

tML<sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125µ OM4 LSOH,  
Type A, Length: xx in m



## tML<sup>®</sup> - tde Modular Link

tML<sup>®</sup> 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<sup>®</sup> - FO Micro Distribution trunk cable is intended for the connection of two tML<sup>®</sup> 24 - FO 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<sup>®</sup> plug has a defined fiber height of 1 - 3.5 $\mu$ . The max. adjacent fiber height difference is 0.2 $\mu$ m and for all fibers 0.3 $\mu$ m.

Cable	Round cable 3.6 mm, loose tube, LSOH, magenta
Connectors	MPO/MTP <sup>®</sup> Push Pull (magenta)
Pin out	Type A
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

## FO Connectors

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### Connector

Type	MPO/MTP <sup>®</sup> Male Push Pull Locking with Elite Pins (magenta)
Ferrule	24 Fiber MM Elite <sup>®</sup> 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.
50/125 $\mu$ OM4	MPO/MTP <sup>®</sup>	850 nm	≤ 0.16 dB	0.30 dB	30 dB

## FO Cables

Standards	EN 50173-5
	IEC 60794-2-20
	ISO/IEC 24764

### Construction

Type	IVH24G50-OM4
Fiber	24 primary coated fibres nominally 242 $\mu$ m, arranged in 2 groups of 12 fibres, Group 1: Red id tread Group 2: Green id tread

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Fiber colors	According to TIA/EIA 598-C also in agreement with IEC 60304: 1-12: Blue, orange, green, brown, grey, white, red, black, yellow, violet, pink and aqua 13-24: Blue, orange, green, brown, grey, white, red, transparent, yellow, violet, pink and aqua (with add. ring mark)
Strength member	Ultra high modulus Aramid yarns
Sheath	Halogen free, flame resistant thermoplastic sheathing compound acc. to EN 50290-2-27, UV stabilised
Sheath colors	Magenta, RAL 4003

## Fire rating

IEC 60332-1-2	Pass
IEC 60332-2-2	Pass
IEC 60754-1	No halogens
IEC 60754-2	No acid matters
IEC 61034-2	No dense smoke

## Heat of combustion

200 MJ/km	0.5 kWh/m
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## Physical properties IEC60974-1-2

Outer diameter cable	$\varnothing$ 3.6 mm +0.1 mm -0.3 mm
Diameter PVC-core tube	2.0 $\pm$ 0.1 mm
Wall thickness PVC-core tube	0.35 mm – 0.40 mm
Weight	11 kg/km
Tensile strength (dynamic)	220 N
Tensile strength (permanent)	110 N
Compressive strength (crush)	400 N
Impact	4 Nm, R= 12.5 mm
Kink	No Kink
Min. Bending radius	R = 20 mm
Temperature range	Operation and installation: -0°C to 50°C. Storage: -20°C to 50°C

## FO Fiber

Type	Corning ClearCurve <sup>®</sup> 50/125 $\mu$ OM4 multimode fiber
Optimized Data Rate over Distance	40/100 Gb over 170 m* 10 Gb/s over 550 m 1 Gb/s over 1100 m
Standard Compliance	ISO/IEC 11801: type OM4 fiber** IEC 60793-2-10: type A1a.3 fiber** TIA/EIA: 492AAAD ITU: ITU G651.1

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*	Distances specified in the 40G/100G per IEEE 802.3ba standard are 150m on OM4 and 100m on OM3; Corning fibers are manufactured to tighter dispersion specifications and thereby support the extended distances shown in the table (assuming cable attenuation $\leq$ 3.0 dB/km and same 1.0 dB of connector loss for OM3 that the standard requires for OM4)
**	Assumes IEC draft standard is harmonized with 492AAAD which was approved by TIA

## Optical Specifications

Bandwidth	High Performance EMB* (MHz.km): 4700 at 850 nm only Legacy Performance EMB** (MHz.km): 3500 at 850 nm / 500 at 1300 nm
Attenuation	At 850 nm max. $\leq$ 2.3 dB/km At 1300 nm max. $\leq$ 0.6 dB/km
Macrobend Loss	Mandrel Radius (mm): 37.2 / 15 / 7.5 Number of Turns: 100 / 2 / 2 Induced Attenuation (dB) at 850 nm: $\leq$ 0.05 / $\leq$ 0.1 / 0.2 Induced Attenuation (dB) at 1300 nm: $\leq$ 0.15 / $\leq$ 0.3 / $\leq$ 0.5
Numerical Aperture	0.200 $\pm$ 0.015
*	Ensured via miniEMBc, per TIA/EIA 455-220A and IEC 60793-1-49, for high performance laser-based systems (up to 10Gb/s)
**	OFL BW, per TIA/EIA 455-204 and IEC 60793-1-41, for legacy and LED-based systems (typically up to 100 Mb/s)

## Dimensional Specifications

Core Diameter	50.0 $\pm$ 2.5 $\mu$ m
Cladding Diameter	125.0 $\pm$ 1.0 $\mu$ m
Core-Clad Concentricity	$\leq$ 1.5 $\mu$ m
Cladding Non-Circularity	$\leq$ 1.0%
Core Non-Circularity	$\leq$ 5.0%
Coating Diameter	242 $\pm$ 5 $\mu$ m
Coating-Cladding Concentricity	$<$ 12 $\mu$ m

## Environmental

Environmental Test	Test Condition	Induced Attenuation 850 nm & 1300 nm (dB/km)
Temperature Dependence	-60°C to +85°C	$\leq$ 0.10
Temperature Humidity Cycling	-10°C to +85°C and 4% to 98% RH	$\leq$ 0.10
Water Immersion	23°C $\pm$ 2°C	$\leq$ 0.20
Heat Aging	85°C $\pm$ 2°C	$\leq$ 0.20
Damp Heat	85°C at 85% RH	$\leq$ 0.20
Operating Temperature Range	-60°C to +85°C	

## Mechanical Specifications

Proof Test	The entire fiber length is subjected to a tensile stress $\geq$ 100 kpsi (0.7 GN/m <sup>2</sup> ).
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Length	Fiber lengths available up to 17.6 km/spool.
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## Performance Characterizations

Refractive Index Difference	1%
Effective Group Index of Refraction	850 nm: 1.480 1300 nm: 1.479
Fatigue Resistance Parameter (nd)	20
Coating Strip Force	Dry: 0.6 lbs (2.7N) Wet: 14 days in 23°C water soak: 0.6 lbs (2.7N)
Chromatic Dispersion	Zero Dispersion Wavelength ( $\lambda_0$ ): 1295 nm $\leq \lambda_0 \leq$ 1315 nm Zero Dispersion Slope ( $S_0$ ): $\leq 0.101$ ps/(nm <sup>2</sup> *km)

## Product variants & accessories

Art.-No.	Description
TMLM2P/M2P09I24E-Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24E9/125 $\mu$ OS2 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G3Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM3 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G4Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM4 LSOH, Type A, Length: xx in m
TMLM2P/M2P50I24G5Axx	tML <sup>®</sup> 24 - FO Micro Distribution trunk cable 24F MPO w. Pins/MPO w. Pins 24G50/125 $\mu$ OM5 LSOH, Type A, Length: xx in m