring that all thermally induced errors are completely eliminated for the most accurate measurements.

Total, On-line Quality Measurement

The IsoTherm scanner's Rigid Sensor Platform supports the full complement of Measurex precision scanning sensors, including the advanced color and strength sensors.

Optimal use of space makes total, on-line quality measurement possible in the tightest of locations. Four inboard and four outboard modular quadrants on the compact Quadrapac Sensor Platform allow flexible mounting of Measurex's family of scanning sensors in both MD and CD directions. Additionally, the Quadrapac Sensor Platform and universal Power Track easily accommodate on-site additions of sensors.

With state-of-the-art technology — high-speed (30 cm/second;12 inches/second) scanning, fast sensor response (3-5 milliseconds) and high-resolution signal processing (100 percent signal integration and one part in 500,000 digital resolution) — Measurex sensors scan across the sheet edge to provide a complete picture of sheet quality and enable tighter control.

The Quadrapac Sensor Platform is adjustable up to ±45° to accommodate machine pass-line.

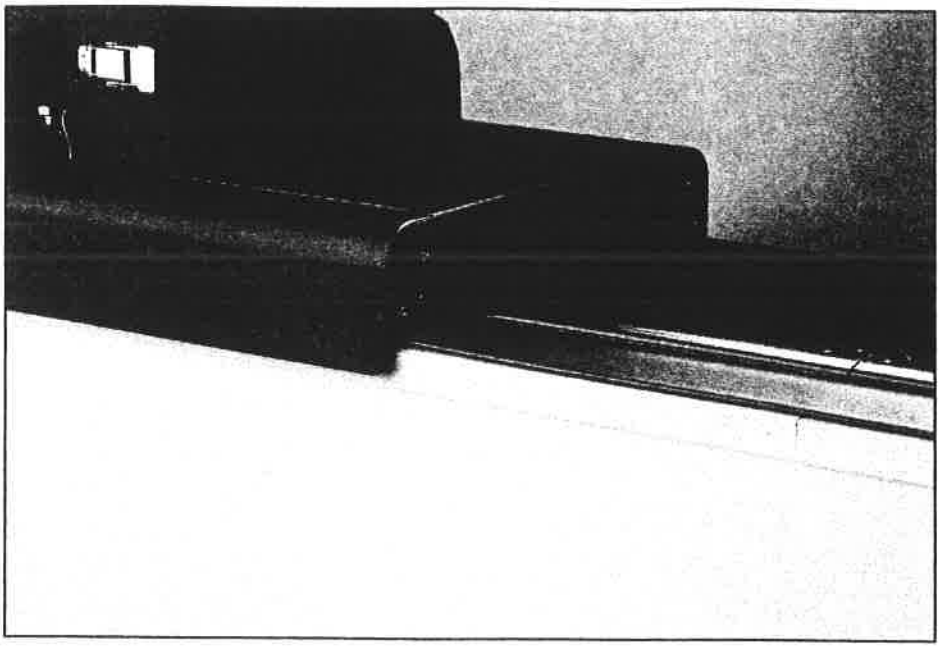
For superior profile control performance, a precision DC drive system provides 0.0635 cm (0.025 inch) sensor platform positioning resolution.

