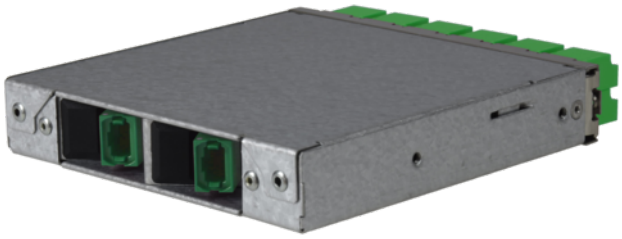
tML® HD - FO Module 2x MPO/MTP® with Pins/12x LC APC Duplex w. shutter 9/125µ OS2





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®HD - FO Module MPO/MTP®is intended for the installation in the tML® Rack Mount Enclosure 1U (for 8 x Modules). The tML® HD 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 8805 61 13
Fax.: +49 231 8805 61 15

info@tde.de | www.tde.de

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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 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	2 x MPO/MTP®Male Adapter (green) back
Exit	12 x LC APC Duplex Adapter with self-closing shutter (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 OS2 APC
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Green
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 APC
Design	One-Piece without flange
Connector style	SC simplex
Color	Green

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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 - 3.5µ. The max. adjacent fiber height difference is 0.2µm and for all fibers 0.3µm.

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 Connectors

Connector Type	LC APC Unibody Simplex
Housing	Plastic, Green
Ferrule	Zirconia Straight Split, Spring-loaded Axially
Ferrule 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.
9/125µ	LC APC	1310 / 1550 nm	≤ 0.10 dB	0.18 dB	75 dB

FO Fiber

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tML® HD - FO Module 2x MPO/MTP® with Pins/12x LC APC Duplex w. shutter 9/125µ OS2

Type	Draka OS2 9/125µm 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 ± 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

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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
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/MPP09E	tML® HD - FO Module 2x MPO/MTP® with Pins/12x LC APC Duplex w. shutter 9/125µ OS2
TML-M12LCDS/MPP09E	tML® HD - FO Module 2x MPO/MTP® with Pins/12x LC Duplex w. shutter 9/125µ OS2
TML-M12LCDS/MPP50G4	tML® HD - FO Module 2x MPO/MTP® with Pins/12x LC Duplex w. shutter 50/125µ OM4

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