High-Performance Fiber-Optic Cabling Using Multifiber MTP® Connectors for Faster Installation, Higher Rack Densities, and an Easier Transition to 40/100G
Luminix Cabling System
High-Density MTP® Connector-Based System

MULTIFIBER ARRAY CONNECTORS
• MTP® connectors for up to 24 fibers
• Standard and low-loss versions
• Standard and high-density cassettes

HIGH OPTICAL PERFORMANCE
• Exceeds industry standards for insertion loss, return loss, and endface geometry
• Factory terminated and tested
• Full test documentation provided with each assembly

SIMPLIFIED MIGRATION TO 40G/100G
• Conversion cassettes and harnesses for compatibility with 40G and 100G transceivers
• Allows full use of trunk cables

EASY TO INSTALL
• Preterminated cables for fast plug-and-play simplicity—and no onsite terminations
• Up to 70% reduction in installation time

High-Density Advantage
The Luminix cabling system gives you the high-density, modular system designed to maximize efficient use of rack space and simplify cable management. By using multifiber MTP® connectors, Luminix cabling systems reduce the cabling footprint to help improve airflow and cooling.

EVERYTHING YOU NEED TO DEPLOY END-TO-END SOLUTIONS

Backbone and Patch Cable Assemblies
Enclosures and Splice Trays
Adapter Panels
Cassettes

MTP is a registered trademark of US Conec Ltd.

TE Components . . . TE Technology . . . TE Know-how . . .
AMP | Agastat | CII | Hartman | Kilovac | Microdot | Nanonics | Polamco | Raychem | Rochester | DEUTSCH
SEACON Phoenix | L.L. Rowe | Phoenix Optix | SEACON

Get your product to market faster with a smarter, better solution.
HIGH-DENSITY MTP CONNECTOR-BASED SYSTEM

Cable
- Multimode OM1, 2, 3, 4
- Single Mode OS2, Bend Insensitive

MTP Connectors
- Standard Loss
- Low Loss

Cable Assemblies
- MTP' to MTP'
- MTP' to LC/SC

Cassettes
- Standard-Density Cassettes
- High-Density Cassettes

Adapter Panels and Cabinets
- Standard-Density
- High-Density

Indoor/Outdoor Armored Outside Plant
- Indoor

12, 24, 48, 72, 96, 144 Fibers

Satisfy Your Speed Requirements: Solutions for up to 100G

24-Port MTP’-to-LC Cassette
Luminix 24-Fiber Cable Assembly or Two Luminix 12-Fiber Cable Assemblies
LC Duplex Cable Assembly

10G with MTP’-to-LC Cassettes

Switch with 10G Ports
40/100G with Conversion Cassettes
(100G is 4 lanes @ 25 Gb/s)

40/100G with Conversion Harnesses
(100G is 4 lanes @ 25 Gb/s)
100G with Luminix Cable Assemblies
(100G is 10 lanes @ 10 Gb/s)

40/100G with Conversion Harnesses
(100G is 4 lanes @ 25 Gb/s)

Performance Margins for Comfortable Headroom

The optical performance of Luminix cabling systems exceeds industry standards. Our precision polishing gives you the margin you need for maximum flexibility in achieving a high-performance end-to-end channel.

### Performance Margins

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Standard</th>
<th>Multimode</th>
<th></th>
<th>Single Mode</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MTP</td>
<td>LC/SC</td>
<td>MTP</td>
<td>LC/SC</td>
</tr>
<tr>
<td>Insertion Loss (Max.)</td>
<td>TIA 568-C.3</td>
<td>.75 dB</td>
<td>.75 dB</td>
<td>.75 dB</td>
<td>.75 dB</td>
</tr>
<tr>
<td></td>
<td>Phoenix Optix (std loss)</td>
<td>.35 dB</td>
<td>.25 dB</td>
<td>.60 dB</td>
<td>.25 dB</td>
</tr>
<tr>
<td></td>
<td>Phoenix Optix (low loss)</td>
<td>.25 dB</td>
<td>.15 dB</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Return Loss (Min.)</td>
<td>TIA568-C.3</td>
<td>-20 dB</td>
<td>-20 dB</td>
<td>-26 dB</td>
<td>-26 dB</td>
</tr>
<tr>
<td></td>
<td>Phoenix Optix</td>
<td>-25 dB</td>
<td>-30 dB</td>
<td>-60 dB</td>
<td>-57 dB</td>
</tr>
</tbody>
</table>

Test Methods: IL per TIA/EIA-455-171 Method B • RL per TIA/EIA-455-107 Method 1
Better End Finishes for Better Performance

The endface geometry and finishes of our cables exceed industry standards. This helps ensure optimal optical performance, intermateability, and long-lasting connections. Our endface testing process—performed to our own stringent in-house standards using automated industry recognized equipment—enables continual improvement of our process.