Engineered for Reliability

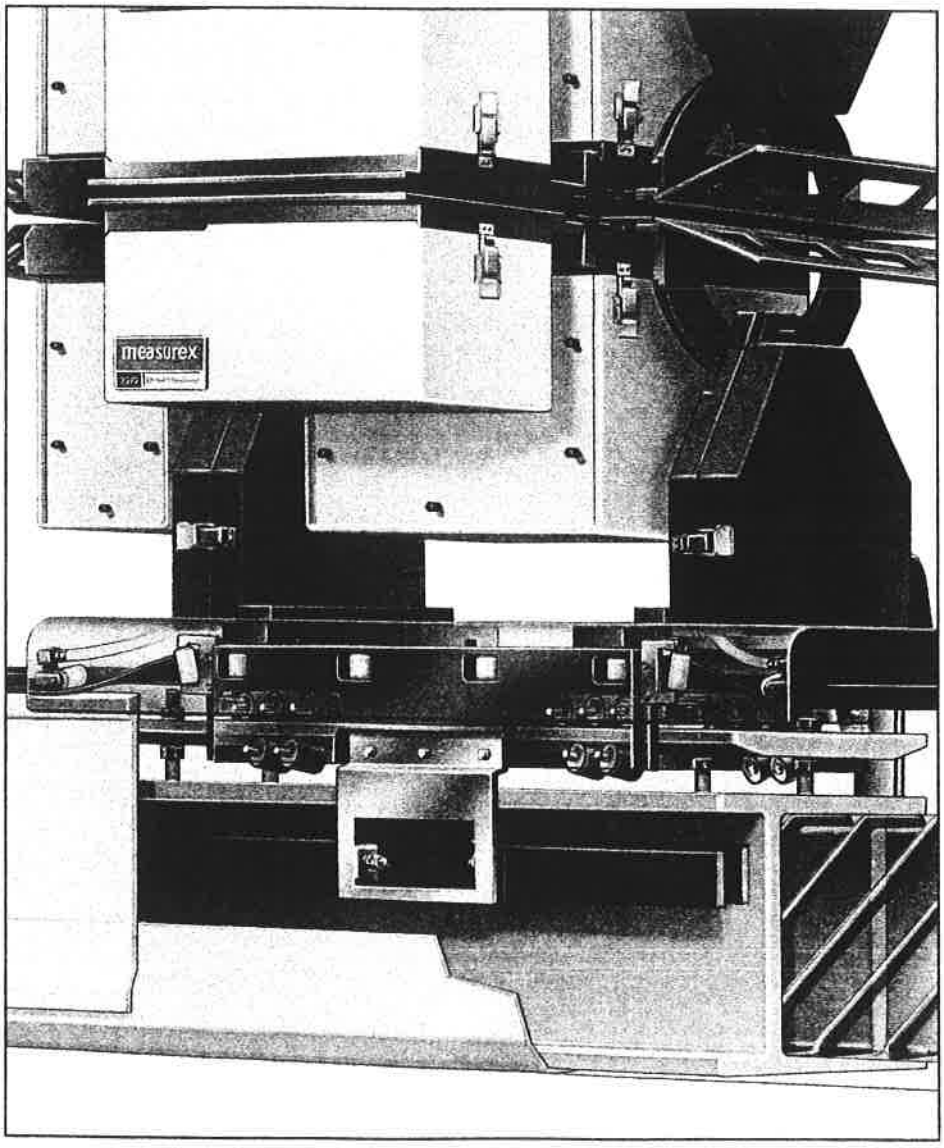
IsoTherm scanner was designed with the goal that it will not fail while in operation, when serviced as recommended. To achieve this level of reliability, high quality, long-life parts were designed into IsoTherm.

For example, the drive system incorporates rugged pulleys. The drive belts are wider. A membrane panel supports frequently used functions instead of mechanical switches. Switch indicator lights have been replaced by light-emitting diodes (LEDs).

All scanner electronics are housed in a separate enclosure that is to be located away from the harsh paper machine environment. The scanner's electronics have been redesigned to improve reliability and to reduce the number of printed circuit boards.



A proprietary Environmental Seal/Air Purge System protects all internal components from the harsh paper machine environment.



IsoTherm's Rigid Sensor Platform — with twin I-beam design and short-lever sensor support arms — delivers 190 times greater rotational stiffness at the sensor platform.

An Environmental Scanner Seal/Air Purge System fully encapsulates all components, protecting them from the paper machine environment. A proprietary sensor platform sealing mechanism ensures that the sealing system retains its integrity as the sensor platform traverses the length of the scanner.

The Quadrapac Sensor Platform is environmentally sealed, water-cooled and nitrogen-purged for high sensor reliability and accuracy.

