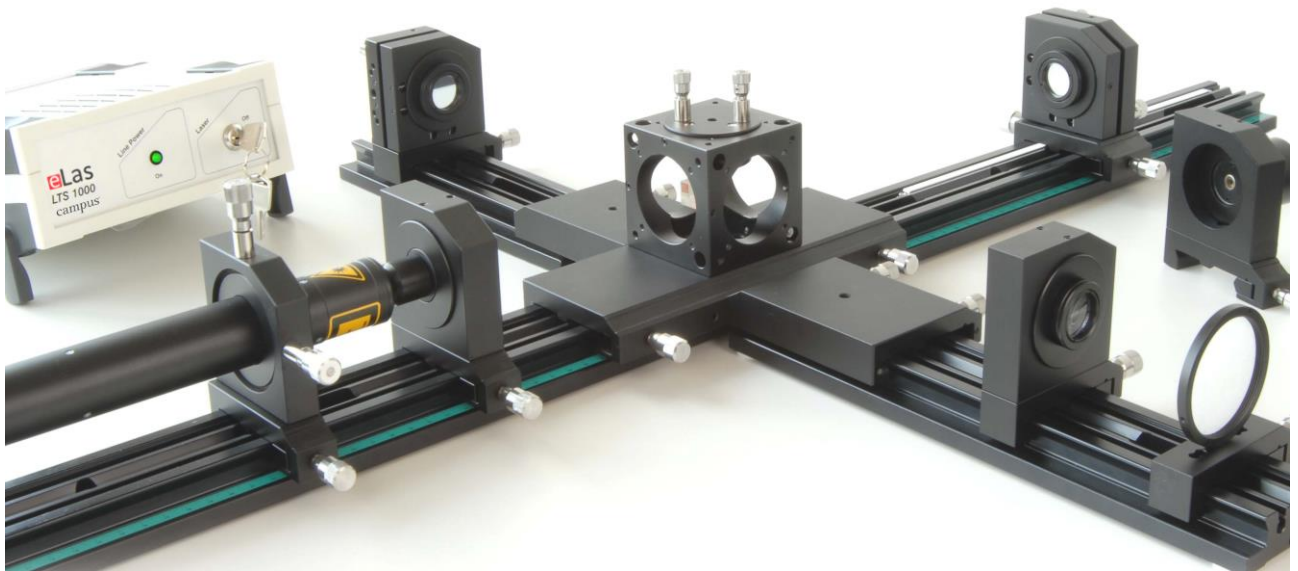


## ***Michelson Interferometer (CA-1300)***

## ***Extension Technical Interferometer (CA-1301)***

## ***Motorized Extension (CA-1302)***



The basic version of a Michelson interferometer (CA-1300) is presented for training of handling, alignment and measurement of an interferometer system. Basics like properties of Gaussian beams, wave fronts and interference patterns are discussed. The spectral emission bandwidth of the laser source is introduced and its influence on the interferometer contrast is measured. The measurement of the coherence length of a HeNe laser shows the students additional parameters of interferometers.

Complemented by the extension CA-1301 the basic Michelson interferometer is rounded up to a technical interferometer. Length measurement with this homodyne laser interferometer is based on electronical fringe counting. The quadrature detection technique allows determining the direction and step numbers of movement of one interferometer mirror. A comparator electronics digitalizes the analogue sine and cosine signals generated by the detection unit. Forwarded to an event counter the number of fringes is registered and can be converted in measures of length.

Option CA-1302 extends the Technical Interferometer by a motorized translation stage and a controller to demonstrate an application of industry, the calibration of an unknown length. Via a PC a travel range is set, encoded by the controller and forwarded to the translation stage. The value measured by the interferometer is compared to the travelling distance and hence to the set value. Corrected for environmental conditions (pressure and humidity) the interferometer value builds the calibration standard.

