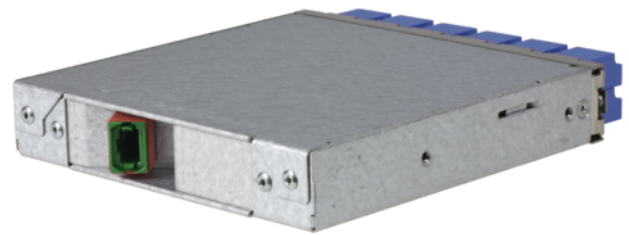


tML[®] 24 - FO Module 1x 24F MPO/MTP[®]/12x LC Duplex w. shutter 9/125 μ OS2



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. 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 200G 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, tML[®] 24 System and now tML[®] 32 System for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G and 400G.

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. A special cleaning tool is required to clean the adapters with shutter.



tde[®] trans data elektronik GmbH

Headquarter address:

Lingener Str. 2
D-49626 Bippen/Ohrte
Tel.: +49 5435 9511 0
Fax.: +49 5435 9511 32

Sales office address:

Prinz-Friedrich-Karl-Str. 46
D-44135 Dortmund
Tel.: +49 231 914 36 99
Fax.: +49 231 914 31 29

info@tde.de | www.tde.de

tML[®] 24 - FO Module 1x 24F MPO/MTP[®]/12x LC Duplex w. shutter 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 | 12 x LC Duplex Adapter with self-closing shutter (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

When the connector is inserted into the adapter it compress the springs, opening the internal shutter. The internal shutter opens, and due to the special design of the shutter, it will not touch the ferrule end face. As the connector is removed from the adapter, the shutter spring automatically returns the internal shutter to the closed position.

| | |
|-----------------|--------------------------|
| Type | LC Duplex |
| Application | Singlemode PC |
| Design | One-Piece without flange |
| Connector style | SC simplex |
| Color | Blue |

tML[®] 24 - FO Module 1x 24F MPO/MTP[®]/12x LC Duplex w. shutter 9/125 μ OS2

| | |
|---------------------------------|------------------------|
| Housing material | Plastic |
| Sleeve | Zirkonia Staight Split |
| Self-closing shutter material | Metal |
| Self-closing shutter protection | Dust an laser light |
| Manufacturer | tde |

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 . 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

tML[®] 24 - FO Module 1x 24F MPO/MTP[®]/12x LC Duplex w. shutter 9/125 μ OS2

| | | |
|---------------------|---|--|
| Type | Draka OS2 9/125 μ m singlemode fiber (C03e) | |
| 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 \pm 0.7 μ m |
| Cladding non-circularity | IEC/EN 60793-1-20 | $\leq 0.7\%$ |
| Core (MFD) non-circularity | IEC/EN 60793-1-20 | $\leq 6\%$ |
| Core (MDF) -cladding concentricity error | IEC/EN 60793-1-20 | ≤ 0.5 μ m |
| Primary coating diameter - uncoloured | IEC/EN 60793-1-21 | 242 \pm 7 μ m |
| Primary coating diameter - coloured | IEC/EN 60793-1-21 | 250 \pm 15 μ m |
| Primary coating non-circularity | IEC/EN 60793-1-21 | $\leq 5\%$ |
| Primary coating-cladding concentricity error | IEC/EN 60793-1-21 | ≤ 12.0 μ m |
| Proof stress level | IEC/EN 60793-1-30 | ≥ 0.7 GPa ($\approx 1\%$) |
| Strip force (peak) | IEC/EN 60793-1-32 | 1.0 N \leq F _{peak.strip} \leq 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, λ_0 | | 1311 \pm 11 nm |
| Zero dispersion slope | | ≤ 0.090 ps/(nm ² *km) |
| Cut-off wavelength | IEC/EN 60793-1-44 | 1034 - 1330 λ_c nm ≤ 1260 λ_c nm |

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| | | |
|---|-------------------|---------------------------|
| Mode field diameter at 1310 nm | IEC/EN 60793-1-45 | 9.0 \pm 0.4 μ m |
| Mode field diameter at 1550 nm | | 10.1 \pm 0.5 μ m |
| Macrobending loss at 1550 nm, 100 turns on a \varnothing 60 mm mandrel. | IEC/EN 60793-1-47 | \leq 0.05 dB |
| Polarisation mode dispersion (PMD) coefficient, cabled | IEC/EN 60793-1-48 | \leq 0.5 ps/ \sqrt km |
| PMDQ Link Design Value: | IEC/EN 60794-3 | \leq 0.2 ps/ \sqrt km |

Product variants & accessories

| Art.-No. | Description |
|----------------------|--|
| L-CLEAN-SMART1.25-R | FO Replacement Cartridges for Cleaning Tool 1,25mm for LC Duplex Adapter with self-closing shutter |
| L-CLEAN-SMART-CS1.25 | FO Cleaning Tool 1,25mm for CS and LC Duplex Adapter with self-closing shutter |
| TML-M12LCADS/M2-09E | tML [®] 24 - FO Module 1x 24F MPO/MTP [®] /12x LC APC Duplex w. shutter 9/125 μ OS2 |
| TML-M12LCDS/M2-09E | tML [®] 24 - FO Module 1x 24F MPO/MTP [®] /12x LC Duplex w. shutter 9/125 μ OS2 |
| TML-M12LCDS/M2-50G4 | tML [®] 24 - FO Module 1x 24F MPO/MTP [®] /12x LC Duplex w. shutter 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 |