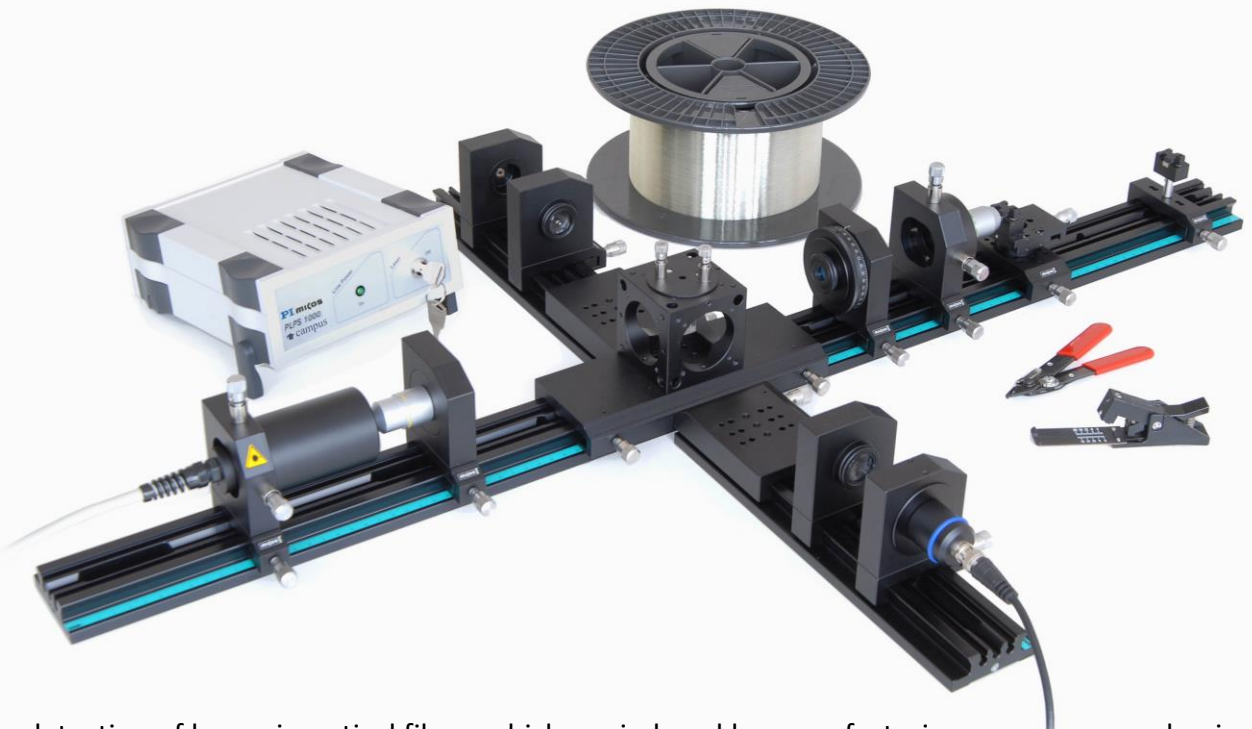


## ***Optical Time Domain Reflectometry (OTDR, CA-1420)***



For detection of losses in optical fibers which are induced by manufacturing process or mechanical stress Optical Time Domain Reflectometry (OTDR) is used as an efficient technique. Basically this procedure couples a light signal to the fiber and measures the occurrence of reflected or backscattered light blips. These blips are generated at stray centers and defects within the fiber or at fiber surfaces, for example at fiber connectors. This behavior is exploited within OTDR and can be used to locate errors in fiber links.

The aim of this educational kit is the comprehension and training of the principle and operation of an OTDR realized by this open frame setup. The measurement of the backscattered light and the interpretation of the measured data are explained and discussed.