Endface Geometry for Multimode and Single Mode/UPC Ceramic Ferrule

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IEC</th>
<th>Phoenix Optix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber Undercut/Protrusion</td>
<td>-100 to 50 μm</td>
<td>-100 to 50 μm</td>
</tr>
<tr>
<td>Radius of Curvature (ROC)</td>
<td>5 to 30 mm</td>
<td>7 to 25 mm</td>
</tr>
<tr>
<td>Apex Offset</td>
<td>&lt;70 μm</td>
<td>&lt;50 μm</td>
</tr>
<tr>
<td>Ferrule Outside Diameter</td>
<td>1.25 mm Dia. (LC) 1.249 to 1.2495 mm</td>
<td>1.249 to 1.2495 mm</td>
</tr>
<tr>
<td>2.5 mm Dia. (SC or FC)</td>
<td>2.499 to 2.4995 mm</td>
<td>2.499 to 2.4995 mm</td>
</tr>
</tbody>
</table>

Optical Interface Parameter Values for MTP® Connector

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IEC PAS 61755-3-32</th>
<th>Phoenix Optix</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Radius of Curvature</td>
<td>&gt; 2000 mm</td>
<td>&gt; 2000 mm</td>
</tr>
<tr>
<td>Y Radius of Curvature</td>
<td>&gt; 5 mm</td>
<td>&gt; 5 mm</td>
</tr>
<tr>
<td>X Endface Angle (also Y for flat polished connectors)</td>
<td>-0.2° &lt; X &lt; 0.2°</td>
<td>-0.15° &lt; X &lt; 0.15°</td>
</tr>
<tr>
<td>Y Endface Angle (SM)</td>
<td>7.8° &lt; Y &lt; 8.2°</td>
<td>7.85° &lt; X &lt; 8.15°</td>
</tr>
<tr>
<td>Fiber Protrusion Height</td>
<td>1000 nm &lt; H &lt; 3500 nm</td>
<td>1000 nm &lt; H &lt; 3500 nm</td>
</tr>
<tr>
<td>Fiber Protrusion Differential Total</td>
<td>&lt; 500 nm</td>
<td>&lt; 400 nm</td>
</tr>
<tr>
<td>Fiber Protrusion Differential Adjacent</td>
<td>&lt; 300 nm</td>
<td>&lt; 200 nm</td>
</tr>
<tr>
<td>Core Dip (MM)</td>
<td>N/A</td>
<td>-200 nm &lt; CD &lt; 150 nm</td>
</tr>
<tr>
<td>Maximum Co-planarity</td>
<td>N/A</td>
<td>&lt; 500 nm</td>
</tr>
<tr>
<td>Flatness Deviation</td>
<td>N/A</td>
<td>&lt; 2000 nm</td>
</tr>
<tr>
<td>Minimum Valid Pixels Ratio</td>
<td>N/A</td>
<td>&gt; 23 %</td>
</tr>
</tbody>
</table>

Fibers for Every Need

You can specify the cable you need for any application. Our standard single-mode fibers are bend-insensitive OS2 style. We offer the full range of multimode fibers to allow you to balance cost against your needs for speed, distance, and compatibility with interface electronics.

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Channel Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100 Mb</td>
</tr>
<tr>
<td>OM1 (62.5/125)</td>
<td>(100BASE-FX)</td>
</tr>
<tr>
<td>OM2 (50/125)</td>
<td>2000</td>
</tr>
<tr>
<td>OM3 (50/125) LOMF</td>
<td>2000</td>
</tr>
<tr>
<td>OM4 (50/125) LOMF</td>
<td>2000</td>
</tr>
<tr>
<td>OM3 (50/125) LOMF</td>
<td>2000</td>
</tr>
</tbody>
</table>

Recommended maximum distances for multimode fibers at various Ethernet speeds
Luminix Cable Assemblies

Part Number Configurator

Fiber Count
12-Fiber Ferrule:
12, 24, 48, 72, 96, 144
24-Fiber Ferrule:
24F, 48F, 72F, 96F, 144F

