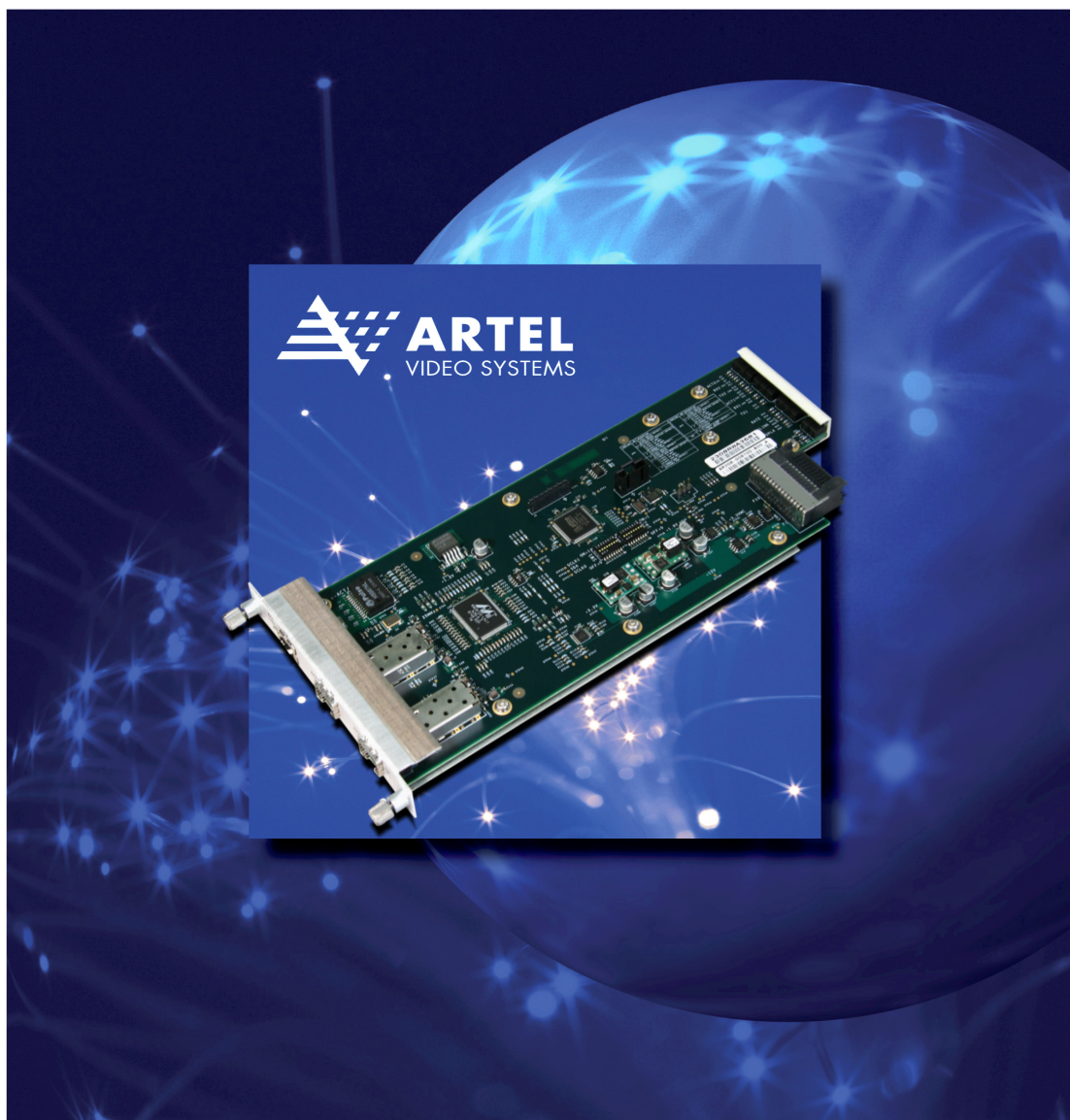


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DLC200 Function Module

10/100/1000 Mb/s Ethernet Optical Transceiver/Repeater



Installation and Operations Guide

DLC200 Function Module

10/100/1000 Mb/s Ethernet Optical Transceiver/Repeater

Installation and Operations Guide

Document Number: AR200-008100-B00_K
Released: January, 2012

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CLASS I LASER CAUTIONS

The optical transmission system on some optical transmitter models is a Class I laser product. When the optical transmission system is installed in accordance with the procedures of this manual, the laser radiation is restricted to the optical cable, thus preventing human access. User modification to the system may alter the product classification and create a radiation hazard.

