tde®

trans data elektronik GmbH

net. work. solution. made in Germany

ISO 9001
TL 9000
ISO 14001

MORE SPEED

LESS CABLE
with tML® 24

Highest packaging density
Easiest migration
More energy efficiency

1/10G

10/40/50/100G

40/100/200G

100/200/400G+

MPO/MTP® 24F Connector

tML® 24 tde Modular Link System

Revolution in the fiber optic cabling

MADE IN GERMANY
tde®
Seit 25 Jahren

tde®

trans data elektronik GmbH
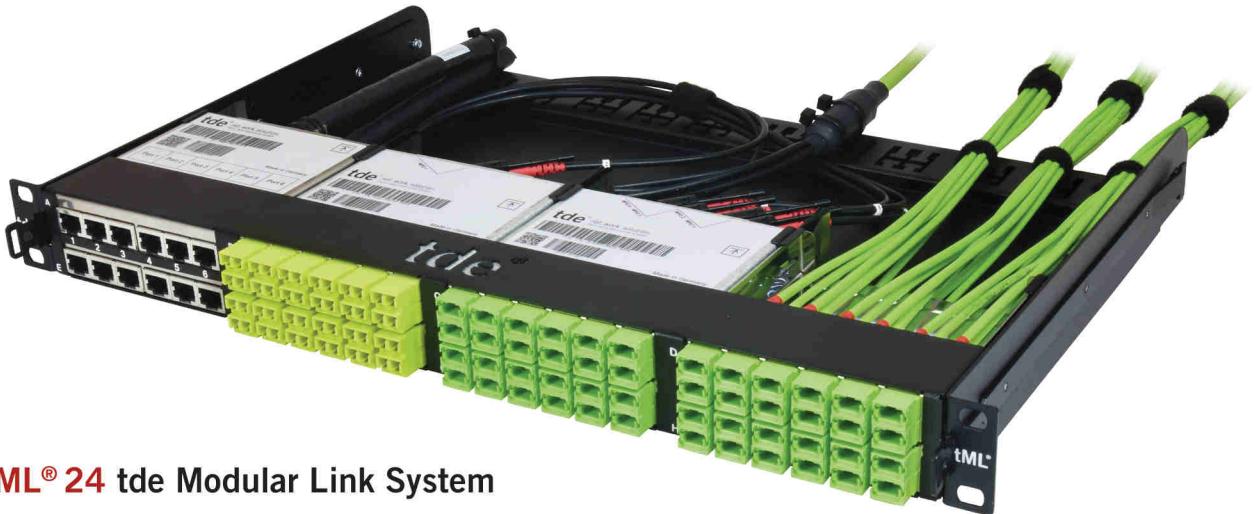
tML® 24 tde Modular Link System

Due to ever greater demands on technology, capacity and bandwidth the amount of network connections in data centres is increasing. Very high packing densities and flexibly expandable cable systems are a basic requirement for server connections and pure storage area networks.

Carrying out changes to the network infrastructure of conventional cable systems involves a great amount of effort: Network technicians often have to reinstall and measure entire parts of the existing cable system. The tML® tde Modular Link System excels where classic systems fall short.

Thanks to Plug & Play, twisted pair and fiber optics cable systems can be quickly installed using the factory-assembled and factory-tested system components. Finished high-capacity and high-density trunk cables can be easily connected via distribution modules. MPO and Telco connectors are the basis of the patented tML® tde Modular Link System in which 24 glass fibers or 24 copper pairs are integrated and at the same time inserted into one connector. Fiber optics and TP modules can be easily combined within one hight unit in a panel.

Protects investments and the environment

Thanks to the Plug & Play functionality of the tML 24® network technicians can very quickly carry out changes to the network. Individual system components can be removed and reused. In this way, the system protects investments made while making a valuable contribution to green IT in companies.