## ***Educational Objectives of Investigation***

- HeNe Laser
- Contrast, Coherence Length
- Two Beam Interference
- Homodyne Interferometer
- Technical Interferometer
- Fringe Detection, Counting and Interpolation
- Lissajous curves
- Definition of Length

## ***Ordering Information***

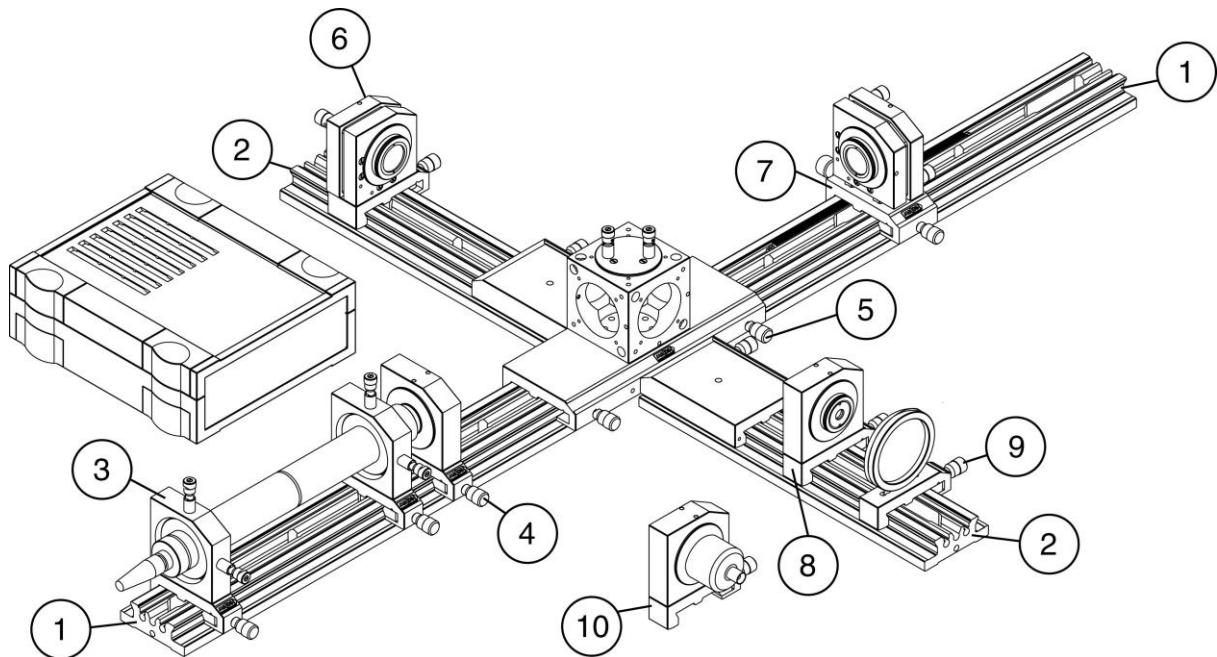
This ordering information gives an overview of ordering numbers of the available Laser Interferometer kits. All modules of the kits can be ordered separately, if required.

For ordering the Michelson Interferometer kit (CA-1300) use ordering number: 490091300

For ordering the Extension Technical Interferometer (CA-1301) use ordering number: 490091301  
**please note:** for this extension the Michelson Interferometer kit (CA-1300) is required

For ordering the Motorized Extension (CA-1302) use ordering number: 490091302  
**please note:** for this extension the Michelson Interferometer kit (CA-1300) is required

