

FL 210

Photoelastic demonstration



The illustration shows the FL 210 device with a normal overhead projector, which is not part of the scope of delivery.

Learning objectives/experiments

- generate plane stress states in various models under load
 - ▶ compressive load
 - ▶ tensile load
- investigate stress distributions with linear and circular polarised light
- interpret photoelastic fringe patterns
 - ▶ stress distribution
 - ▶ stress concentration

Description

- demonstration unit as an attachment for an overhead projector
- generate stress patterns with linear or circular polarised light in typical polycarbonate components
- detect stress concentrations

Photoelasticity can be used to demonstrate stress profiles and stress concentrations in component models.

The distribution of stress in plane, transparent bodies (plastic models) is investigated using polarised light. Polarising filters represent the stress profiles in colour. The notching and point loading and the criteria dictating component design are clearly visualised.

The FL 210 unit can be used with overhead projectors.

Various transparent plastic models are mounted inside a frame. A load application device is used to apply pressure or tensile loads to the model under investigation through a spindle.

An arrangement of polarising filters and quarter-wave filters generates either linear or circular polarised light. A green filter to generate monochromatic light is also part of the scope of delivery. The light source is an overhead projector (e.g. FL 210.01).

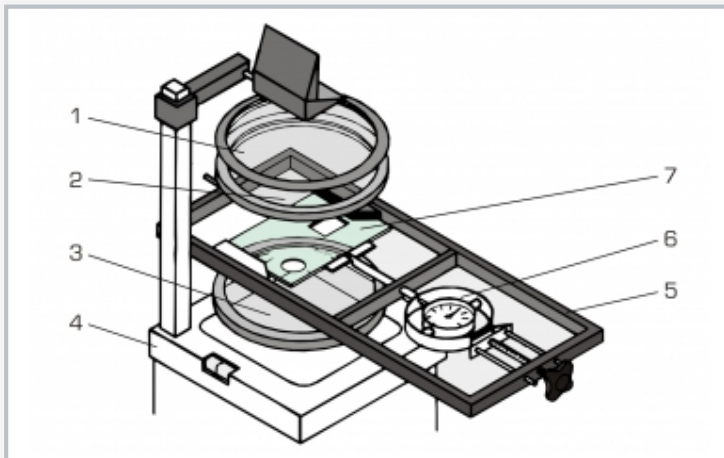
The use of monochromatic light produces a system of dark and light stripes, which reflect the distribution and magnitude of mechanical stresses. The models which belong to the scope of delivery represent typical components, permitting experimentation in relation to notching and point loading. The stress profiles shown on the model are identical to those in real-world components.

Additional models are also available to represent stress profiles in roller bearings, tooth flanks, screw connections and wrenches.

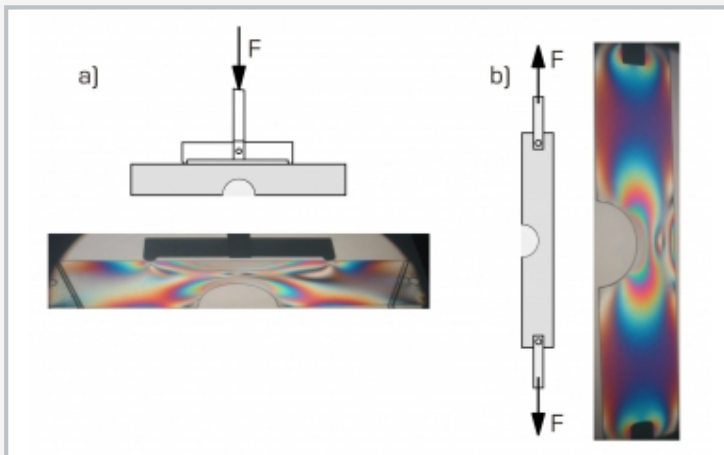
All parts of the experiment are clearly laid out and securely housed in a storage system.

FL 210

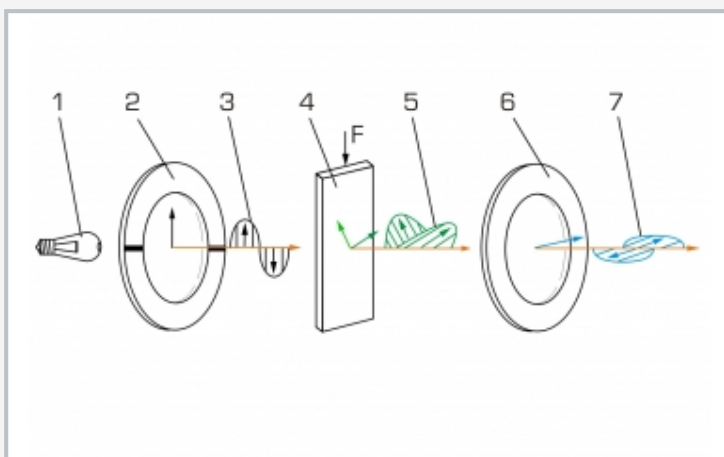
Photoelastic demonstration



1 green filter, 2 analyser, 3 polariser, 4 overhead projector (FL 210.01), 5 frame, 6 load application device with force gauge, 7 plastic model



a) Model under bending load, stress profile
b) Model under tensile load, stress profile



Schematic representation of the photoelastic demonstration:
1 light source, 2 polariser, 3 linear polarised light, 4 model under load, 5 light decomposed into two components in the directions of the principal stresses, 6 analyser, 7 horizontal components of the light

Specification

- [1] photoelastic experiments with an overhead polariscope
- [2] polariser and analyser each comprise a polarising filter and a quarter-wave filter
- [3] filter enclosed, with stress-free glazing
- [4] all filters arbitrarily rotatable in the horizontal plane
- [5] linear or circular polarised light possible
- [6] green filter for monochromatic light
- [7] load application device with force gauge for pressure and tensile load
- [8] eight different polycarbonate models are delivered
- [9] storage system for parts

Technical data

Filter bracket with polariser and analyser

- diameter of filters: $\varnothing=165\text{mm}$
- 1 green filter, diameter: $\varnothing=150\text{mm}$

Load application device with force gauge

- load force: 0...250N

8 models, PC

- unnotched bar
- bar with hole
- bar notched on one side
- bar notched on both sides
- rectangle without recesses
- rectangle with recesses
- fork
- crane hook

LxWxH: 500x190x30mm (frame)

LxWxH: 280x280x90mm (filter bracket)

Weight: approx. 8kg

LxWxH: 1170x480x178mm (storage system)

Scope of delivery

- 1 frame with load application device
- 1 filter bracket with polariser and analyser
- 1 green filter
- 8 photoelastic models
- 1 storage system with foam inlay
- 1 set of instructional material

FL 210

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Optional accessories

021.21001	FL 210.01	Overhead projector
021.21010	FL 210.10	Model bolted connection
021.21011	FL 210.11	Model roller bearing
021.21012	FL 210.12	Model wrench
021.21013	FL 210.13	Model pinion
020.30009	WP 300.09	Laboratory trolley