# Nip Pressure Alignment Tool™
## Measure Nip Width & Relative Pressure Distribution

The Nip Pressure Alignment Tool™ (NPAT™) is a system used to capture nip footprints and relative pressure distribution between nip rolls. The system utilizes a sensor made up of an array of multiple thin and flexible pressure sensitive bands, which can be configured to different lengths to create a sensor that matches the size of a custom application. The real-time data provided by the NPAT ensures machine setup and proper roll uniformity resulting in a better printing process.

## KEY FEATURES & BENEFITS

- **Capture visual representation of real-time relative pressure distribution, nip contact, nip width/length, and cross width**
- **Ensures proper machine setup to prevent equipment damage, improve yield, and reduce waste**
- **Provides quantifiable and credible data**
- **Easily maintained in-field**
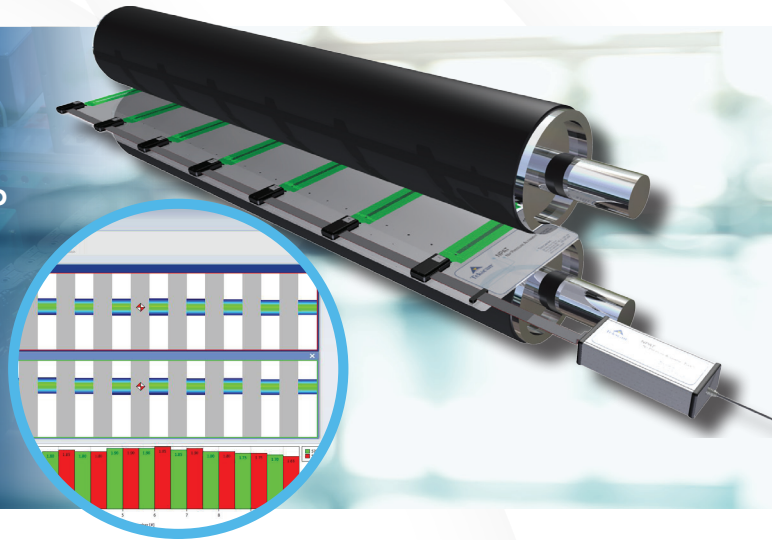
## APPLICATIONS

- Machine Setup
  - Preventive Maintenance
  - Roll Uniformity
  - Crowns
  - Diameter variations due to roller wear
- Deflections
- Machine Comparison

## INDUSTRIES

- Paper
- Iron and Steel
- Packaging
- Film
- Printing
- Die Press
- Converting
- Coaters
- Laminators
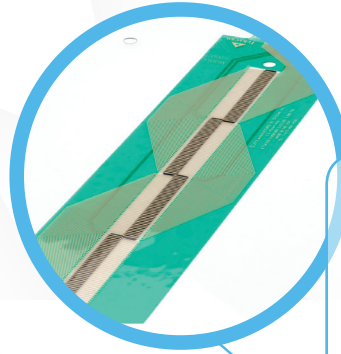- Pull Rolls

*Aligning Nip Rolls*

*Paper Mill*

Tekscan™

# NPAT SYSTEM COMPONENTS

## Factory Configurable Sensor:
- Large sensor (up to 10 m in length) with multiple sensor bands whose length and spacing can be configured to match the dimension of the nip being measured
- Bands can be spaced to show pressure footprint and nip width across the roll

## Sensor Band:
- 3 sensor model resolutions to support different nip sizes
- Standard band measures pressures from 25- 4,500 psi (172- 31,026 kPa). Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)

## Portable Carrier:
- Polycarbonate sheet that supports & aligns sensor bands/connectors for easy alignment when taking measurements
- Easily rolled up for storage and lays flat when unrolled
- Includes a removable plastic sleeve that protects from wet environments

