About This Manual

Subject
This manual explains how to install operate the XTA-50 optical tunable filter in local and remote modes. It also explains how to perform basic maintenance operations.

Application
Information in this document applies to the firmware version 2.1.x.

Intended Readers
Users of this manual must be familiar with:
• Fiber optic technology
• The use of the USB, Ethernet, RS-232 C and/or IEEE-488.2 interfaces used to control the XTA-50 in remote mode

Date
24 October 2018

Manual Reference
XTA-50_UG_2.1v2.3

Typographical Conventions

**bold** Identifies graphical interface objects such as menu names, labels, buttons and icons.

*italic* Identifies references to other sections or other guides.

`monospace` Identifies portions of program codes, command lines, or messages displayed in command windows.

Symbols

![Important]
**Important**
Identifies important information to which you must pay particular attention.

![Warning]
**Warning**
Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Do not proceed unless you understand and meet the required conditions.

![Caution]
**Caution**
Indicates a potentially hazardous situation which, if not avoided, may result in component damage. Do not proceed unless you understand and meet the required conditions.

Abbreviations Used

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FWHM</td>
<td>Full width at Half Maximum</td>
</tr>
<tr>
<td>GPIB</td>
<td>General Purpose Interface Bus</td>
</tr>
<tr>
<td>SELV</td>
<td>Safety Extra-Low Voltage</td>
</tr>
</tbody>
</table>
Command Syntax

Notation Conventions

<table>
<thead>
<tr>
<th>Notation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;...&gt;</td>
<td>The content between angled brackets indicates the type of information that you must enter as parameter (command) or that is received (response).</td>
</tr>
<tr>
<td></td>
<td>Indicates an alternative. Equivalent to &quot;or&quot;.</td>
</tr>
</tbody>
</table>

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Product Warranty and Limitation of Warranty

For detailed information about the sales terms and conditions, visit the EXFO web site at www.exfo.com/how-to-buy/sales-terms-conditions

Contact Information

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers.

**Technical Support Group**

400 Godin Avenue  
Quebec (Quebec) G1M 2K2  
CANADA

Tel. USA and Canada: 1 866 683-0155  
Fax: 1 418 683-9224  
E-mail: support@exfo.com

For detailed information about technical support and for a list of other worldwide locations, visit the EXFO web site at www.EXFO.com/support

To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.
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Before you start working with your device, you need to first read the important safety information provided in this section. This section provides information that may supplement or add safety information to the user guides of your product. Keep this information close at hand.

You can obtain a copy of the complete user guide for your product at the following link: www.EXFO.com

**Important**

- If you see the ⚠️ symbol on your unit, make sure that you refer to the instructions provided in this safety notice. Ensure that you understand and meet the required conditions before using your product.
- Other safety instructions relevant for your product are located throughout this documentation, depending on the action to perform. Make sure to read them carefully when they apply to your situation.

### Product Safety

#### Safety Symbols on Your Product

One or more of the following symbols may appear on your product.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>----</td>
<td>Direct current</td>
</tr>
<tr>
<td>~</td>
<td>Alternating current</td>
</tr>
<tr>
<td>└</td>
<td>The product is equipped with an earth (ground) terminal.</td>
</tr>
<tr>
<td>└</td>
<td>The product is equipped with a protective conductor terminal.</td>
</tr>
<tr>
<td>└</td>
<td>The product is equipped with a frame or chassis terminal.</td>
</tr>
<tr>
<td>└</td>
<td>On (Power)</td>
</tr>
<tr>
<td>○</td>
<td>Off (Power)</td>
</tr>
<tr>
<td>وبة</td>
<td>On/Off (Power)</td>
</tr>
<tr>
<td>←</td>
<td>Fuse</td>
</tr>
</tbody>
</table>
Product Safety Instructions

Warning

- The use of voltages higher than those indicated on the label affixed to your unit may damage the unit.
- The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Use only accessories designed for your unit and approved by EXFO. For a complete list of accessories available for your unit, see its technical specifications or contact EXFO.
- Where applicable, use only the listed and certified AC adapter provided by EXFO with your unit. It provides reinforced insulation between primary and secondary, and is suitably rated for the country where the unit is sold.
- Use only the certified power cord that is suitably rated for the country where the unit is used. Replacing detachable mains supply cords by inadequately rated cords, may result in overheating of the cord and create a fire risk.
- Your unit is equipped with an internal replaceable clock battery to keep time and date accurate. Only authorized personnel can replace this battery. Attempting to replace it yourself could seriously compromise your safety.
- Unless otherwise specified, all interfaces are intended for connection to Safety Extra Low Voltage (SELV) circuits only.
- To avoid electrical shock, do not operate the unit if any part of the outer surface (covers, panels, etc.) is damaged.
- Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.
- Only authorized personnel should carry out adjustments, maintenance or repair of opened units under voltage. A person qualified in first aid must also be present. Do not replace any components while the power cable are connected.
- Use only the listed and certified AC adapter/charger provided by EXFO with your unit. It provides reinforced insulation between primary and secondary, and is suitably rated for the country where the unit is sold.

Caution

- Where applicable, the operation and storage temperatures, as well as the altitude and relative humidity values of some modules may differ from those specified for your platform. In this case, always ensure that you comply with the most restrictive conditions (either module or platform).
- When using the unit while connected to the AC/DC adapter/charger, make sure you do not position the equipment so that it is difficult to disconnect the adapter/charger from the AC mains.
- Position the unit so that the air can circulate freely around it.
1. Product Presentation

The XTA-50 is a flat-top tunable filter for fiber-optic component and system testing. It is designed for closely-spaced channel selection and extraction in DWDM applications. When an optical signal is detected at the XTA-50 input port, the input wave is directed towards the output port after passing through the XTA-50 monochromator, which is tuned at the center wavelength via the XTA-50 software.

Each XTA-50 provides on-board touchscreen controls and user interface to drive both system common controls and parameters. All system operations are software-controlled from the XTA-50 user interface.

The XTA-50 system may also be remote-operated via an external screen or standard USB, Ethernet, RS-232 and IEEE-488 (with an external controller) interfaces.

1.1 Technical Specifications

The following table lists the technical specifications of all XTA-50 models.

<table>
<thead>
<tr>
<th>Optical Characteristics</th>
<th>Standard</th>
<th>Ultrafine</th>
<th>O-band*1</th>
<th>Wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength Range</td>
<td>1450–1650 nm</td>
<td>1480–1620 nm</td>
<td>1260–1360 nm</td>
<td>1525–1610 nm</td>
</tr>
<tr>
<td>Wavelength Resolution</td>
<td>1 pm</td>
<td>1 pm</td>
<td>1 pm</td>
<td>1 pm</td>
</tr>
<tr>
<td>Wavelength Accuracy*2</td>
<td>±30 pm</td>
<td>±30 pm</td>
<td>±30 pm</td>
<td>±30 pm</td>
</tr>
<tr>
<td>Wavelength Tuning Speed</td>
<td>1 s</td>
<td>1 s</td>
<td>1 s</td>
<td>1 s</td>
</tr>
<tr>
<td>Minimum Bandwidth (FWHM)</td>
<td>50 pm (6.25 GHz)</td>
<td>32 pm (4 GHz)</td>
<td>50 pm (8 GHz)</td>
<td>50 pm (6.25 GHz)</td>
</tr>
<tr>
<td>Maximum Bandwidth (FWHM)</td>
<td>950 pm (120 GHz)</td>
<td>650 pm (80 GHz)</td>
<td>900 pm (160 GHz)</td>
<td>5000 pm (625 GHz)</td>
</tr>
<tr>
<td>Bandwidth Resolution</td>
<td>1 pm</td>
<td>1 pm</td>
<td>1 pm</td>
<td>1 pm</td>
</tr>
<tr>
<td>Bandwidth Tuning Speed</td>
<td>1 s</td>
<td>1 s</td>
<td>1 s</td>
<td>1 s</td>
</tr>
<tr>
<td>Filter Edge Roll-off</td>
<td>500 dB/nm typical*3</td>
<td>800 dB/nm typical</td>
<td>500 dB/nm typical*3</td>
<td>500 dB/nm typical*4</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>5 dB (4.5 dB typical)<em>5</em>6</td>
<td>5 dB (4.0 dB typical)<em>7</em>8</td>
<td>5 dB (4.5 dB typical)<em>6</em>9</td>
<td>5 dB (4.5 dB typical)<em>9</em>10</td>
</tr>
<tr>
<td>Flatness</td>
<td>0.2 dB*11</td>
<td>0.2 dB*12</td>
<td>0.3 dB<em>11</em>13</td>
<td>0.2 dB*14</td>
</tr>
<tr>
<td>Polarization Dependent Loss</td>
<td>±0.2 dB*5</td>
<td>±0.2 dB*7</td>
<td>±0.2 dB*8</td>
<td>±0.2 dB*9</td>
</tr>
<tr>
<td>Out-band Suppression (crosstalk)</td>
<td>40 db (60 dB typical)*15</td>
<td>40 db (50 dB typical)*15</td>
<td>40 db (60 dB typical)*15</td>
<td>40 db (45 dB typical)*15</td>
</tr>
<tr>
<td>Maximum Input Power</td>
<td>30 dBm</td>
<td></td>
<td>27 dBm</td>
<td></td>
</tr>
</tbody>
</table>

All specifications are given at 21°± 3°C after 30 minutes warm-up.

