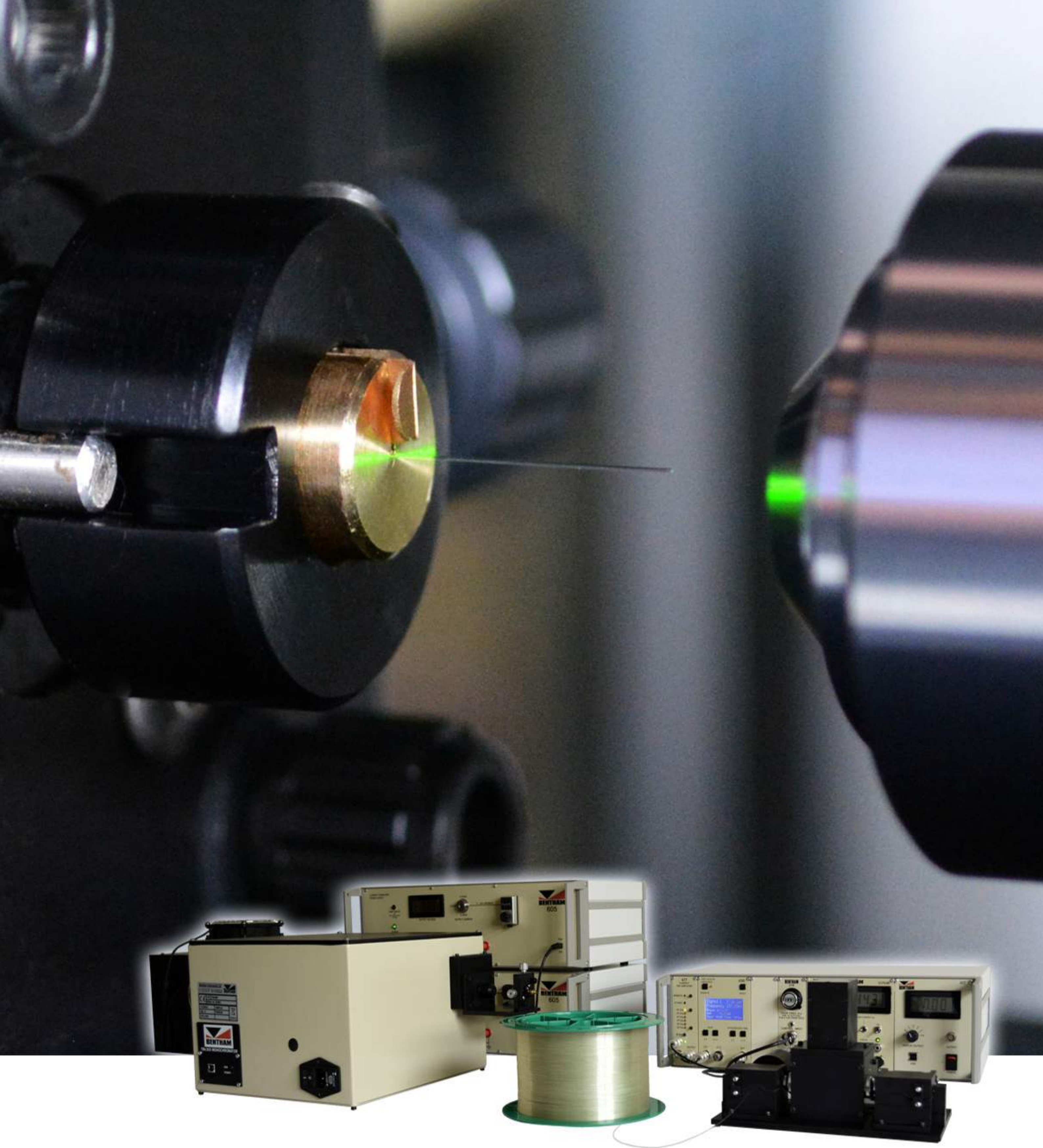


BENTHAM

FSL300

Fibre Spectral Loss Measurement System

FSL300 Fibre Spectral Loss system

The Bentham FSL300 is a reliable, turn-key solution for the measurement of fibre spectral loss. Whilst traditionally configured to cover the telecommunications wavelength band, the capability of the FSL300 can be extended into the ultra-violet, visible and further into the infra-red to 5000nm and beyond.

Spectral loss is a key metric in quality control, material research and development of optical fibre used for example in single transmission and in optical amplifiers.

In the FSL300, this parameter is evaluated using the cut-back technique, the internationally recognised reference test method offering the highest measurement accuracy[1].