## Rugged Electronics:
- Single set of electronics covering a large area
- Connected to a standard Evolution handle; 1 USB connection to PC
- Protected by ruggedized enclosure
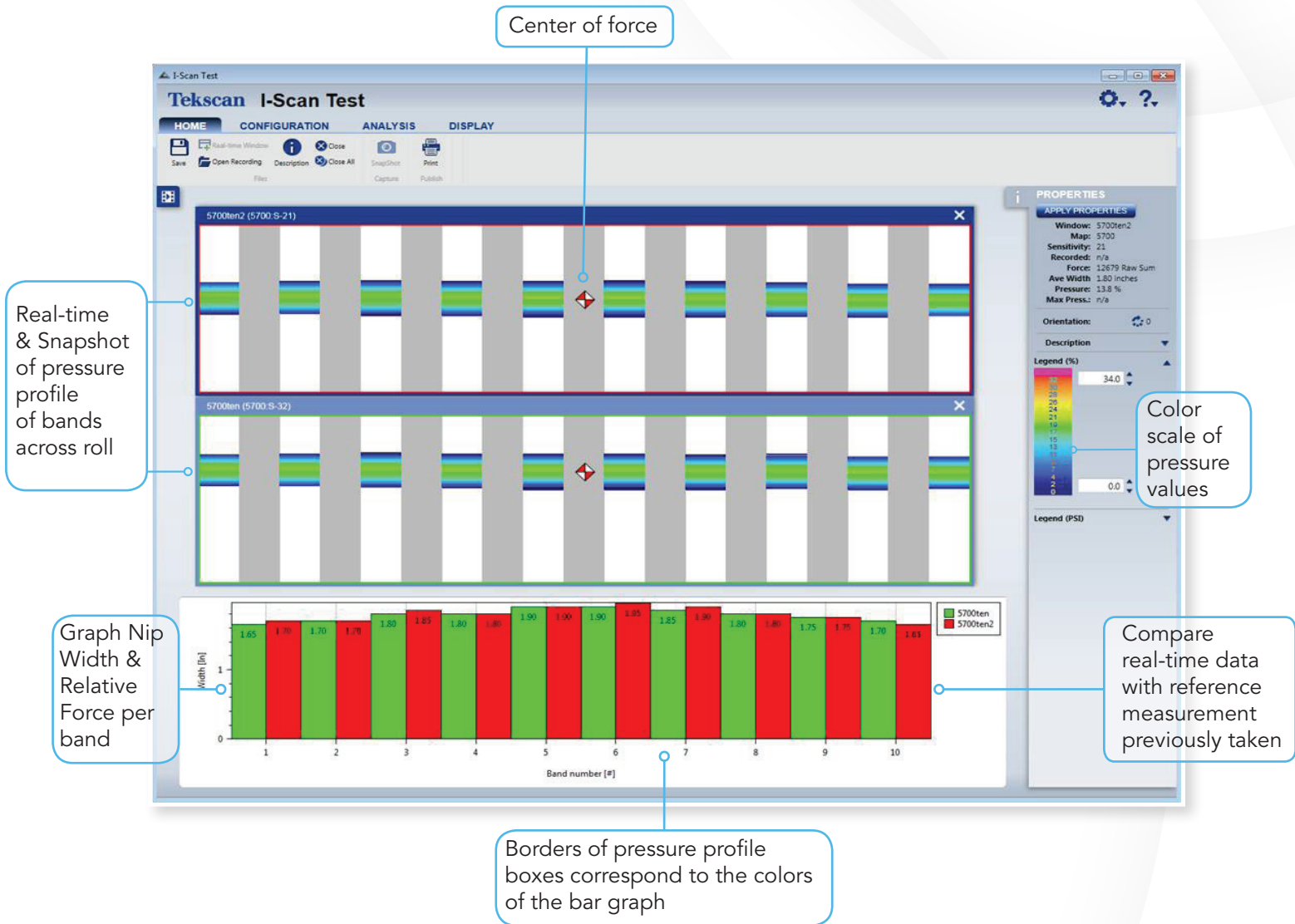
## Sensor Band Interconnect:
- Bands are easily replaced and can be serviced in-field
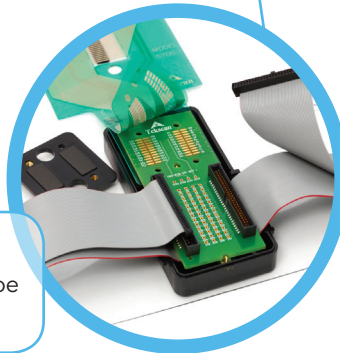
# I-SCAN™ TEST SOFTWARE

- Software includes force/length units and graph features which easily display nip data by band

- Includes basic features to capture average nip width, relative pressure distribution, and nip uniformity

- Software can save a snapshot of nip uniformity, which can be used as a **"gold standard"** reference image next to real-time data

- Provides a clear visual representation of pressure distribution, center of force across the sensor, nip contact footprint width and cross width (pressure across each band)

- The various configurations of NPAT sensors offer different lengths and total spacing between bands.