Highly compact

Telco for 6x RJ45 GbE TP Links

tML® System cable (right) by comparison to the standard

MPO 24F for 12x FO duplex links 10/40/50/100G, 3x 40/100/200G or 1x 100/200/400G+

Product characteristics

> Maximum packing density
> TP and FO modules can be combined on 1U
> Quick and simple „Plug & Play" installation
> Up to 2304 fibers on 1U
> Available with OS2/OM3/OM4 and OM5 fibers
> Basically with bend optimised fibers
> 96x LC duplex ports on 1U (192 fibers)
> 48x RJ45 GbE or 10GbE ports screened on 1U
> 96x MPO Ports on 1U (2304 fibers)
> Stable, shielded Telco connectors
> Simple Migration on 40/100/200/400G + possible
> No polarity problems
> Also with CS, MDC, MPO16/32 connection technology available
> System component reusability ensures environmental friendliness
> „Made in Germany"

tde®

trans data elektronik GmbH

tML® Breakout FO modules MPO/MTP®

1x 12F MPO SR4/LR4 to 4x LC Duplex

Fiber	Part Number
9/125µ OS2	TML-M04LCADx⁹ /MPP09E
9/125µ OS2	TML-M04LCDx⁹ /MPP09E
50/125µ OM3	TML-M04LCDx⁹ /MPP50G3
50/125µ OM4	TML-M04LCDx⁹ /MPP50G4
50/125µ OM5	TML-M04LCADx⁹ /MPP50G5

2x 12F SR4/LR4 MPO to 8x LC Duplex

Fiber	Part Number
9/125µ OS2	TML-M08LCADx⁹ /MPP09E
9/125µ OS2	TML-M08LCDx⁹ /MPP09E
50/125µ OM3	TML-M08LCDx⁹ /MPP50G3
50/125µ OM4	TML-M08LCDx⁹ /MPP50G4
50/125µ OM5	TML-M08LCDx⁹ /MPP50G5

tML® 24 Breakout FO modules MPO/MTP®

1x 24F MPO SR10 to 10x LC Duplex

Fiber	Part Number
9/125µ OS2	TML-M10LCADx⁹ /M2P09E
9/125µ OS2	TML-M10LCDx⁹ /M2P09E
50/125µ OM3	TML-M10LCDx⁹ /M2P50G3
50/125µ OM4	TML-M10LCDx⁹ /M2P50G4
50/125µ OM5	TML-M10LCDx⁹ /M2P50G5

Technical Data

FO Connector Performance					
			insertion loss (dB)		return loss (dB)
Fiber	Type	Wavelength	typical	max	min
50/125µ OM3	LC	850nm	0,04dB	0,15db	35db
	MPO (12)	850nm	0,14dB	0,25db	35db
	MPO (24)	850nm	0,12dB		35db
50/125µ OM4	LC	850nm	0,07dB	0,15db	35db
	MPO (12)	850nm	0,12dB	0,25db	35db
	MPO (24)	850nm	0,12dB		35db
50/125µ OM5	LC	850nm	0,03dB	0,15db	35db
	MPO (12)	850nm	0,11dB	0,25db	35db
	MPO (24)	850nm	0,11dB		35db
9/125µ OS2	LC	1550nm	0,08dB	0,18db	55db
	LC APC	1550nm	0,10dB	0,18db	75db
	MPO (12)	1550nm	0,10dB	0,20db	75db
	MPO (24)	1550nm	0,14dB		75db

* arithmetic mean   ** IL at 97% measured according to IEC 61300-3-4 under laboratory conditions

All system components are tested before shipment **(Plug-and-play)**.

For all fiber optic connectors following applies:

> FO connector geometry according to IEC and better
> 100% inspection of all MPO/MTP and SM connectors using interferometers
> MPO/MTP plug has a defined fiber height of 1 - 3,5µ
> Max. adjacent fiber height difference is 0,2µm and for all fibers 0,3µm
> Each connector is tested for insertion and return loss.

TP Link Performance
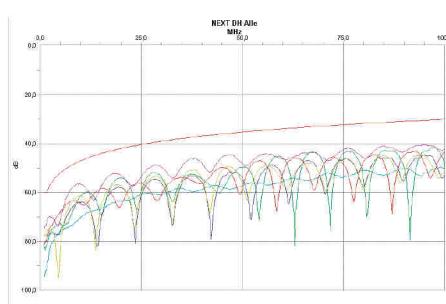
TP trunk cabel GbE
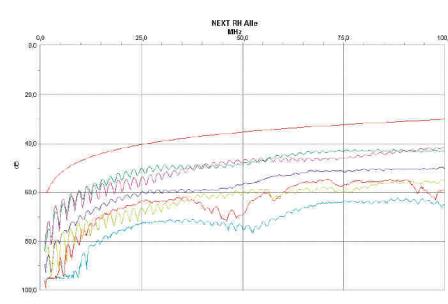
TP module GbE
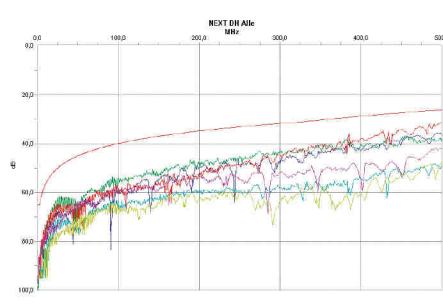
TP trunk cable with modules 10GbE