## **Setup and Components CA-1300 Michelson Interferometer**

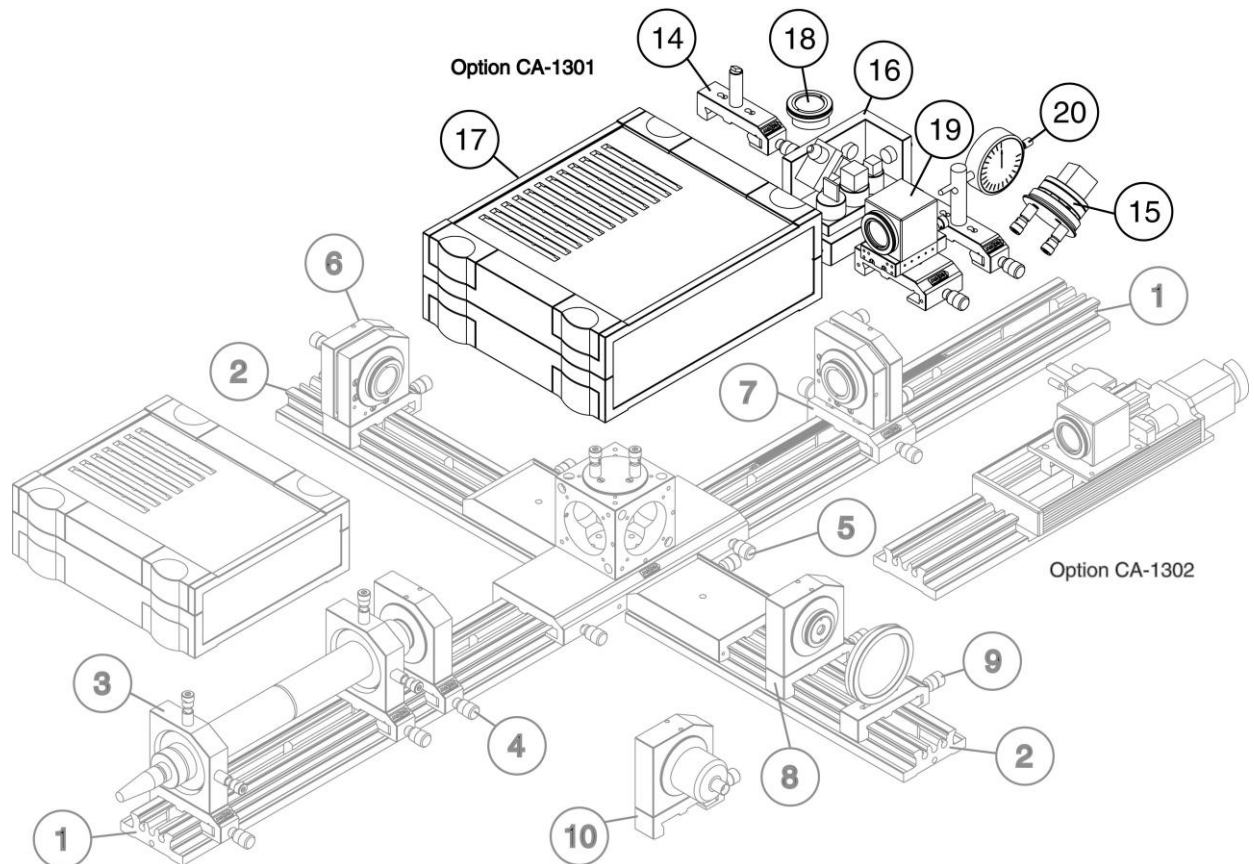


- 1 Optical Flat Rail 500 mm with scale (2x)
- 2 Optical Flat Rail 300 mm with scale (2x)
- 3 HeNe Laser with X/Y adjustment holder on carriers
- 4 Beam expander in holder on carrier
- 5 Beam splitting unit in adjustable holder on cross piece
- 6 Plane mirror in adjustment holder on carrier
- 7 Plane mirror in adjustment holder on carrier with rack-and-pinion drive
- 8 Beam expanding optics for interference patterns on carrier
- 9 Screen for interference pattern on carrier
- 10 PIN-Photo detector with holder on carrier and BNC cable
- 11 Target screen insert
- 12 Optics cleaning set
- 13 User manual

### **Measurements and Handling**

- Assembling and alignment of a Michelson interferometer
- Representation of interference patterns
- Measurement of contrast function and coherence length