DO NOT, UNDER ANY CIRCUMSTANCES, stare directly into a fiber optic connector or use instruments to inspect fiber ends unless they have been confirmed to be unenergized. Although the light used in most fiber optic transmissions is not visible to the naked eye, potentially harmful levels of optical laser radiation may be present at the optical output ports and unconnected receive fiber ends. Prior to applying system power, connect fiber cables to either another DigiLink unit or to an optical power meter.

ESD CAUTIONS

The DigiLink video platform contains components that can be damaged by electrical static discharge. Ensure that you connect an approved anti-static wrist strap to your wrist and then to an electrical ground that is reliably connected to electrical ground before installing or removing the DigiLink video platform and sub-assemblies.

CAUTION

This manual is intended for use by trained service personnel. The use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous exposure to optical radiation.

SAFETY LISTING

CAN/CSA-C22.2 NO. 60950

EN 60950:International Safety Standards

NETWORK EQUIPMENT-BUILDING SYSTEMS (NEBS)

This product is NEBS Level 3 certified. Contact factory for details.

FEDERAL COMMUNICATIONS COMMISSIONS NOTICE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user must correct the interference at the user's own expense.

Compliance with applicable regulations depends on the use of shielded I/O cables. The user is responsible for procuring the appropriate cables.

CANADIAN EMISSIONS REQUIREMENTS

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur la matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministère des Communications.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Department of Communications.

INTERNATIONAL EMC REQUIREMENTS

This equipment has been tested and found to comply with the limits of the following international standards.

EN55 022 Radiated & Conducted Emissions

CISPR 22 Class A

EN50 082-1 Immunity

IEC 801-2 ESD

EC 801-3 Immunity

EC 801-4 EFT

AS/NZ 3548

VCCI

Disposal and Recycling Information

Based on our customer requests, the DigiLink video platform and sub-assemblies contain lead solder that will avoid potentially unreliable solder connections when lead-free solder is used. When the product reaches its end of life, dispose of the product in accordance with state and local environmental laws and guidelines.

Declaration of Conformity

We,

Artel Video Systems Corporation

Located at

5B Lyberty Way

Westford, MA 01886

declare under our sole responsibility that the following DigiLink video platform product:

DLC200

to which this declaration relates, is in conformity with the following standards and other normative documents:

Product Safety: EN 60950

EMC: EN55 022, EN 50 082-1

NEBS: GR-63, GR-1089

The aforementioned product follows the provisions of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

Name: John Clark

Title: Vice President of Product Development

Date: January, 2012

Revision history for the *DLC200 Function Module Installation and Operations Guide*.

Revision History			
Revision	Document Number	Date	Reason for Change
A	AR200-008100-B00_K	January, 2012	Initial release.

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About This Guide

This guide provides instructions for installing, configuring, and operating the DLC200 function module.

Audience

This guide is intended for the following trained and qualified service personnel who are responsible for installing and operating the DLC200:

- System installer
- Hardware technician
- System operator

Related Documentation

The following documentation contains material related to the DLC200 function module:

Document	Provides . . .
<i>DLC200 Data Sheet</i>	Product operating and environmental specifications, and regulatory conformance information.
<i>DLC200 Quick Start</i>	Product configuration information and descriptions of the front panel status LED operations.
<i>DigiLink Video Platform Chassis Installation and Operations Guide</i>	Overview installation instructions for the DigiLink video platform chassis options, including the following: <ul style="list-style-type: none">• DL4000 chassis—Installation of this 4-slot chassis, power supplies, and function modules.• DL4300 chassis—Installation of this 12-slot chassis, power supplies, and function modules.
<i>DigiLink Video Platform Chassis Data Sheet</i>	Overview of the DigiLink video platform chassis options.
<i>DL Manager Setup and Operations Guide</i>	Overview and operating instructions for the DL Manager element management system.

Note: To obtain the latest versions of this guide and the documents listed in this section, go to www.artel.com.

Symbols and Conventions

This manual uses the following symbols and conventions:

Caution

A caution means that a specific action you take or fail to take could cause harm to the equipment or to the data transmission.



Warning

A warning describes an action you take or fail to take that could result in death, serious physical injury, or destruction of property.

Note: Important related information, reminders, and recommendations.

Italics—used for emphasis, for indicating the first occurrence of a new term, and for book titles

1. Numbered list—where the order of the items is important
 - Bulleted list—where the items are of equal importance and their order is unimportant

Artel Customer Service

You can reach Customer Service by e-mail at customercare@artel.com or by telephone:

In the US call (800) 225-0228, then select 1 for technical support.

Outside the US call (978) 263-5775, then select 1 for technical support.

When requesting assistance, please be ready to provide the following information:

- Your name and telephone number
- Product model and serial number
- Brief description of the problem
- List of symptoms
- Steps you have already taken to try to resolve the problem

If the product is damaged

If any portion of the unit is damaged, forward an immediate request to the delivering carrier to perform an inspection of the product and to prepare a damage report. Save the container and all packing materials until the contents are verified.