*1: Specifications apply for wavelengths not equal to any water absorption line.
*2: With "Backlash Suppression" setting enabled.
*3: Between -3 and -40 dB for FWHM <800 pm.
*4: Between -3 and -40 dB. Typically 550 dB/nm @ FWHM = 50 pm, 450 dB/nm @ FWHM= 1 nm, 225 dB/nm @ FWHM = 5 nm.
*5: From 1500 to 1600 nm & FWHM >100 pm.
*6: At lowest FWHM the insertion loss is 7 dB typical.
*7: From 1500 to 1600 nm & FWHM >60 pm.
*8: From 1280 to 1340 nm & FWHM >100 pm.
*9: For FWHM >100 pm.
*10: At lowest FWHM the insertion loss is < 7.0 dB.
*11: Centered width of FWHM - 150 pm. For 150 pm < FWHM < 650 pm.
*12: Centered width of FWHM - 100 pm. For 100 pm < FWHM < 500 pm.
*13: From 1280 to 1340 nm.
*14: Centered width of FWHM - 150 pm. For 150 pm < FWHM < 2000 pm.
*15: Measured 1 nm away from the -3 dB points.

**Interfaces & Electrical Specifications**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Ultrafine</th>
<th>O-band</th>
<th>Wide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Interfaces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Connector</td>
<td></td>
<td>FC/PC or FC/APC</td>
<td></td>
</tr>
<tr>
<td>Optical Fiber Type</td>
<td></td>
<td>SMF or PMF</td>
<td>SMF</td>
</tr>
<tr>
<td>Remote Interfaces</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethernet RJ45 (x2)</td>
<td>1 Gb/s max</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IEEE 488.2 (GPIB)</td>
<td>Accessory (only available with a GPIB/RS-232 converter)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USB-B</td>
<td>115 kb/s max.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial ports (x2)</td>
<td>COM1: unused</td>
<td>COM2 (RS-232C): 9.6 kb/s</td>
<td></td>
</tr>
<tr>
<td>External Devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Display</td>
<td>DVI-I (Digital) port (x1): res. 1920x1200 max</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouse, keyboard</td>
<td>USB-A (x4), PS/2 (x2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Specifications</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Unit | Input Power | XTA-50 turned on: 12 V , 2.8 A
XTA-50 turned off (power switch set to I): 12 V , 0.16 A |
| | Fuse Type | 4 A Fast-acting, Low-breaking, 250 V, Ø5x20 mm |
| | Internal clock battery | 3V CR2032 (replacement by service personnel only) |
| AC/DC Adapter | Input Power | 100–240 V , 50–60 Hz, 2.0 A rms |
| | Output power | 12 V , 100 W |

All specifications are given at 21°± 3°C after 30 minutes warm-up.
1.2 Product Overview

The XTA-50 is delivered with the following accessories:

- A power supply cord
- An RS-232 cross-connect cable with two female adapters (for remote control)
- The calibration certificate and the test report
- A USB key containing the available drivers and user documentation

Cables for fiber-optic input/output are not provided.
1.2.1 Front Panel Description

Touch Screen
The touch screen enables you to perform all possible operations on the XTA-50. To select a parameter, command or function on the screen, touch the corresponding command with the tip of your finger or a touch screen stylus device. If you apply simultaneous pressure with two or more fingers, the touchscreen will not function properly.

Optical Connectors
The two following optical connectors, protected by a dust cap, are located on the front panel:
- **IN**: channel filter input port.
- **OUT**: channel filter output port.

The two optical connectors are mounted on a drawer, which enables you to access the internal optical connectors for cleaning (see section Cleaning Optical Connectors, p. 58).

On Switch
The 🔄 label identifies the on button that enables you to turn on the XTA-50 (see section Turning on/off the XTA-50, p. 19).

Retractable Legs
The retractable legs enable you to tilt the XTA-50 upward for convenient purpose, so that it stands on both front legs and the rear feet (see section Unpacking and Installing the XTA-50, p. 15).
1.2.2 Rear Panel Description

**Cooling Fan**
The cooling fan extracts warm air from inside. Ventilation holes for air input are located on the top and bottom sides of the XTA-50.

**DC Connector and Power Adapter**
The power adapter is provided with the product and must be plugged to the DC connector.

*Caution*
To ensure the smooth functioning of the XTA-50, you must only use the power adapter provided by EXFO.

**Fuse Holder**
The fuse holder contains a fuse (see section *Technical Specifications, p. 9* for fuse type) to protect the XTA-50 from overcurrent.

**Connectors**
All ports and interfaces are SELV classified and must only be connected to interfaces of the same type.

- **RS-232 (COM 2)** enables you to connect a computer for remote control. The RS-232 COM 1 port is not active. For more details, see section *Remotely Controlling the XTA-50 via RS-232, p. 41*.

- **USB-A** ports enable you to connect a USB keyboard and a USB mouse. Do not connect a computer to this port.

- **USB-B** port enables you to connect a computer for remote control via USB. For more details, see section *Remotely Controlling the XTA-50 via USB-B, p. 35*. 

---

*Figure 2: Rear Panel*
• Ethernet RJ45 ports enables you to connect a computer/network for Ethernet remote control.

• Ethernet port LAN1:
  This port is associated with a DHCP server. It can be used to connect directly a computer that will be assigned automatically an IP address.

• Ethernet port LAN2:
  You can configure this port manually or automatically through a remote DHCP server.
  For more information, see section Remote Controlling the XTA-50 via Ethernet, p. 38.

• DVI port enables you to connect an external screen. For more details, see section Controlling the XTA-50 Graphical Interface from an External Screen, p. 43.

• PS/2 ports enable you to connect a USB keyboard and a USB mouse.

Labels

<table>
<thead>
<tr>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of the Product</td>
<td>Indicates serial number, model, options (if any), CE marking (see section Certification and Compliance, p. 65) and date of manufacture.</td>
</tr>
<tr>
<td>Manufacturer Identification</td>
<td>Contact information of the manufacturer.</td>
</tr>
<tr>
<td>Power and Compliance</td>
<td>• △: indicates an injury hazard. It appears on a location that requires special instructions for proper use: see section Safety Information, p. 7.</td>
</tr>
<tr>
<td></td>
<td>• −−−−−: the fuse type is described in section Technical Specifications, p. 9.</td>
</tr>
<tr>
<td></td>
<td>• Compliances: see section Certification and Compliance, p. 65.</td>
</tr>
<tr>
<td>Warranty Seal</td>
<td>The XTA-50 cover must not be open, otherwise the warranty is not valid anymore.</td>
</tr>
</tbody>
</table>
2. Installing and Connecting the XTA-50

2.1 Unpacking and Installing the XTA-50

Subject

The XTA-50 is a bench-top instrument designed for indoor use only, and is not dedicated to wet locations. It is designed for use either in the horizontal or tilted position.

Before Starting

Caution

- To ensure proper environment conditions:
  - Do not expose the XTA-50 to rain or excessive moisture.
  - Do not install the XTA-50 near flammable gases or fumes.
- To ensure proper ventilation and cooling, make sure there is sufficient clearance below, and at the back of the XTA-50 in the place where it will be installed.

Procedure

1. Open the package with care and remove the protective foam.

   Important

   When unpacking, handle the device with care and do not damage the original shipping container in case the XTA-50 needs to be returned to EXFO.

2. Pull out the XTA-50 vertically from its packaging.

3. Set the XTA-50 on a flat stable surface free of excessive vibration and make sure you can easily reach the rear of the instrument to remove the power supply cord if necessary.

4. Allow the flow of air to circulate freely around the XTA-50 and remove any equipment or paper that could block the air flow. Ventilation holes are located on the bottom side of the XTA-50. Do not place anything under or at the rear of the XTA-50, as illustrated in the following figure.

   Figure 3: Air Flow

5. On the rear panel (see Figure 2, p. 13), make sure the power switch is set to O.

6. Place the XTA-50 in the wanted operating position as illustrated in Figure 4, p. 15. To tilt the XTA-50 upward, deploy the two retractable legs located below it.

   Figure 4: Possible Operating Positions
2.2 Connecting the XTA-50 to a Power Source

Subject
The XTA-50 is dedicated to be connected to a SELV circuit. The XTA-50 has a chassis connected to ground via the power supply cord. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

You must use the power adapter provided with the XTA-50. For voltage specifications, see section Technical Specifications, p. 9.

Before Starting

Warning
- Make sure the wall socket on which the XTA-50 will be plugged is protected by a 16 A max circuit breaker.
- Make sure the XTA-50 power source does not apply more than 265 Volts RMS between the supply conductors and the ground.
- To avoid the possibility of injury, make sure the socket outlet in which the power supply cord will be plugged is equipped with a protective ground contact, and that the electrical installation fulfills the local safety requirements.
- The XTA-50 system is intended to operate from an external power adapter 12V/8A. Use the one provided by EXFO at instrument delivery or contact EXFO for replacement unit.