# SOFTWARE DISPLAY

Center of force

Real-time & Snapshot of pressure profile of bands across roll

Color scale of pressure values

Graph Nip Width & Relative Force per band

Compare real-time data with reference measurement previously taken

Borders of pressure profile boxes correspond to the colors of the bar graph

# SYSTEM SPECIFICATIONS

## Performance Specifications

| | |
|---|---|
| Measured Pressure Range | 5700/5707: 25 - 4,500 psi (172 - 31,026 kPa)<br>5705: 10 - 1,500 psi (69 - 10,342 kPa) |
| Non-Linearity | 5705: 10 - 1,500 psi (69 - 10,342 kPa) |
| Hysteresis | < 4.5% of full scale |
| Repeatability | <± 3.5% |
| Operation | Piezoresistive Array |
| Nip Width | *5700 Sensor: 223.5 mm (8.80")<br>**5705 Sensor: 44.5 mm (1.75")<br>***5707 Sensor: 201.2 mm (7.92") |
| Nip Width Resolution | 5700/5705 Sensor: 1.3 mm (0.05")<br>5707 Sensor: 1.5 mm (0.06") |
| Sensing Length | See Selection Table |
| Peak Pressure | > 2,500 psi (17,237 kPa) |
| Lag Time | 5 µsec |

## Mechanical Specifications

| | |
|---|---|
| Sensor Band Thickness | 0.2 mm (0.008") |
| Sensor Material | Polyester |
| Carrier Sheet Thickness | 0.8 mm (0.030") |
| Carrier Sheet Material | Polycarbonate |
| Protective Sleeve Thickness | 0.3 mm (0.012") |
| Protective Sleeve Material | Polyethylene |
| Assembled Sensor Thickness | 1.0 mm (0.038") |
| Assembled Sensor Thickness with Protective Sleeve | 1.3 mm (0.050") |
| Ribbon Cable Material | Vinyl |
| Band Interconnect Enclosure Material | ABS |
| Housing for Scanning Electronics | Aluminum |

\*   5700 Sensing Band (1 column per band; MAX 13 bands/13 columns) is used to make sensors between 457.2 mm (18") and 6,400.8 mm (252").

\*\*   5705 Sensing Band (5 columns per band; MAX 13 bands /65 columns) is used to make sensors between 355.6 mm (14") and 1,625.6 mm (64").

\*\*\*   5707 Sensing Band (1 column per band; MAX 17 bands/17 columns) is used to make sensors between 1,524 mm (60") and 10,000 mm (396").

## Operating Conditions

| | |
|---|---|
| Temperature, Operating | -20° to 35°C (-4° to 95°F) |
| Relative Humidity (%) | 5 to 90 (Non-condensing) |

## Storage Conditions

| | |
|---|---|
| Temperature, Operating | -30° to 60°C (-22° to 140°F) |
| Relative Humidity (%) | 5 to 90 (Non-condensing) |

## Communication Specifications

| | |
|---|---|
| PC Connection | USB 2.0, 480 Mbps |
| Scan Speed for Real-time Display | 40 Hz |

# PRODUCT SELECTION

## Product Selection

| Sensor Type | Sensing Length | Carrier Sheet Length | # of Sensor Bands (Columns) | Sensor Column Spacing | Nip Resolution | Nip Sensing Width | System Number |
|---|---|---|---|---|---|---|---|
| 5700 | 4,570 mm (180") | 4,800 mm (189") | 13 (13) | 380 mm (15") | 1.3 mm (0.05") | 223.5 mm (8.80") | NER5700-1500-13B180 |
| | 1,830 mm (72") | 2,057 mm (81") | 13 (13) | 150 mm (6") | | | NER5700-1500-13B72 |
| | 1,830 mm (72") | 2,057 mm (81") | 7 (7) | 305 mm (12") | | | NER5700-1500-7B72 |
| | 6,400 mm (252") | 6,629 mm (261") | 13 (13) | 530 mm (21") | | | NER-5700-1500-13B252 |
| 5707 | 6,100 mm (240") | 6,324 mm (249") | 17 (17) | 380 mm (15") | 1.5 mm (0.06") | 201.2 mm (7.92") | NER5707-1500-17B240 |
| | 9,750 mm (384") | 9,982 mm (393") | 17 (17) | 610 mm (24") | | | NER5707-1500-17B384 |
| 5705 | 1,625 mm (64") | 1,651 mm (65") | 13 (65) | 25.4 mm (1") | 1.3 mm (0.05") | 44.5 mm (1.75") | NER5705-500-13B64 |
| | 1,371 mm (54") | 1,397 mm (55") | 11 (55) | 25.4 mm (1") | | | NER5705-500-11B54 |
| | 990 mm (39") | 1,016 mm (40") | 8 (40) | 25.4 mm (1") | | | NER5705-500-8B39 |

