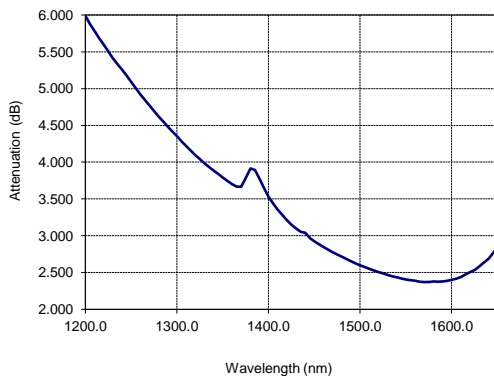




Singlemode ARF Attenuation Reference Fibre



The Attenuation Reference Fibre (ARF) consists of a spool of singlemode fibre, which is mounted in a protective case for an optimum mechanical and thermal stability. The spectral attenuation of the fibre is calibrated by using a “cut-back” technique, according to IEC 60793-1-40 and the attenuation homogeneity is calibrated by comparison with a reference optical time domain reflectometer. This artefact is designed for use under standard laboratory conditions. The Attenuation Reference Fibre is ideally suited for the calibration of the attenuation scale of OTDR, according to IEC 61746.



Typical Spectral attenuation of a 12 km G652 ARF.

Specifications

Available fibre types

Singlemode G652, G655
Multimode, with controlled modal distribution

Typical Fibre lengths

10 - 12 km,
other length available on request

Calibrated quantities and uncertainties (*)

Spectral attenuation $A(\lambda)$

$U_A = 0.03$ dB

Attenuation uniformity $D(\lambda)$

$U_D = 0.009$ dB / dB

Fibre optical length L

$U_L = 0.11$ m @ $L = 12$ km

Wavelength domain

1200 nm - 1650 nm, other domains on request

Connectors

Flat or angled, with Multipurpose Adapter System.

Available adapters: E-2000, FC, SC, ST.

Pigtailed version also available

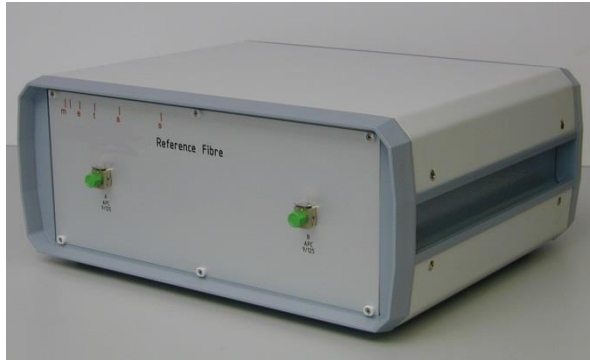
(*) These values correspond to typical uncertainties, which may vary depending on fibre type and length.

Ordering Information: ARF – a – b – c/x – d/x

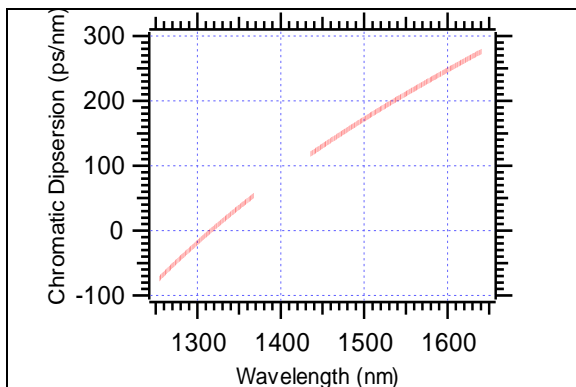
a fibre type	b fibre length in meter	c input connector type	d output connector type	x Configuration
G652 G655 MM50 MM62.5		FCPC FCUPC FCAPC E2000	FCPC FCUPC FCAPC E2000	A: Multipurpose adapter P: fixed pigtail, length 2 m.