Procedure
1. Make sure the power adapter is not plugged to the wall socket.
2. On the rear panel (see Figure 2, p. 13), make sure the power switch is set to O.
3. On the rear panel, connect the power cord of the adapter to the 12 V connector.
4. Connect one end of the provided power supply cord to the power adapter located on the rear panel and plug the other end to the proper voltage wall socket outlet (to know the voltage requirement, see section Technical Specifications, p. 9).
5. On the rear panel, set the power switch to I.
2.3 Connecting an Optical Source to the XTA-50

Subject

Caution

- Make sure you use the appropriate connector type, corresponding to the one mounted on your XTA-50 (see section Technical Specifications, p. 9 for available models).
- Make sure optical connectors are perfectly clean. It is essential to achieve optimum system performance (see section Cleaning Optical Connectors, p. 58).
- To prevent premature failure of the XTA-50 optical connectors due to frequent connections, always keep a fiber-optic jumper cable connected to the XTA-50 optical port while you use the jumper’s free end to connect to other devices.

Procedure

- Remove the protective cap from the IN and OUT connectors and connect the appropriate jumper corresponding to the connector type mounted on your product, as indicated next to the connectors (see Figure 2, p. 13).

Important

Keep protective caps on optical connectors when not in use.
3. Turning on/off the XTA-50

3.1 Turning On the XTA-50 and Accessing the Operating Modes

Subject
The Operating Mode window enables you to access all XTA-50 functions.

Before Starting
Make sure the XTA-50 is properly installed: see section Installing and Connecting the XTA-50, p. 15.

Procedure
- If the XTA-50 is turned off: on the front panel, press the \( \text{button}. \)
The button lights up and the initialization procedure starts.

Caution
Do not turn the XTA-50 off during the system initialization.

Once started, the About window is displayed for a few seconds before the Operating Mode window appears.

- If the XTA-50 is turned on and you have entered an operating mode or a configuration window, touch the Back button to get back to the Operating Mode window.

Operating Mode Window Description

The Operating Mode window enables you to access the following functions:
3.2 Checking the Firmware Version

**Subject**
The *About* window provides information on your XTA-50. It is displayed for a few seconds at system startup. You can also display it on demand as explain in the following procedure.

**Procedure**

1. Access the *Operating Mode* window (see section *Turning On the XTA-50 and Accessing the Operating Modes*, p. 19).

2. In the *Operating Mode* window, touch the button.

   The *About* window appears and displays information on your XTA-50.

3. To go back to the *Operating Mode* window, touch the button.
3.3 Setting the Screen Brightness

Subject
You can control the screen brightness from the Settings window, as explained in the following procedure.
If you have connected an external screen to the XTA-50 (see section Controlling the XTA-50 Graphical Interface from an External Screen, p. 43), this function is not applicable.

Procedure
1. In the Operating Mode window, touch the Settings button. The Settings window appears.

![Figure 6: Settings Window – Display Setting](image)

2. In the Display area, slide the Backlight cursor to increase or decrease the screen brightness.
3. Touch the Apply button.

3.4 Turning off the XTA-50

Subject
The following procedure explains how to correctly turn the XTA-50 off.

**Important**
Do not turn the XTA-50 off by using the On switch located on the front panel.

Procedure
1. Access the Operating Mode window (see section Turning On the XTA-50 and Accessing the Operating Modes, p. 19).
2. In the Operating Mode window, touch the button.

**Caution**
Do not unplug any power cord during the shutdown process.

A confirmation message appears.
3. Touch the Continue button. The XTA-50 stops
4. On the rear panel, set the power switch to O.
4. Setting the Wavelength/Frequency and FWHM Values

4.1 Manually Entering the Wavelength/Frequency and FWHM Values

Subject

The Spectral Selection function enables you to manually set the wavelength or frequency and FWHM values.

Procedure

1. In the Operating Mode window, touch the Spectral Selection button.

   The Spectral Selection window appears.

   ![Spectral Selection Window]

   Figure 7: Spectral Selection Window

2. Specify the wanted spectral unit by touching the button.
   - In wavelength mode:
     - FWHM unit is pm (picometer).
     - Wavelength unit is nm (nanometer).
   - In frequency mode:
     - FWHM unit is GHz (gigahertz).
     - Frequency unit is THz (terahertz).

3. Specify the wanted wavelength or frequency value by doing one of the following:
   - Touch the Wavelength or Frequency field and using the virtual keypad appearing on screen, enter the wavelength/frequency value.
   - Touch the and buttons to increment/decrement the displayed digits of the wavelength/frequency value.
   - Touch one wavelength/frequency digit and using the virtual keypad appearing on screen, enter the wanted value for the digit.

   The graph display the selected wavelength/frequency value.
   The available wavelength values are detailed in section Technical Specifications, p. 9.

4. Specify the FWHM:
a. In the FWHM area, touch the gauge. The virtual keypad appearing on screen is initialized with the value corresponding to the point you have touched on the gauge.

b. Enter the wanted FWHM value using the virtual keypad. The available FWHM values are detailed in section Technical Specifications, p. 9.

FWHM Constraint on Central Wavelength

As shown in the following Figure 8, p. 24, the minimum (and maximum) central wavelength reachable value is constrained by FWHM.

- $\lambda_1$ is the minimum central wavelength reachable with FWHM$_1$.
  $\lambda_1 = \lambda_{\text{min}} + \text{FWHM}_1 / 2$.

- $\lambda_2$ is the minimum central wavelength reachable with FWHM$_2$.
  $\lambda_2 = \lambda_{\text{min}} + \text{FWHM}_2 / 2$.

![Figure 8: Wavelength/Frequency constrained by FWHM](image)

4.2 Selecting a Channel by Using an ITU Grid

4.2.1 Using a Predefined Grid to Select a Channel

Subject

The ITU Grid function enables you to use a predefined ITU grid to quickly select a channel. This function is not available for O-band models of the XTA-50.

Procedure

1. In the Operating Mode window, touch the ITU Grid button. The ITU Grid Selection window appears.
Setting the Wavelength/Frequency and FWHM Values

2. Set the predefined grid you want to use:
   - **Band**: touch the button corresponding to the band you want to use.
   - **Frequency Spacing**: touch the button corresponding to the wanted spacing between two channels of the grid.

3. Touch the **Grid** button to display the selected ITU grid.
   The grid window appears: channels are organized in tables. Each tab corresponds to a table and the name of the tab is the first value of its table.

4. Specify the wanted spectral unit by touching the button.
   - In wavelength mode:
     - FWHM unit is pm (picometer).
     - Wavelength unit is nm (nanometer).
   - In frequency mode:
     - FWHM unit is GHz (gigahertz).
     - Frequency unit is THz (terahertz).

5. Select the wanted channel:
   a. Touch the tab to display the corresponding table.
   b. In the table, select the value corresponding to the wanted channel.

6. Specify the FWHM:

   **Important**
   FWHM can be constrained by wavelength/frequency value (see *FWHM Constrain on Central Wavelength*, p. 24 for reverse principle).
   a. In the **FWHM** area, touch the gauge.
The virtual keypad appearing on screen is initialized with the value corresponding to the point you have touched on the gauge.

b. Enter the wanted FWHM value using the virtual keypad.

The available FWHM values are detailed in section Technical Specifications, p. 9.

### 4.2.2 Using a Custom Grid to Select a Channel

**Subject**

The **Custom Grid** function enables you to create and use a custom grid to select a channel.

**Procedure**

1. In the Operating Mode window, touch the **Custom Grid** button.
   The Custom Grid Selection window appears.

   ![Custom Grid Selection Window](image)

   **Figure 11: Custom Grid Selection Window**

   - Create your custom grid:
     a. Specify the wanted spectral unit by touching the **Tab** button.
     b. Specify the starting wavelength/frequency to use for the grid:
        - Touch the **Start** field and using the virtual keypad appearing on screen, enter the wavelength/frequency value.
        - In the **Start value** field, touch the ^ and ^ buttons to increment/decrement the displayed digits of the wavelength/frequency value.
        - Touch one wavelength/frequency digit and using the virtual keypad appearing on screen, enter the wanted value for the digit.
     c. Touch the **Spacing** field to specify the spacing value between two channels of the grid using the virtual keypad appearing on screen.
        - The maximum available wavelength corresponding to your configuration appears in the **Max** field and the number of channels appears in the **Number of elements** field.
   2. Touch the **Grid** button to display the created grid.
   The grid window appears: channels are organized in tables. Each tab corresponds to a table and the name of the tab is the first value of its table.
3. Specify the wanted spectral unit by touching the button.
   - In wavelength mode:
     - FWHM unit is pm (picometer).
     - Wavelength unit is nm (nanometer).
   - In frequency mode:
     - FWHM unit is GHz (gigahertz).
     - Frequency unit is THz (terahertz).

4. Select the wanted channel:
   a. Touch the tab to display the corresponding table.
   b. In the table, select the value corresponding to the wanted channel.

5. Specify the FWHM:

   **Important**
   FWHM can be constrained by wavelength/frequency value (see FWHM Constrain on Central Wavelength, p. 24 for reverse principle).

   a. In the FWHM area, touch the gauge.
      The virtual keypad appearing on screen is initialized with the value corresponding to the point you have touched on the gauge.
   b. Enter the wanted FWHM value using the virtual keypad.
      The available FWHM values are detailed in section Technical Specifications, p. 9.
4.3 Defining and Running a Sequence of Wavelength/Frequency and FWHM Values

The Sequence Editor function enables you to create a list of wavelength and FWHM values that the XTA-50 will be able to execute without supervision. An instruction is composed of:
- a wavelength/frequency value
- FWHM
- duration of the instruction execution.
Each instruction can be triggered by a specific time. You can save, load and run sequences you have created, as explained in this section.