Connector Type, End A
MF: MTP® Female
MM: MTP® Male

Connector Type, End B
MF: MTP® Female
MM: MTP® Male
LC: LC
SC: SC
LA: LC/APC
SA: SC/APC

Ferrule Type
E: Elite
L: Low Loss

Fiber Type
1: OM1 MMF
2: OM2 MMF
3: OM3 MMF
4: OM4 MMF
8: OS2 SMF


X = Polarity

Overall Length
Specify Length in Feet

Pulling Eye
P: Pulling Eye
N: None
D: Dual Pulling Eye

Breakout
Specify Breakout in Inches (Standard is 24”)

Furcation
S2: 2-mm Simplex
S3: 3-mm Simplex
D2: 2-mm Duplex
D3: 3-mm Duplex

Cable Type
P: Indoor
U: Indoor/Outdoor
A: Armored

• Consult Phoenix Optix for availability of other fiber counts and cable types.
• Standard breakout is 24”; consult us for other lengths
• Single fiber connectors are staggered every 12 fibers;
• When a pulling eye is required, staggering is every 6 fibers.
• Multifiber connectors are staggered every four connectors
• Single fiber subunit bundles are 6” in length
• Single-mode fibers are UPC polished unless otherwise noted.
STANDARD-DENSITY CASSETTES

Flexible Configurations
- Single mode and multimode
- 12 or 24 fibers
- MTP®, LC, SC interfaces
- Up to three cassettes — 72 fibers — per 1U rack space

Part Number Configurator

Standard Cassette
- Fiber Type: OM1, OM2, OM3, OM4, OS2
- Fiber Quantity: 12, 24 (LC only)

High Density Cassette
- Fiber Type: OM1, OM2, OM3, OM4, OS2
- Fiber Quantity: 12, 24 (LC only)

LHD HIGH-DENSITY CASSETTES
- 33% higher density: Up to four cassettes — 96 fibers — per 1U rack space

Part Number Configurator

High Density Cassette
- Fiber Type: OM1, OM2, OM3, OM4, OS2
- Fiber Quantity: 12, 24 (LC only)
STANDARD ADAPTER PANELS

Flexible Configurations
• Single mode and multimode
• Color coded with choice of phosphor bronze or zirconia alignment sleeve
• MTP®, LC, SC interfaces
• Up to 72 fibers per 1U rack space

Part Number Configurator

<table>
<thead>
<tr>
<th>Standard Adapter Panel</th>
<th>Fiber Quantity</th>
<th>Connector Type</th>
<th>Receptacle Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12</td>
<td>LC</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>24 (LC only)</td>
<td>SC</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MT</td>
<td>Q</td>
</tr>
</tbody>
</table>

Alignment Sleeve
- **P**: Phosphor Bronze
- **Z**: Zirconia Ceramic

Color
- **AQ**: Aqua
- **BE**: Beige
- **BL**: Blue
- **GR**: Green

LHD HIGH-DENSITY ADAPTER PANELS

Flexible Configurations
• Up to 33% more ports—96 fibers—per 1U rack space

Part Number Configurator

<table>
<thead>
<tr>
<th>High-Density Adapter Panel</th>
<th>Fiber Quantity</th>
<th>Connector Type</th>
<th>Receptacle Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12</td>
<td>LC</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>24 (LC only)</td>
<td>SC</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MT</td>
<td>Q</td>
</tr>
</tbody>
</table>

Alignment Sleeve
- **P**: Phosphor Bronze
- **Z**: Zirconia Ceramic

Color
- **AQ**: Aqua
- **BE**: Beige
- **BL**: Blue
- **GR**: Green
Jumper Cables

Reliable High-Bandwidth Performance

- Exceeds industry standards for insertion loss, return loss, and endface geometry
- Manufactured in the USA
- 100% in-house tested and documented

Convenient

- Wide variety of cable and connector options to help meet your specific requirements.
- Quick turnaround for standard and custom lengths

Part Number Configurator

Number of Fibers
- S: Simplex
- (blank): Duplex

Connector Type, End A
- LC: LC
- SC: SC
- FC: FC
- LA: LC/APC
- SA: SC/APC
- FA: FC/APC

Connector Options, End A
- F: Flexible Boot
- M: Mini Boot
- R: Reversible (LC Only)
- H: High Density (LC Only)
- P: IP Rated (LC Duplex or SC Simplex Only)
- U: Unclipped (LC/SC Duplex)