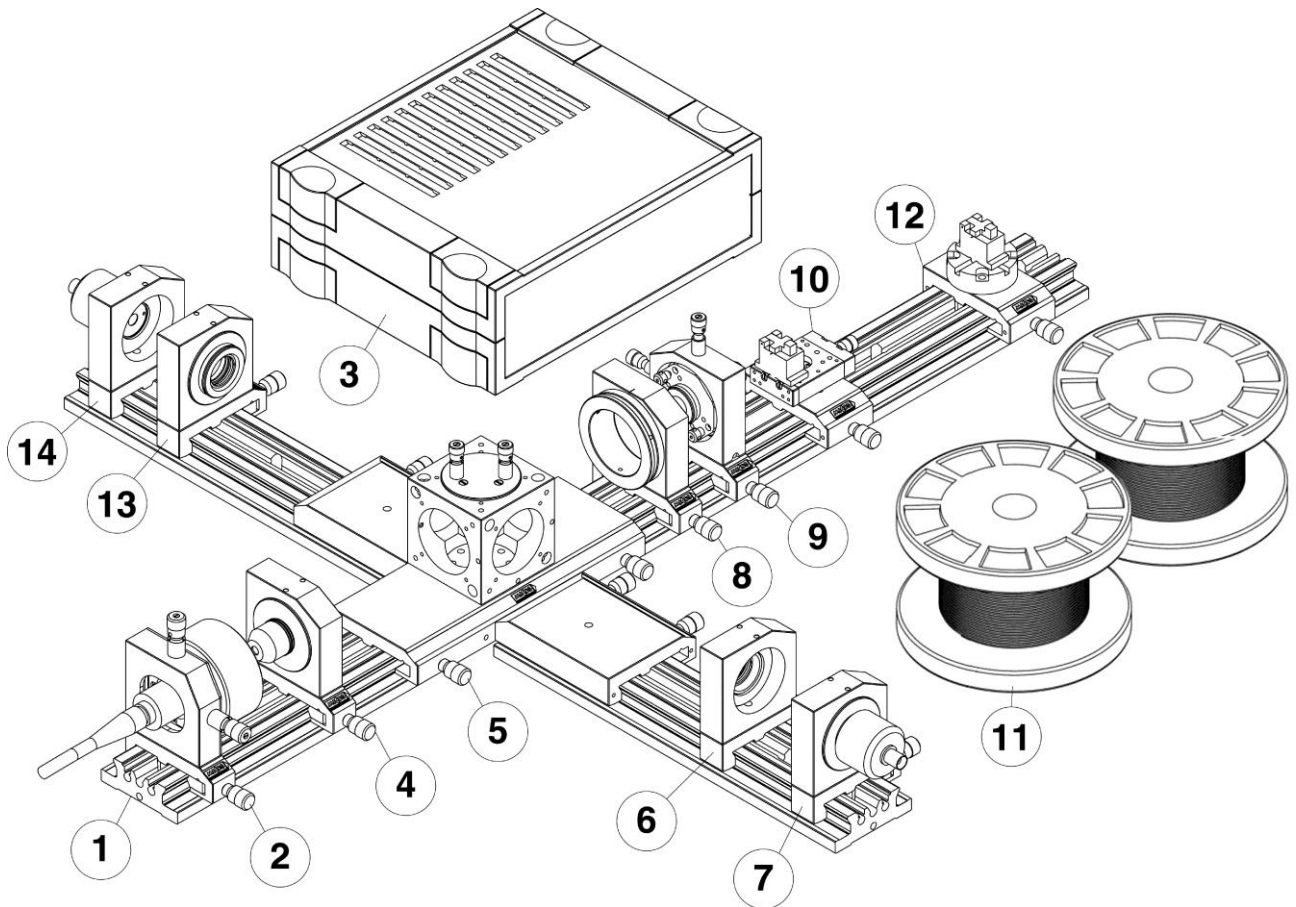
After assembling the complete OTDR kit reflectometry measurements can be performed. Short pulses (<5ns) are coupled in a 1 km multimode fiber. The fiber ends are prepared by Miller pliers and a fiber cleaver. A trigger signal generated by reference pulses starts the measurement. The time of flight of the light backscattered by the fiber determines the length of the fiber. A fiber-fiber coupling module introduces an air gap between two fibers and simulates a distortion of the fiber. Besides the OTDR measurements, some of the experiments of the Glass Fiber Optics kit (CA-1410) are possible. Further, measurements of the velocity of light and laser pulse characterization can be performed.

For the measurements a 100 MHz oscilloscope is necessary and can be ordered optionally.

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

- Pulsed Laser Module
- Properties of Glass Fibers
- Fiber Defects
- InGaAs Photo Detector
- Fiber Handling and Preparation
- Coupling Light to Fiber
- Reflected Light Echoes
- Speed of Light

## Setup and Components



- |    |   |    |   |
|----|---|----|---|
| 1  | Set of 4 flat rails with scale                    | 11 | ~1000 m multimode glass fiber (2x)                                |
| 2  | Pulsed Laser Module in adjustment holder          | 12 | Fiber holder on carrier   |
| 3  | Pulsed Laser control electronics PLPS 1000        | 13 | Imaging optics for signal pulse detector                          |
| 4  | Collimator for laser diode beam                   | 14 | Detector for signal pulse in holder                               |
| 5  | Adjustable beam splitter on articulated connector | 15 | Fiber coupling module for ST connectors (not shown)               |
| 6  | Imaging optics for start pulse detector           | 16 | Fiber cleaver and stripper (not shown)                            |
| 7  | Detector for start pulse in holder                | 17 | IR card 800 – 1600 nm (not shown)                                 |
| 8  | Quarter wave plate in rotation holder             | 18 | 2 BNC cables with BNC T pieces and 50 $\Omega$ shunts (not shown) |
| 9  | XY adjustment holder with coupling optics         | 19 | User manual (not shown)   |
| 10 | Fiber holder on linear stage                      |    |   |

## Ordering Information

For ordering the Optical Time Domain Reflectometry kit (CA-1420) use ordering number: 490091420

Version 1/17