Concurrently, report the nature and extent of the damage to Artel Customer Service so that action can be initiated to either repair or replace the damaged items.

Do not return any items to Artel until you obtain instructions from Customer Service.



ARTEL

Report the problem or deficiency to Customer Service along with the model number and serial number. Upon receipt of this information, Artel will provide service instructions, or a *Return Authorization Number* and shipping information.

DLC200 Function Module

10/100/1000 Mb/s Ethernet Optical Transceiver/Repeater

Information About the DLC200

Chassis Compatibility: DL4000, DL4300, or DL4100

This guide introduces the DLC200 function module (DLC200), which is a three port, 1 Gb/s Ethernet module that you configure to operate in one of the following modes:

- Optical-to-electrical and electrical-to-optical converter
- Optical repeater

Provisioning and monitoring is accomplished using DIP switches, LEDs, or Artel's DL Manager, which is an element management system (for more information, see the *DL Manager Setup and Operations Guide*). The DLC200 also has a set of major and minor alarms that indicate problems related to the power supplies, optics, temperature, and input signals.

DLC200 Laser Warnings

The SFP module used in the DLC200 has a transmitter that contains a Class 1 laser. You must adhere to the standard safety practices for handling a Class 1 laser product, including the following warning.



Warning

Never stare directly into a fiber optic connector.

Although the light used in most fiber optic transmissions is not visible to the naked eye, potentially harmful levels of radiation may be present at the optical output ports and unconnected transmit fiber ends.

Failure to observe this warning could result in personal injury.



DLC200 Module Functional Descriptions

This section provides a functional description of the DLC200, including the functional block diagram shown in [Figure 1](#).

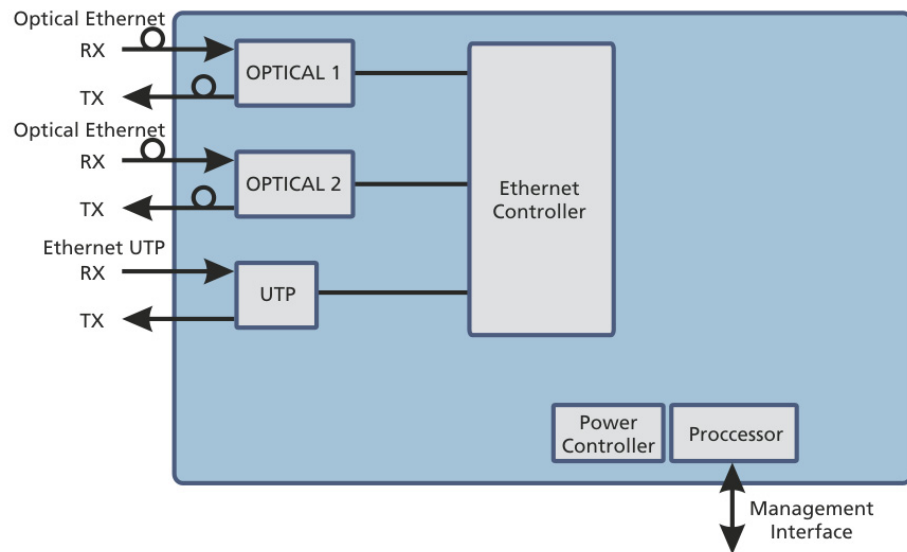


Figure 1. DLC200 Module Functional Block Diagram

This section includes the following topics:

- [Signal Paths \(page 2\)](#)
- [Electrical Outputs \(page 2\)](#)
- [Optical Inputs and Outputs \(page 3\)](#)

Signal Paths

When you configure the DLC200 to operate as an optical-to-electrical/electrical-to-optical converter, the transmit and receive signals pass between the OPTICAL 1 and UTP ports.

When you configure the DLC200 to operate as an optical repeater, the transmit and receive signals pass between the OPTICAL 1 and OPTICAL 2.

Electrical Outputs

A single RJ-45 UTP copper interface provides the electrical output interface that supports speeds of 10/100/1000 Mb/s and either half or full duplex. This interface is limited to the standard 100 meter distance (1000BASE-T).

Optical Inputs and Outputs

The optical interfaces are provided by two SFP sockets. The SFPs use LC/PC connectors. Optical performance is dependant upon the quality of your optical fiber and fiber interconnects, and on the selected SFP, which must be specifically qualified by Artel. Consult Artel for available SFP options.

Overview of the DLC200 Module

Figure 2 provides a view of the major components of the DLC200.