All RJ45 modules and terminated cables are tested with Lantester on Cat.5e or Cat.6A in links.

tML® 24 Migration 10/40/100/200/400G +

A crossover of both optical fibers is required for transmission between the transmitting and receiving diodes in any fiber-optic cabling system.

tML® 24 for 10/40/50/100G

The tML® 24 trunk cable has an type A configuration.
The modules and patch cables are uniformly configured.

12x   1x   12x
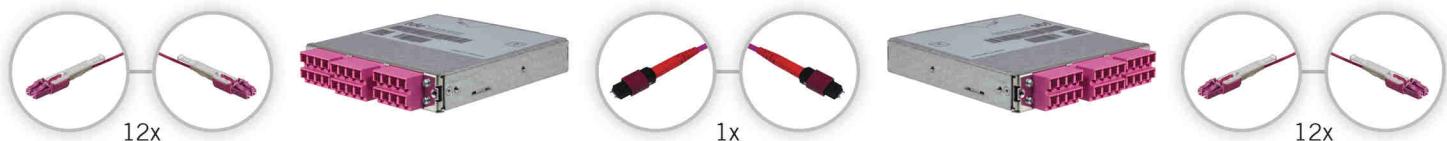
tML® 24 Migration to SR4 40/100/200G

The tML® 24 trunk cable will be re-used. Just the modules must be exchanged.
The modules and patch cables are uniformly configured.

6x   2x   6x

12x   4x   12x
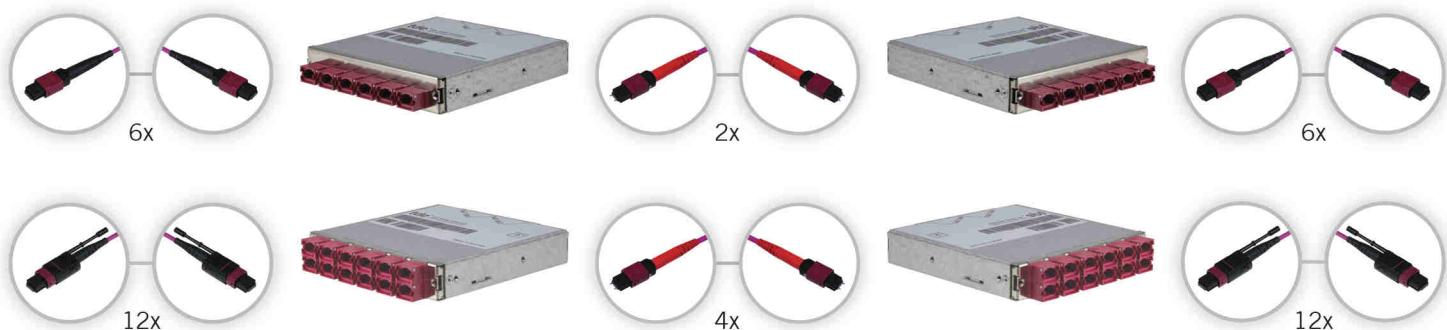
tML® 24 Migration to SR8/SR10 100/200/400G +

The tML® 24 trunk cable will be re-used. Just the modules must be changed to front plates.
The modules and patch cables are uniformly configured.

