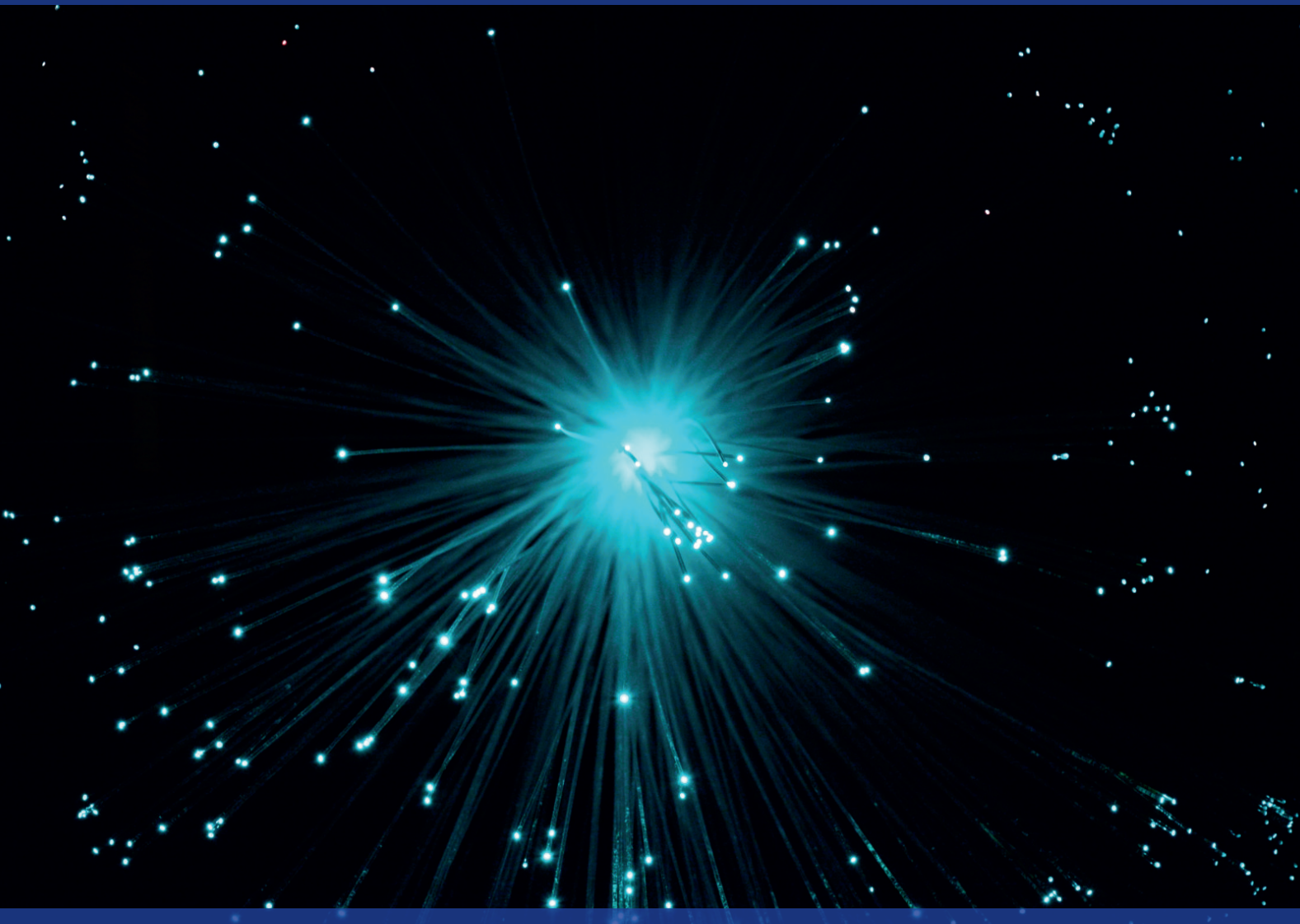
# RF over Fiber Guide

Part of the axing Group

## WE CARE FOR YOUR SIGNALS...



## RELIABLE, COST-EFFECTIVE AND FAST

### Your Partner for Optical RF Transmission in

- Satellite Communications
- Broadcast and Cable
- Government and Military
- HFC Headends

THE ART OF ENGINEERING

## RF over Fiber (RFoF) Technology

"RF over Fiber" refers to technology that modulates light with a radio frequency signal for transmission over an optical fiber. All satellite ground stations and teleports must have an effective transmission method for RF signals linking antennas, signal management equipment and wide-ranging equipment centers. Beyond traditional copper or coax, current "state-of-the-art" installations are best served by fiber-optic links. RFoF incorporates several advantages over coax: limited losses, preserved signal quality, and muted crosstalk. High-capacity fiber connectivity secures an enduring platform in the face of today's ever-changing technology environment.

