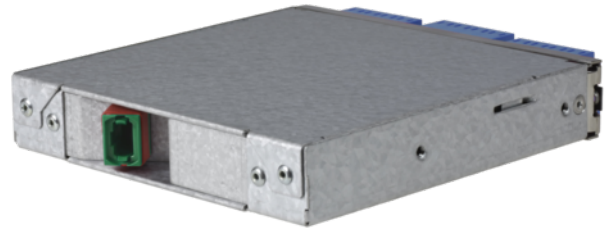


tML[®] 24 - FO Module 1x 24F MPO/MTP[®] without Pins/12x LC Duplex 9/125 μ OS2



tML[®] - tde Modular Link

tML[®] is a patented, modular cabling system consisting of the three key components module, trunk cable and rack mount enclosure. The system components are 100 percent manufactured, pre-assembled and tested in Germany. They enable plug-and-play installation on site - especially in data centres, but also in industrial environments - within the shortest possible time. The system is characterized by highest packing density and highest flexibility during migration to higher transmission rates. Fibre optic and TP modules can be combined in one rack mount enclosure. 96x fibre optics LC Duplex or 96x MPO connectors can be used modularly on a 19-inch height unit. Thanks to its patented polarity and dark fibre modules, the tML system offers the simplest migration options to 100G and more.

The tML[®] 24 - FO Module MPO/MTP[®] is intended for the installation in the tML[®] Rack Mount Enclosure 1U (for 8 x Modules). The tML[®] 24 module can be used only in combination with the tML[®] HD patch cord.



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tML[®] 24 - FO Module 1x 24F MPO/MTP[®] without Pins/12x LC Duplex 9/125 μ OS2

Technical Data

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP[®]plug has a defined fiber height of 1 - 3.5 μ . The max. adjacent fiber height difference is 0.2 μ m and for all fibers 0.3 μ m. All system components (modules, trunk cables and patch cords) are co-ordinated for the reaching of the performance particularly. The module is marked with sequential serial number and article number. The modules are ROHS compliant.

Entry	1 x MPO/MTP [®] Female Adapter (red) back
Exit	6 x LC PC Quad Adapter (blue) front
Tests	Interferometer, Insertion Loss, Return Loss and Visual Final Inspection; all measured values are electronically archived
	QS-Managementsystem ISO 9001, ISO 14001 and TL 9000

Box	Galvanized steel sheet
Front Panel	Stainless steel
Dimensions	110 x 108 x 20 mm

FO Adapters

Type	MPO/MTP [®]
Application	Singlemode / Multimode
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Red
Material	Plastic
Sleeve	--
Shutter	--
Standards	IEC 61754-7 TIA 604-5
Manufacturer	US Conec

FO Adapters

Type	LC Quad
Application	Singlemode OS2 PC
Design	with flange
Footprint	SC Duplex
Color	Blue
Material	Plastic
Sleeve	Zirconia Straight Split
Shutter	--
Manufacturer	tde

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FO Connectors

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP[®] plug has a defined fiber height of 1 - 3.5 μ m. The max. adjacent fiber height difference is 0.2 μ m and for all fibers 0.3 μ m.

Connector

Type	MPO/MTP [®] Female Push Pull Locking (green)
Ferrule	24 Fiber SM Elite [®] ferrule, PPS
Boot colour	Red
Temperature range	-40°C to +75°C
Manufacturer	tde/US Conec

Optical Performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
9/125 μ OS2	MPO/MTP [®] APC	1550 nm	≤ 0.10 dB	0.25 dB	75 dB

FO Connectors

Connector Type	LC UPC Unibody Simplex
Housing	Plastic, Blue
Ferrule	Zirconia Straight Split, Spring-loaded Axially
Ferrul Hole	125.5 μ
Ferrule Concentricity	≤ 0.6 μ
Mating Cycles	500
Operating temperature	-40°C up to +75°C
Strain Relief to	100 N
Manufacturer	tde

Optical performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
9/125 μ	LC UPC	1310 / 1550 nm	≤ 0.10 dB	0.25 dB	55 dB

FO Fiber

Type	Corning SMF-28e+ [®] 09/125 μ OS2 G.652.D singlemode fiber
Maximum Attenuation	At 1310 nm max. 0.33 - 0.35 dB/km At 1383 ± 3 nm max. 0.31 - 0.35 dB/km At 1490 nm max. 0.21 - 0.24 dB/km At 1550 nm max. 0.19 - 0.20 dB/km At 1625 nm max. 0.20 - 0.23 dB/km
Attenuation vs. Wavelength	Range: 1285 - 1330 nm; Ref. λ : 1310 nm; Max. Difference: 0.03 dB/km Range: 1525 - 1575 nm; Ref. λ : 1550 nm; Max. Difference: 0.02 dB/km