Chromatic Dispersion Reference Fibre (CDRF)



The Chromatic Dispersion Reference Fibre (CDRF) consists of a spool of singlemode fibre, which is mounted in a protective case for an optimum mechanical and thermal stability. The chromatic dispersion D , the zero dispersion wavelength λ_o and the dispersion slope S_o are calibrated according to IEC 60793-1-42, by using the phase shift method. The CDRF is ideally suited for the calibration of chromatic dispersion measuring equipment.



Typical Chromatic Dispersion of a G652 Fibre.

Specifications

Fibre types

Singlemode G652, G653, G655
Other types on request

Typical Fibre lengths

1 - 50 km,
other length available on request

Calibrated quantities and uncertainties (*)

Total Chromatic Dispersion D (ps·nm⁻¹)
 $U_D / D < 1 \%$

Zero Dispersion Wavelength λ_o (nm)
 $U_{\lambda_o} < 80$ pm

Dispersion Slope S_o around λ_o (ps·nm⁻²)
 $U_{S_o} / S_o < 1 \%$

Fibre optical length L
 $U_L = 0.11$ m @ $L = 12$ km

Wavelength domain

1254 nm – 1633 nm, 1436 nm – 1640 nm
Other domains on request

Connectors

Flat or angled, with Multipurpose Adapter System.
Available adapters: E-2000, FC, SC, ST

Pigtails version also available

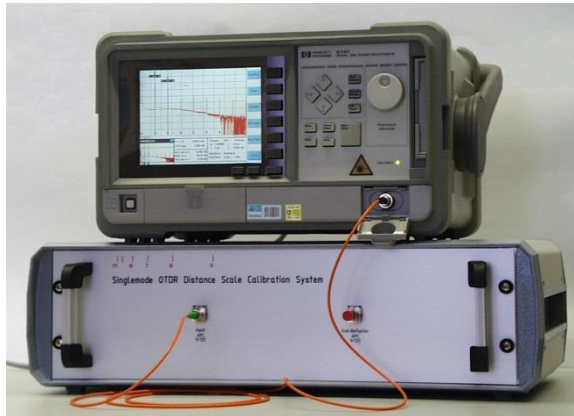
(*) These values correspond to typical uncertainties, which may vary depending on fibre type and length.

Ordering Information: CDRF – a – b – c/x – d/x – o

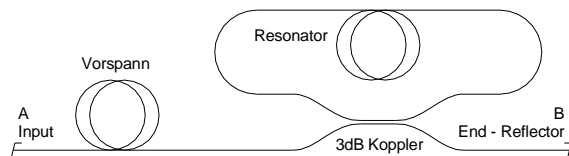
a fibre type	b fibre length in meter	c input connector type	d output connector type	x Configuration	o Temperature monitoring
G652 G653 G655		FCPC FCUPC FCAPC E2000	FCPC FCUPC FCAPC E2000	A: Multipurpose adapter P: fixed pigtail, length 2 m.	N. without T: with monitor



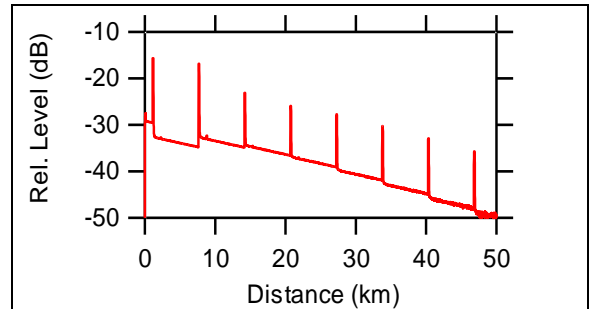
OTDR Distance Scale Calibration System (DSCS)



The Distance Scale Calibration System (DSCS) allows calibrating the distance scale of singlemode and of multimode OTDRs according to IEC 61746. The DSCS consists of a recirculating delay line and of a lead-in fibre, as shown here below.



A measurement of the system performed with an OTDR shows a series of reflection peaks, whose positions can be directly derived from the length of the lead-in fibre and of the delay line. A typical example is shown in the figure below. The deviation of the distance scale is then determined by comparing the OTDR measurements with the calibrated position of the reflection peaks.