# SYSTEM CONFIGURATION: 5700 AND 5707 SENSORS
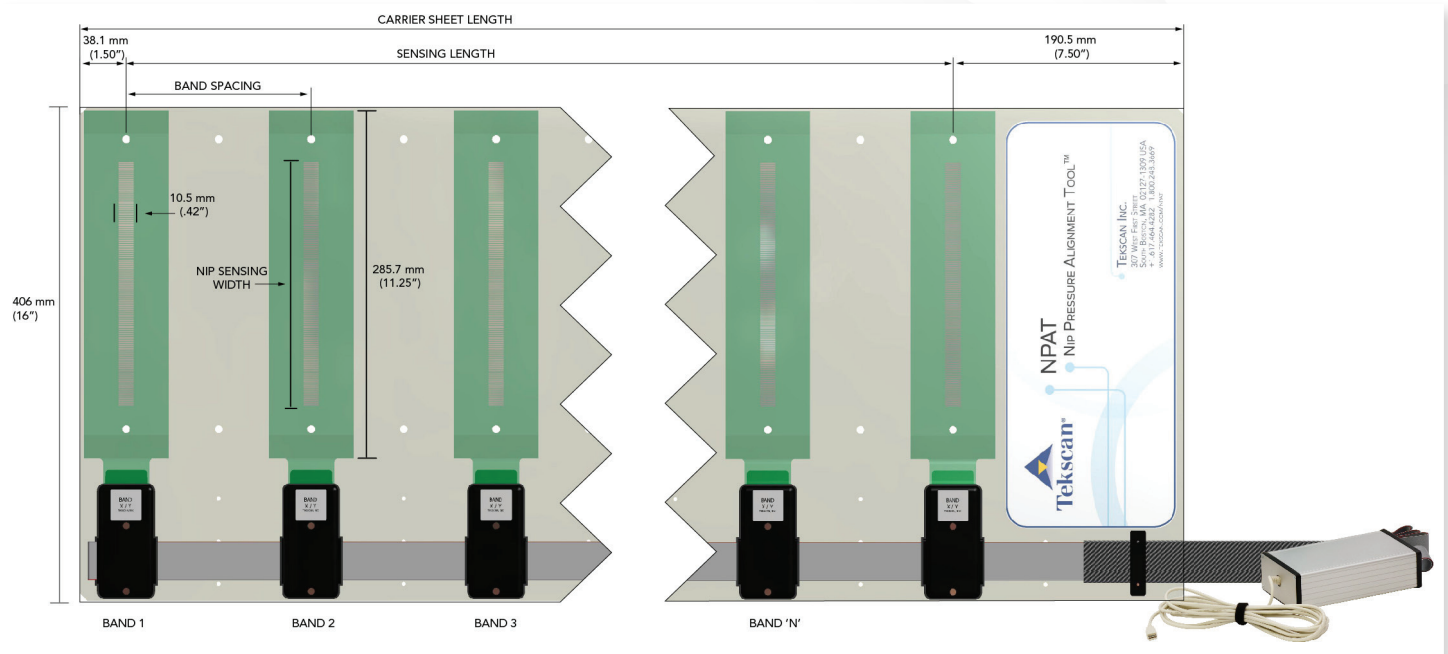


# SENSOR SPECIFICATIONS

## Sensor Band Specifications

| Sensor Band Type | 5700 | 5707 |
|---|---|---|
| Nip Length | 457.2 mm (18") - 6,400.8 mm (252") | 1,524 mm (60") - 10,000 mm (396") |
| Nip Sensing Width | 223.5 mm (8.80") | 201.2 mm (7.92") |
| Nip Sensing Resolution | 1.3 mm (0.05" | 1.5 mm (0.06") |
| # of Sensing Rows in Nip Width | 176 | 132 |
| Max # of Sensor Bands (Columns) | 13 (13) | 17 (17) |
| Measured Pressure Range | 25 - 4,500 psi (172 - 31,026 kPa) | 25 - 4,500 psi (172 - 31,026 kPa) |
| Sensor Band Model | 5700-1500 | 5707-1500 |