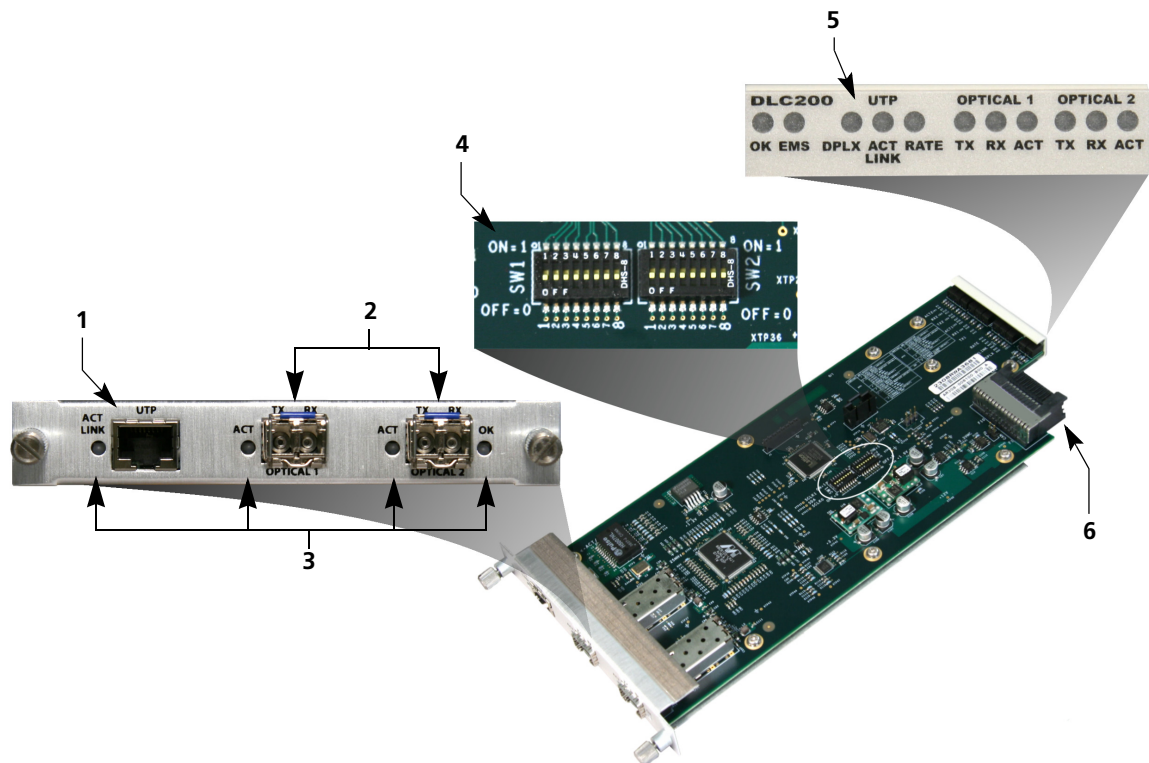


Figure 2. DLC200 Module Major Components

Table 1 describes the components called out in Figure 2.

Table 1. DLC200 Elements

Item	DLC200 Element	for details, see...
1	Rear panel RJ-45 electrical connector that provides a UTP copper interface.	Cabling the Electrical Connections (page 8)
2	Rear panel SFP sockets, Optical 1 and Optical 2, for the following optical connections: <ul style="list-style-type: none"> TX—Transmit RX—Receive 	Cabling the Optical Connections (page 8)

Table 1. DLC200 Elements (Continued)

Item	DLC200 Element	for details, see...
3	Rear panel status LEDs: <ul style="list-style-type: none"> • UTP ACT LINK—UTP link and activity indicator • OPTICAL 1 ACT—SFP 1 activity indicator • OPTICAL 2 ACT—SFP 2 activity indicator • OK—Alarm indicator 	Understanding the Rear Panel Status LEDs (page 11)
4	Configuration DIP switch SW1. SW2 is not used at this time.	Configuring the DLC200 Module (page 5)
5	Front panel status LEDs: <ul style="list-style-type: none"> • OK—Alarm indicator • EMS—Element Management System indicator • UTP DPLX—Duplex status Indicator • UTP ACT—Activity indicator • UTP RATE—Link rate • OPTICAL 1 TX—Transmit status indicator • OPTICAL 1 RX—Receive status indicator • OPTICAL 1 ACT—Activity indicator • OPTICAL 2 TX—Transmit status indicator • OPTICAL 2 RX—Receive status indicator • OPTICAL 2 ACT—Activity indicator 	Understanding the Front Panel Status LEDs (page 9)
6	Backplane connector—Provides power to the module and is used for management and alarm signals.	N/A

Configuring the DLC200 Module

This section describes how to configure the operation of the DLC200. You must configure the module while it is out of the chassis because the configuration DIP switch SW1 is mounted to the top of the module PCB. The two optical ports are set to Auto Negotiate and cannot be altered by SW1.

