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Document Approval			
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SpecMetrix® Fixed Probe In-Line Coating Thickness Measurement System

Technical Specifications


Specification Overview:

This specification document describes the requirements and commitments for an installed SpecMetrix® Fixed Probe In-Line System. The terms “gauge” or “system” as used in this document refers to all equipment and software Sensory Analytics supplies to the customer in connection with this specification. Fixed (stationary) Probes are attached to a mounting bar and will measure coating thickness or film weight on the customer product line. Each mounting bar at a measurement location can support between one to four fixed probes. One system can support up to 8 total fixed probes. Special modifications based on customer requests or unique installation configurations may not be reflected in this document.

System Hardware Inclusions:

1. SpecMetrix Primary Control Workstation (Mark V)
 - a. Main processor unit and SSD
 - b. 22” Touchscreen monitor to view, control, and input for the system software screens
 - c. Stainless steel enclosure to house monitor and processor
 - d. Tray with keyboard and mouse



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- e. Thermoelectric Air Conditioner featuring self-enclosed cooling – no exchange with outside air
- f. Mounting system options
 - i. Pedestal Mount for floor mounting, with swivel base and vertical adjustment
 - ii. Wall Mount with swivel arms to mount to a wall
- g. Power cable with plug

2. Inline Controller Unit (ICU)

- a. Optical hardware kit to support system probes, cycling between measurement readings from each probe
- b. Lamps for each fiber optic probe
- c. Communications hardware to interact with the processor unit
- d. EMI filtered electronics
- e. I/O to support included hardware interactions
- f. One light indicator tower will be used for each measuring location (up to 4 probes). Systems over 4 probes or second measuring location will use 2 light towers.



3. Measurement Apparatus

- a. 1 to 8 fixed position fiber optic probes
- b. One or two hex bars for mounting probes. Includes side mounting plates to mount hex bar assembly directly to customer's equipment
- c. Collar clamps to mount probes to the hex bar
- d. NIST TVU (Thickness Verification Unit with NIST standard sample)




System Software and Operating System Inclusions:

1. SA Inline Software

- a. Inline Measurement software to support and view measurements from 2 or 3 probes, viewable on the Primary Control Workstation
- b. Analysis Tool to review optical data and make recipe modifications
- c. Data Manager to create, edit, and view coating recipes



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- d. User security
 - e. Screen language conversion options
2. Measurement batch output file, to include measurements from each probe by batch or work order, viewable by MS Excel or any CSV viewer
3. TeamViewer Remote Software and/or Ultra VNC Remote Software
4. Microsoft Windows platform
5. Microsoft Excel
6. Adobe Acrobat Reader

Supplementary Inclusions:

1. System Measurement Verification – Sensory will supply a certified and documented NIST traceable thickness verification standard with each system prior to shipment. This verification standard can be used with the supplied recipe to verify that each individual probe and optical system is performing as expected.
2. Factory Gauge R&R – Performed prior to shipment, Gauge R&R documentation will be provided to the customer. All shipped products will have results satisfying <5% criteria.
3. System Hardware and Software Manuals
4. Maintenance and Troubleshooting Guides
5. Installation Information

Operational Specifications:

1. Probe distance from coated material
 - a. SpecMetrix standard system probes: 1.0" +/- 0.25" (25 +/- 6 mm)
 - b. SpecMetrix extended range EXR probes: 0.75" +/- 0.25" (19 +/- 6 mm)
2. Probe perpendicularity from coated material – 90° +/- 3°, both upstream to downstream and left to right side directions
3. Probe reflectance criteria – Typically between 30% to 90% as depicted by the SpecMetrix Inline software while in run mode
4. Line Speed Capability – The gauge takes coating thickness measurements of materials moving linearly up to 1,800 ft/min (550 m/min)
5. Material Flutter – The gauge maintains accuracy during any material flutter up to +/- 0.25" (+/- 6mm) from the nominal distance between the probe to the material
6. Electrical Requirements
 - a. Primary Control Workstation and processor: 100-240VAC, 15A circuit, single phase
 - b. ICU: 100-240VAC, 15A circuit, single phase
 - c. Circuits: All should be dedicated, isolated circuits
7. Ethernet Requirements