Connector Type, End B
- LC: LC
- SC: SC
- FC: FC
- LA: LC/APC
- SA: SC/APC
- FA: FC/APC
- XX: None (Pigtail)

Custom jacket colors are available, including beige, blue, green, purple, pink, red, and white. Consult Phoenix Optix for other configurations and jumper options.
STANDARD-DENSITY CABINETS

Organize, protect, and secure your cables with our premium cabinets

Flexible
- 1U, 2U, and 4U heights
- Up to 72 fibers per rack unit
- Accommodates both adapter panels and cassettes

Convenient
- 16 gauge powder-coated steel
- Fits both 19” and 23” racks
- Lockable front door with Plexiglas panels for easy inspection
- Slide-out tray and removable top cover for easy access to cassettes

<table>
<thead>
<tr>
<th>Height (Rack Units)</th>
<th>No. of Adapters</th>
<th>No. of Fibers</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Density</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1U</td>
<td>3</td>
<td>72</td>
<td>RM-1300P/S</td>
</tr>
<tr>
<td>2U</td>
<td>6</td>
<td>144</td>
<td>RM-2300P/S</td>
</tr>
<tr>
<td>4U</td>
<td>12</td>
<td>288</td>
<td>RM-4300P/S</td>
</tr>
</tbody>
</table>

1U Enclosure
Capacity: 3 Cassettes or Adapters
Fits 19” or 23” rack
1.75” x 12.70” x 19.00” (HxDxW)
Part No. RM-1300P/S

2U Enclosure
Capacity: 6 Cassettes or Adapters
Fits 19” or 23” rack
3.50” x 12.70” x 19.00” (HxDxW)
Part No. RM-2300P/S

4U Enclosure
Capacity: 12 Cassettes or Adapters
Fits 19” or 23” rack
7.00” x 12.70” x 19.00” (HxDxW)
Part No. RM-4300P/S

1U Shelf
An economical solution to cassette management

Capacity: 3 Cassettes or Adapters
Fits 19” rack
1.63” x 8.00” x 19.00” (HxDxW)
Part No. 80048-C
LHD HIGH-DENSITY CABINETS

Organize, protect, and secure your cables with our premium cabinets

High-Density Cabinets

• 33% increase in port capacity

Flexible

• 1U and 2U heights
• Up to 96 fibers per rack unit
• Accommodates both LHD adapter panels and cassettes

Durable

• 16 gauge powder-coated steel
• 19” rack mount

<table>
<thead>
<tr>
<th>Height (Rack Units)</th>
<th>No. of Adapters</th>
<th>No. of Fibers</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1U</td>
<td>4</td>
<td>96</td>
<td>LHD-001</td>
</tr>
<tr>
<td>2U</td>
<td>8</td>
<td>192</td>
<td>LHD-002</td>
</tr>
</tbody>
</table>
CONVERSION CASSETTES AND HARNESSES

A Better Path to 40/100G

Luminix conversion harnesses and cassettes make it easy to migrate to 40G and 100G networks. 100G, for example, uses four 25G lanes, requiring eight fibers for transmit and receive. A typical conversion harness uses two 12-fiber or one 24-fiber connector on one end and three 8-fiber connectors on the other for connection to transceivers.

<table>
<thead>
<tr>
<th>Fiber Count</th>
<th>Output</th>
<th>Input</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>Three 8-Fiber MTP® Connectors</td>
<td>Two 12-Fiber MTP®</td>
<td>CC-2X12-3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One 24-Fiber MTP®</td>
<td>CC-1X24-3</td>
</tr>
<tr>
<td>48</td>
<td>Six 8-Fiber MTP® Connectors</td>
<td>Four 12-Fiber MTP®</td>
<td>CC-4X12-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Two 24-Fiber MTP®</td>
<td>CC-2X24-6</td>
</tr>
</tbody>
</table>

*Add “S” to part number for single-mode version

Conversion Harnesses
(OM4 shown. For single-mode, change “CA” to “CAS” in part number. OM4 cables available in aqua or violet)

- 4 x 12-Fiber MTP® In
  6 x 8-Fiber MTP® Out
  Part No. CC-4X12-6

- 2 x 12-Fiber MTP® In
  3 x 8-Fiber MTP® Out
  Part No. CC-2X12-3

- 2 x 24-Fiber MTP® In
  6 x 8-Fiber MTP® Out
  Part No. CC-2X24-6
MULTIFIBER TRUNK CABLES

