CWDM MUX and DEMUX Modules and Frame

Guide to Installation and Operation

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A **BELDEN** BRAND

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1 CWDM MUX and DEMUX Modules and Frame

1.1 Introduction

The Miranda CWDM mux/demux modules are bi-directional passive optical multiplexers and demultiplexers, allowing multiple optical signals at different wavelengths to pass through a single optical fiber strand. The product is designed to integrate conveniently with Miranda's FIO-1901, FIO-991 and FIO-991p series of optical/electrical converters, but is equally useful with other products working with CWDM wavelengths, such as Miranda's NVISION routers.

The CWDM mux/demux combines up to 18 different-wavelength signals from different optical fibers into a single optical fiber, or separates up to 18 different-wavelength signals coming from a single optical fiber to 18 separate optical fibers. The units are completely agnostic to the signal type, allowing different signals such as AES, MADI, DVB-ASI, 3Gbps/HD/SD SDI or Ethernet to travel in either direction on the same fiber link.

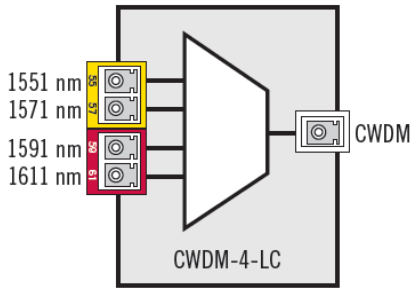
1.2 Features

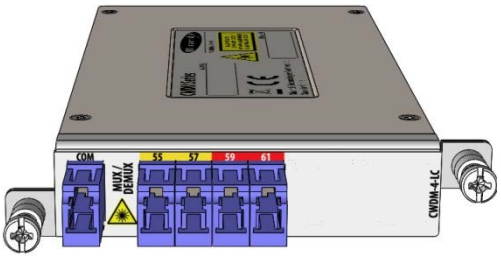
- 4, 8, 16 or 18 channel optical mux/demux
- Long distance coverage of multiple signals on a single fiber strand
- Various types of signals supported such as 3Gbps/HD/SD, AES, DVB-ASI , Ethernet, etc.
- Same module can be used in either direction, allowing some channels in one direction and other channels in opposite direction
- Passive CWDM optical mux/demux design
- Minimizes content delivery costs where dark fiber is available
- Packaged in the same modular form as Miranda's FOS series of optical splitters, with all modules the same width, and configured to install in a convenient 1RU tray that holds up to 10 single height modules or 5 double height modules, or any combination of both

1.3 Available Modules

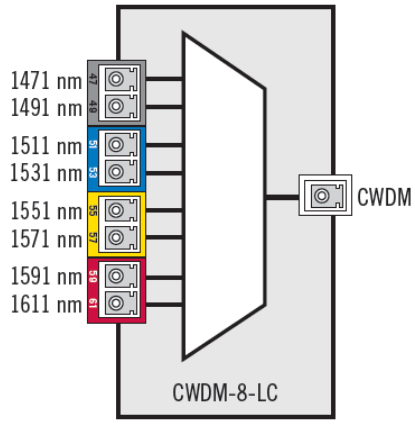
The following modules are available for this series:

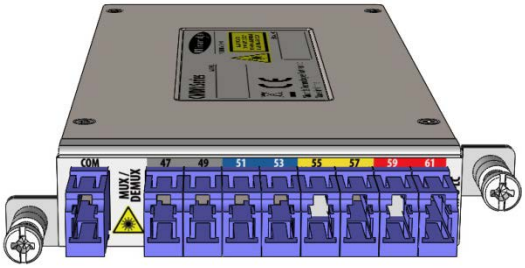
CWDM-4-LC



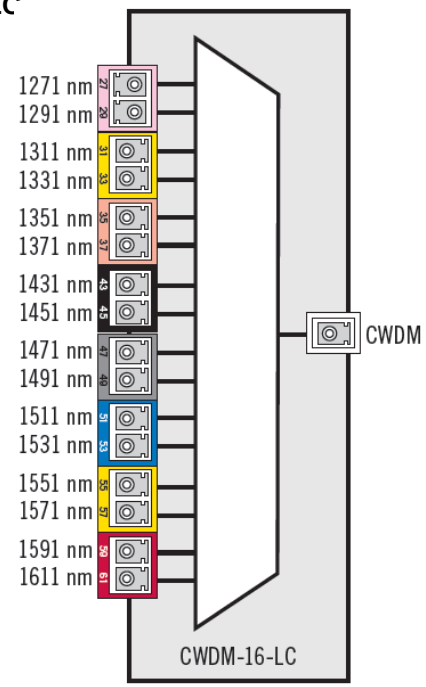


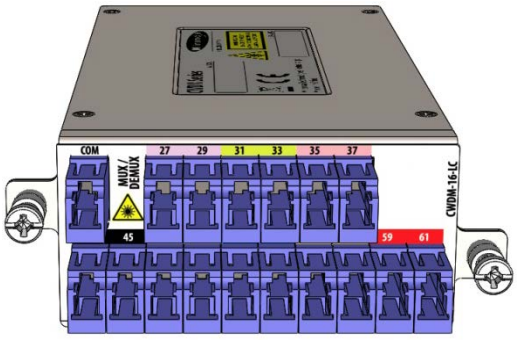
CWDM-8-LC



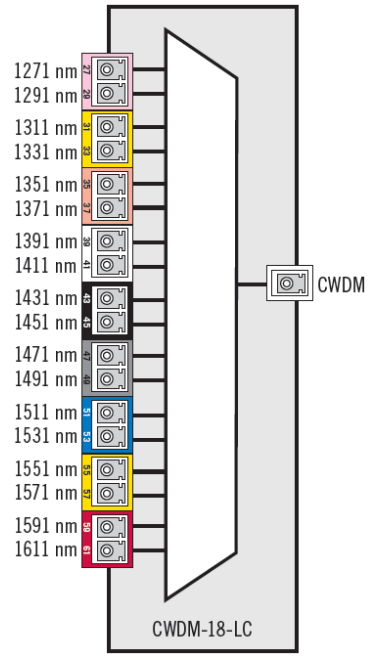


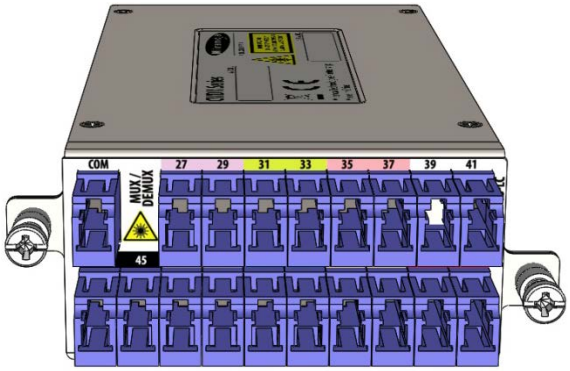
CWDM-16-LC





CWDM-18-LC





1.4 MUX Operation

When used as **MUX,** modules have multiple inputs and a single output.

The inputs are paired, according to the pairs of optical frequencies/wavelengths supplied by standard SFP-TT modules, allowing easy use of reverse fiber position duplex patch cords (see the image below). The label of each input pair on the CWDM unit is color coded, as shown in the following chart, to match the color coding on the clasp handle of the SFP-TT module that is required to drive that input.

The optical wavelengths conform to ITU-T Rec. G.694.2 (12/2003).

- Note that the wavelengths have been offset by I nm relative to the former revision of the standard.