6x   6x   6x

12x   12x   12x
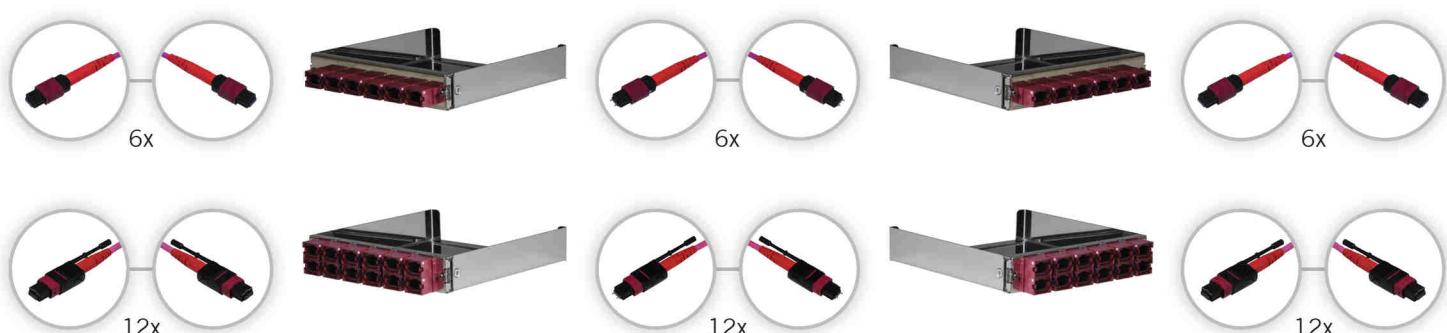
tML® 24 FO Trunk Cable

FO Micro Distribution round cable 24F MPO

Type A M/M	Part Number
9/125μ	TMLM2P/M2P09Iyy[2] E-Axx [1]
50/125μ OM3	TMLM2P/M2P50Iyy[2] G3Axx [1]
50/125μ OM4	TMLM2P/M2P50Iyy[2] G4Axx [1]
50/125μ OM5	TMLM2P/M2P50Iyy[2] G5Axx [1]

FO Universal cable 24F MPO

Type A M/M	Part Number
9/125μ	TMLM2P/M2P09Byy[2] E-Axx [1]
50/125μ OM3	TMLM2P/M2P50Byy[2] G3Axx [1]
50/125μ OM4	TMLM2P/M2P50Byy[2] G4Axx [1]
50/125μ OM5	TMLM2P/M2P50Byy[2] G5Axx [1]

tML® 24 FO Module MPO for 10/40/50/100G

1x 24F MPO to 12x LC Duplex

Fiber	Part Number
9/125μ OS2	TML-M12LCADx[9] /M2-09E [4]
9/125μ OS2	TML-M12LCDx[9] /M2-09E [4]
50/125μ OM3	TML-M12LCDx[9] /M2-50G3 [4]
50/125μ OM4	TML-M12LCDx[9] /M2-50G4 [4]
50/125μ OM5	TML-M12LCDx[9] /M2-50G5 [4]

1x 24F MPO to 12x LC Duplex 5HP

Fiber	Part Number
9/125μ OS2	TML-T12LCADx[9] /M2-09E [4]
9/125μ OS2	TML-T12LCDx[9] /M2-09E [4]
50/125μ OM3	TML-T12LCDx[9] /M2-50G3 [4]
50/125μ OM4	TML-T12LCDx[9] /M2-50G4 [4]
50/125μ OM5	TML-T12LCDx[9] /M2-50G5 [4]

tML® 24 LWL migration to SR4 40/100/200G

2x 24F MPO to 6x MPO Dark Fiber

Fiber	Part Number
9/125μ	TML-M06MPP/02M2-09E
50/125μ OM3	TML-M06MPP/02M2-50G3
50/125μ OM4	TML-M06MPP/02M2-50G4
50/125μ OM5	TML-M06MPP/02M2-50G5

2x 24F MPO to 6x MPO Dark Fiber 5HP

Fiber	Part Number
9/125μ	TML-T06MPP/02M2-09E
50/125μ OM3	TML-T06MPP/02M2-50G3
50/125μ OM4	TML-T06MPP/02M2-50G4
50/125μ OM5	TML-T06MPP/02M2-50G5

4x 24F MPO to 12x MPO Dark Fiber

Fiber	Part Number
9/125μ	TML-M12MPP/04M2-09E [5]
50/125μ OM3	TML-M12MPP/04M2-50G3 [5]
50/125μ OM4	TML-M12MPP/04M2-50G4 [5]
50/125μ OM5	TML-M12MPP/04M2-50G5 [5]

4x 24F MPO to 12x MPO Dark Fiber 5HP

Fiber	Part Number
9/125μ	TML-T12MPP/04M2-09E [5]
50/125μ OM3	TML-T12MPP/04M2-50G3 [5]
50/125μ OM4	TML-T12MPP/04M2-50G4 [5]
50/125μ OM4	TML-T12MPP/04M2-50G4 [5]

tML® 24 LWL migration to SR8/SR10 100/200/400G +

Partial front plate 6x MPO Adapter

Typ A	Part Number
Grün	TML-M06MP-GN-A8
Aqua	TML-M06MP-TK-A8
Magenta	TML-M06MP-VI-A8
Limettengrün	TML-M06MP-LG-A8

