

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 Fan-out Cable MPO/MTP® is for the use with tML®- FO Trunk Cables.

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 (fan-out cables or modules, trunk cables and patch cords) are co-ordinated for the reaching of the performance particularly. The fanout cable is marked with sequential serial number and article number.

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|--------------|--|
| Cable | Round cable, loose tube, LSOH, aqua |
| Fan-out unit | Metal |
| Entry | 1 x MPO/MTP® Male Push Pull (aqua) |
| Exit | 12 x E2000 (beige) |
| Pin-out | Crossover (TIA/EIA-568-B.1 Methode C) |
| 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

| | |
|------------------|---------|
| Type | E2000 |
| Ferrule | Ceramic |
| Ferrule Hole | 126 µ |
| Connector colour | Beige |
| Lever colour | Aqua |
| Boot colour | Black |
| Manufacturer | RDM |

Optical performance

| Fiber | Type | Wavelength | Insertion loss typ. | Insertion loss max. | Return loss min. |
|-------------|-------|------------|---------------------|---------------------|------------------|
| 50/125µ OM3 | E2000 | 850 nm | ≤ 0.20 dB | 0.35 dB | 30 dB |

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 Fan-Out

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|---------------------|-------|
| Length Fan-Out | 40 mm |
| Max. Ø Fan-Out | 10 mm |
| Parallel connectors | 12 |

FO Cables

| | |
|------------------|----------------|
| Standards | EN 50173-5 |
| | IEC 60794-2-20 |
| | ISO/IEC 24764 |
| Flame resistance | IEC 60332-1-2 |
| | IEC 60332-2-2 |
| | IEC 60754-1 |
| | IEC 60754-2 |
| | IEC 61034 |

Cable construction

| | |
|------------|---------------------------------------|
| Type | IVH12G50-OM3 |
| Loose tube | 12 coated fibers within PVC-core tube |

tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 12G50/125µ OM3 LSOH, Length: xx

| | |
|-------------------------|---|
| Wall thickness PVC-tube | 0.20 mm – 0.25 mm |
| Fiber type | MM-OM3, 50/125µ, Corning ClearCurve OM3 |
| Strength members | Aramid yarn |
| Outer jacket | LSZH (Halogen free, low smoke, flame retardant thermoplastic compound) |
| Jacket color | Aqua, RAL 6027 |
| Identification | "t d e – IVH12G50-MPO-OM3 LSZH" and sequential meter marking + Lot number |

Physical properties

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|---|----------------|
| Outer diameter cable | 3.0 ± 0.1 mm |
| Diameter PVC-core tube | 1.8 ± 0.1 mm |
| Max. tensile load | 300 N |
| Min. bending radius | 30 mm |
| Temperature range (storage, installation, operation) | -20°C to +70°C |

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

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|--------------------|---|
| 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 |

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| * | 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

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|--------------------------------|----------------|
| 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

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|------------|---|
| Proof Test | The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GN/m ²). |
| Length | Fiber lengths available up to 17.6 km/spool. |

Performance Characterizations

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|-------------------------------------|---------------------------------|
| Refractive Index Difference | 1% |
| Effective Group Index of Refraction | 850 nm: 1.480 1300 nm: 1.479 |
| Fatigue Resistance Parameter (nd) | 20 |

**tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x
E2000 12G50/125μ OM3 LSOH, Length: xx**

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|----------------------|--|
| 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 (λ_0): 1295 nm $\leq \lambda_0 \leq$ 1315 nm Zero Dispersion Slope (S0): ≤ 0.101 ps/(nm ² *km) |

| Art.-No. | Description |
|----------------------|--|
| TML-E2A/MPP09I12Exx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 APC 12E9/125μ LSOH, Length: xx |
| TML-E2/MPP09I12Exx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 UPC 12E9/125μ LSOH, Length: xx |
| TML-E2/MPP50I12G3-xx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 12G50/125μ OM3 LSOH, Length: xx |
| TML-E2/MPP50I12G4-xx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 12G50/125μ OM4 LSOH, Length: xx |
| TML-E2/MPP50I12Gxx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 12G50/125μ OM2 LSOH, Length: xx |
| TML-E2/MPP62I12Gxx | tML® - FO Fan-out Cable MPO/MTP® w. Pins/12x E2000 12G62,5/125μ OM1 LSOH, Length: xx |