



1 Hand-held terahertz sensor. Ready for use without additional devices, standard socket sufficient.

2 B-Scan on a step wedge with flat bottom holes made of PE (bottom) and schematic cross-section (top). The diameters of the holes are 2 to 10 mm, each in 2 mm increments. The step height is 1 mm.

TERAHERTZ SENSOR FOR MOBILE USE

Non-destructive testing with Terahertz waves in production and service

The handheld scanner is a complete Terahertz test system for non-destructive on-site testing. Thanks to its compact, lightweight design, the device is easy to transport, making it ideal for testing immobile specimens, for example, and for use at various test sites in production. A one-sided sample access is sufficient as the system works in reflection. The combination of the sensor with a linear position encoder enables linear examinations of the sample, whereby a depth profile of the samples is determined at each point. In this way, A and B scans of the examined sample are obtained in analogy to ultrasonic examinations.

The sensor housing is closed, dustproof and splashproof and can therefore be used in production environments. A touch screen integrated in the computer serves for simple operation and display of the measurement.

Fraunhofer-Institut für Techno- und Wirtschaftsmathematik ITWM

Fraunhofer-Platz 1
67663 Kaiserslautern
Germany

Contact

Dr. Joachim Jonuscheit
Phone +49 631 31600-49 11
joachim.jonuscheit@itwm.fraunhofer.de

www.itwm.fraunhofer.de

Advantages

- Non-contact: no contact of the test specimen with a coupling medium
- Test specimens with internal hollow structures can be examined
- One-sided access sufficient: measurement in reflection
- No radiation protection measures necessary

The System

- Robust and long-term stable construction
- User-friendly user and evaluation interface
- Measurement data is archived for documentation purposes
- Interchangeable measuring heads



1 Testing the insulation of district heating pipes after welding

2 Inspection of glass fiber reinforced containers

System specifications

- Frequency ranges: 70 – 110 GHz, 110 – 170 GHz, 220 – 325 GHz
- Dynamic range > 40 dB at 1 kHz measurement rate
- Type of measurements: A scans and B scans (with position sensor). B scans are done manually
- Depth resolution (separation of two adjacent surfaces): typ. 6 – 2 mm, depends on bandwidth and material
- Lateral resolution in focus plane: typ. 3 – 1 mm, depends on frequency and material

Sensor (without cable)

- Closed, dust-tight and splash-proof housing
- Dimensions: L 304 mm × B 90 mm × H 100 mm (with wheels)
- Weight: < 2 kg

Computer

- Dimensions: B 420 mm × H 320 mm × T 180 mm (opened 460 mm)
- Weight: 11 kg

Electrical connections

- Operating voltage; 23 VAC, 50 Hz
- Power consumption: < 200 W

Applications

Non-contact inspection

- Detection of blowholes and bubbles
- Inspection of hidden structures
- Detection of inhomogeneities such as undulation, delamination in GFK and NFK
- Thickness measurement

Use in quality control

- Detection of hidden defects in production lines
- Recurring condition checks of containers and pipelines
- Documented control through storage of measurement data