## Optribution – The All-in-One Solution

With Optribution DEV offers a product line providing electrical and optical functions within one system. All products are engineered, developed and manufactured in Germany.

OPTRIBUTION
powered by DEV

**Optribution** allows complex switching, redundant configurations, and long-distance signal transport up to 200 km. The very compact, cost-effective **ALPHA** line serves up to 32 optical fiber connections in just 1 RU.

All our RF-over-Fiber products feature modular flexibility and open paths scalable for future needs. Our consistent solution architecture offers perfect interoperability with other DEV devices, including matrix switches, redundancy or antenna control systems, and lightning protection gear. When using standardized frequencies, protocols and connectors, DEV systems can also be integrated with third-party systems.

## Wide Range of Functions

The Optribution product line features a wide selection of diverse fiber transmission and signal distribution modules for switching, splitting, CWDM/DWDM, redundancy routing and much more! Optribution modules can be flexibly combined into four different indoor and two outdoor clusters.

Additional features make life much easier from signal recording and automatic switch-back to built-in monitoring features. We design our products to provide superior value.

Our broad selection of chassis, multiple modules, and flexible configuration menu assures a uniform, easy-to-manage solution for your optical RF signal-handling needs reaching up to 200 km. DEV's proven track record has demonstrated the highest signal performance quality and reliability.

## Alpha – World's Most Compact RF over Fiber Solution

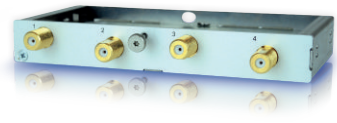
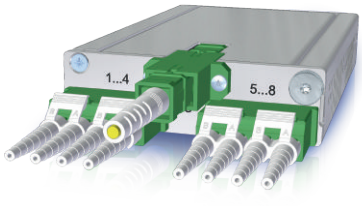
The high-density RFoF solution Alpha within the Optribution family serves up to 32 fiber links in 1 RU – the world's highest number of optical channels. Splitting and switching modules are available for redundancy application on both the transmitting and receiving sides. With an unmatched cost-performance ratio, Alpha is the optimal solution for standard RF-over-Fiber transmission up to 3 km when it comes to limited rack spacing. All Alpha modules are interoperable with all other products of the Optribution line and can be housed within a, 1-RU indoor chassis or in a waterproof outdoor chassis mounted directly on the antenna mast. The Alpha Outdoor Chassis can hold up to 8 optical channels.