Preterminated for Fast Installation

Reliable High-Bandwidth Performance
- Exceed industry standards for insertion loss, return loss, and endface geometry
- Manufactured in the USA
- 100% in-house tested and documented

Convenient
- Wide variety of cable and connector options to help meet your specific requirements.
- Quick turnaround for standard and custom lengths

Part Number Configurator

Number of Fibers
4, 6, 8, 12, 24, 48, 72, 96, 144

Connector Type (End A)
LC: LC
SC: SC
FC: FC
ST: ST
LA: LC/APC
SA: SC/APC
FA: FC/APC

Connector Type (End B)
LC: LC
SC: SC
FC: FC
ST: ST
LA: LC/APC
SA: SC/APC
FA: FC/APC
MU: MU

Fiber Type
1: OM1
2: OM2
3: OM3
4: OM4
8: OS2

Overall End-to-End Length
In Feet
48 - LA - LA - 4 - T - A - S2 - 24 - P - 120

Pulling Eye
P: Pulling Eye
N: None
D: Dual Pulling Eye

Breakout Length
In Inches

Furcation
S2: Simplex 2mm
S3: Simplex 3 mm
D2: Duplex 2 mm
D3: Duplex 3 mm

Armor
A: Armored

Cable Type
T: Indoor Low Smoke
V: Indoor/Outdoor
X: Indoor Distribution Plenum
Y: Indoor Loose-Tube Plenum
S: Tactical
M: Indoor/Outdoor Distribution Plenum

Notes
- Single-mode connectors are UPC polished unless otherwise specified.
- Other cable types available: consult Phoenix Optix.
- Standard breakout is 24". Consult Phoenix Optix for other lengths.
- Single fiber connections are staggered on both ends every 12 fibers or, when a pulling eye is required, every 6 fibers.
- Consult Phoenix Optix for low-loss part numbers.
Method A, B, C Wiring

Three methods of polarity in the Luminix cabling system

Method A

- Provides simplest deployment
- Easily supports network extensions
- Works for both single and multimode
- Employs key up to key down adapters to connect array connectors

With this method, registration of Fiber 1 is maintained throughout the optical circuit. Fiber 1 in the near end cassette mates to Fiber 1 in the trunk assembly, which mates to Fiber 1 in the remote cassette, and the circuit, is complete by using a flipped patch cord.

Method B

- Requires more in depth planning stage
- Requires two separate cassettes or special labeling
- Employs key up to key up mating of array connectors

Under Method B, the fiber circuit is completed by using straight patch cords at the beginning and end of the link. With this method, a pair flip is created by mating Fiber 1 with Fiber 12, Fiber 2 with Fiber 11, and so forth. For proper transceiver operation, one of the cassettes needs to be inverted at the end of the link so Fiber 12 is mated with Fiber 1.

Method C

- Requires more in depth planning to manage polarity links
- Employs key up to key down adapters

With Method C, the fiber circuit is completed by utilizing straight patch cords at the beginning and end of the link, much like method A. However, the pair flip happens in the array cable itself as opposed to the end patch cords in Method A.

<table>
<thead>
<tr>
<th>Method A</th>
<th>Method B</th>
<th>Method C</th>
</tr>
</thead>
<tbody>
<tr>
<td>POS</td>
<td>END A</td>
<td>END B</td>
</tr>
<tr>
<td>1</td>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Orange</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
<td>Brown</td>
</tr>
<tr>
<td>5</td>
<td>Slate</td>
<td>Slate</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>White</td>
</tr>
<tr>
<td>7</td>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>8</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>9</td>
<td>Yellow</td>
<td>Yellow</td>
</tr>
<tr>
<td>10</td>
<td>Violet</td>
<td>Violet</td>
</tr>
<tr>
<td>11</td>
<td>Rose</td>
<td>Rose</td>
</tr>
<tr>
<td>12</td>
<td>Aqua</td>
<td>Aqua</td>
</tr>
</tbody>
</table>
HIGH-PERFORMANCE FIBER-OPTIC CABLEING USING MULTIFIBER MTP® CONNECTORS FOR FASTER INSTALLATION, HIGHER RACK DENSITIES, AND AN EASIER TRANSITION TO 40/100G

PhoenixOptix.com

For More Information

Phoenix Optix Support Center
15 Gray Lane, Suite 109, Ashaway, RI 02804, USA

+1 401 637 4600   +1 401 637 4606
SalesRI@phoenixoptix.com   TechSupport@phoenixoptix.com

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Consult TE for the latest dimensions and design specifications.

is now part of

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