Partial front plate 6x MPO Adapter 5HP

Typ A	Part Number
Grün	TML-T06MP-GN
Aqua	TML-T06MP-TK
Magenta	TML-T06MP-VI
Limettengrün	TML-T06MP-LG [5]

Partial front plate 12x MPO Adapter

Typ A	Part Number
Grün	TML-M12MP-GN [5] -A8
Aqua	TML-M12MP-TK [5] -A8
Magenta	TML-M12MP-VI [5] -A8
Limettengrün	TML-M12MP-LG [5] -A8

Partial front plate 12x MPO Adapter 5HP

Typ A	Part Number
Grün	TML-T12MP-GN [5]
Aqua	TML-T12MP-TK [5]
Magenta	TML-T12MP-VI [5]
Limettengrün	TML-T12MP-LG [5]

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[1] xx stands for the cable length in m (every length is available)
[2] yy stands for the fiber counts: 24, 48, 72, 96, 144
[9] x stands for K = without Shutter, S = with Shutter

[3] xxx stands for the cable length in m (every length is available)
[4] can only be used in combination with tML HD LC Duplex patch cords

tML® 24 FO patch cord for SR4 40/100/200G

FO patch cord 12F MPO

Typ B F/F	Part Number
9/125µ	**TML-MP/MP09I12E-Bxxx** [3]
50/125µ OM3	**TML-MP/MP50I12G3Bxxx** [3]
50/125µ OM4	**TML-MP/MP50I12G4Bxxx** [3]
50/125µ OM5	**TML-MP/MP50I12G5Bxxx** [3]

FO patch cord 12F MPO HD

Typ B F/F	Part Number
9/125µ	**P-MPH/MPH09I12E-Bxxx** [3]
50/125µ OM3	**P-MPH/MPH50I12G3Bxxx** [3]
50/125µ OM4	**P-MPH/MPH50I12G4Bxxx** [3]
50/125µ OM5	**P-MPH/MPH50I12G5Bxxx** [3]

tML® 24 FO patch cord for SR8/SR10 100/200/400G +

FO patch cord 24F MPO

Typ A F/F	Part Number
9/125µ	**TMLM2/M2-09I24E-Axxx** [3]
50/125µ OM3	**TMLM2/M2-50I24G3Axxx** [3]
50/125µ OM4	**TMLM2/M2-50I24G4Axxx** [3]
50/125µ OM5	**TMLM2/M2-50I24G5Axxx** [3]

FO patch cord 24F MPO HD

Typ A F/F	Part Number
9/125µ	**P-M2H/M2H09I24E-Axxx** [3]
50/125µ OM3	**P-M2H/M2H50I24G3Axxx** [3]
50/125µ OM4	**P-M2H/M2H50I24G4Axxx** [3]
50/125µ OM5	**P-M2H/M2H50I24G5Axxx** [3]

tML® TP RJ45 1GbE Solution

for connection of TP Telco modules

Description	Part Number
Telco Female/Female shielded	**TML-TELCO-FF-Cxx** [6]
Telco Female/Female shielded (Industrial)	**TML-TELCO-FF-xx** [6]

TP Modul Telco to 6x RJ45 GbE

Description	Part Number
shielded for Rack Mount Enclosure 19"/10" 1U	**TML-M06RJ45/TELCO-M**

TP Modul Telco to 6x RJ45 GbE 5HP

Description	Part Number
shielded for Rack Mount Enclosure 19" 3U	
Stainless steel	**TML-T06RJ45/TELCO-M**
black	**TML-T06RJ45/TELCO-MS**

tML® TP RJ45 10GbE Solution

TP Trunk Cable on both ends 6x RJ45 10GbE

Description	Part Number
shielded for Rack Mount Enclosure 19"/10" 1U	**TML-M06RJ45-xx** [6]

TP Trunk Cable on both ends 6x RJ45 10GbE 5HP

Description	Part Number
shielded for Rack Mount Enclosure 19" 3U	
Stainless steel	**TML-T06RJ45xx** [6]
black	**TML-T06RJ45xx** [6] **S**