4.3.1 Creating a Sequence

Procedure

1. In the Operating Mode window, touch the Sequence Editor button. The Sequence Editor window appears.

2. Specify the wanted spectral unit by touching the button.
   - In wavelength mode:
     - FWHM unit is pm (picometer).
     - Wavelength unit is nm (nanometer).
   - In frequency mode:
     - FWHM unit is GHz (gigahertz).
     - Frequency unit is THz (terahertz).

3. Add instructions to the list by touching the following buttons. Maximum instruction number is 200.

<table>
<thead>
<tr>
<th>Button</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>INSERT</td>
<td>Adds an instruction before the first instruction displayed in the list</td>
</tr>
<tr>
<td>NEW</td>
<td>Adds an instruction at the end of the list.</td>
</tr>
<tr>
<td>DELETE</td>
<td>Deletes the first instruction of the list.</td>
</tr>
<tr>
<td></td>
<td>Enables you to navigate through the list.</td>
</tr>
</tbody>
</table>

4. For each instruction, specify the wanted values by touching the corresponding fields:
• Wavelength/Frequency
• FWHM
• Delay: period of time between instruction execution (in seconds).
  Possible value: 0.1 to 100 seconds.

4.3.2 Running a Sequence

Subject
The XTA-50 provides two ways to execute a sequence:
• Executing a single run of the listed instructions
• Executing the listed instructions continuously.

Before Starting
In the Sequence Editor window, display the list of instructions you want to execute by creating (see section Creating a Sequence, p. 28) or loading (see section Loading a Sequence, p. 31) a sequence.

Procedure Executing a Single Run

1. In the Sequence Editor window, touch the button.
   The Running Single Sequence window appears.

2. Select the sequence execution mode by touching one of the following buttons:
   • Automatic: the entire sequence is automatically executed.
   • Manual: this mode enables you to execute the sequence step by step. The first instruction is executed and the sequence execution stops until you touch the Next button.

3. Touch the Start button to begin the sequence execution.
   • To stop the sequence execution touch the button.
   • In Manual execution mode, the first instruction is executed. Touch the Next button to execute the following instruction.

4. To go back to the Sequence Editor page, touch the button.
Executing the Sequence Continuously

1. In the Sequence Editor window, touch the Run button. The Running Loop Sequence window appears and the sequence is automatically started.

2. To stop the sequence execution touch the Back button.

3. To go back to the Sequence Editor page, touch the Back button again.

4.3.3 Saving a Sequence

Subject
You can save the sequence you have just created to the XTA-50 internal disk, as explained in the following procedure.
You cannot save sequences to an external device.

Procedure
1. In the Sequence Editor window, touch the Save button. The Save Sequence window appears, displaying the previously saved sequences. The default sequence name is YY.MM.DD_HH.MM

2. To modify the sequence name, touch the name field and using the virtual keyboard appearing on screen, enter the wanted sequence name and touch OK.

3. To delete a previously saved sequence, select the sequence name in the Sequence files list and touch the Delete button.

4. Save the new sequence to the XTA-50 internal disk by touching the Save button.
4.3.4 Loading a Sequence

Subject
You can load a previously saved sequence, as explained in the following procedure.
You cannot load a sequence from an external device.

Procedure
1. In the Sequence Editor window, touch the **LOAD** button.
The Load Sequence window appears, displaying the previously saved sequences.
The default sequence name is YY.MM.DD_HH.MM

2. To delete a previously saved sequence, select the sequence name in the Sequence files list and touch the **DELETE** button.

3. Load the selected sequence by touching the **LOAD** button.
4.4 Enabling/Disabling the Backlash Suppression Mechanism

Subject

When you change the wavelength/frequency or FWHM value, the XTA-50 automatically operates the backlash suppression mechanism to eliminate the effect of mechanical backlash on the tuning wavelength actuator: it moves 5 nm lower than the wanted wavelength/frequency before going to the requested wavelength/frequency. This mechanism is enabled after each startup of the XTA-50. You may want to disable the backlash suppression mechanism for specific applications, as explained in the following procedure.

Important

If you disable the backlash suppression, the wavelength/frequency accuracy specification is no longer guaranteed.

Procedure

1. In the Operating Mode window, touch the Settings button. The Settings window appears.

![Figure 16: Settings Window – Backlash Suppression](image)

2. In the Backlash Suppression area,
   - To disable the backlash suppression mechanism, touch the Enabled button.
   - To enable the backlash suppression mechanism, touch the Disabled button.

3. Touch the Apply button.
5. Using the XTA-50 in Remote Mode

The XTA-50 features the following interfaces for remote control (see Figure 2, p. 13):

• **USB-B** (see section Remotely Controlling the XTA-50 via USB-B, p. 35)
• **Ethernet** (see section Remotely Controlling the XTA-50 via Ethernet, p. 38)
• **RS-232** for remote control (see section Remotely Controlling the XTA-50 via RS-232, p. 41)

  With an external RS-232/GPIB converter, you can also use the RS-232 interface for **GPIB** remote control (see section Remotely Controlling the XTA-50 via IEEE-488 with an External Controller, p. 44)
• **DVI** for remote display (section Controlling the XTA-50 Graphical Interface from an External Screen, p. 43)

5.1 Switching Between Remote and Local Mode

**Procedures**

**Entering the Remote Mode**

The remote mode can only be used after initialization of the XTA-50 and after validation of the presentation page appearing at device start-up.

The XTA-50 switches to remote mode in the following cases:

• An RS-232, USB or GPIB command is received.
• An Ethernet session is open.

When the XTA-50 enters the remote mode, the touch screen comes back to the main menu and all controls are disabled.

![Operating Mode](OperatingMode.png)

*Figure 17: Remote Mode Window*

If a sequence is running, wavelength, frequency and FWHM remote assignment are disabled.
Using the XTA-50 in Remote Mode

Switching back to Local Mode
In remote mode, the Remote label (at the top right corner) is available in the Operating mode window. To go back to the local mode, do one of the following:

- Click on the Remote label.
- Use the LOCAL remote command (see section Available Remote Commands, p. 48).
- If using the Ethernet interface, close the Ethernet session using the remote application software.

The XTA-50 switches back to remote mode as soon as it receives a command.

5.2 Installing/Updating and Starting the XTA-50 Remote Program

Subject
If LabVIEW is not installed on your computer or if you want to check the connection using a dedicated interface, you can install the XTA-50 Remote Client program, which enables you to remotely access the XTA-50.

If the XTA-50 Remote program is already installed on your computer and you want to update it, you do not need to uninstall it, just follow the installation procedure below.

Procedure
1. From the XTA-50 USB key or the EXFO website, copy the Remote Client vx.xx folder to a local directory on your computer.
2. Double-click the setup.exe file located in the Remote Client vx.xx folder.
   The installation wizard appears.
3. Follow the instructions displayed in the wizard window to install the program.
4. Restart your computer.
5. To start the Remote Client software, click the icon located in Start\All Programs\EXFO (default location).
6. If you want to remotely control the XTA-50 via USB-B, you must install the USB driver on your computer as explained in section Installing the USB Driver, p. 35 before using the XTA-50 Remote program.
5.3 Remotely Controlling the XTA-50 via USB-B

The USB-B port enables you to connect the XTA-50 to a computer to control it with remote commands. The XTA-50 can receive RS-232C commands at the USB-B port from a computer on which the appropriate USB driver is installed.

5.3.1 Installing the USB Driver

Subject

The XTA-50 USB Driver is available on the USB key provided with the product, or can be downloaded from the EXFO website.

You must install the XTA-50 USB Driver on your computer in order to make the XTA-50 USB-B port appear as an additional COM port available to the computer.

Application software can then access the USB port in the same way as it would access a standard COM port. Therefore, you can send RS-232C commands to the XTA-50 using a serial-communication terminal.

Before Starting

- Make sure your computer runs one of the following operating systems: Windows 7, Windows 8 or Windows 10. If not, the XTA-50 USB driver is not supported by your computer.
- Make sure you have a USB-B/USB-A cable to link the XTA-50 to your computer.
- Make sure you have the appropriate XTA-50 USB driver. It is provided on the USB key delivered with the XTA-50, or you can download it from the EXFO website (www.exfo.com/software/exfo-apps).
- If a previous version of the XTA-50 USB driver is already installed on your computer, uninstall it.

Procedure

1. Do one of the following:
   - Connect the XTA-50 USB key to the USB-A port of your computer.
   - From the EXFO website (http://www.exfo.com/software/exfo-apps), download the XTA-50 USB driver and unzip it to a temporary folder on your computer.

2. In the USB Driver folder, double-click one of the following files, depending on your Windows platform (if you select the wrong file, a message appears, prompting you to select the other file):
   - 32-bit system: XTA-50 USB Driver_x86.exe
   - 64-bit system: XTA-50 USB Driver_x64.exe

   The USB Driver installation wizard appears.