SFP-TT Module Type Feeding Input	Optical Input Wavelengths	Label on Panel	Panel Label Color Code	4 Ch	8 Ch	16 Ch	18 Ch
SFP-TT-C27C29-LC	1271 / 1291 nm	27 29	Light Purple			X	X
SFP-TT-C31C33-LC	1311 / 1331 nm	31 33	Yellow Green			X	X
SFP-TT-C35C37-LC	1351 / 1371 nm	35 37	Pink			X	X
SFP-TT-C39C41-LC	1391 / 1411 nm	39 41	White				X
SFP-TT-C43C45-LC	1431 / 1451 nm	43 45	Black			X	X
SFP-TT-C47C49-LC	1471 / 1491 nm	47 49	Gray		X	X	X
SFP-TT-C51C53-LC	1511 / 1531 nm	51 53	Blue		X	X	X
SFP-TT-C55C57-LC	1551 / 1571 nm	55 57	Yellow	X	X	X	X
SFP-TT-C59C61-LC	1591 / 1611 nm	59 61	Red	X	X	X	X

You must use this duplex patch cord at the inputs in MUX operation. Alternatively, simplex patch cords can be used.

A-to-A duplex optical fiber patch cord
Reverse Fiber Position (A-A, B-B)

1.5 DEMUX Operation

When used as **DEMUX,** modules have a single input and multiple outputs.

The outputs are paired, according to the pairs of optical frequencies/wavelengths supplied by standard SFP-TT modules. This allows easy use of duplex patch cords (continuous fiber position – see the image below) between each module output and its associated downstream SFP receiver. The output pairs are color coded, as shown in the following chart, to match the color coding on the clasp handles of SFP-TT modules operating at the associated wavelengths. The SFP-RR receiver, however, is universal and accepts all wavelengths that can be carried by this CWDM system. This receiver has a blue clasp handle.

Optical Output Wavelengths	Label on Panel	Panel Label Color Code	4 Ch	8 Ch	16 Ch	18 Ch	Downstream SFP Receiver Modules
1271 / 1291 nm	27 29	Light Purple			X	X	SFP-RR-LC (1260-1620 nm)
1311 / 1331 nm	31 33	Yellow Green			X	X	
1351 / 1371 nm	35 37	Pink			X	X	
1391 / 1411 nm	39 41	White				X	
1431 / 1451 nm	43 45	Black			X	X	
1471 / 1491 nm	47 49	Gray		X	X	X	
1511 / 1531 nm	51 53	Blue		X	X	X	
1551 / 1571 nm	55 57	Yellow	X	X	X	X	
1591 / 1611 nm	59 61	Red	X	X	X	X	

You must use this duplex patch cord at the outputs in DEMUX operation. Alternatively, simplex patch cords can be used.