*Also available in custom pressure ranges measuring up to 7,500 psi (51,711 kPa)*
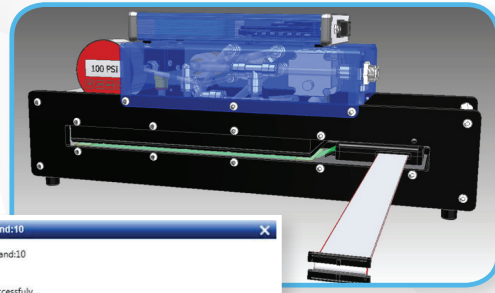
# SYSTEM CONFIGURATION: 5705 SENSOR
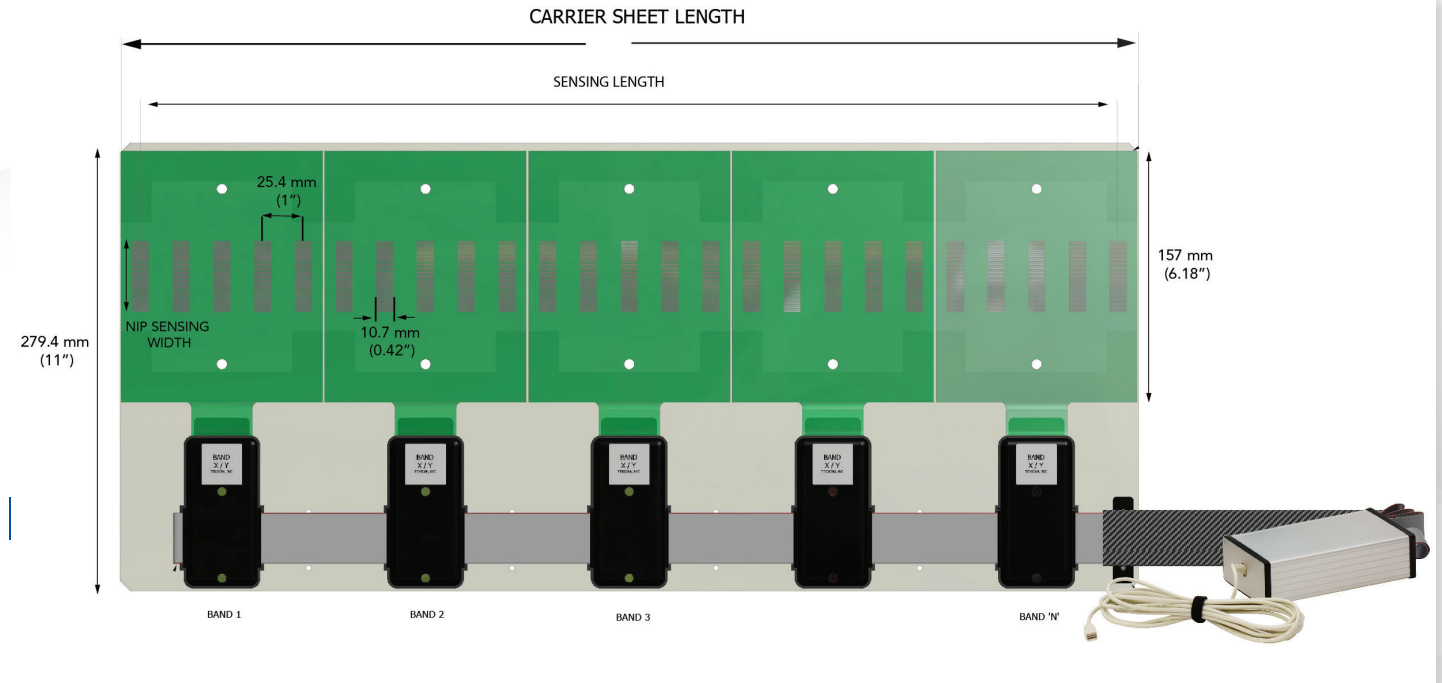