## **Setup and Components CA-1301 Extension Technical Interferometer**

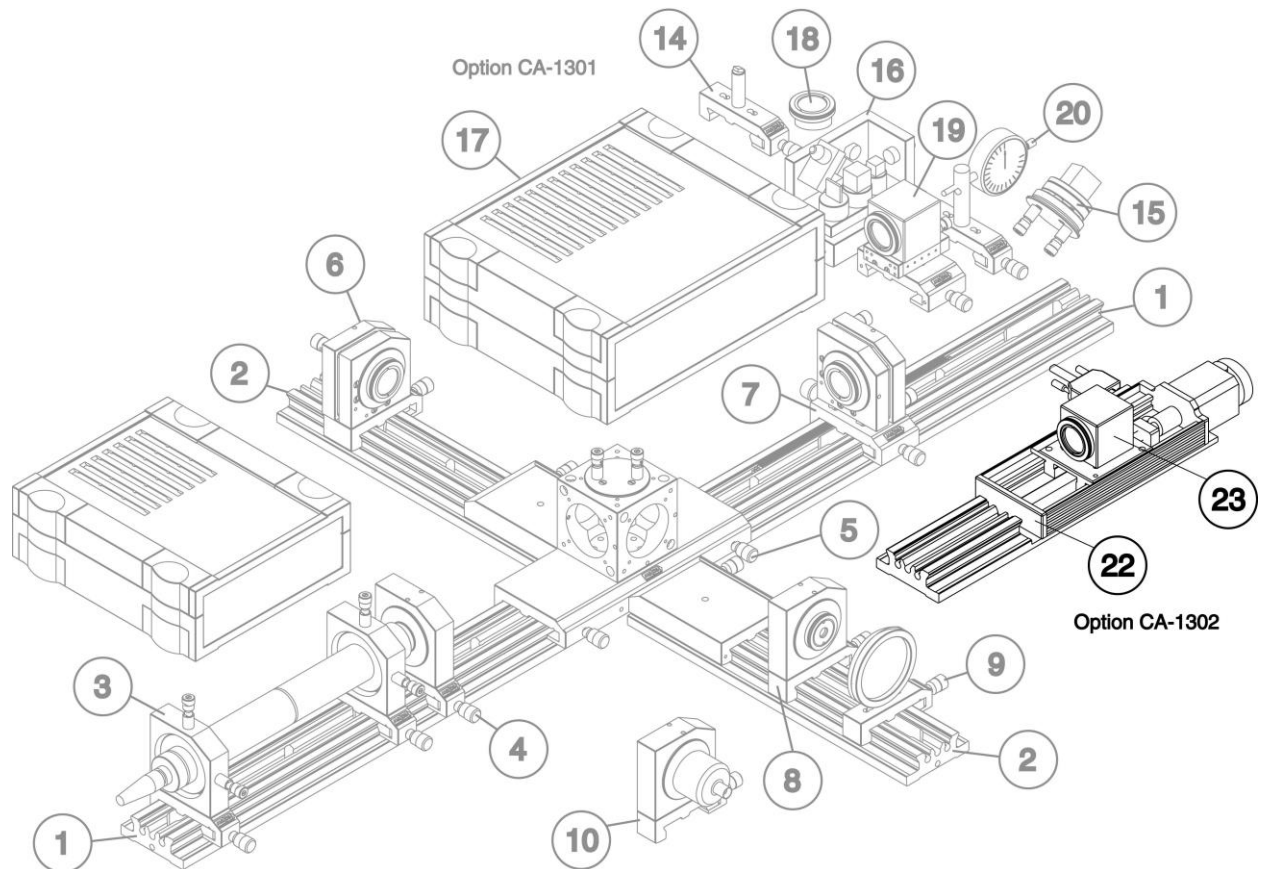


- 14 Beam displacement optics in holder on carrier
- 15 Beam splitting unit for technical interferometers in adjustable holder on cross piece
- 16 Signal detection unit for sin/cos on carrier
- 17 Controller for light detection and signal evaluation
- 18 Corner cube reflector in holder
- 19 Corner cube reflector on translation stage on carrier
- 20 Dial indicating gauge in holder on carrier
- 21 BNC connection cables

### **Measurements and Handling**

- Assembling and alignment of a technical interferometer
- Signal conditioning of sin / cos
- Fringe detection, resolution, limits
- Lissajous curves
- Distance measurement

## Setup and Components CA-1302 Motorized Extension



22 Linear stage 100 mm on flat rail connector

23 Corner cube in holder

24 Stepper motor controller SMC basic

25 Control software

### Measurements and Handling

- Industrial application
- Calibration of a translation stage
- Closed loop operation of a translation stage
- Environmental conditions