alpha

| Product | Name of Product | Technical Description |
|---|---|---|
|  | **RF over Fiber Indoor Chassis**<br>DEV 4111 | **Intelligent Universal Optribution Chassis, 19“, 1 RU, 2 Slots**<br>50 Ohm SMA (f) and/or 75 Ohm F (f)<br>Prepared for Optical Tx, Rx Modules or RF Amplifier Modules<br>L-Band Distribution 1:8 and 1:16<br>IRD controlled Switch 2x8 and 4x8<br>1+1 Redundancy<br>Power Supply Redundancy<br>DEV Web Interface and SNMP |
|  | **RF over Fiber Indoor Chassis**<br>DEV 7113 | **Intelligent Optribution Chassis, 19“, 3 RU, 20 Slots**<br>50 Ohm SMA (f) or 75 Ohm F (f) or 75 Ohm BNC (f)<br>1+1 and n+1 (4+1, 8+1, 12+1, 16+1) Redundancy Options<br>CWDM for up to 9 channels<br>DWDM for up to 49 channels<br>Automatic Switch Back<br>Redundancy Path Gain Compensation (RGC)<br>Ethernet to Optical Converter<br>Power Supply Redundancy<br>DEV Web Interface and SNMP |
|  | **RF over Fiber Indoor Chassis**<br>DEV 7114 | **Intelligent Optribution Distribution Chassis 19”, 4 RU, 16 Slots**<br>50 Ohm SMA (f) and 75 Ohm F (f)<br>Distribution Amplifiers from 1:4 up to 1:128<br>IRD controlled Switches from 4x16 up to 4x64<br>Matrix Modules 8x8, 8x16, 16x8 and 16x16<br>CWDM for up to 9 channels<br>Automatic Switch Back<br>Redundancy Path Gain Compensation (RGC)<br>Ethernet to Optical Converter<br>Power Supply Redundancy<br>DEV Web Interface and SNMP |
|  | **RF over Fiber Indoor Chassis**<br>DEV 7134 | **Compact Intelligent Optribution Chassis, 19“, 4 RU, 12 Slots**<br>50 Ohm SMA (f) and/or 75 Ohm F (f)<br>Half Depth, Front Accessible and Wall Mountable<br>L-Band 1+1 Tx & Rx Redundancy<br>CATV- and L-Band 4+1 Redundancy Option<br>CWDM for up to 9 channels<br>Automatic Switch Back<br>Redundancy Path Gain Compensation (RGC)<br>Ethernet to Optical Converter<br>Power Supply Redundancy<br>DEV Web Interface and SNMP |
|  | **RF over Fiber Outdoor Chassis**<br>DEV 7152 | **Intelligent Optribution Outdoor Chassis, 5 Slots**<br>Signal Conversion Directly at Antenna<br>50 Ohm SMA (f) or N (f) and/or 75 Ohm F (f)<br>5 Slots for Tx and/or Rx Modules<br>-30…+60 °C / -22…+140 °F<br>1+1 or 4+1 Redundancy Options<br>Redundancy Path Gain Compensation (RGC)<br>Ethernet to Optical Converter<br>Power Supply Redundancy<br>DEV Web Interface and SNMP |
|  | **RF over Fiber Outdoor Chassis**<br>DEV 7151 | **Wall Mountable Chassis for Desktop Optribution Modules, 4 Slots**<br>Up to 4 Desktop Tx and/or Rx Modules<br>-20…+65 °C / -4…+149 °F<br>Easy Handling Character<br>Wall Mountable<br>Compact Size<br>Power Supply Redundancy |
|  | **RF over Fiber Desktop Modules**<br>DEV 728x series (Tx)<br>DEV 738x series (Rx) | **Stand-Alone Desktop Optribution Tx and Rx Modules**<br>47…1006 MHz or 700…2300 MHz<br>LC/APC<br>RF Monitoring Port<br>LNB Power switchable 13/18 V and 0/22 kHz Tone<br>Overtemperature Protection<br>Different Mounting Products |

| Product | Name of Product | Technical Description |
|---|---|---|
|  | **Optical Modules L-Band**<br>DEV 72xx series (Tx)<br>DEV 73xx series (Rx) | **Optribution Tx and Rx L-Band Link**<br>10 MHZ, 700...2300 MHz, 850...2450 MHz, 950...2150 MHz<br>SC/APC, FC/APC or E2000 HRL<br>9 different wavelengths for CWDM Applications<br>49 different wavelengths for DWDM Applications<br>Optical Modulation Index (OMI) optimization<br>Low Noise<br>Variable Gain and Variable Tilt<br>RF Sensing<br>RF Monitoring Port<br>LNB Powering and Bias Current Monitoring |
|  | **Optical Modules CATV-Band**<br>DEV 72xx series (Tx)<br>DEV 73xx series (Rx) | **Optical Tx and Rx Modules for Optribution Chassis**<br>10 MHz, 47...1006 MHz<br>SC/APC, FC/APC or E2000 HRL<br>9 different wavelengths for CWDM Applications<br>Low Noise<br>Variable Gain and Variable Tilt<br>RF Sensing<br>RF Monitoring Port<br>LNB Powering and Bias Current Monitoring |
|  | **Optical Switch Modules**<br>DEV 746x series | **Optribution Switches**<br>1260...1610 nm<br>SC/APC, FC/APC or E2000 HRL<br>1:2 / 2:1 Bidirectional Optical Switches<br>Low Loss Optical Switching<br>Very High Isolation |
|  | **Optical Splitter Modules**<br>DEV 751x series | **Optribution Splitters**<br>1260...1610 nm<br>SC/APC, FC/APC or E2000 HRL<br>1:2, 1:4, 1:8 Bidirectional Optical Splitters<br>Applicable in CWDM and DWDM Systems |
|  | **Optical De-/Multiplexer Modules**<br>DEV 76xx series | **Optribution CWDM/DWDM De-/Multiplexers**<br>1470...1610 nm<br>SC/APC, FC/APC or E2000 HRL<br>2:1/1:2, 4:1/1:4 and 8:1/1:8<br>Extension Port, 1310 nm, for CWDM<br>Extension Port for up to 49 Channels DWDM |
|  | **EDFA Modules**<br>DEV 741x / DEV 742x series | **Optical EDFA Modules for Optribution**<br>Pre- and Boost-Amplifier<br>High Gain, Low Noise Figure<br>Automatic Output Power Control (APC)<br>Manual Gain Control (MGC)<br>Monitoring of Input and Output Optical Power Level<br>Optimized for DWDM Solutions |
|  | **EDFA Chassis for DWDM**<br>DEV 716x series | **EDFA Optribution Amplifier, 19“, 1 RU**<br>1, 8, 2*8, or 16 Outputs<br>High Gain, Low Noise Figure<br>Automatic Output Power Control (APC)<br>Manual Gain Control (MGC)<br>Monitoring of Input and Output Optical Power Level<br>Optimized for DWDM Solutions<br>DEV Web Interface and SNMP |