TP Trunk Cable on both ends 6x RJ45 10GbE

Description	Part Number
both ends connected	**TML-MS6RJ45C26-xx** [6] **A8**
one end connected	**TML-MS6RJ45C26-xx** [6] **UA8**
both ends connected w. LID	**TML-MS6RJ45C26-xx** [6] **LA8**
one end connected w. LID	**TMLMS6RJ45C26-xx** [6] **LUA8**

TP Trunk Cable on both ends 6x RJ45 10GbE 5HP

Description	Part Number
both ends connected	**TML-TS06RJ45C26-xx** [6]
one end connected	**TML-TS06RJ45C26-xx** [6] **U**
both ends connected w. LID	**TML-TS06RJ45C26-xx** [6] **L**
one end connected w. LID	**TML-TS06RJ45C26-xx** [6] **LU**

[5] can only be used in combination with tML HD MPO patch cords

[6] xx stands for the cable length in m (max. length 60m)

tML® Rack Mount Enclosures + Accessories

Rack Mount 19" 1U with drawer pull-out

Description	Part Number
for 8x Modules	
black	**TML-19/1HE-8-M-A**

Cover/Cable tray

Description	Part Number
with labeling strip	
black	**TML-19/1HE-8-M-A-PM2**

Blind module

Description	Part Number
for Rack Mount Enclosure 19"/10" 1U	
Stainless steel	**TML-M-BLIND-A8**

Rack Mount 19" 3U
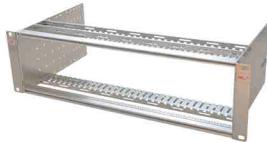
Description	Part Number
for 17x Modules 5HP	
Stainless steel	**TML-19/3HE-17**
black	**TML-19/3HE-17-S**

Blind plate

Description	Part Number
for Rack Mount Enclosure 19" 3U	
Stainless steel	**TML-T-BLIND**
black	**TML-T-BLIND-S**

CUBE

Description	Part Number
for 4x Modules	**TML-CUBE**

Detector for TP Trunk cables with LID function

Description	Part Number
incl. battery	**TBL-LID-TOOL**

SSTP patch cords RJ45/RJ45 TM31 Cat.6$_A$

Description	Part Number
1 : 1 polarity	**SS-H6AZyy [7]-Nzz [8] xxxx [6]**

FO patch cords LC HD

Description	Part Number
9/125µ	**TML-TLCA/TLCA09DRMxx [1]**
9/125µ	**TML-TLC/TLC09DRMxx [1]**
50/125µ OM3	**TML-TLC/TLC50D3RMxx [1]**
50/125µ OM4	**TML-TLC/TLC50D4RMxx [1]**
50/125µ OM5	**TML-TLC/TLC50D5RMxx [1]**

tML® FO TAP Module

TAP Module 2x LC Duplex

Fiber		Part Number
9/125µ	50:50	**TMLM02LCAD09E-TAP50**
9/125µ	70:30	**TMLM02LCAD09E-TAP70**
9/125µ	50:50	**TML-M02LCD09E-TAP50**
9/125µ	70:30	**TML-M02LCD09E-TAP70**
50/125µ OM4	50:50	**TML-M02LCD50G4TAP50**
50/125µ OM4	70:30	**TML-M02LCD50G4TAP70**

TAP Modul 4x LC Duplex

Fiber		Part Number
9/125µ	50:50	**TMLM04LCAD09E-TAP50[4]**
9/125µ	70:30	**TMLM04LCAD09E-TAP70[4]**
9/125µ	50:50	**TML-M04LCD09E-TAP50[4]**
9/125µ	70:30	**TML-M04LCD09E-TAP70[4]**
50/125µ OM4	50:50	**TML-M04LCD50G4TAP50[4]**
50/125µ OM4	70:30	**TML-M04LCD50G4TAP70[4]**

TAP Modul 1x MPO 12F

Fiber		Part Number
9/125µ	50:50	**TML-M01MPP09E-TAP50**
9/125µ	70:30	**TML-M01MPP09E-TAP70**
50/125µ OM4	50:50	**TML-M01MPP50G4TAP50**
50/125µ OM4	70:30	**TML-M01MPP50G4TAP70**

TAP Modul 2x MPO 12F

Fiber		Part Number
9/125µ	50:50	**TML-M02MPP09E-TAP50**
9/125µ	70:30	**TML-M02MPP09E-TAP70**
50/125µ OM4	50:50	**TML-M02MPP50G4TAP50**
50/125µ OM4	70:30	**TML-M02MPP50G4TAP70**

