

## Metrology Equipment Overview

Measuring Environment / Measuring Equipment Portfolio



## Measuring Equipment According to Measurand

| Length / Path                    |                                     |                             |                                         |
|----------------------------------|-------------------------------------|-----------------------------|-----------------------------------------|
| Measuring equipment              | Measuring principle                 | Resolution/DPMI             | Measuring range                         |
| Tactile measuring sensor         | Inductive (incremental)             | to 5 nm                     | to 50 mm                                |
| Laser interferometer             | Optical (incremental)               | to 0.151 nm                 | to 10 m                                 |
| Vibrometer                       | Optical (Doppler effect)            | 2 nm                        | 40 mm                                   |
| Multi-sensor measuring machine   | Optical and tactile                 | 0.1 $\mu\text{m}$           | 300 mm $\times$ 300 mm $\times$ 160 mm  |
| CNC coordinate measuring machine | Incremental sensor with glass scale | 0.1 $\mu\text{m}$           | 900 mm $\times$ 1800 mm $\times$ 800 mm |
| PISeca                           | Capacitive sensor                   | 0.001 % of the travel range | to 100 $\mu\text{m}$                    |

| Angle                                   |                           |                 |                                           |
|-----------------------------------------|---------------------------|-----------------|-------------------------------------------|
| Measuring equipment                     | Measuring principle       | Resolution/DPMI | Measuring range                           |
| Laser interferometer                    | Optical (incremental)     | to 34 nrad      | $\pm 0.11^\circ$                          |
| Autocollimator (AKF)                    | Optical (autocollimation) | to 0.05 arcsec  | $\pm 0.29^\circ$ (up to $\pm 2.3^\circ$ ) |
| Angle measuring device / rotary encoder | Incremental               | to 0.4 arcsec   | 360°                                      |

| Velocity             |                          |                          |                  |
|----------------------|--------------------------|--------------------------|------------------|
| Measuring equipment  | Measuring principle      | Velocity resolution      | V <sub>max</sub> |
| Laser interferometer | Optical (incremental)    | to 10 nm/s               | up to 4 mm/s     |
| Vibrometer           | Optical (Doppler effect) | to 0.005 $\mu\text{m/s}$ | up to 10 mm/s    |

| Surface finish / surface flatness |                                               |                                |                                                          |
|-----------------------------------|-----------------------------------------------|--------------------------------|----------------------------------------------------------|
| Measuring equipment               | Measuring principle                           | Resolution/DPMI                | Measuring range                                          |
| White light interferometer        | Optical (incremental)                         | $\lambda/25$                   | 80 mm $\times$ 80 mm                                     |
| White light interferometer        | Optical (scanning white light interferometry) | to 1 nm<br>for smooth surfaces | Z=70 mm<br>X=38 mm<br>Y=28 mm                            |
| Laser scanning microscope         | Optical                                       |                                | X=100 mm; Y=100 mm;<br>1 $\times$ - 8 $\times$ objective |

| Eccentricity / wobble   |                     |                              |                                                         |
|-------------------------|---------------------|------------------------------|---------------------------------------------------------|
| Measuring equipment     | Measuring principle | Resolution/DPMI              | Measuring range                                         |
| Static spindle analyzer | Capacitive          | 80 $\mu\text{V}/\mu\text{m}$ | Low $\pm 125 \mu\text{m}$<br>High $\pm 6.5 \mu\text{m}$ |