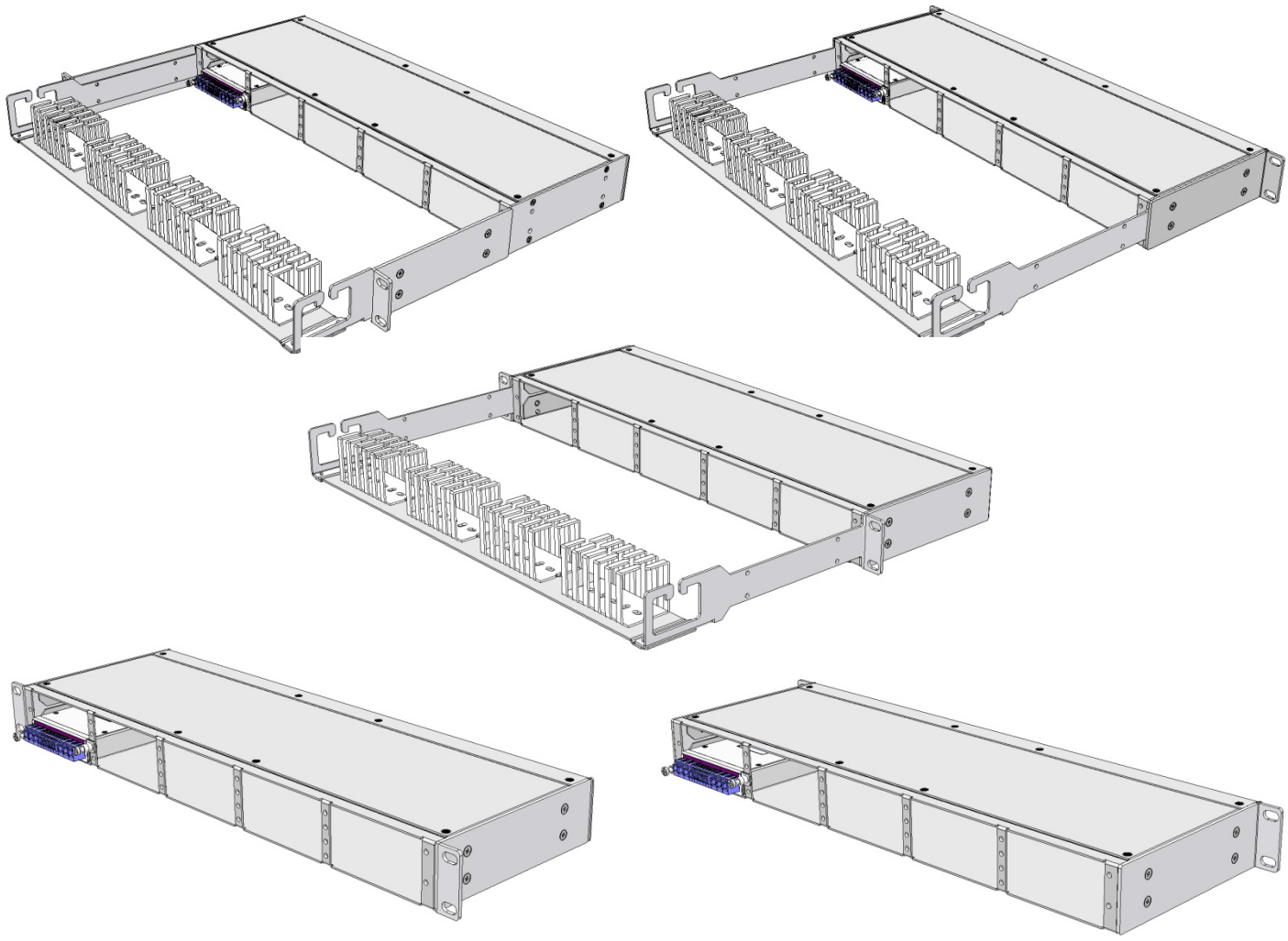
A-to-B duplex optical fiber patch cord
Continuous Fiber Position (A-B, B-A)
ANSI/TIA-568-C

2 Installation

Install the tray into a standard 19” rack using 4 standard rack-mounting screws through the four holes in the corners of the mounting flanges.

An available support bracket extending from the front of the tray provides physical support for the fiber cables, minimizing strain on the connectors.

- Several different configurations are available for the support bracket and mounting flanges, to accommodate different installation set-ups.



Slide each CWDM module into an empty bay in the tray, and secure it in position with the two captive screws on the front flanges.

3 Operation

There are no operating controls or adjustments on this product.

Warning: *Infrared radiation is invisible and can seriously damage the retina of the eye. Do not look into the end of an active fiber. A clean, protective cap or hood MUST be immediately placed over any radiating connector or optical fiber to avoid exposure to potentially dangerous amounts of radiation. This practice also helps prevent contamination of connectors and adapters. Do not assume laser power is turned off or the fiber is disconnected at the other end.*

Avertissement : *Le rayonnement infrarouge est invisible et peut sérieusement endommager la rétine de l'œil. Ne regardez pas dans l'extrémité d'une fibre active. Un capuchon de protection propre doit être immédiatement placé sur n'importe quel connecteur rayonnant pour fibre optique pour éviter l'exposition à des quantités potentiellement dangereuses de rayonnement. Cette pratique permet également de prévenir la contamination des connecteurs et adaptateurs. Ne présumez pas que la puissance du laser est désactivée ou la fibre est déconnectée à l'autre extrémité*

Caution: Class 1M Laser radiation when fiber connector is unplugged.
Mise en garde: Rayonnement laser de la classe 1M lorsque le connecteur de fibre est débranché.