TAP Modul 3x MPO 12F

Fiber		Part Number
9/125µ	50:50	**TML-M03MPP09E-TAP50**
9/125µ	70:30	**TML-M03MPP09E-TAP70**
50/125µ OM4	50:50	**TML-M03MPP50G4TAP50**
50/125µ OM4	70:30	**TML-M03MPP50G4TAP70**

TAP Modul 1x MPO 24F

Fiber		Part Number
9/125µ	50:50	**TML-M01M2P09E-TAP50**
9/125µ	70:30	**TML-M01M2P09E-TAP70**
50/125µ OM4	50:50	**TML-M01M2P50G4TAP50**
50/125µ OM4	70:30	**TML-M01M2P50G4TAP70**

[7] yy stands for the boot color: BL (blue), GE (yellow), GN (green), GR (grey), OR (orange), RT (red), SW (black), VI (violet)

[8] zz stands for the cable color: BL (blue), GE (yellow), GN (green), GR (grey), OR (orange), RT (red), SW (black), VI (violet)

tde®

trans data elektronik GmbH

For 25 years, the internationally successful company tde has specialised in developing and producing scalable cabling systems for highest packing densities. Numerous in-house developments and continuous improvements to the production process have made tde one of the most advanced fiber optics manufacturers in Europe. In addition to standard equipment such as polishing machines and interferometers the product range also includes laser cleaver, glue robots and fully-automatic machines to prepare the fibers.

tde plays an active part in the DKE/UK 412.7 standardisation committee (fiber optics connection technology and passive optical components). tde is also represented in the European Committee for Electrotechnical Standardization CENELEC TC 86BXA / WG 01 and in the committee of the International Electrotechnical Commission IEC. Since 2014, the network expert has also been involved in the international committee IEC SC 86B.

Situated in Dortmund, Germany, the company's top priority is to guarantee customers the highest possible standards in quality. So as to always ensure this aspiration tde employees use interferometers to inspect every pre-assembled connector for grinding geometry and make sure that no assembled product leaves the production site without inspection record. To ensure the highest standards in quality tde has a consistent and systematic quality management system and is certified according to ISO 9001 and ISO 14001. With the TL 9000 quality management system tde was the first German company to receive a special certification for the telecommunications industry in 2002.

Renowned customers

Numerous renowned companies place their trust in the network expert's continuous quality assurance, including the prestigious CERN research centre in Switzerland.

Together with CERN engineers tde has realized a customized, highly compact cabling system with multimode optical fibers. The new solution ensures reliable high-speed transmission for future requirements. Thanks to tde's optimized laser cutting process, the MPO connector offers exceptionally good performance.

This makes the connector attractive for all areas in which high packing density takes first priority. Due to cuttingedge production processes and highest standards in quality tde ranks among the worldwide leading technology experts in the fields of multi-fibre and twisted pair technology. The network expert provides these fields with suitable solutions. One of the largest projects was the development of a mobile Telco-based cabling system for the German armed forces. For many years, this system has been in use at many military bases including Afghanistan.

It also serves as the basis for the tML®-system: The modular cabling system consists of the three core components module, trunk cable and module rack and is the result of many years of experience and improvement processes in the field of copper and fiber optics technology. Just like many other innovations made by tde it is protected by mutiple patents.

Quality „Made in Germany"

The tde portfolio comprises full system solutions focusing on Plug & Play for high-speed datacom, telecom, industry, medical and defence applications. The network expert's system solutions are exclusively developed, produced and assembled in Germany.

With its very own service department responsible for planning and installation tde offers competent services from a single source. As a member of the "European Code of Conduct" tde is committed to energy efficiency in data centres and with its standardised, flexible and recyclable system components makes an active contribution to green IT. Customer service is provided by qualified employees with a background in distribution and production.

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net. work. solution.

ISO 9001, TL 9000 and ISO 14001 certified

tde® trans data elektronik GmbH

Main address:
Lingener Straße 2, 49626 Bippen/Ohrte
T +49 5435 9511-0, F +49 5435 9511-32

Sales Office:
Prinz-Friedrich-Karl-Str. 46, 44135 Dortmund
T +49 231 9143-127, F +49 231 9143-129

info@tde.de | www.tde.de

MADE IN GERMANY
tde®
Seit 25 Jahren