The high degree of configurational flexibility of the FSL300 allows the choice of light source, monochromator configuration, launch optics and detector station to allow measurements over very wide spectral range and a large range of fibre types, including silica, doped glass, plastic and photonic bandgap fibres.

This system may also be used to determine fibre cut-off wavelength[2], in the measurement of mode field diameter[3], the determination of macrobending loss[4] and evaluation of the spectral properties of a wide range of passive WDM components such as taps and couplers.

The Cut-Back Technique

Light transmission over the spectral range of interest is measured through a long piece of fibre (typically 1-2km long) which is then cut back by a known amount and the light transmission measurement repeated.

From these two measurements and knowing the length of fibre cut-back we can determine the spectral loss (dB/km).

$$a(\lambda) = \frac{1000}{l_c}.10.log_{10}\left(\frac{P_{short}(\lambda)}{P_{long}(\lambda)}\right)$$

Where:-

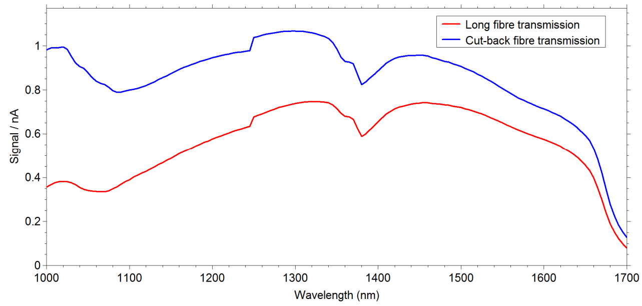
- **$\alpha(\lambda)$** is the fibre spectral loss (dB/km)
- **l_c** is the cut-back length (m)
- **$P_{long}(\lambda)$** is the measured signal through a long piece of fibre
- **$P_{short}(\lambda)$** is the measured signal with above fibre cut back by l_c

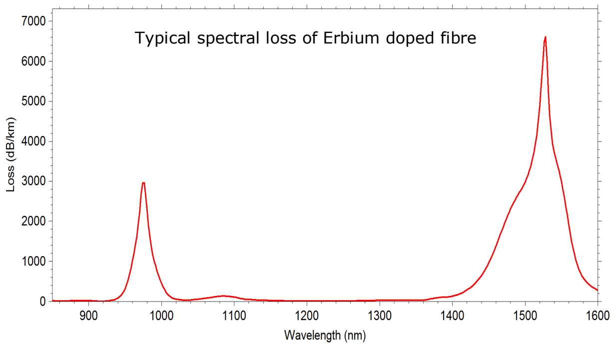
[1] IEC 60793-1-40,"Measurement methods and test procedures - Attenuation."

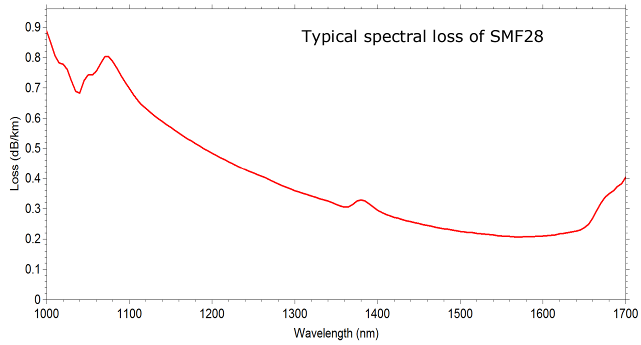
[2] IEC 60793-1-44,"Measurement methods and test procedures - Cut-off wavelength"

[3] IEC 60793-1-45,"Measurement methods and test procedures - Mode field diameter "

[4] IEC 60793-1-47,"Measurement methods and test procedures - Macrobending loss







System Overview

Spectrometer

Light transmission as a function of wavelength is determined by illuminating the fibre under test with an optically chopped, monochromatic probe output from a TMc300 single monochromator, configured according to the spectral range of interest.

The light source employed may include up to two lamps of xenon, quartz halogen or Nernst IR emitter.

The monochromatic probe is optically chopped to improve the measured signal-to-noise ratio.

Launching Light into Fibre

A short focal length objective lens is used to couple a maximum of the monochromatic probe into the fibre under test.

An x-y-z translation assembly is provided to optimise alignment to the fibre under test, whether the fibre is cabled or not (bare fibre, FC and SMA connectors mounts available).

The launch optics/fibre mount assembly is mechanically rigid and securely mounted to the monochromator exit slit to ensure that the monochromatic probe does not misalign during measurement.

