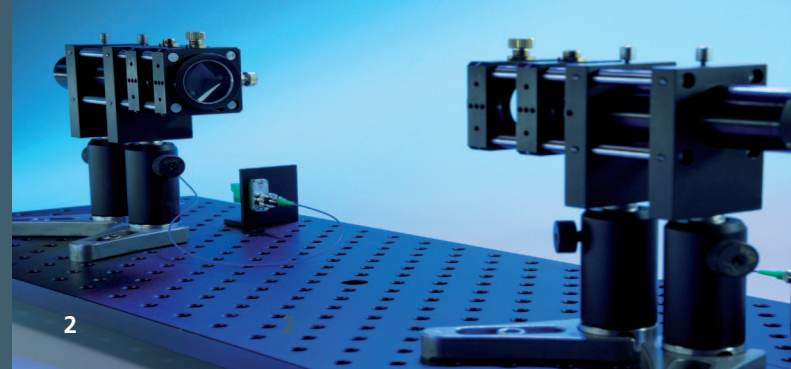




# Fraunhofer

## IPM

FRAUNHOFER INSTITUTE FOR PHYSICAL MEASUREMENT TECHNIQUES IPM



1 Supply unit.

2 Fiber-coupled THz modules:  
transmitter and receiver unit.

## FIBER-COUPLED TERAHERTZ SYSTEM

### Fraunhofer Institute for Physical Measurement Techniques IPM

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[www.ipm.fraunhofer.de/en](http://www.ipm.fraunhofer.de/en)



[www.TeraTec.org](http://www.TeraTec.org)

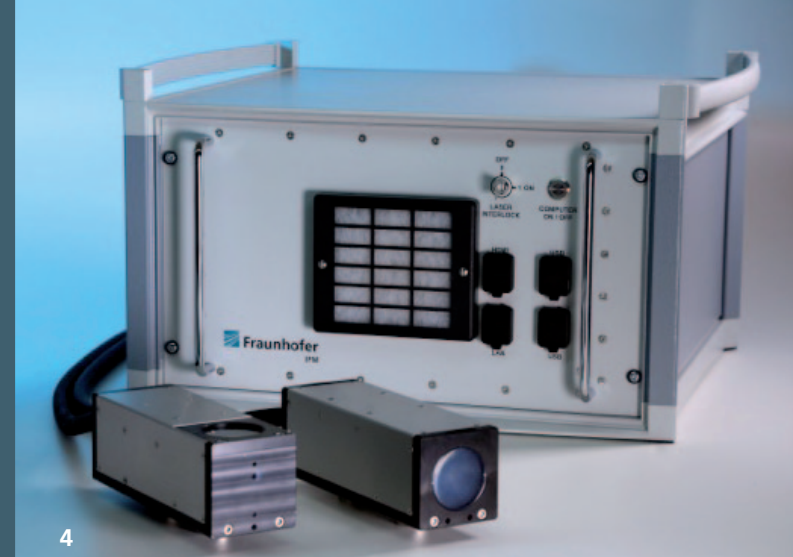
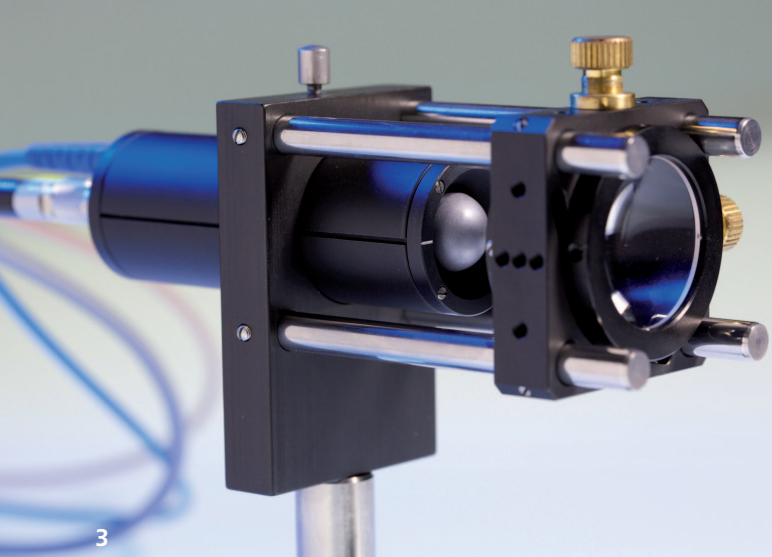
The terahertz frequency range opens up new possibilities for non-destructive and contact-free testing of non-metallic materials. Due to its comparatively low energy, terahertz (THz) radiation – unlike, for example, UV radiation or X-rays – causes no changes in the chemical structure of the materials to be tested. THz radiation is non-ionizing and thus harmless to humans. No special radiation protection is necessary.

#### Our offer

- Comprehensive consultation
- Test measurements on existing systems
- Equipment rental
- Individual design of measurement modules and peripherals according to customer preferences
- Translational and rotational axes for surface scanning of samples including software integration optionally available

#### The benefits

- Compact system for mobile application
- Robust and long-term stable construction
- Quick and simple switching between transmission and reflection configuration
- Simple integration into existing measuring systems via flexible fiber and cable connection
- Length of connecting cables freely selectable up to 15 m
- No special laser protection measures necessary due to complete fiber-coupling
- Operator-friendly user interface of the control software



3 Terahertz antenna module.

4 Supply unit with terahertz transceiver modules.

### System specifications

- Pump wavelength: 1 550 nm
- Repetition rate: 80 MHz
- connecting cable length: 5 m (up to 15 m optional)
- Dynamic range: >60 dB at maximum
- Online operation: >40 measurements per second
- High-resolution measurements (sub 5 GHz frequency resolution)
- Transmission and reflection measurements

#### Supply unit:

- 19" rack
- Dimensions (WxHxD): 420 x 500 x 265 mm<sup>3</sup>
- Weight: approx. 33 kg
- Uninterruptible power supply (optional)

#### Transmission and reflection unit (fig. 3):

- Dimensions: 25 x 70 mm<sup>3</sup>
- Weight: approx. 200 g

#### Measuring module (fig. 2 + 4) :

- measuring in reflection
- Dimensions (WxHxD): 75 x 75 x 220 mm<sup>3</sup>
- Weight: approx. 1 300 kg

#### 5 Spectrum of the fiber-coupled terahertz-system at:

Measuring time: 200 ms

Measuring rate: 5 Measurements per second

Scan range: 100 ps

Configuration: transmission measurement with two parabolic mirrors

### Applications

#### Contact-free inspection:

Layer thickness measurement, foreign particles detection, moisture measurement, inspection of hidden structures, delamination, adhesive joints, detection of inhomogeneities, inspection of packed and unpacked items.

#### Non-destructive materials characterization:

Degree of purity, analysis of mixtures, conformation, polymorphism, isomers, amorphous/crystalline distinction, determination of charge-carrier mobility and concentration in semiconductors.

### Materials selection

*Transparent materials*, which permit looking inside or through the material, include ceramics, plastics, composite materials such as GFRP, chemicals, paints and varnishes, adhesives, semiconductors, textiles, and paper.

*Reflective materials*, which only allow surface or applied-coatings inspection, are metals and electrically conductive materials such as CFRP.

*Crystalline substances* can be detected specifically.

*Polar liquids*, such as water, do absorb strongly, non-polar liquids like gasoline only absorb slightly.

