tML® 24- FO Dark Fiber Module 4x 24F MPO without Pins/12x 12F MPO with Pins 9/125µ OS2, LR4

tML® 24

tML® 24 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. Heart of the system are the rear MPO/MTP® 24 fiber and Telco connectors, which can be used to connect at least six or twelve ports at a time. Depending on the module configuration, transfer rates of up to 400G are currently possible with SR4. The fibre optic and TP modules can be used together in a module carrier with a very high port density. The tde offers its tML® cabling system as a proven tML® standard system and in the highly innovative variants tML®Xtended and now tML® 32 for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G and 400G.

The tML® - FO Dark Fiber Module MPO/MTP®uses all the fibers of the back room cabling and is intended for the installation in the tML® Rack Mount Enclosure 1U (for 8 x Modules).

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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 hieght of 1 - 3.5µ. The max. adjacent fiber height difference is 0.2µm and for all fibers 0.3µm. 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	4 x MPO/MTP®(24 Fibers) Female Adapter (red) back
Exit	12 x MPO/MTP®(12 Fibers) Male Adapter (green) 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	MPO/MTP®
Application	Singlemode OS2 APC
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Green
Material	Plastic
Sleeve	--
Shutter	--

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Standards	IEC 61754-7 TIA 604-5
Manufacturer	US Conec

FO Connectors

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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.
9/125µ OS2	MPO/MTP®APC	1550 nm	≤ 0.10 dB	0.25 dB	75 dB

FO Connectors

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Connector

Type	MPO/MTP® APC Male Push Pull Locking with Elite Pins (green)
Ferrule	12 Fiber SM Elite® ferrule, PPS
Boot colour	Black
Temperature range	-40°C bis +75°C
Manufacturer	tde/US Conec

Optical Performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
9/125µ OS2	MPO/MTP®APC	1310 / 1550 nm	≤ 0.10 dB	0.20 dB	75 dB

FO Fiber

Type	Draka OS2 9/125µm singlemode fiber (C03e)

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Standards and Norms	IEC 60793-2-50 Category B.1.3	ISO/IEC 11801:2002, cat. OS1
	EN 60793-2-50: Class B1.3	ISO/IEC 24702: 2006, cat. OS2; also OS1 requirements are fulfilled
	ITU Recommendation G.652.D – the older ITU designations A, B and C are also fulfilled	IEEE 802.3 – 2002 incl. 802.3ae
	EN 50173-1:2007, cat. OS2; also OS1 requirements are fulfilled	

Attenuation (of cable with fibers) according to IEC 60793-1-40

1310 nm – 1625 nm	≤ 0.39 dB/km
1550 nm	≤ 0.25 dB/km
Inhomogeneity of OTDR trace for any two 1000 metre fiber lengths	Max. 0.1 dB/km

Group index of refraction according to IEC 60793-1-22

Group index of refraction at 1310 nm	1.467
Group index of refraction at 1550 nm	1.468
Group index of refraction at 1625 nm	1.468

Other properties according to IEC 60793-1-xx

Attribute	Measurement method	Limits
Cladding diameter	IEC/EN 60793-1-20	125.0 ± 0.7 µm
Cladding non-circularity	IEC/EN 60793-1-20	≤ 0.7%
Core (MFD) non-circularity	IEC/EN 60793-1-20	≤ 6%
Core (MDF) -cladding concentricity error	IEC/EN 60793-1-20	≤ 0.5 µm
Primary coating diameter - uncoloured	IEC/EN 60793-1-21	242 ± 7 µm
Primary coating diameter - coloured	IEC/EN 60793-1-21	250 ± 15 µm
Primary coating non-circularity	IEC/EN 60793-1-21	≤ 5%
Primary coating-cladding concentricity error	IEC/EN 60793-1-21	≤ 12.0 µm
Proof stress level	IEC/EN 60793-1-30	≥ 0.7 GPa (≈ 1 %)
Strip force (peak)	IEC/EN 60793-1-32	1.0 N ≤ Fpeak.strip ≤ 8.9 N
Chromatic dispersion coefficient In the interval 1285 nm – 1330 nm At 1550 nm At 1625 nm	IEC/EN 60793-1-42	 ≤ 3 ps/km*nm ≤ 18.0 ps/km*nm ≤ 22.0 ps/km*nm
Zero dispersion wavelength, λ0		1311 ± 11 nm
Zero dispersion slope		≤ 0.090 ps/(nm2*km)
Cut-off wavelength	IEC/EN 60793-1-44	1034 - 1330 λc nm ≤ 1260 λc nm
Mode field diameter at 1310 nm Mode field diameter at 1550 nm	IEC/EN 60793-1-45	9.0 ± 0.4 µm 10.1 ± 0.5 µm
Macrobending loss at 1550 nm, 100 turns on a ø 60 mm mandrel.	IEC/EN 60793-1-47	≤ 0.05 dB

Polarisation mode dispersion (PMD) coefficient, cabled	IEC/EN 60793-1-48	≤ 0.5 ps/√km
PMDQ Link Design Value:	IEC/EN 60794-3	≤ 0.2 ps/√km

Product variants & accessories

Art.-No.	Description
TML-M12MPP/04M2-09E	tML® 24- FO Dark Fiber Module 4x 24F MPO without Pins/12x 12F MPO with Pins 9/125µ OS2, LR4
TML-M12MPP/04M2-50G3	tML® 24- FO Dark Fiber Module 4x 24F MPO without Pins/12x 12F MPO with Pins 50/125µ OM3, SR4
TML-M12MPP/04M2-50G4	tML® 24- FO Dark Fiber Module 4x 24F MPO without Pins/12x 12F MPO with Pins 50/125µ OM4, SR4
TML-M12MPP/04M2-50G5	tML® 24- FO Dark Fiber Module 4x 24F MPO without Pins/12x 12F MPO with Pins 50/125µ OM5, SR4