Note: You configure the operation of the DLC200 using SW1 only. SW2 is not used at this time and its switches must remain in the ON position at all times.

Artel ships the DLC200 configured to operate in the electrical-to-optical mode with EMS enabled as follows:

- UTP is enabled and set for auto-negotiate
- Optical 1 is enabled and set for auto-negotiate
- Optical 2 is disable
- EMS override enabled (DL Manager can change the DLC200 configuration)

When installing the DLC200, modify the configuration only when you need to restrict module functionality. For example, to limit an optical Ethernet port rate to 100 Mb/s or to configure a port for half-duplex operation.

DIP Switch SW1 configures the operating parameters SFP1/Optical port 1 and RJ-45/UTP port. You can also use SW1 to enable or disable the operation of the these two ports. [Figure 3](#) shows the DLC200 configuration DIP switch SW1 located on top of the PCB.

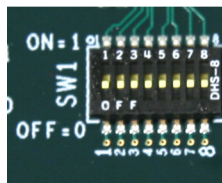


Figure 3. DLC200 Configuration DIP Switch SW1

[Table 2](#) describes the DIP switch SW1 configuration options. The factory-set configuration settings are shown in bold type.

Table 2. DIP Switch SW1 Settings

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
Reserved		ON	ON	ON					
Operating Mode	Electrical-to-optical mode: UTP and Optical 1 ports are enabled; Optical Port 2 is disabled.	-	-	-	ON				
	Optical-to-optical mode: Optical 1 and Optical 2 ports are enabled; UTP port is disabled.	-	-	-	OFF				

Table 2. DIP Switch SW1 Settings (Continued)

Function	Selected Operation	Position							
		S1	S2	S3	S4	S5	S6	S7	S8
UTP Port Duplex	Full-duplex	-	-	-	-	ON			
	Half-duplex	-	-	-	-	OFF			
UTP Port Speed	Auto	-	-	-	-	-	ON	ON	
	10 Mb/s	-	-	-	-	-	ON	OFF	
	100 Mb/s	-	-	-	-	-	OFF	ON	
	1000 Mb/s	-	-	-	-	-	OFF	OFF	
EMS Override	Enabled: DL Manager can change the DLC200 module configuration.	-	-	-	-	-	-	-	ON
	Disabled: DL Manager cannot change the DLC200 module configuration. ¹	-	-	-	-	-	-	-	OFF

1. If the module is operating in EMS Override mode, as indicated by a green OK LED on the front panel, then the EMS Override DIP switch has no effect until you use DL Manager to take the module out of override mode and set it to local mode (see the *DL Manager Setup and Operations Guide*).

Details for the UTP port settings are as follows:

- UTP Port Duplex:
 - Full-duplex—Enables the port for full-duplex operations.
 - Half-duplex—Enables the port for half-duplex operation only.
- UTP Port Speed:
 - Auto—Sets the auto-negotiate rate to the rate and duplex mode used by the line.
 - 10 Mb/s—Restricts the line rate to 10 Mb/s.
 - 100 Mb/s—Restricts the line rate to 10 Mb/s or 100 Mb/s.
 - 1000 Mb/s—Restricts the line rate to 10 Mb/s, 100 Mb/s, or 1000 Mb/s.

Note: When you configure the UTP port speed for auto-negotiate, the DLC200 ignores the UTP Port Duplex switch settings and configures the port for full-duplex operation.

When you configure the UTP port speed to a specific rate, the DLC200 operates according to the UTP Port Duplex setting.

Installing the DLC200 Module and SFPs

The DLC200 and associated SFPs are hot swappable, enabling you to safely install them while power is applied to the chassis. Before you install the DLC200, see the DLC200 data sheet for a detailed description of the DLC200 module product specifications including environmental requirements that you must adhere to when installing the modules.

To install a DLC200 in the chassis (see [Figure 4](#)), perform the following steps:

1. From the back of the chassis, remove the two screws that secure the blank tray to one of the unused function module slots (if necessary). Use any available function module slot.
2. Slide the DLC200 into the slot using the printed circuit board guide rails located on both sides of the slot.
3. Push the DLC200 in until it is firmly seated into the backplane and flush with the chassis.
4. Tighten the two mounting screws that secure the module to the chassis.

Note: Failure to properly secure the module to the chassis with the two mounting screws can result in the module sliding out of the chassis.

5. Depending on your application, install the SFP in the DLC200 (handle on top as shown in [Figure 4](#)) as follows:

- Electrical-to-optical—Install an SFP in OPTICAL 1 only.
- Optical-to-optical—Install SFPs in OPTICAL 1 and OPTICAL 2.