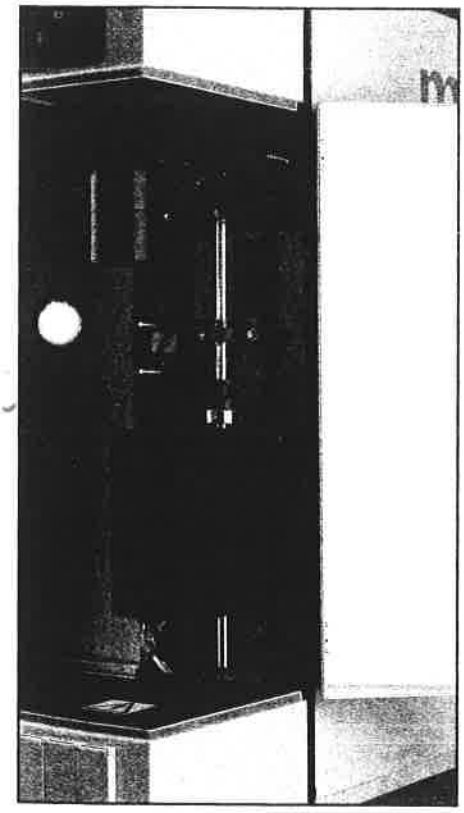
Additionally, the entire structure is treated with a multi-step zinc primer and polyurethane finishing process to protect it from corrosion in the harsh mill environment.

The IsoTherm scanner and sensor package is thoroughly tested with the entire system prior to shipment to ensure fast, trouble-free installation and startup.

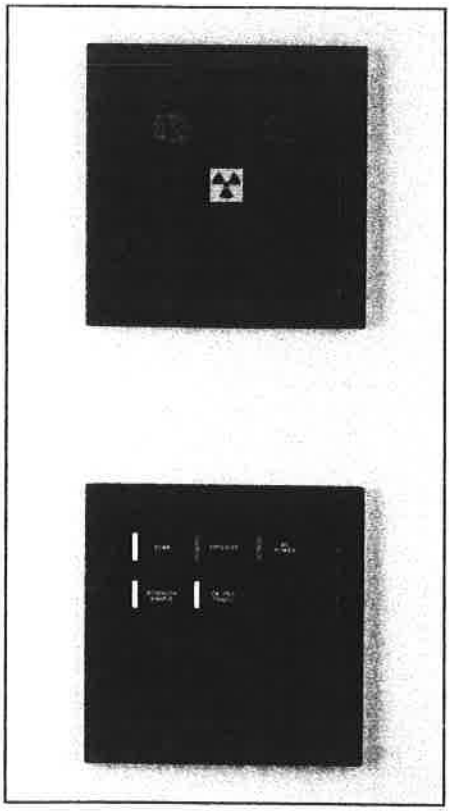
Simplified Service Features

IsoTherm's features make service easier, and reduce maintenance time and cost. For example:

- Sensor heads are easily separated with a clutch mechanism for cleaning or maintenance.
- Easy-to-use, computer-aided, interactive video displays simplify service.
- Interlocking scanner beam enclosure covers are easily removed for visibility of the entire scanner and for access to all internal components.
- Swing-open access-doors provide immediate accessibility to the drive system.
- Quick-access panels allow easy entry to all sensor components in the Quadrapac.
- Electrical test points are clearly labeled and easily accessible in the remote electronics enclosure.
- All power and maintenance switches are located on the outside of the scanner, under sealed panels, eliminating the need to violate the internal environmental integrity of the scanner.
- The CASA system allows the IsoTherm scanner to be easily and quickly realigned on-site if it is inadvertently damaged.



Clutch mechanism allows easy separation of the sensor heads.



IsoTherm's durable membrane panel, with long-life light-emitting diodes (LEDs), eliminates mechanical switches.

Specifications

IsoTherm Scanner

Sensor Support on Each Scanner Basis Weight, Moisture, Caliper, Color, Brightness, Fluorescence, Strength, Formation, Gloss, Opacity, Ash, Smoothness, Sheet Temperature, Sheet Width, Dynamic Measurement Gap Compensation and Air Gap Temperature.

Scan Speed 30 cm/sec (12 in/sec) maximum.

Paper Pass-line Adjustment ±45° from horizontal standard.

Paper Trim 10.4 meters (410 in) maximum.

Scanner Length 12.2 meters (480 in) maximum.

Scanner Weight 254 kg/meter + 190 kg (171 lbs/ft + 420 lbs).

Maximum Ambient Temperature 100°C (212°F) with Air Purge System enabled.

Power Requirements 12kVA, 50/60 Hz, 220 to 240 VAC maximum.

Air Purge 56 cubic meters/minute (2000 SCFM).

Thermal Equalization System Fluid Quantity 5.5 liter/meter (.44 gal/ft).