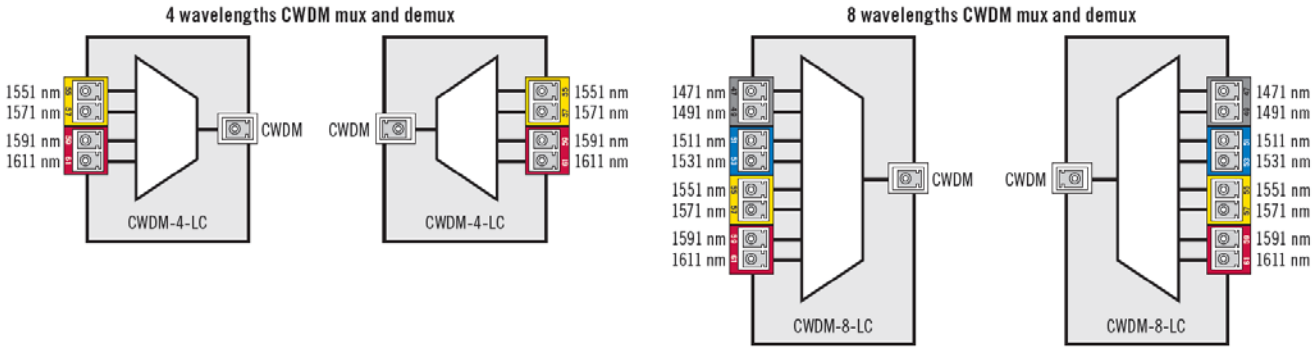
Plug the LC connector on the end of the fiber cable into the appropriate connector on the CWDM module. Be sure to match the wavelength of the input signals arriving on the fiber cable to the wavelength specified for the input on the MUX module. Mismatched signals will not pass through the system.

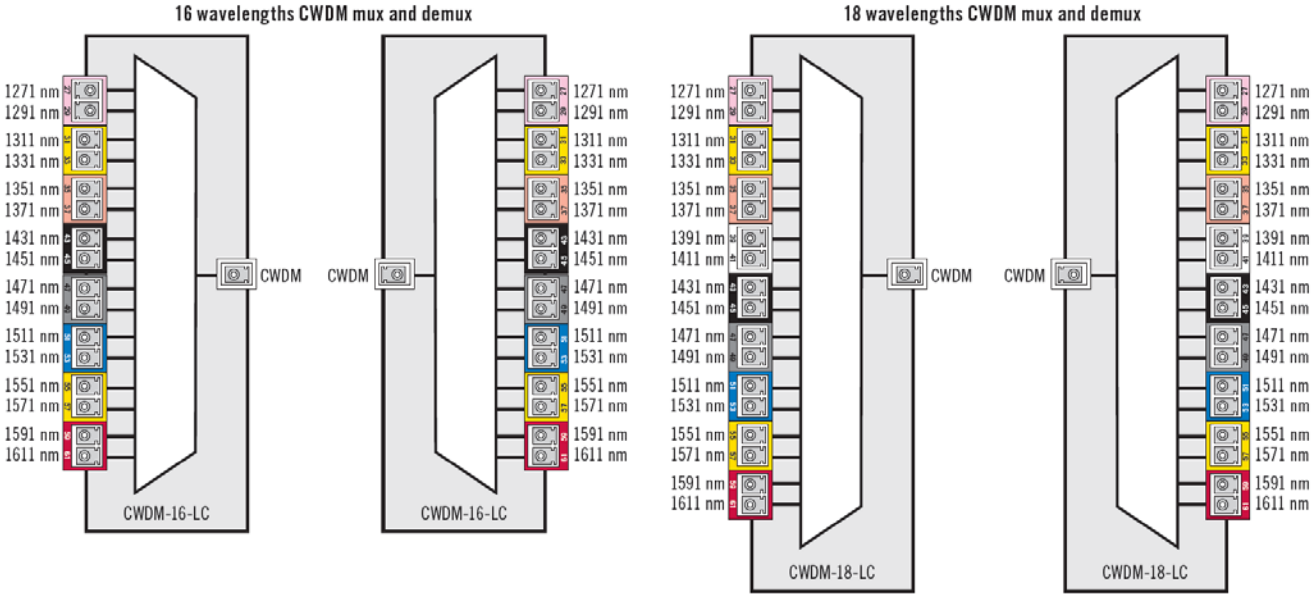
- Remove any dust plugs from the connectors on the fiber and CWDM module
- Push the fiber connector straight into the module socket until it clicks into place