Insert the SFP into the port with the handle on top as shown in [Figure 4](#). Push the SFP in until it is firmly seated into the port.

Note: When you do not install an SFP, the TX and RX status LEDs located on the DLC200 front panel both flash. See [Table 3](#) for other LED status indications.

6. Repeat this procedure for each DLC200 module that you are installing in the DL4000 chassis.

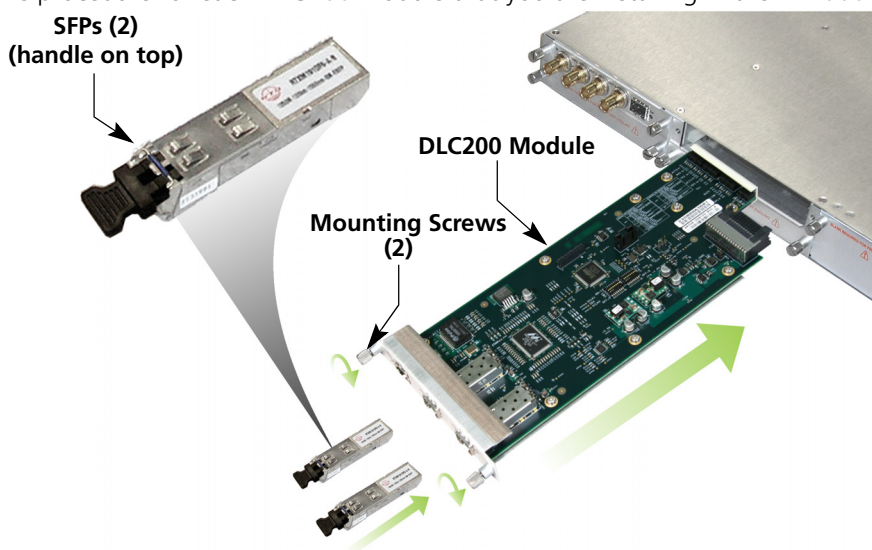


Figure 4. DLC200 Module and SFP Installation

Note: Insert a blank tray in any unused chassis module slots to maintain proper ventilation.

Cabling the DLC200 Module

The DLC200 allows you to transmit and receive signals over electrical and fiber optic cable connections. The cabling configuration that you use depends on your application. You can have electrical in and out, optical in and out, or any combination of the two. Only two ports can be active at any given time. The user-configurable operating mode determines the ports that are active:

- Electrical-to-Optical Operating Mode—UTP and OPTICAL 1 ports are active.
- Optical-to-Optical Operating Mode—OPTICAL 1 and OPTICAL 2 ports are active.

The electrical and optical connectors are located on the rear panel of the DLC200 (see [Figure 5](#)). You can access the connectors from the rear panel of the chassis.



Figure 5. DLC200 UTP Electrical and SFP Optical Connectors

Note: When handling fiber optic cables, adhere to the standard safety practices for handling a Class 1 laser product (see the ["DLC200 Laser Warnings" section on page 1](#)).

For information on the rear panel status indicators, see the ["Understanding the Rear Panel Status LEDs" section on page 11](#).

This section contains the following topics:

- [Cabling the Electrical Connections \(page 8\)](#)
- [Cabling the Optical Connections \(page 8\)](#)

Cabling the Electrical Connections

(Electrical-to-optical operating mode only) To connect to the UTP connector on the DLC200, use a CAT 5e or better cable.

Cabling the Optical Connections

Use a single mode fiber when connecting to the LC connectors of the DLC200 SFPs.

To cable the optical connections, perform the following tasks:

1. Remove the SFP safety plug that protects the TX and RX ports. Cover any unused optical port to keep the port clean.

2. Cable the optical connections as follows:
 - Receive signal—Connect the fiber optic cable to the source device's optical transmit connector and the SFP receive optical connector (RX) on the DLC200.
 - Transmit signal—Connect the fiber optic cable to the destination device's optical receive connector and the SFP transmit optical connector (TX) on the DLC200.
3. Repeat Steps 1 and 2 if you are using both optical ports.

Monitoring the DLC200 Module Operation

You monitor the operation of the DLC200 using the status LEDs on the front panel of the module (see [Figure 6](#)).

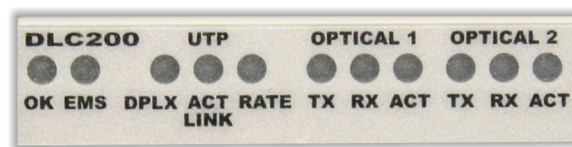


Figure 6. DLC200 Status LEDs and Monitor Connector

Note: You can also use Artel's element management system, DL Manager, to monitor the module operations (see the *DL Manager Setup and Operations Guide*).