3. Follow the instructions displayed in the wizard window.

   The XTA-50 USB Driver is now installed on your computer.
4. Connect the USB B port of the XTA-50 (see Figure 2, p. 13) to the USB-A port of your computer using a USB-B/USB-A cable.

**Important**

Do not connect your computer to the XTA-50 USB-A port. The USB remote mode is only available through the XTA-50 USB-B port.

The XTA-50 USB-B port is recognized as a COM port by the computer.

5. To know the COM port number your computer use for the XTA-50, open the Windows Device Manager (Control Panel>System and Security>System) and browse the Ports (COM & LPT) folder.

### 5.3.2 Controlling the XTA-50 via USB-B

**Before Starting**

- Make sure the XTA-50 USB Driver is installed on your computer (see section *Installing the USB Driver, p. 35*).
- Connect the USB B port of the XTA-50 (see Figure 2, p. 13) to your computer with a USB-A to USB-B cable.

**Procedures**

Controlling the XTA-50 Using LabVIEW

1. If LabVIEW is already installed on your computer, use the following files:
   - `<XTA-50 USB key>\LabVIEW vx.xx\XTA-50 Remote.lvproj`: this file contains the LabVIEW sample project.
   - `<XTA-50 USB key>\LabVIEW vx.xx\src\Ethernet USB GPIB RS232 clients.vi`: this file contains a sample LabVIEW program for either an Ethernet, USB or GPIB RS232 interface.
   - `<XTA-50 USB key>\LabVIEW vx.xx\src\CP1202 UART USB`: this directory contains all the .vi files for USB control.

The following identifiers are required by the LabVIEW driver.
- PID (Product IDentifier): 0x8606
- Baud rate: 115200
- Parity: None
- Stop bits: 1 stop bit
- DSR: Status input
- DTR: Held inactive
- DCD: Status input
- CTS: Status input
- RTS: Held inactive
- xonxoff: false/OFF

2. Use the authorized remote commands detailed in section *Available Remote Commands, p. 48* to remotely control the XTA-50.
Controlling the XTA-50 Using the XTA-50 Remote Client

If LabVIEW is not installed on your computer, do the following:

1. Install and start the XTA-50 Remote Client program on your computer as explained in section Installing/Updating and Starting the XTA-50 Remote Program, p. 34.

   If you don't intend to program with LabVIEW, you can use this software to check the connection between your computer and the XTA-50 via this interface.

2. In the XTA-50 Remote Client program, select the USB tab.

3. In the COM Port field, select the computer COM port used for the XTA-50. To know the COM port number your computer use for the XTA-50, open the Windows Device Manager (Control Panel>System and Security>System) and browse the Ports (COM & LPT) folder.

4. Click the Connect button.

5. Use the Command and Parameter fields to send commands to the XTA-50.

6. Use the authorized remote commands detailed in section Available Remote Commands, p. 48 to remotely control the XTA-50.

Figure 18: XTA-50 Remote Client - USB Communication
5.4 Remotely Controlling the XTA-50 via Ethernet

The Ethernet port enables you to connect the XTA-50 to a computer or to a network to control it with remote commands.

5.4.1 Setting the XTA-50 Ethernet Ports

Subject To connect the XTA-50 to a computer or network via the Ethernet port, use the Settings window to configure the IP address.

Before Starting Make sure you have an Ethernet RJ45 cable to link the XTA-50 to your computer.

Procedure

1. In the Operating Mode window, touch the Settings button. The Settings window appears.

2. In the Ethernet TCP Socket area, specify the TCP socket Port as described in the following Ethernet Parameter Description section, p 39.

3. Connect the RJ45 cable to the wanted port:
   - Use port LAN 1 (left) to directly connect a computer to the XTA-50. This port provides an automatic IP address configuration.
   - Use port LAN 2 (right) to remotely control the XTA-50 from a computer through your company network, or to directly connect a computer to the XTA-50 and manually configure the connection parameters.

4. Set the corresponding parameters as described in the following Ethernet Parameter Description section, p 39.

   If the XTA-50 is connected to a network and/or if you don't know which configuration to use, contact your network administrator.

5. Touch the Apply button.

   The new IP configuration can take a few minutes to be operational.
### Ethernet Port 1 (Left) - DHCP server
Displays the address automatically assigned to the XTA-50.
Default XTA-50 IP address: 192.168.54.1

### Ethernet Port 2 (Right)
Specify the wanted IP configuration mode by touching the **Auto** button.
- **Auto**: the XTA-50 connection parameters (IP address, subnet mask and default gateway) are automatically retrieved from the connected network, and the connection is automatically established. You cannot modify the values.

- **Manual**: enables you to manually set the connection parameters. Touch a field to modify its value by using the virtual keypad appearing on screen:
  - **IP**: IP address used by your company network.
    Default value: 192.168.0.5
  - **Mask**: subnet mask used by your company network.
    Default value: 255.255.255.0
  - **Gateway**: default gateway used by your company network.
    Default value: 192.168.0.1

### Ethernet TCP Socket
TCP destination port to be used by the socket to allow data transmission between the XTA-50 and the external controller.
Default value: 5025 (SCPI-RAW)

---

### 5.4.2 Controlling the XTA-50 via Ethernet

#### Subject
The Ethernet port enables you to remotely control the XTA-50 via a direct connection to a computer or through a network.

#### Before Starting
- Connect the LAN 1 or LAN 2 port of the XTA-50 (see Figure 2, p. 13) to a computer or network with an RJ45 cable.
- Make sure the IP address is configured correctly (see section Setting the XTA-50 Ethernet Ports, p. 38).

#### Procedures
**Controlling the XTA-50 Using LabVIEW**

1. If LabVIEW is already installed on your computer, use the following files:
   - `<XTA-50 USB key>\LabVIEW vx.xx\XTA-50 Remote.lvproj`: this file contains the LabVIEW sample project.
   - `<XTA-50 USB key>\LabVIEW vx.xx\src\Ethernet USB GPIB RS232 clients.vi`: this file contains a sample LabVIEW program for either an Ethernet, USB or GPIB RS232 interface.
   - `<XTA-50 USB key>\LabVIEW vx.xx\src\Ethernet`: this directory contains all the .vi files related to Ethernet control.

---

*Important*
Make sure the firewall of your computer allows communication on this port.
2. Use the authorized remote commands detailed in section *Available Remote Commands*, p. 48 to remotely control the XTA-50.

**Controlling the XTA-50 Using the XTA-50 Remote Client**

If LabVIEW is not installed on your computer, do the following:

1. Install and start the **XTA-50 Remote Client** program on your computer as explained in section *Installing/Updating and Starting the XTA-50 Remote Program*, p. 34.

   If you don't intend to program with LabVIEW, you can use this software to check the connection between your computer and the XTA-50 via this interface.

![Figure 20: XTA-50 Remote Client - Ethernet Communication](image)

2. In the **XTA-50 Remote Client** program, select the **Ethernet** tab.
3. Fill-in the **IP** and **Port** fields according to the Ethernet configuration you set (see section *Setting the XTA-50 Ethernet Ports*, p. 38):
   - **IP**: type the IP address displayed in the **Settings** screen of the XTA-50, in the **Current Address** field corresponding to the connected port.
   - **Port**: type the TCP socket displayed in the **Settings** screen of the XTA-50, in the **Ethernet TCP Socket** field.
4. Click the **Connect** button.
5. Use the **Command** and **Parameter** fields to send commands to the XTA-50.
6. Use the authorized remote commands detailed in section *Available Remote Commands*, p. 48 to remotely control the XTA-50.

**Caution**

Before disconnecting the XTA-50 from the computer or closing the LabVIEW driver, do one of the following otherwise an error message will appear.

- Send the **LOCAL** command.
- On the XTA-50 screen, touch the **Remote** label on the top right corner.
5.5 Remotely Controlling the XTA-50 via RS-232

The RS-232 port enables you to connect the XTA-50 to a computer to control it with remote commands.

5.5.1 Setting the XTA-50 RS-232C Port

Subject If you want to use the RS-232 port of the XTA-50, use the Settings window to set the port, as explained in the following procedure.

Procedure

1. In the Operating Mode window, touch the Settings button. The Settings window appears.

   ![Settings Window – RS-232 Setting](image)

2. In the GPIB/RS232 area, touch the RS232 button.
3. Touch the Apply button.
   The RS-232 Port is ready to receive remote commands.

5.5.2 Controlling the XTA-50 via RS-232

Before Starting Link the COM2 port of the XTA-50 (see Figure 2, p. 13) to your computer with the RS-232 cable delivered with the product (cross-connect cable (in Rx/Tx) with two female adapters).

Procedures Controlling the XTA-50 Using LabVIEW

1. If LabVIEW is already installed on your computer, use the following files:
   • `<XTA-50 USB key>\LabVIEW vx.xx\XTA-50 Remote.lvproj`: this file contains the LabVIEW sample project.
Using the XTA-50 in Remote Mode

- `<XTA-50 USB key>\LabVIEW vx.xx\src\Ethernet USB GPIB RS232 clients.vi`: this file contains a sample LabVIEW program for either an Ethernet, USB or GPIB RS232 interface.
- `<XTA-50 USB key>\LabVIEW vx.xx\src\RS232`: this directory contains all the .vi files related to RS-232 control.