Electronics Enclosure

IP 55 (International standard based on the DIN 40050, IEC 529 and BS5490 standards) and NEMA (National Electronical Manufacturers Association) rated.

Dimensions 1000 mm x 800 mm x 300 mm (39.37 in x 31.50 in x 11.81 in).

Weight 115 kg (250 lb).

Power Requirements 2.5 kVA, single phase, 50/60 Hz, 220 to 240 VAC.

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PrecisionPLUS IsoTherm Scanner

Product Brief

The PrecisionPLUS™ IsoTherm™ Scanner provides stable, fast-scanning support for Honeywell-Measurex sensors on continuous sheet processes. The scanner's dual I-beam structure and stable measurement platform maintain precise sensor alignment, for fast measurement with superior accuracy.

The PrecisionPLUS IsoTherm Scanner is constructed to withstand continuous operation in hostile paper mill environments. The scanner's design incorporates service and maintainability features ranging from easy internal component access to advanced diagnostic video displays and system-resident maintenance schedules. The result is reliable and accurate measurement, with low life-cycle costs.

Features & Benefits

- Dual I-beam and steel end-support frame provide superior vertical, horizontal and torsional stiffness for heavy sensor loads and wide web widths.
- "Pultruded" composite carriage track design and triple-axis wheel mounting on the head carriage tightly couple each sensor enclosure to the beam to ensure precise sensor alignment under all conditions.
- Integral Dynamic Z-axis correction continuously eliminates error resulting from Z-axis changes between upper and lower sensor enclosures, ensuring high absolute accuracy and precise profile measurement under all conditions.
- High-speed scanning, coupled with fast sensor response, 100 percent signal integration, and true edge-to-edge measurement provide a complete and accurate picture of sheet quality and fast resolution of profile changes.

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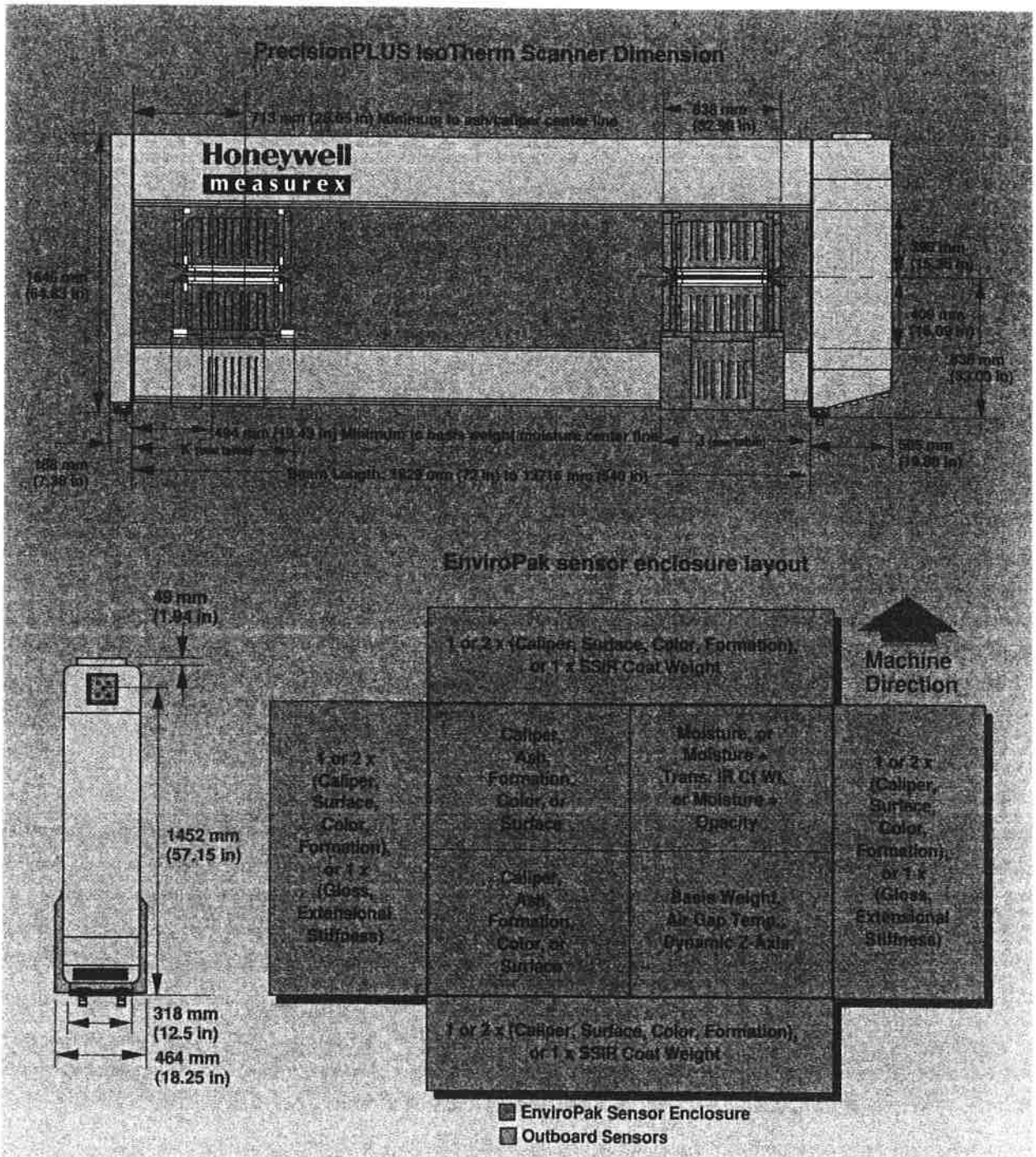


