

## Description

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. Heart of the system are the rear MPO/MTP® 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® 12, tML® 24, tML® 32 and now tML® 24+ System for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G, 400G and 800G and more.

The tML® - FO Module 5HP MPO/MTP® is intended for the installation in the tML® Rack Mount Enclosure 3U (for 17 x Modules).



## 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 - 3.5µ. 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	1 x MPO/MTP® Male Adapter (aqua) back
Exit	6 x LC Duplex Adapter (aqua) 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

### FO Adapters

Type	MPO/MTP®
Application	Multimode OM3
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Aqua
Material	Plastic
Sleeve	--
Shutter	--
Standards	IEC 61754-7 TIA 604-5
Manufacturer	US Conec

### FO Adapters

Type	LC Duplex
Application	Multimode OM3
Design	One-Piece without flange
Connector style	SC simplex
Color	Aqua
Material	Plastic
Sleeve	Zirkonia Straight Split
Shutter	--
Manufacturer	tde

### FO Connectors

Type	MPO/MTP® Male Push Pull Locking (aqua)
Ferrule	12 Fiber MM Elite® ferrule, PPS
Boot colour	Black
Manufacturer	tde/US Conec

**Optical Performance**

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
50/125µ OM3	MPO/MTP®	850 nm	≤ 0.14 dB	0.25 dB	35 dB

**FO Connectors**

Connector Type	LC Unibody Simplex
Housing	Plastic, Aqua
Ferrule	Zirkonia Staight Split, Spring-loaded Axially
Ferrule Hole	126µ
Mating Cycles	1.000
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.
50/125µ OM3	LC	850 nm	≤ 0.20 dB	0.35 dB	30 dB

IL at 97% measured according to IEC 61300-3-4 under laboratory conditions.

**FO Fiber**

Type	Corning ClearCurve® 50/125µ OM3 multimode fiber
Optimized Data Rate over Distance	40/100 Gb/s über 140 m* 10 Gb/s over 300 m 1 Gb/s over 1000 m
Standard Compliance	ISO/IEC 11801: type OM3 fiber IEC 60793-2-10: type A1a.2 fiber TIA/EIA: 492AAAC-B ITU: ITU G651.1
*	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 ≤3.0 dB/km and same 1.0 dB of connector loss for OM3 that the standard requires for OM4).

### Optical Specifications

Bandwidth	High Performance EMB* (MHz.km): 2000 at 850 nm only Legacy Performance EMB* (MHz.km): 1500 at 850 nm / 500 at 1300 nm
Attenuation	At 850 nm max. ≤ 2.3 dB/km At 1300 nm max. ≤ 0.6 dB/km
Macrobend Loss	Mandrel Radius (mm): 37.5 / 15 / 7.5 Number of Turns: 100 / 2 / 2 Induced Attenuation (dB) at 850 nm: ≤ 0.05 / ≤ 0.1 / ≤ 0.2 Induced Attenuation (dB) at 1300 nm: ≤ 0.15 / ≤ 0.3 / ≤ 0.5
Numerical Aperture	0.200 ± 0.015
*	Ensured via miniEMBc, per TIA/EIA 455-220A and IEC 60793-1-49, for high performance laser-based systems (up to 10 Gb/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 ± 2.5 µm
Cladding Diameter	125.0 ± 1.0 µm
Core-Clad Concentricity	≤ 1.5 µm
Cladding Non-Circularity	≤ 1.0%
Core Non-Circularity	≤ 5.0%
Coating Diameter	242 ± 5 µm
Coating-Cladding Concentricity	< 12 µm

### Environmental

Environmental Test	Test Condition	Induced Attenuation 850 nm & 1300 nm (dB/km)
Temperature Dependence	-60°C to +85°C	≤ 0.10
Temperature Humidity Cycling	-10°C to +85°C and 4% to 98% RH	≤ 0.10
Water Immersion	23°C ± 2°C	≤ 0.20
Heat Aging	85°C ± 2°C	≤ 0.20
Damp Heat	85°C at 85% RH	≤ 0.20
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 GN/m²).
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# tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 50/125µ OM3

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 (S0): $\leq 0.101$ ps/(nm <sup>2</sup> *km)

Art.-No.	Description
TML-T06LCADKH/MPP09E	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC APC Duplex 9/125µ OS2
TML-T06LCDKH/MPP09E	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 9/125µ OS2
TML-T06LCDKH/MPP50G	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 50/125µ OM2
TML-T06LCDKH/MPP50G3	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 50/125µ OM3
TML-T06LCDKH/MPP50G4	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 50/125µ OM4
TML-T06LCDKH/MPP62G	tML® - FO Module 5HP MPO/MTP® with Pins/6x LC Duplex 62,5/125µ OM1