Specifications

Fibre types

Singlemode G652
Multimode 50 μm or 62.5 μm

Typical Fibre lengths

Lead-in: 2 m - 8 km,
Recirculating delay line: 12 m to 50 km

Calibrated quantities and uncertainties (*)

Lead-in and delay line lengths L_i
 $U_{L_i} = (0.005 + 1 \cdot 10^{-5} \cdot L_i)$ m (singlemode)
 $U_{L_i} = (0.01 + 5.8 \cdot 10^{-4} \cdot L_i)$ m (multimode)

Wavelength domain

850 nm, 1310 nm, 1550 nm
Other wavelengths on request

Connectors

Flat or angled, with Multipurpose Adapter System.

Available adapters: E-2000, FC, SC, ST.

Pigtailed version also available

(*) These values correspond to typical uncertainties, which may vary depending on fibre type and length.

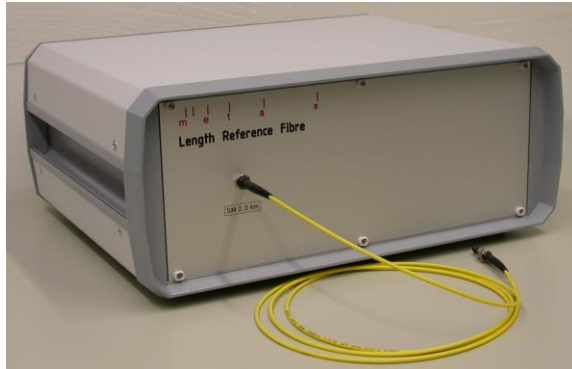
Ordering Information: DSCS – a – b1/b2 – c/x – d/A

a fibre type	b1 Lead-in fibre length in meter	b2 Recirculating Delay line length in meter	c Input Connector type	d Output Connector type	x Configuration
G652, MM50 MM62.5	2 m to 8000 m	12 m to 50'000 m	FCPC FCUPC FCAPC E2000 SC ST	Multimode: FCPC FCUPC Singlemode: FCAPC	A: Multipurpose adapter P: fixed pigtail, length 2 m.

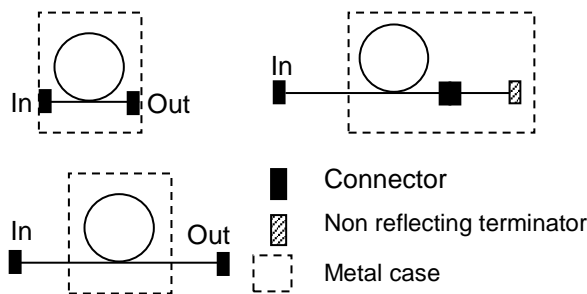
Calibrated input patchcords available upon request.



Length Reference Fibre (LRF)



Length Reference Fibres (LRF) are well adapted to the calibration of the distance scale of singlemode and multimode Optical Time domain Reflectometers (OTDR), according to IEC 61746. Our LRF consists of a spool of fibre, which is mounted in a protective case for an optimum stability of the reference. The transit time of a light pulse propagating through the Reference is calibrated by using time of flight measurement techniques, according to IEC 61746. The optical length is calculated assuming an arbitrary value of the effective index of refraction n_{eff} . The LRF is available in a two port or in a single port version with an internal non-reflecting fibre termination.



Specifications

Fibre types

Singlemode G652
Multimode
Other fibre types available on request

Typical Fibre lengths

Singlemode: 100 m to 100 km
Multimode: 100 m to 5 km
Other length available on request

Calibrated quantities and uncertainties (*)

Transit time τ (ps)

$$U_{\tau} = (25.1 + 1 \cdot 10^{-5} \cdot \tau) \text{ ps (singlemode)}$$

$$U_{\tau} = (49.5 + 5.8 \cdot 10^{-4} \cdot \tau) \text{ ps (multimode)}$$

Equivalent optical length (m)