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Macrobend Loss	Mandrel Diameter:32mm; Number of Turns: 1; Wavelength: 1550nm; Induced Attenuation: ≤ 0.03 dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1310nm; Induced Attenuation: ≤ 0.03 dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1550nm; Induced Attenuation: ≤ 0.03 dB Mandrel Diameter:60mm; Number of Turns: 100; Wavelength: 1625nm; Induced Attenuation: ≤ 0.03 dB
Point Discontinuity	Wavelength: 1310 nm; Point Discontinuity: ≤ 0.05 dB Wavelength: 1550 nm; Point Discontinuity: ≤ 0.05 dB
Cable Cutoff Wavelength (λ_{ccf})	$\lambda_{ccf} \leq 1260$ nm
Mode-Field Diameter	At 1310 nm = 9.2 ± 0.4 μ m At 1550 nm = 10.4 ± 0.5 μ m
Dispersion	At 1550 nm = ≤ 18.0 [ps/(nm*km)] At 1625 nm = ≤ 22.0 [ps/(nm*km)]
	Zero Dispersion Wavelength (λ_0): 1310 nm $\leq \lambda_0 \leq 1324$ nm Zero Dispersion Slope (S_0): ≤ 0.092 ps/(nm ² *km)
Polarization Mode Dispersion (PMD)	PMD Link Design Value = ≤ 0.06 ps/ \sqrt km Maximum Individual Fiber = ≤ 0.1 ps/ \sqrt km
Norm	ITU-T Recommendation G.652 (Tables A, B, C, and D) IEC Specifications 60793-2-50 Type B1.3 TIA/EIA 492-CAAB Telcordia Generic Requirements GR-20-CORE ISO 11801 OS2

Dimensional Specifications

Fiber Curl	≥ 4.0 m radius of curvature
Cladding Diameter	125.0 ± 0.7 μ m
Core-Clad Concentricity	≤ 0.5 μ m
Cladding Non-Circularity	$\leq 0.7\%$
Coating Diameter	242 ± 5 μ m
Coating-Cladding Concentricity	< 12 μ m

Environmental Specifications

Environmental Test	Test Condition	Induced Attenuation 1310 nm, 1550 nm & 1625 nm
Temperature Dependence	-60°C to +85°C	≤ 0.05
Temperature Humidity Cycling	-10°C to +85°C up to 98% RH	≤ 0.05
Water Immersion	23°C \pm 2°C	≤ 0.05
Heat Aging	85°C \pm 2°C	≤ 0.05
Operating Temperature Range	-60°C to +85°C	

Mechanical Specifications

Proof Test	The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GPa).
Length	Fiber lengths available up to 63.0 km/spool.

Performance Characterizations

Core Diameter	8.2 μ m
Numerical Aperture	0.14

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Zero Dispersion Wavelength (λ_0)	1317 nm
Zero Dispersion Slope (S_0)	0.088 ps/(nm ² *km)
Effective Group Index of Refraction	1310 nm: 1.4676 1550 nm: 1.4682
Fatigue Resistance Parameter (nd)	20
Coating Strip Force	Dry: 0.6 lbs (3N) Wet: 14 days room temperature: 0.6 lbs (3N)
Rayleigh Backscatter Coefficient (for 1 ns Pulse Width)	1310 nm: -77 dB 1550 nm: -82 dB

Product variants & accessories

Art.-No.	Description
TML-M12LCADK/M2-09E	tML [®] 24 - FO Module 1x 24F MPO/MTP [®] without Pins/12x LC APC Duplex 9/125 μ OS2
TML-M12LCDK/M2-09E	tML [®] 24 - FO Module 1x 24F MPO/MTP [®] without Pins/12x LC Duplex 9/125 μ OS2
TML-M12LCDK/M2-50G3	tML [®] 24 - FO Module 1x 24F MPO/MTP [®] without Pins/12x LC Duplex 50/125 μ OM3
TML-M12LCDK/MPP50G4	tML [®] HD - FO Module 2x MPO/MTP [®] with Pins/12x LC Duplex 50/125 μ OM4
TML-M12LCDS/M2-50G5	tML [®] 24 - FO Module 1x 24F MPO/MTP [®] without Pins/12x LC Duplex w. shutter 50/125 μ OM5