The following identifiers are required by the LabVIEW driver.
- Baud rate: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1 stop bit
- Char Term: LF (Line Feed)
- Flow Control: None

2. Use the authorized remote commands detailed in section Available Remote Commands, p. 48 to remotely control the XTA-50.

Controlling the XTA-50 Using the XTA-50 Remote Client

If LabVIEW is not installed on your computer, do the following:

1. Install and start the XTA-50 Remote Client program on your computer as explained in section Installing/Updating and Starting the XTA-50 Remote Program, p. 34.

   If you don’t intend to program with LabVIEW, you can use this software to check the connection between your computer and the XTA-50 via this interface.

   ![Figure 22: XTA-50 Remote Client - RS-232 Communication](image)

   **Figure 22: XTA-50 Remote Client - RS-232 Communication**

2. In the XTA-50 Remote Client program, select the RS232 tab.
3. In the COM Port field, select the computer COM port used for the XTA-50.
4. Click the Connect button.
5. Use the Command and Parameter fields to send commands to the XTA-50.
6. Use the authorized remote commands detailed in section Available Remote Commands, p. 48 to remotely control the XTA-50.
5.6 Controlling the XTA-50 Graphical Interface from an External Screen

Subject
You can connect an external screen to the XTA-50 to display and control the graphical interface.

Before Starting
• Make sure you have a DVI cable to link the XTA-50 to your external screen.
• If the screen you want to connect is not a touch screen, make sure you have a mouse to be able to control the XTA-50 graphical interface.

Procedure
1. Connect your external screen to the DVI port located on the rear panel of the XTA-50 (see Figure 2, p. 13).
   The XTA-50 graphical interface immediately appears on the external screen, and is no longer displayed on the XTA-50 screen.
2. Do one of the following, depending on the type of screen you have connected:
   • If you have connected a touchscreen, you can control the graphical interface by using touch screen gestures.
   • If your screen is not a touch screen, connect a mouse to one of the USB-A or PS/2 port located on the XTA-50 rear panel (see Figure 2, p. 13) to control the graphical interface.
3. To stop the remote display, disconnect the DVI cable from the XTA-50.
5.7 Remotely Controlling the XTA-50 via IEEE-488 with an External Controller

### 5.7.1 Setting the GPIB Address

**Subject**
If you want to use the IEEE-488 interface (accessory) of the XTA-50, use the **Settings** window to configure the GPIB address.

**Procedure**
1. In the **Operating Mode** window, touch the **Settings** button.
   The **Settings** window appears.

   ![Figure 23: Settings Window – GPIB Setting](image)

2. In the **GPIB/RS232** area, touch the **GPIB** button to make available the GPIB address setting.
3. In the **GPIB Address** list, select the appropriate GPIB address from the list.
4. Touch the **Apply** button.

### 5.7.2 Controlling the XTA-50 via an IEEE-488 Interface

**Subject**
The IEEE-488 interface is optional. This option can be ordered with the instrument to enable software setting.

**Before Starting**
* Make sure you have the following material:
  * An external RS-232/GPIB converter, to provide the GPIB (IEEE-488) interface.
  * The RS-232 cable delivered with the XTA-50 (cross-connect cable with two female adapters) to link the XTA-50 to the converter.
  * A GPIB cable, to link the converter to your application.
• Link the COM2 port of the XTA-50 (see Figure 2, p. 13) to the RS-232 converter via the RS-232 cable delivered with the product and use a GPIB cable to link the GPIB converter to your application.

Procedures

Controlling the XTA-50 Using LabVIEW

1. If LabVIEW is already installed on your computer, use the following files:
   • `<XTA-50 USB key>\LabVIEW vx.xx\XTA-50 Remote.lvproj`: this file contains the LabVIEW sample project.
   • `<XTA-50 USB key>\LabVIEW vx.xx\src\Ethernet USB GPIB RS232 clients.vi`: this file contains a sample LabVIEW program for either an Ethernet, USB or GPIB RS232 interface.
   • `<XTA-50 USB key>\LabVIEW vx.xx\src\NI GPIB-RS232`: this directory contains all the .vi files related to RS-232 control.

2. Use the authorized remote commands detailed in section Available Remote Commands, p. 48 to remotely control the XTA-50.

Controlling the XTA-50 Using the XTA-50 Remote Client

If LabVIEW is not installed on your computer, do the following:

1. Install and start the XTA-50 Remote Client program on your computer as explained in section Installing/Updating and Starting the XTA-50 Remote Program, p. 34.

   If you don’t intend to program with LabVIEW, you can use this software to check the connection between your computer and the XTA-50 via this interface.

   ![XTA-50 Remote Client - GPIB Communication](image)

   Figure 24: XTA-50 Remote Client - GPIB Communication

2. In the XTA-50 Remote Client program, select the GPIB tab.

3. In the Address GPIB field, type the GPIB address specified in section Setting the GPIB Address, p. 44.

4. Click the Connect button.

5. Use the Command and Parameter fields to send commands to the XTA-50.

6. Use the authorized remote commands detailed in section Available Remote Commands, p. 48 to remotely control the XTA-50.
Configuring the National Instrument Measurement & Automation Explorer (MAX)

To directly send commands using the National Instrument Measurement & Automation Explorer (MAX), proceed to the configuration illustrated in Figure 25, p. 46:

![Figure 25: National Instrument - MAX Configuration](image)

Figure 25: National Instrument - MAX Configuration
5.8 Remote Control Commands

The XTA-50 specific commands and syntax are identical in USB, Ethernet, RS-232 and GPIB remote control modes.

5.8.1 Command/Answer Syntax

Rules

- A command is a string.
- The decimal separator is the dot.
- Spaces are treated as nothing: " L A M B D A ?   " is the same as "LAMBDA?"
- Commands are not case sensitive. All answers are in uppercase.
- Each command ends with the two following characters:
  - CR: carriage return (0x0D)
  - LF: line feed (0x0A).

Command Types

Setting Commands

Setting commands enable you to assign a new value to an internal parameter of the XTA-50.
Name and value of parameters are returned.

- Command:
  - Syntax: `<parameter name>=<value><CR><LF>
  - Example: LAMBDA=1550.0000000<CR><LF>

- Answer:
  - Syntax: `<parameter name>=<value><CR><LF>
  - Example: LAMBDA=1550.000<CR><LF>

Query Commands

Query commands enable you to get the value of an internal parameter.
Name and value of parameters are returned.

- Command:
  - Syntax: `<parameter name>?<CR><LF>
  - Example: LAMBDA?<CR><LF>

- Answer:
  - Syntax: `<parameter name>=<value><CR><LF>
  - Example: LAMBDA=1550.000<CR><LF>

Action Commands

Action commands enable you to ask the XTA-50 to perform an action. Answer is the command.

- Command/Answer:
  - Syntax: `<action identifier><CR><LF>
  - Example: LOCAL<CR><LF>
Command Error
If the XTA-50 is not able to understand a command, it resends it (in uppercase and without space) preceded by the character "?":

```
?<Command><CR><LF>
```

Error can come from a wrong parameter name, a wrong action identifier, a wrong value. For one command all operators are not always available. A command sent with an unavailable operator will not be understood by the XTA-50.

![Important]
Do not omit the two ending parameters <CR><LF>. Without them the XTA-50 will never understand a command.

### 5.8.2 Available Remote Commands

The following table gives an overview of the available commands and queries.

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<td>Corresponding Section</td>
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<td>ETH_MANUAL</td>
<td>ETH_MANUAL, p. 56</td>
</tr>
<tr>
<td>ETH_MANUAL?</td>
<td>ETH_MANUAL?, p. 56</td>
</tr>
</tbody>
</table>

### 5.8.2.1 General System Control

**Syntax**

*IDN?

*IDN?

**Description**

Queries the XTA-50 identification string.

**Query Response**

EXFO, XTA-50, 0, x.x.x

where x.x.x is the firmware version.

**Syntax**

SERIAL_NUMBER?

SERIAL_NUMBER?

**Description**

Queries the XTA-50 serial number.

**Query Response**

Y0xxxxxxxxx
5.8.2.2 Wavelength/Frequency and FWHM Control

**LAMBDA= Syntax**

LAMBDA=\(<value>\)

**Description**

Sets a new wavelength value in nm. If a sequence is running, the wavelength cannot be remotely assigned. In this case the XTA-50 answer is: \(\text{SEQUENCE\_RUNNING=TRUE}\)

- \(<value>\): string of a natural number, according to the wavelength limits and the FWHM value. Available wavelength and FWHM values are detailed in section *Technical Specifications*, p. 9. FWHM can constrain wavelength/frequency value, as explained in section *FWHM Constrain on Central Wavelength*, p. 24. The value really taken into account is returned in the answer.

**Example**

LAMBDA=1550.003

**LAMBDA? Syntax**

LAMBDA?

**Description**

Queries the current wavelength value in nm.

**Example**

LAMBDA? \(\rightarrow\) 1550.003

**LAMBDA_MIN? Syntax**

LAMBDA_MIN?

**Description**

Queries the XTA-50 minimal wavelength value in nm.

**Query Response**

String of a natural number

**LAMBDA_MAX? Syntax**

LAMBDA_MAX?