To disconnect a fiber from the module:

- NEVER pull on the cable itself to disconnect a fiber; ALWAYS grip the connector, push in the release tab and pull straight out
- ALWAYS place a plug into any unused fiber ports, to keep out dust and debris

The figures below illustrate typical 4, 8, 16 and 18-channel MUX-DEMUX connection scenarios.




16 wavelengths CWDM mux and demux
1271 nm
1291 nm
1311 nm
1331 nm
1351 nm
1371 nm
1431 nm
1451 nm
1471 nm
1491 nm
1511 nm
1531 nm
1551 nm
1571 nm
1591 nm
1611 nm
CWDM
CWDM-16-LC
CWDM
CWDM-16-LC
18 wavelengths CWDM mux and demux
1271 nm
1291 nm
1311 nm
1331 nm
1351 nm
1371 nm
1391 nm
1411 nm
1431 nm
1451 nm
1471 nm
1491 nm
1511 nm
1531 nm
1551 nm
1571 nm
1591 nm
1611 nm
CWDM
CWDM-18-LC
CWDM
CWDM-18-LC

4 Specifications

Channel spacing:	20 nm
Channel passband:	CW +/-7 nm
Adjacent channel isolation:	> 30 dB
Non-adjacent channel isolation:	> 40 dB
Directivity:	> 50 dB
Return loss:	> 45 dB
Passband ripple:	< 0.5 dB

CWDM MUX/DEMUX

CWDM-4-LC:	
Wavelengths:	1551, 1571, 1591, 1611 nm
Insertion loss:	< 1.8 dB
Module height:	half height (1⁄2 U)
CWDM-8-LC *:	
Wavelengths:	1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611 nm
Insertion loss:	< 1.8 dB
Module height:	half height (1⁄2 U)
CWDM-16-LC:	
Wavelengths:	1271, 1291, 1311, 1331, 1351, 1371, 1431, 1451, 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611 nm
Insertion loss:	< 3.0 dB
Module height:	full height (1 U)
CWDM-18-LC *:	
Wavelengths:	1271, 1291, 1311, 1331, 1351, 1371, 1391, 1411, 1431, 1451, 1471, 1491, 1511, 1531, 1551, 1571, 1591, 1611 nm
Insertion loss:	< 3.0 dB
Module height:	full height (1 U)

END-TO-END MUX/DEMUX INSERTION LOSS

4 wavelengths:	< 3 dB
8 wavelengths:	< 3 dB
16 wavelengths:	< 6 dB
18 wavelengths:	< 6 dB

ENVIRONMENTAL

Operating temperature range:	0 °C ~ 70 °C

* Use of wavelengths in the vicinity of 1380 nm requires the use of Zero Water Peak Fiber cables, i.e. conforming to Rec. ITU -T G.652 (11/2009), C or D attributes.