# OPTRIBUTION ALPHA PRODUCT PORTFOLIO

| Product | Name of Product | Technical Description |
|---|---|---|
|  | **Alpha Indoor Chassis**<br>DEV 7181 | **Intelligent Optribution Chassis Alpha, 19", 1 RU, 8 Slots**<br>Up to 32 RF over Fiber links<br>Space for 8 optical and 8 electrical modules<br>LNB Powering – 13 V, 18 V and 0 Hz, 22 kHz<br>2.2" Full Color Display<br>Local User Interface<br>Manageable via SNMP or DEV Web Interface<br>Power Supply Redundancy<br>Interoperability with the DEV Optribution Series |
|  | **Alpha Outdoor Chassis**<br>DEV 7185 | **Optribution Outdoor Chassis Alpha, 2 Slots**<br>Up to 8 RF over Fiber links<br>Space for 2 optical and 2 electrical modules<br>LNB Powering – 13 V, 18 V and 0 Hz, 22 kHz<br>Wall or pole mountable<br>Waterproof to IP66 standards<br>Interoperability with the DEV Optribution Series |
|  | **Alpha Optical Transmitter**<br>Option 101<br>Option 102 (CWDM Channel 1...4)<br>Option 103 (CWDM Channel 5...8) | **Alpha Optical Transmitter**<br>850...2450 MHz<br>4 Tx channels per module<br>SC/APC connectors<br>CWDM option (1470...1610 nm)<br>RF Sensing<br>Variable Gain |
|  | **Alpha Optical Receiver**<br>Option 111 | **Alpha Optical Receiver**<br>850...2450 MHz<br>4 Rx channels per module<br>SC/APC connectors<br>Wavelength Range 1270...1610 nm<br>RF Sensing<br>Variable Gain |
|  | **Alpha RF Input/Output Ports**<br>Option 151 | **Alpha Input/Output RF Ports**<br>Connection to the related optical module<br>850...2450 MHz<br>4 I/O Ports per module<br>75 Ohm, F (f) connectors |
|  | **Alpha RF Redundancy Option**<br>Option 152 (Splitter)<br>Option 153 (Switch) | **Alpha 1+1 Redundancy RF Ports – Transmitting or Receiving**<br>Connection to two optical modules<br>850...2450 MHz<br>4 RF Ports per module<br>Tx or Rx Redundancy<br>75 Ohm, F (f) connectors |
|  | **Alpha CWDM De-/Multiplexer**<br>Option 161 (1:4)<br>Option 162 (1:8) | **Alpha CWDM De-/Multiplexer**<br>4 or 8 Optical Ports for CWDM Applications<br>1470...1610 nm<br>SC/APC and LC/APC Connectors |

## Reliable Technology, Trusted Expertise

DEV Systemtechnik, part of the AXING Group, develops and manufactures a complete range of products and systems for optical and electrical transmission of Radio Frequency (RF) signals via coaxial cable or fiber. For over 20 years DEV has designed, engineered, and manufactured RF transmission equipment for satellite, broadcast, and cable applications. All products are built to meet the highest standards of system availability, reliability and manageability.

Our product portfolio includes:

- Distribution Amplifiers, Splitters and Combiners
- Redundancy Switching Systems
- Distributing and Combing Matrices
- Routing Products and Multiplexers
- RF Signal Transmission over Optical Fiber
- DOCSIS 3.1-Ready Equipment for Cable and HFC Networks

## Modular – Flexible – Manageable

We configure custom arrays spanning the frequency range from DC to 40 GHz. Accessory products include Lightning Protection, Bias Tees, and Impedance Transformers to help make your critical signal transmission simple and reliable. Control your DEV equipment easily via our user-friendly Web Interface or SNMP – even locally or through other monitor and control methods supported.

## Ready to work with us?

We're always excited to help our customers meet new challenges – and we believe you will really enjoy working with us. Call us with any of your RF transmission needs from antenna to receiver.

Whatever your requirement, discover the DEV solution.

## Discover Superior RF Solutions

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