Recommended off-sheet space for sensor enclosure

	EnviroPak Sensor Enclosure Only	EnviroPak Sensor Enclosure with One CD Outboard Enclosure	EnviroPak Sensor Enclosure with Two CD Outboard Enclosures
K (Tending End)	1094 mm (43.06 in)	1354 mm (53.31 in)	1667 mm (65.62 in)
J (Drive End)	1094 mm (43.06 in)	1354 mm (53.31 in)	1667 mm (65.62 in)

Specifications

Sensors Supported:

- Basis Weight
- Moisture (Transmission Infrared or High-Power Transmission Infrared or Microwave)
- Caliper
- Color/Fluorescence/Brightness/Whiteness (top- and/or bottom-side)
- Extensional Stiffness
- Formation
- Gloss (top- and/or bottom-side)
- Opacity
- Surface/Printability (top- and/or bottom-side)
- Reflection Infrared Coat Weight and/or Surface Moisture (top- and/or bottom-side)
- Transmission Infrared Coat Weight and/or Moisture
- Sheet Temperature (top- and/or bottom-side)

Scan Speed:

- Continuously variable up to 51 cm/sec (20 in/sec)
- Recommended 40 cm/sec (16 in/sec) or a minimum of 15 seconds per single-direction scan

Sheet Pass Angle Adjustment:
±45° from horizontal

Maximum Web Width:
10.0 m (400 in)

Scanner Weight (not including TES liquid):
253 kg/m + 190 kg
(170 LB/ft + 420 lb)

Maximum Ambient Temperature:
100°C (212°F) with air purge

Power Requirements:
3kVA, 50/60 Hz
220 to 240 VAC max

Sensor Enclosure Coolant Requirements:
Flow rate:
3.8 liters/min (1 gal/min)
Pressure:
2.8 kg/cm² (40 lb/in²)
Recommended temperature:
15 - 25°C (60 - 77°F)
(Note: Coolant flow is approximate. Coolant flow under actual conditions depends upon coolant temperature, sensor heat load and ambient temperature.)

Air Purge:
56 m³/min
(2000 SCFM)

Fluid Quantity, Optional Thermal Equalization System:
5.5 liter/m (0.44 gal/ft)

EnviroPak Sensor Enclosure.

The EnviroPak has four inboard and four outboard quadrants to support measurement. This, in combination with fast response that is common to all Honeywell-Measurex sensors, and advanced measurement software, allow flexible configuration of sensors in both the MD and CD locations, and provide the ability to scan sensors off the sheet edge. This strategy enables large sensor complements in confined process space, and also provides accurate measurement of the sheet edges. The result is precise cross-direction control at the sheet edges, where CD control problems and rejects frequently occur with conventional measurement systems.

Air-wipes and static eliminators on the upstream edge of the EnviroPak enclosures provide streamlined flow of temperature-controlled air through the sheet gap to minimize dust buildup and condensation on sensor windows.

