

Overview - Categorization

clip-on extensometer



- cost efficient
- preferably for determination of elastic properties
- Longitudinal / Transversal
- limited in measuring range

long travel extensometer



- depending on instrument useable for determination of strain for wide range of materials up to fracture
- fully automated available, suitable for automated systems
- recommended for strain controlled testing

non-contact extensometer no influence of measurement (own weight/edges)

Video or Laser



- Marking necessary
- suitable for various (sensitive) materials at high- and low temperatures
- no abrasion, suitable for measurement until fracture
- quality of measurement depends on optical outer influences
- transversal/axial

Laser Speckle

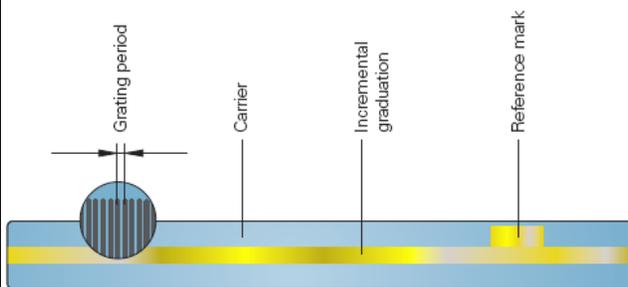


- no marking necessary
- no marking necessary, but strongly depends on specimen surface
- not applicable to all materials, depending on specimen surface
- no abrasion, suitable for measurement until fracture, but only "true" elongation from regional measurement, no technical strain

Measuring Principles

optical incremental

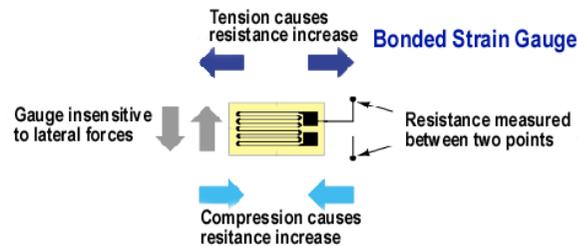
- fast, reliable and accurate length measurement
- insensitive to vibration and shock
- defined thermal behavior
- changes in atmospheric pressure or relative humidity have no influence on the accuracy



- MFX200
- MFL300B
- MFE910

strain gauge

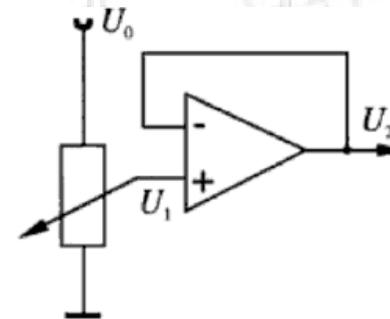
- strain gauge is excited with a stabilized DC supply and with additional conditioning electronics, can be zeroed at the null point of measurement, as stress is applied to the bonded strain gauge, a resistive changes takes place and unbalances the Wheatstone Bridge
- commonly 2mV/V output
- temperature sensitive
- mechanically sensitive



- (mini) MFA2
- MFA25
- MFQ
- MFN-A-4/500
- MFN-A-D4/300
- MFL300B

potentiometric

- Input signal (kinematic measurend = angle or position) is converted into a change in resistance
- mechanically sensitive
- sensitive to temperature
- supply voltage contributes to measurement



- MFN-A-4/500

optical

- measurement bases on optical systems

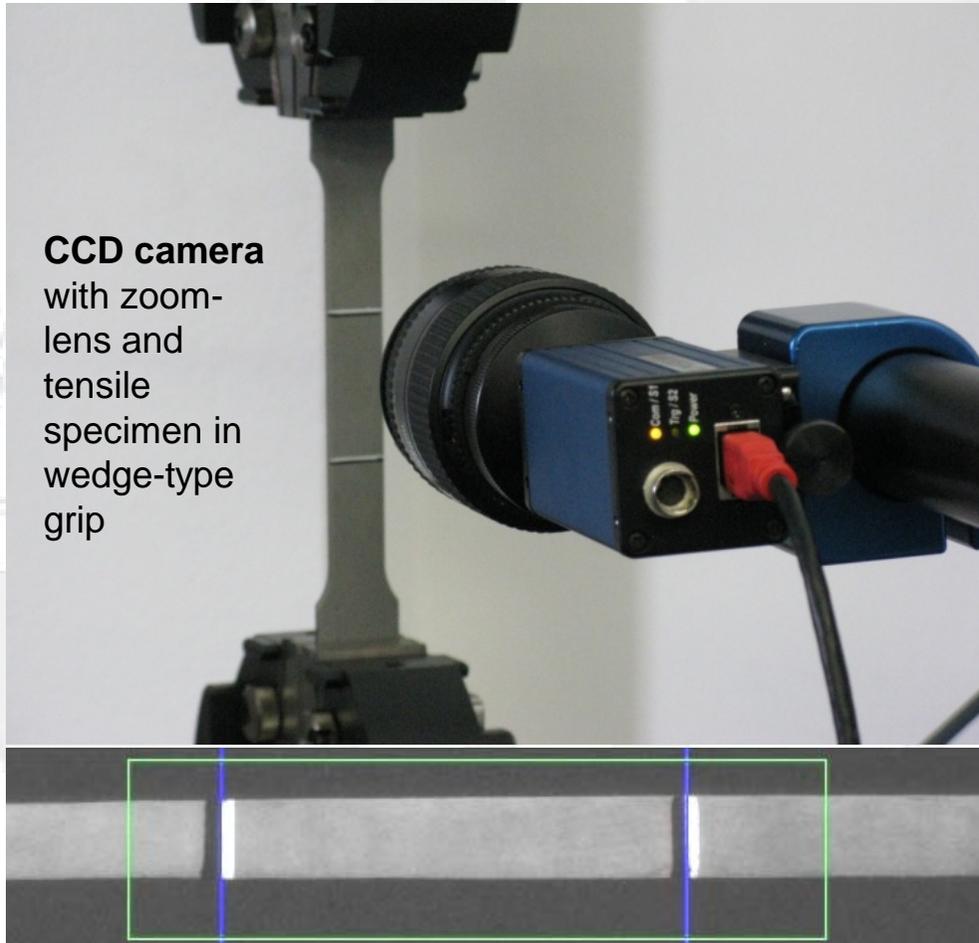
- video
- laser
- laser speckle

digital

- measurement bases on digital linear gauge
- sensitive to certain magnetic field

- MFN-A-D 4/300

Non-Contact - Video Extensometer



CCD camera
with zoom-
lens and
tensile
specimen in
wedge-type
grip

optical extension
blue line: gauge marks in software
green frame: analysis area, Area of Interest (AOI)

VideoShot 50

- contact-free
 - longitudinal and lateral strain (r - n -values, true stress)
 - used in temperature chambers
 - resolution of the field of view ca. 1: 100.000
(e.g. visual field 100 mm, resolution 1 μ m)
 - rel. measuring accuracy up to 0.002% ext.
(e.g. 20 μ strain, L_0 50 mm, DI 0.001 mm)
 - max. test speed depending on AOI
 - automatic determination of initial gauge length
- data transfer from camera to extensometer computer via FireWire and to testing computer via RS232
- gauge marks via pen or sticker, based on contrast differences
- problematic at higher strain depending on specimen material