Calculated with $n_{eff} = 1.46$

Other n_{eff} values can be specified

$$U_L = (0.005 + 1 \cdot 10^{-5} \cdot L) \text{ m (singlemode)}$$

$$U_L = (0.01 + 5.8 \cdot 10^{-4} \cdot L) \text{ m (multimode)}$$

Wavelengths

850 nm, 1310 nm, 1550 nm

Other wavelengths on request

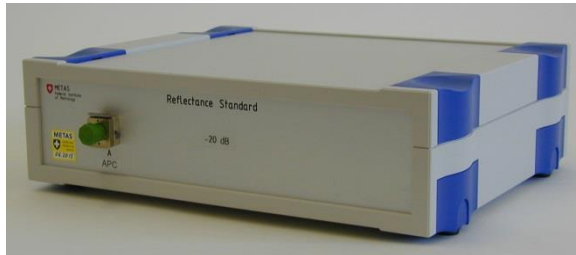
(*) These values correspond to typical uncertainties, which may vary depending on fibre type and length.

Ordering Information: LRF – a – b – c/x – d/x

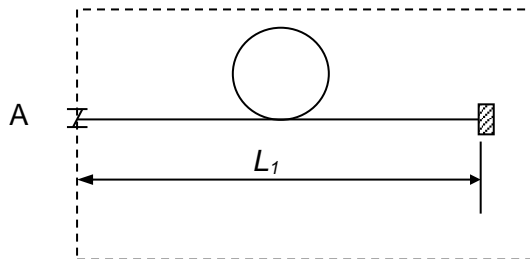
a fibre type	b fibre length in meter	c input connector type	d output connector type	x Configuration
G652 MM50 MM62.5		FCPC FCUPC FCAPC E2000 SC ST	FCPC FCUPC FCAPC E2000 SC ST N: Non reflecting terminator	A: Multipurpose adapter P: fixed pigtail, length 2 m.



Reflectance Standard (RS)



The singlemode Reflectance Standard (RS) consists of a fibre attenuator, which is terminated with a high reflectivity mirror, as proposed in Annex F.1 of the IEC 61746-1 standard. This artefact allows generating fixed reflectance values and can be used for the calibration of optical reflectometers, like OTDR or Return Loss meters. The internal structure of the RS is shown in the figure below.



Specifications

Fibre types

Singlemode G652

Reflectance

-10 dB, -20 dB, -30 dB, -40 dB, -50 dB

Typical Fibre lengths

2 m – 3.5 km

Calibrated quantities and uncertainties (*)

Reflectance in dB

$U = 0.6$ dB

Backscatter coefficient in dB

$U = 0.12$ dB

Wavelength domain

1310 nm, 1550 nm

Other wavelengths on request

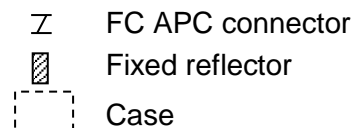
Connectors

Flat or angled, with Multipurpose Adapter System.

Available adapters: E-2000, FC, SC, ST.

Pigtailed version also available

(*) These values correspond to typical uncertainties, which may vary depending on fibre type and length.



Ordering Information: RS – a – r – b – c/x

a Fibre type	r Reflectance in dB	b Lead-in fibre length in meter	c Input Connector type (**)	x Configuration
G652	- 10 - 20 - 30 - 40	2 m to 3500 nm	FCPC FCUPC FCAPC E2000 SC ST	A: Multipurpose adapter P: fixed pigtail, length 2 m.



Small size calibration artefacts

Following artefacts are also available in small size cases (241 x 197 x 65) mm:

LRF, with $L_{\max} = 3500$ m

DSCS, with $L_{\text{Lead-in max}} = 5$ m and $L_{\text{Delay Line max}} = 30$ m.



Customized artefacts

We are also offering a large variety of customized artefacts for quantities like:

- Backscattering coefficient (multimode and singlemode fibres)
- Mode Field Diameter (MFD) of singlemode and multimode fibres
- Polarisation Mode Dispersion (PMD), mode-coupled and non mode-coupled

Please contact us for any special request; we will be pleased to help you with the best possible solution to any of our specific needs.