# SENSOR SPECIFICATIONS

## Sensor Band Specifications

| | |
|---|---|
| Sensor Band Type | 5705 |
| Nip Length | 355.6 mm (14") - 1625.6 mm (64") |
| Nip Sensing Width | 44.5 mm (1.75") |
| Nip Sensing Resolution | 1.3 mm (0.05") |
| # of Sensing Rows in Nip Width | 35 |
| Max # of Sensor Bands (Columns) | 13 (65) |
| Measured Pressure Range | 10 - 1,500 psi (69 - 10,342 kPa) |
| Sensor Band Model | 5705-500 |

## EQUILIBRATION

Equilibration improves accuracy and extends sensor life by verifying that all 2,000 sensing elements have similar output under the same load. To equilibrate, each sensor band of the NPAT is fed into the equilibrator one band at a time. The software uses a Wizard to help users through this step-by-step process. The software controls the pressure via an analog controller to verify a repeatable load is being placed on each sensor (30-60-90%).

The software detects whether or not the process was done correctly and provides feedback. Once all the bands are loaded, the software applies equilibration factors to all of the sensing elements in the system to improve output uniformity. This process allows the user to identify if a sensor band needs to be replaced.

Equilibrator: PB100NPAT-1



*Each sensor band is passed through the equilibrator to normalize output*
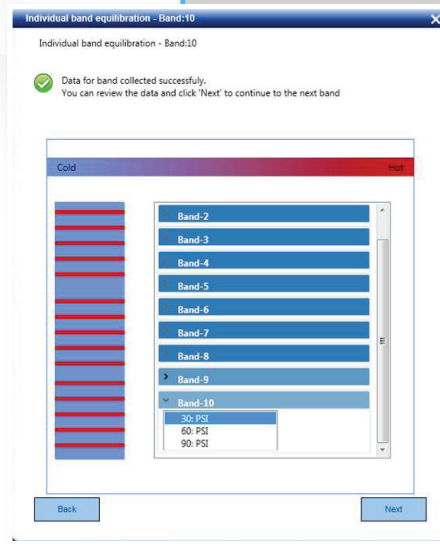


*Equilibration Software Wizard*

## Why Equilibrate?

Over time and through repeated loading, individual pressure sensing elements will start to vary in sensitivity. The equilibrator applies a uniform pressure across the face of the sensor, allowing the software to easily see and quantify these variations.
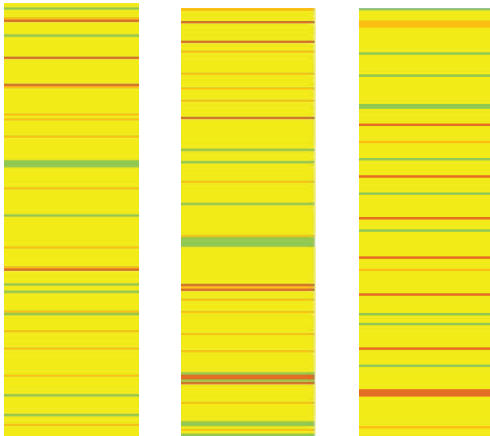


*Sensor in Equilibrator BEFORE software equilibration is performed*
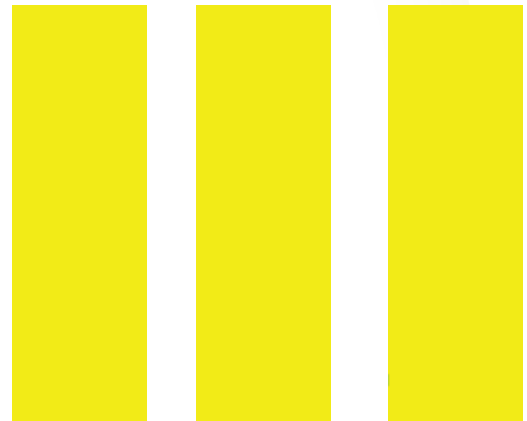


*Sensor in Equilibrator AFTER software equilibration is performed*

**CONTACT US** | FREE DEMONSTRATION

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