This section contains the following topics:

- [Understanding the Front Panel Status LEDs \(page 9\)](#)
- [Understanding the Rear Panel Status LEDs \(page 11\)](#)

Understanding the Front Panel Status LEDs

[Table 3](#) describes the different states of the DLC200 status LEDs as shown in [Figure 6](#).

Table 3. DLC200 Front Panel Status LEDs

LED	Indicates . . .	State	Description	Alarms	Action
OK	The DLC200 status	Off	If power is applied to the system, an internal fault with the DLC200 may exist.	None	Replace the DLC200.
		Green	Normal operation.	None	None.
		Yellow	Minor alarm or power-on test.	Minor	None.
		Red	Major alarm or major and minor alarm.	Major (and possibly minor)	Replace the DLC200.

Table 3. DLC200 Front Panel Status LEDs (Continued)

LED	Indicates . . .	State	Description	Alarms	Action
EMS	Element management system, DL Manager, operation status	Off	The DLC200 module is in local mode and its configuration is controlled by the onboard configuration switches.	None	None.
		Green	The DLC200 module is in remote mode and the configuration has been set by DL Manager. When in remote mode, the actual configuration of the module will likely not match the settings of the configuration switches and changing the configuration switches will have no effect on the module operation.	None	None.
UTP DPLX	UTP connection type	Green	Full-duplex.	None	None.
		Yellow	Half-duplex or power-on test.	None	None.
UTP ACT	UTP link status	Green	Link present.	None	None.
		Green (flashing)	Link activity.	None	None.
UTP Rate	UTP link rate	Off	10 Mb/s.	None	None.
		Yellow	100 Mb/s or power-on test.	None	None.
		Green	1000 Mb/s.	None	None.
Optical TX (per port)	Optical transmission status	Off	No SFP installed or port disabled.		Install SFP or enable port.
		Green	Normal operation (input signal present).	None	None.
		Red (flashing)	SFP TX fault (laser fail).		Replace SFP.
		Red (flashing with RX red flashing)	No SFP installed and the port is enabled.		Install SFP.

Table 3. DLC200 Front Panel Status LEDs (Continued)

LED	Indicates . . .	State	Description	Alarms	Action
Optical RX (per port)	Optical receive status	Off	No SFP installed or port disabled.		Install SFP or enable port.
		Green	Normal operation (input signal present).	None	None.
		Yellow (flashing)	RX optical high power.		
		Red (flashing)	Low optical receive power or optical SFP RX fault.		Check connection or replace SFP.
		Red (flashing with TX red flashing)	No SFP installed and the port is enabled.		Install SFP.
Optical ACT (per port)	Optical link status.	Green	Link present.	None	None.
		Green (flashing)	Link activity.	None	None.

Understanding the Rear Panel Status LEDs

Table 4 describes the different states of the DLC200 status LEDs as shown in [Figure 5](#).

Table 4. DLC200 Rear Panel Status LEDs

LED	Indicates . . .	State	Description	Alarms	Action
UTP ACT LINK	UTP link status	Green	Link present.	None	None.
		Green (flashing)	Link activity.	None	None.
Optical ACT (per port)	Optical link status.	Green	Link present.	None	None.
		Green (flashing)	Link activity.	None	None.
OK	The DLC200 status	Off	If power is applied to the system, an internal fault with the DLC200 may exist.	None	Replace the DLC200.
		Green	Normal operation.	None	Check other Status LEDs.
		Yellow	Minor alarm or power-on test.	Minor	
		Red	Major alarm or major and minor alarm.	Major (and possibly minor)	Replace the DLC200.

Removing the SFP and DLC200 Module

You can safely remove either the SFP from the DLC200 or the DLC200 from the chassis while power is applied to the module.

This section contains the following topics:

- [Removing the SFP \(page 12\)](#)
- [Removing the DLC200 Module \(page 12\)](#)

Removing the SFP

To remove the SFP from the DLC200 (see [Figure 7](#)), perform the following steps:

1. Remove the fiber optic cables from the SFP.
2. Pull down on the SFP handle to dislodge the SFP from the DLC200.
3. Using the SFP handle, pull the SFP out of the DLC200 module.