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- a. Internal network connection – if customer wants the ability to send files to/from the SpecMetrix system to/from their network or enable data communication. Connects to the Primary Control WorkStation and processor
 - b. External Ethernet connection – If customer wants to enable TeamViewer remote access or other remote access program. Connects to the Primary Control Workstation and processor
8. Compressed Air – None required
9. Operating Temperature – 0°C-50°C
10. Humidity – 10%-90%, relative, non-condensing
11. ICU enclosure and Mark V control workstation certifications– CE, UL, CSA
12. Optional Remote Monitor Workstation Enclosure Rating – IP65/66, NEMA 4X
13. Probe positioning – To prevent false readings from occurring between sheets, probes cannot be aimed at a metallic entity or any surface that could be affected by the coated material beneath the measurement surface.

Measurement Specifications and Requirements:

1. Measurement Range – SpecMetrix systems measure wet or dry coating thicknesses between 0.5 micron to 350 microns for transparent and translucent coatings and 0.7 to 75 microns for pigmented and non-transparent coatings depending on the supplied optical package(s).
2. Measurement Conversion – Measurements can be reported in microns, mils, or can be readily converted by the software into average film weights (g/m², mg/in², or mg/4in²). Other measurement units are available with consultation from Sensory Analytics. Conversion results require that the proper Wet Density, % Solids by Weight, and % Solids by Volume values are input into the coating recipe (included on coating supplier technical data sheets).
3. Measurement Rate – The SpecMetrix Inline software will report one averaged measurement per second which is an average of 100+ single point measurements. The averaged measurement is defined as the average of all measurements taken by the optical device that are deemed “valid” by the selected coating recipe during that 1 second interval. Measurements not meeting the coating recipe criteria are not included in this average.
4. Accuracy – The gauge has an accuracy of +/- 3% of the applied in-line coating thickness measured in microns. Results reported in film weight rely upon the accuracy of the technical data sheet values and may impact the accuracy of the measurements.
5. Repeatability – System has ability to measure all transparent and semi-transparent coatings with the same accuracy and repeatability. Same spot repeatability within +/- 0.1 microns.

OPTIONAL FEATURES (If quoted option is selected)

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Data Communication Package (Kepware® software):

1. Provides a data interface software package between the SpecMetrix Inline Software and the customer supplied PLC (Allen Bradley, Siemens, etc.) or onboard OPC Server (limited to single connection per SpecMetrix® PC).
2. Allows varying levels of automation from plant process systems to the SpecMetrix system.
3. Sensory provides all tag lists, fields, naming conventions, and field types to set up the communications. The customer is responsible for programming and integrating their PLC or SCADA system based on these tag lists and naming conventions.
4. Input Communications
 - a. Takes coating recipe name from customer device
 - b. Takes Tracking ID (work order or batch number) from customer device
 - c. Takes and applies start/stop commands for the SpecMetrix system from customer device
5. Output Communications
 - a. Sends periodic real-time measurement results and statistical data stream for each probe to customer device
 - b. Sends all recipe defined (high and low) tolerance limits for the coating recipe

Additional Options:

1. If purchased, the system can be supplied with ATEX certified fiber optic probes for use in hazardous zones. The electronics enclosures and monitor stations are not explosion proof rated and must be kept outside of the hazardous zones. Plant personnel will be solely responsible for potting/sealing the probe conduit at all appropriate wall/coater/covering openings and maintaining the sealing to meet proper regulations.
2. Second Remote Monitor Station – Provides an additional mounting device, remote monitor, keyboard tray, keyboard, mouse, and KVM extension kit.

1.0 History Table

Revision (No. or Letter)	Description (Brief Summary of Change, Sections Modified)	Modified By (Last Name, First Name)	Date (YYYY-MM-DD)	Change Control (Reference of Change Control No.)
0	Initial Release	Khan, Dean	2019-03-27	N/A