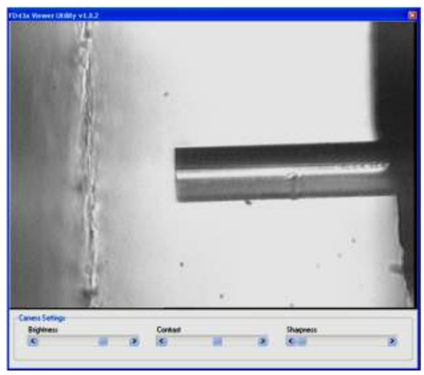
Detector Station

A range of single and dual detector stations are available with microscope or CMOS-camera based viewer to inspect the condition of the cleaved cut-back fibre.

The detector output is coupled to a fully automated DSP lock-in amplifier for signal recovery.

Software Control

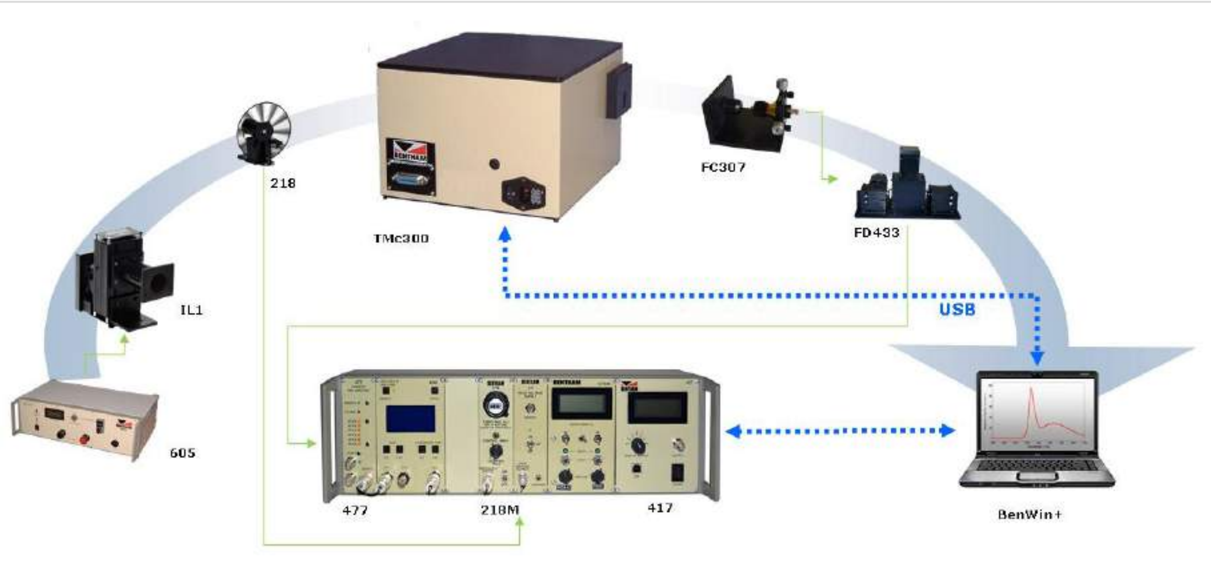
All measurements with this system are driven from our proprietary Windows software, BenWin+, allowing full control of the FSL300 system.



Where the detector station is fitted with a CMOS camera, the fibre condition can be viewed through BenWin+.

Specification

Spectral range of Monochromatic Probe	Light Source	Diffraction Gratings
	IL1: 350-2500nm **IL7**: 300-1100nm **ILD-QH-IR-CHOP**: 350-5000nm	**T312ROU5**: 350-1200nm **T30831U2**: 500-1800nm **T306R1U6**: 800-2500nm **T303R3U0**: 1500-5500nm
Typical Spectral data interval	5nm	
Typical Spectral bandwidth (FWHM)	5nm	
Spectral range of Detector Station	**Si**: 350-1100nm	
	InGaAs: 800-1700nm	
	InGaAs_EX_TE: 800-2500nm	
	PbSe_TE: 1500-5000nm	
Wavelength accuracy	**T312R0U5** ± 0.2nm **T30831U2**: ± 0.3nm **T306R1U6**: ± 0.4nm **T303R3U0**: ± 0.8nm	
Computer requirements	OS: Windows 7 + (32-/64-bit) Minimum hard disk space: approx. 100MB Minimum RAM: 2 GB 3 x USB 2.0 ports	
Services requirements	5 x 110/220V AC mains sockets, 600VA total	



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