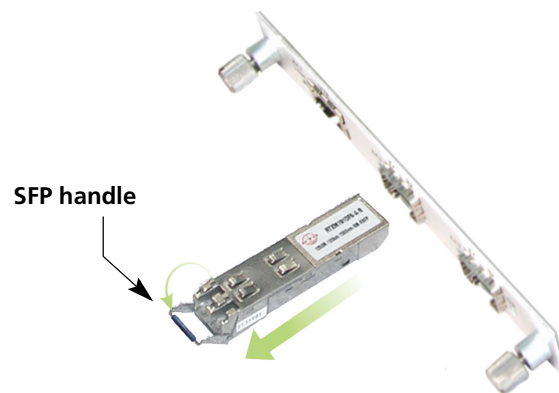


Figure 7. Removing the SFP

Removing the DLC200 Module

To remove the DLC200 from the chassis, perform the following steps:

1. Remove the fiber optic cables from the DLC200 SFP.
2. Remove the cable from the UTP RJ45 connector.
3. Loosen the two mounting screws that secure the DLC200 to the chassis.
4. Using the two mounting screws, pull the DLC200 out of the chassis.

Caution

To avoid problems associated with overheating, do not leave a function module slot open when power is applied to the chassis. Every module slot must contain a module or blank tray to ensure proper ventilation when power is applied.

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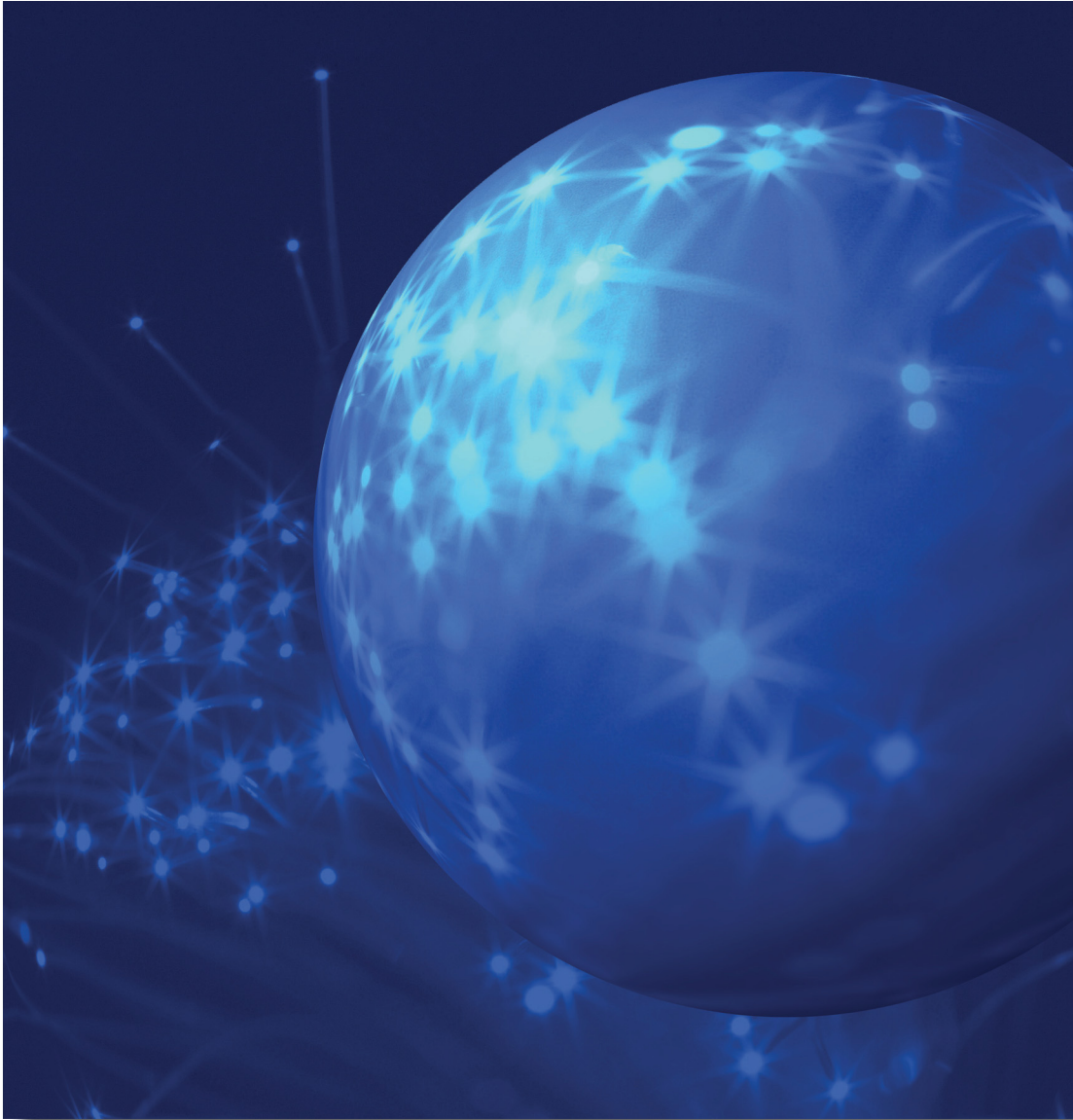
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