**Description**

Queries the XTA-50 maximal wavelength value in nm.

**Query Response**

String of a natural number
Using the XTA-50 in Remote Mode

FREQ=

**Syntax**

FREQ=<value>

**Description**

Sets the frequency value in THz.

If a sequence is running, the wavelength cannot be remotely assigned. In this case the XTA-50 answer is: SEQUENCE_RUNNING=TRUE

- `<value>`: string of a natural number, according to the frequency limits and the FWHM value. Available wavelength and FWHM values are detailed in section *Technical Specifications*, p. 9.
  
  FWHM can constrain wavelength/frequency value, as explained in section *FWHM Constrain on Central Wavelength*, p. 24. The value really taken into account is returned in the answer

**Query Response**

String of a natural number corresponding to the current frequency value in THz.

**Example**

FREQ=193.415

FREQ?

**Syntax**

FREQ?

**Description**

Queries the current frequency value in THz.

**Example**

FREQ? → 193.415

FWHM=

**Syntax**

FWHM=<value>

**Description**

Sets a new FWHM value in nm.

If a sequence is running, the FWHM cannot be remotely assigned. In this case the XTA-50 answer is: SEQUENCE_RUNNING=TRUE

- `<value>`: string of a natural number, according to the FWHM limits. Available wavelength and FWHM values are detailed in section *Technical Specifications*, p. 9.
  
  This value can constrain wavelength and frequency values, as explained in section *FWHM Constrain on Central Wavelength*, p. 24

**Example**

FWHM=0.065
FWHM? Syntax
FWHM?

Description
Queries the current FWHM value in nm.

Example
FWHM? → 0.065

FWHM_F= Syntax
FWHM_F=<value>

Description
Sets a new FWHM value in GHz.
If a sequence is running, the FWHM cannot be remotely assigned. In this case the XTA-50 answer is: SEQUENCE_RUNNING=TRUE

• <value>: string of a natural number, according to the FWHM limits. Available wavelength and FWHM values are detailed in section Technical Specifications, p. 9. This value can constrain wavelength and frequency values, as explained in section FWHM Constrain on Central Wavelength, p. 24

Example
FWHM_F=8.11

FWHM_F? Syntax
FWHM_F?

Description
Queries the current FWHM value in GHz.

Example
FWHM? → 8.11

FWHM_MIN? Syntax
FWHM_MIN?

Description
Queries the XTA-50 minimal FWHM value in nm.

Query Response
String of a natural number.
**FWHM_MAX?**

**Syntax**

FWHM_MAX?

**Description**
Queries the XTA-50 maximal FWHM value in nm.

**Query Response**
String of a natural number.

**SEQUENCE_RUNNING?**

**Syntax**

SEQUENCE_RUNNING?

**Description**
Queries if a sequence is currently running. In this case, the wavelength, frequency and FWHM cannot be remotely assigned.

**Query Response**

- **TRUE**: a sequence is currently running.
- **FALSE**: no sequence is currently running.

**B_SUPPR=**

**Syntax**

B_SUPPR=DISABLED|ENABLED

**Description**
Sets the state of the backlash suppression mechanism:

- **DISABLED**: the backlash suppression is disabled
- **ENABLED** (default): the backlash suppression is enabled

**B_SUPPR?**

**Syntax**

B_SUPPR?

**Description**
Queries the state of the backlash suppression mechanism:

**Query Response**

- **DISABLED**: the backlash suppression is disabled.
- **ENABLED**: the backlash suppression is enabled
5.8.2.3 Remote Mode Control

**LOCAL**

**Syntax**

```
LOCAL
```

**Description**

Ends remote mode, the XTA-50 comes back to local mode.

**ETH_IP=**

**Syntax**

```
ETH_IP=<value>.<value>.<value>.<value>
```

**Description**

Sets a new IP address (for more details, see section Setting the XTA-50 Ethernet Ports, p. 38). The new value is only taken into account after calling `ETH_MANUAL`. We do not recommend to set this value using the Ethernet remote mode.

- `<value>`: integer in the range 0 to 255.

**Example**

```
ETH_IP=192.168.0.5
```

**ETH_IP?**

**Syntax**

```
ETH_IP?
```

**Description**

Queries the XTA-50 IP address.

**Query Response**

String of four integers (0 to 255) separated by dots

**Example**

```
ETH_IP? → 192.168.0.5
```

**ETH_MASK=**

**Syntax**

```
ETH_MASK=<value>.<value>.<value>.<value>
```

**Description**

Set a new mask for Ethernet connection (for more details, see section Setting the XTA-50 Ethernet Ports, p. 38). The new value is only taken into account after calling `ETH_MANUAL`.

We do not recommend to set this value using the Ethernet remote mode.

- `<value>`: integer in the range 0 to 255.

**Example**

```
ETH_MASK=255.255.255.0
```
<table>
<thead>
<tr>
<th>Command</th>
<th>Syntax</th>
<th>Description</th>
<th>Query Response</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ETH_MASK?</strong></td>
<td><strong>ETH_MASK?</strong></td>
<td>Queries the XTA-50 mask.</td>
<td>String of four integers (0 to 255) separated by dots.</td>
<td>ETH_MASK? → 255.255.255.0</td>
</tr>
<tr>
<td><strong>ETH_GATEWAY=</strong></td>
<td><strong>ETH_GATEWAY=&lt;value&gt;.&lt;value&gt;.&lt;value&gt;.&lt;value&gt;</strong></td>
<td>Sets a new gateway (for more details, see section Setting the XTA-50 Ethernet Ports, p. 38). The new value is only taken into account after calling <strong>ETH_MANUAL</strong>. We do not recommend to set this value using the Ethernet remote mode.</td>
<td></td>
<td>ETH_GATEWAY=192.168.0.1</td>
</tr>
<tr>
<td><strong>ETH_GATEWAY?</strong></td>
<td><strong>ETH_GATEWAY?</strong></td>
<td>Queries the XTA-50 gateway.</td>
<td>String of four integers (0 to 255) separated by dots.</td>
<td>ETH_GATEWAY? → 192.168.0.1</td>
</tr>
<tr>
<td><strong>ETH_AUTO</strong></td>
<td><strong>ETH_AUTO</strong></td>
<td>Sets Ethernet parameters (IP, mask, gateway) automatically. They are configured by the network DHCP.</td>
<td>The new configuration will be operational after few seconds/minutes.</td>
<td></td>
</tr>
</tbody>
</table>
Using the XTA-50 in Remote Mode

**ETH_AUTO?**

**Syntax**

ETH_AUTO?

**Description**

Queries if the XTA-50 Ethernet parameters are currently in automatic mode.

**Query Response**

- **TRUE**: the XTA-50 Ethernet parameters are currently in automatic mode.
- **FALSE**: the XTA-50 Ethernet parameters are not currently in automatic mode.

**ETH_MANUAL**

**Syntax**

ETH_MANUAL

**Description**

Uses the Ethernet parameters (IP, mask, gateway) set in manual mode.

See **ETH_IP** (page 54), **ETH_MASK** (page 54), and **ETH_GATEWAY** (page 55) commands.

The new configuration will be operational after few seconds/minutes.

**ETH_MANUAL?**

**Syntax**

ETH_MANUAL?

**Description**

Queries if the Ethernet parameters currently used by the XTA-50 are the ones set in manual mode.

**Query Response**

- **TRUE**: the XTA-50 uses the Ethernet parameters set manually.
- **FALSE**: the XTA-50 does not use the Ethernet parameters set manually.
6. Performing Basic Maintenance Operations

User maintenance of the XTA-50 system is limited to basic maintenance tasks that do not require removing the instrument case-cover or accessing any internal component of the instrument.

**Warning**
To avoid the possibility of injury, never remove the protective cover of the chassis to perform servicing or maintenance operations to the XTA-50 internal parts and optical components.
You must refer to EXFO service representative (see section Contact Information, p. 4).

6.1 Updating the Firmware Version

**Subject**
The firmware version update package is a .pkg file named `XTA_Updater_x.xx.pkg` where x.xx is the firmware version. It is available on the EXFO website, from the EXFO Apps area.

**Caution**
Do not install a lower version of software than the current version installed on your product. EXFO cannot be held liable or be made responsible for problems caused by a software downgrade.

**Before Starting**
Make sure you have a USB flash drive.

**Procedure**

1. From the EXFO website (EXFO Apps), download the last XTA-50 firmware version update (.pkg file) and copy it to a USB device, so that the necessary .pkg file is located at the USB device root.

   **Important**
   Make sure the downloaded version is a higher version than the one installed on your product.

2. Connect the USB device to one of the available USB ports located on the rear panel (see Figure 2, p. 13).

3. Turn off the XTA-50 (see section Turning off the XTA-50, p. 21).

4. On the front panel, press the button to turn on the XTA-50.
The XTA-50 automatically detects the .pkg file on the USB device and starts the system update wizard.

   **Caution**
   To avoid serious system problems:
   - Do not turn the XTA-50 off during the system update.
   - Do not remove the USB device before the end of the upgrade process.
5. Follow the instructions displayed on screen to update the firmware version.
   Once the update is finished, the XTA-50 starts normally.