EnviroPak's Environment Control Unit (ECU) tightly controls the internal head temperature to ensure precise and repeatable measurement and electronics component reliability. Dual fans circulate the internal air to ensure uniform temperature distribution throughout the enclosure. The EnviroPak also shields the sensors and electronics from electrostatic discharges and electromagnetic interference.

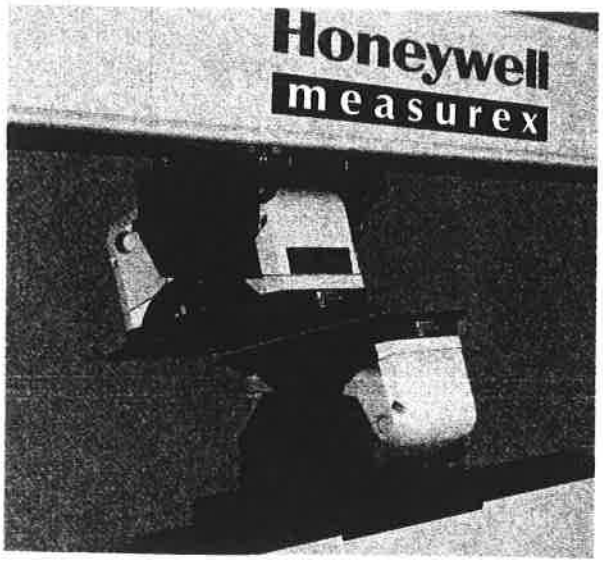
Reliability and Maintainability.

The PrecisionPLUS scanner design incorporates many features that contribute to reduced maintenance effort and reduced life-cycle costs. These features include:

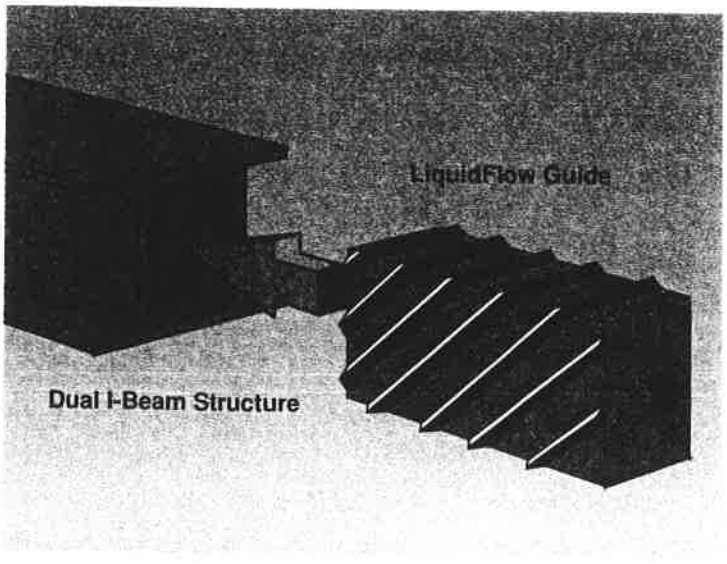
- Sensor enclosures are easily separated for cleaning and maintenance.
- Interlocking beam covers are removable for easy access to drive belts, pulleys, power track, carriages and tracks.
- Swing-open doors provide complete access to the scanner electronics and drive system components.
- Easily removable EnviroPak sensor enclosure covers provide access to all sensor components.

Optional Thermal Equalization System (TES).

Heat from both the process and the sheet can create temperature gradients across the beams of a scanner, regardless of the beam's shape or size. Temperature gradients across a beam cause the beam to deflect toward its warmest side, which may compromise both absolute accuracy and profile accuracy. The PrecisionPLUS IsoTherm Scanner's Thermal Equalization System (TES) is a sealed, closed-loop liquid circulation system. TES prevents thermal deflection by circulating a liquid in the narrow space between the beams' interior walls and specially designed LiquidFlow fluid guides located within the beam "box." The circulating liquid contacts all internal beam surfaces and absorbs and redistributes heat equally across the beams' internal surfaces, eliminating thermal gradients, and maintaining beam straightness in the harshest environments.



EnviroPak heads are easily separated for cleaning and maintenance.



LiquidFlow guides ensure that circulating liquid absorbs and redistributes heat equally across all beam surfaces.