6. Remove the USB device.

### 6.2 Cleaning Optical Connectors

**Subject**

To optimize the performance of the instrument and prevent loss of optical power, you must verify that optical connectors are clean every time you connect a fiber.

**Important**

To reduce the need for cleaning, immediately replace protective caps on the optical connectors when not in use.

The XTA-50 optical connectors are mounted on a drawer to ease the cleaning of internal connectors.

**Before Starting**

Make sure you have the following material:
- Optical grade cleaning cotton swabs
- Canned air
- Isopropyl alcohol
- Fiberscope or similar if available
- Lint-free tissue or cleaning cartridges

Use only high quality cleaning supplies that are non-abrasive and leave no residue.

**Procedure**

1. Turn the XTA-50 off (see section *Turning off the XTA-50, p. 21*) and unplug the power supply cord from the wall socket.

2. On the front panel, make sure the protective caps of the connectors are in place.

3. On the front panel, use your fingers to unscrew the two screws of the connector drawer.
   Once unscrewed from the front panel, the two screws stay attached to the drawer.

4. Gently pull the drawer out of the front panel (no more than 70 mm) so that fiber ends are made visible, as illustrated in the following figure.

![Figure 26: Optical Connectors – Cleaning](image)

5. At the rear of the drawer plate, remove one connector end from the plate:

6. Gently clean the connector end, with the following instructions:
Performing Basic Maintenance Operations

a. Hold the can of compressed air upright and spray the can into the air to purge any propellant.
b. Spray the clean compressed air on the connector to remove any loose particles or moisture.
c. Moisten a clean optical swab with isopropyl alcohol and lightly wipe the surfaces of the connector with gentle circular motion.
d. Spray the clean compressed air on the connector again to remove any loose particles or isopropyl alcohol.
e. Check that the connector is clean with a fiberscope (or similar).
7. Replace the connector end at the rear of the drawer plate: make sure the key of the connector is mated with that of the adapter and screw it back.
8. Perform steps 5 to 7 on the second connector.
9. Push the connector drawer back on the front panel and screw the drawer back in its location, making sure no fiber is trapped between the front panel and the drawer plate.

6.3 Cleaning the XTA-50

6.3.1 Cleaning the Cover of the XTA-50

Subject
If the external cover of the XTA-50 becomes dirty or dusty, clean it by following the instruction below.

Caution
Do not use chemically active or abrasive materials to clean the XTA-50.

Before Starting
Material needed: lint free cleaning cloth

Procedure
1. Turn the XTA-50 off (see section Turning off the XTA-50, p. 21) and unplug the power supply cord from the wall socket.
2. Gently swipe dirt and dust on the external cover of the XTA-50, without applying excessive force onto it.
6.3.2 Cleaning the Fan Grid

Subject To ensure proper cooling of the XTA-50 from the fan, the fan grid must not be dusty, you must clean it regularly.

Caution
Do not use a vacuum cleaner to clean the fan as this may apply excessive force to it and cause damage to the fan.

Procedure
1. Turn the XTA-50 off (see section Turning off the XTA-50, p. 21) and unplug the power supply cord from the wall socket.
2. Using a duster or a slightly moist cloth, gently clean the external grid of the fan without pressing it.

6.3.3 Cleaning the Touch Screen

Subject To ensure proper functioning and accuracy of the touch screen, you must clean it regularly.

Before Starting Material needed:
• Lint-free cleaning cloth
• Isopropyl alcohol

Procedure
1. Turn the XTA-50 off (see section Turning off the XTA-50, p. 21) and unplug the power supply cord from the wall socket.
2. Using an lint-free cloth slightly damped with ethyl alcohol, gently swipe dirt on the screen.
   Make sure to avoid drops and prevent alcohol from entering the XTA-50.
6.4 Replacing the Power Fuse

Subject
You must verify the power fuse in case you cannot turn on the XTA-50.

Warning
To avoid fire hazard, only use the correct fuse type, voltage and current ratings (see section Technical Specifications, p. 9).

Before Starting
Make sure you have the following equipment:

- 1 slot screwdriver (4 to 6 mm).
- 1 replacement fuse (for fuse type, see section Technical Specifications, p. 9).

Procedure
1. Turn the XTA-50 off (see section Turning off the XTA-50, p. 21) and unplug the power supply cord from the wall socket.
2. Unplug the cord of the adapter from the 12 V connector.
3. Insert the screwdriver in the fuse holder notch and unscrew the fuse holder from its housing.
4. Pull out the defective fuse from the fuse holder and replace it with the new one.
5. Replace the fuse holder in its housing on the rear panel and screw it back.
6. Plug the power cord of the adapter to the 12 V connector.

6.5 Packaging for Shipment

If you need to return the XTA-50 to EXFO for servicing or calibration, use the original packaging.

For instructions on returning the XTA-50, please contact EXFO (see section Contact Information, p. 4).
7. Troubleshooting

This section lists all the possible error and warning messages, and how to handle them. Errors are classified by function.

7.1 Motor Errors

**Motor Connection error. No driver detected**
The motor driver has not been found during the initialization process.
  • Restart the XTA-50.
  • If the error appears again, contact the EXFO customer service (see section Contact Information, p. 4).

**Motors Connection error. At least one motor is missing**
At least one motor was not connected to the driver during initialization.
  • Restart the XTA-50.
  • If the error appears again, contact the EXFO customer service (see section Contact Information, p. 4).

**Motors Communication error**
Communication with one motor failed.
  • Restart the XTA-50.
  • If the error appears again, contact the EXFO customer service (see section Contact Information, p. 4).

7.2 Remote Interface Errors

**USB interface error**
The USB-B interface card has not been found during initialization.
  • Restart the XTA-50.
  • If the error appears again, contact the EXFO customer service (see section Contact Information, p. 4).

**USB/Ethernet/GPIB/RS232 communication error**
Communication has been lost during remote mode.
  • Close and re-open the remote connection (see section Switching Between Remote and Local Mode, p. 33).
  • Check cables.
  • Check your computer configuration.
  • Check IP or GPIB address (see section Using the XTA-50 in Remote Mode, p. 33).
  • Restart the XTA-50.
7.3 General Error Messages

Wavelength (and or FWHM) limit switch
One motor has reached one of its limits.
- Restart the XTA-50.
  If the error appears again, contact the EXFO customer service (see section Contact Information, p. 4).

Not a number or number too big! Try again
The number entered with the virtual keyboard is too long, or it is not a number.
- Enter a smaller value.
- Type only digits with one dot maximum.

An error occurred, selected sequence cannot be loaded
The sequence file is corrupted and cannot be loaded.
- Try again.
- Restart the XTA-50.
  If the error appears again, the sequence file is lost. You must delete it and create a new one.

The sequence has been adjusted within the limits of the XTA-50
Some parameters of this sequence file are out of their range.
The sequence file has been loaded and parameters have been modified to fit to their range.
Certification and Compliance

Electromagnetic Compatibility

Canada and USA Electromagnetic Interference Regulatory Statement

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America and from ICES-003 compliance in Canada. However, EXFO Inc. makes reasonable efforts to ensure compliance to the applicable standards.

The limits set by these standards 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 user guide, 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 will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user’s authority to operate the equipment.

European Electromagnetic Compatibility Regulatory Statement

Warning: This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

European Declaration of Conformity

The European Declaration of Conformity is available at www.EXFO.com/en/resources/legal-documentation

Recycling and Disposal

This symbol on the product means that you should recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

For complete recycling/disposal procedures and contact information, visit the EXFO website at www.EXFO.com/recycle.
## China Table of Toxic and Hazardous Substances

**CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES (RoHS)**  
中国关于危害物质限制的规定  
**NAMES AND CONTENTS OF THE TOXIC OR HAZARDOUS SUBSTANCES OR ELEMENTS CONTAINED IN THIS EXFO PRODUCT**  
包含在本 EXFO 产品中的有毒有害物质或元素的名称及含量

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Lead (Pb)</th>
<th>Mercury (Hg)</th>
<th>Cadmium (Cd)</th>
<th>Hexavalent Chromium (Cr(VI))</th>
<th>Polybrominated biphenyls (PBB)</th>
<th>Polybrominated diphenyl ethers (PBDE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Electronic and electrical sub-assembly</td>
<td>X</td>
<td>O</td>
<td>X</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Optical sub-assembly</td>
<td>X</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Mechanical sub-assembly</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

**Note:**  
This table is prepared in accordance with the provisions of SJ/T 11364.  
本表依据 SJ/T 11364 的规定编制。  
O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.  
O: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 标准规定的限量要求以下。  
X: indicates that said hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572. Due to the limitations in current technologies, parts with the “X” mark cannot eliminate hazardous substances.  
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 标准规定的限量要求。标记“X”的部件，皆因全球技术发展水平限制而无法实现有害物质的替代。  
a. If applicable.  
如果适用。

### MARKING REQUIREMENTS  
标注要求

<table>
<thead>
<tr>
<th>Product</th>
<th>Environmental protection uses period (years)</th>
<th>Logo</th>
</tr>
</thead>
<tbody>
<tr>
<td>This EXFO product</td>
<td>10</td>
<td>![10]</td>
</tr>
<tr>
<td>Battery</td>
<td>5</td>
<td>![5]</td>
</tr>
</tbody>
</table>

a. If applicable.  
如果适用。
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