LUNA

Setup Guide │Luna 6415

Class 1 Laser Product
Appareil Laser Classe 1
Laser Produkt Klass 1
IEC60825-1, 2014

Many regions prohibit the disposal of WEEE (Waste Electrical and Electronic Equipment) in the normal waste stream, to comply with the Restriction of Hazardous Substances (RoHS) released into the environment. Please contact your local waste authority for instructions on proper recycling of the electronic product(s) described in this *User Guide*.

Luna 6415:
Luna 6415 Setup Guide
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1 Safety

The advisory words **Danger**, **Warning** and **Caution** used in this manual identify the level of hazard that may be encountered by the user.

- **DANGER** means if the danger is not avoided, it will cause death or serious injury.
- **WARNING** means if the warning is not heeded, it can cause death or serious injury.
- **CAUTION** means if the precaution is not taken, it may cause minor or moderate injury.

⚠ Warning

The protection provided by the equipment may be impaired if the equipment is used in a manner not specified by the manufacturer, resulting in serious injury or death.

The power cord is the main electrical disconnect for this equipment. If it is necessary to ensure no power to the unit, remove the power cord.

The use of controls, adjustments, performance, or procedures other than those specified herein may result in hazardous laser radiation exposure and one or more safety protections may be impaired or rendered ineffective.

⚠ Attention

La protection fournie par l'équipement peut être compromise si l'équipement est utilisé d'une manière non spécifiée par le fabricant, entraînant des blessures graves ou la mort.

Le cordon d'alimentation est le principal disjoncteur électrique de cet équipement. S'il est nécessaire de ne pas mettre l'appareil hors tension, retirez le cordon d'alimentation.

L'utilisation de commandes, d'ajustements, de performances ou de procédures autres que celles spécifiées ici peut entraîner une exposition dangereuse au rayonnement laser et une ou plusieurs protections de sécurité peuvent être altérées ou rendues inefficaces.

2 Technical Support

If you have concerns with or questions about the information contained in this document, contact our technical support staff using one of the following methods:

2.1 **Mail**

Luna Innovations Inc.
3155 State Street
Blacksburg, VA 24060

2.2 **Phone**

Main Phone: (540) 961-5190
Toll-Free Support: 1.866.LUNA OVA (866.586.2682)

2.3 **E-mail**

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www.lunainc.com

3 System Overview

The Luna 6415 provides users with the ability to make high resolution insertion loss and return loss measurements of optical devices in both reflection and transmission. These measurements can be viewed in both the delay and spectral domains for improved visibility in characterizing and screening optical components and networks.

3.1 Luna 6415 Hardware Configuration

The flexibility of the reflection or transmission measurement modes allows you to design and execute tests that perfectly fit your needs. First, it can be set up to measure an optical device in reflection, meaning the measurement data will consist of all of the light that was reflected from the device under test and back to the instrument. Secondly, it can be set up to measure in transmission, meaning that the measurement data will consist of all of the light that passes through the device under test and then back into the instrument.

4 What you get with the Luna 6415

The Luna 6415 is shipped with everything needed to conduct strain and temperature measurements, including the measurement instrument and all supporting hardware, software, documentation, and cables. Read and follow all assembly and startup instructions before attempting to operate the Luna 6415.

The following components are shipped with each Luna 6415:

Luna 6415 Instrument

One power cord for the Luna 6415

Flash drive containing the user guide and recovery software

Optical fiber connector cleaner

Optical fiber bulkhead cleaners

Dedicated instrument controller

Power adapter

Two meter USB 3.1 Gen I cable

If any components are missing or damaged, contact Luna toll free at 866-586-2682 or by e-mail at solutions@lunainc.com

4.1 A Closer Look at the Luna 6415

4.1.1 Front Panel

The front panel of the Luna 6415 contains the two optical connectors, as well as three LED system status indicators.

- Power   Lit while the system is powered on

- Source   Lit while front panel optical connectors are energized

- Measure   Lit while the system is making measurements

Eight optical connectors are located on the front panel of the system. In order to keep the optical connections clean, it is important to keep dust covers attached while connections are not in use. Refer to the maintenance information section of this guide for instructions.
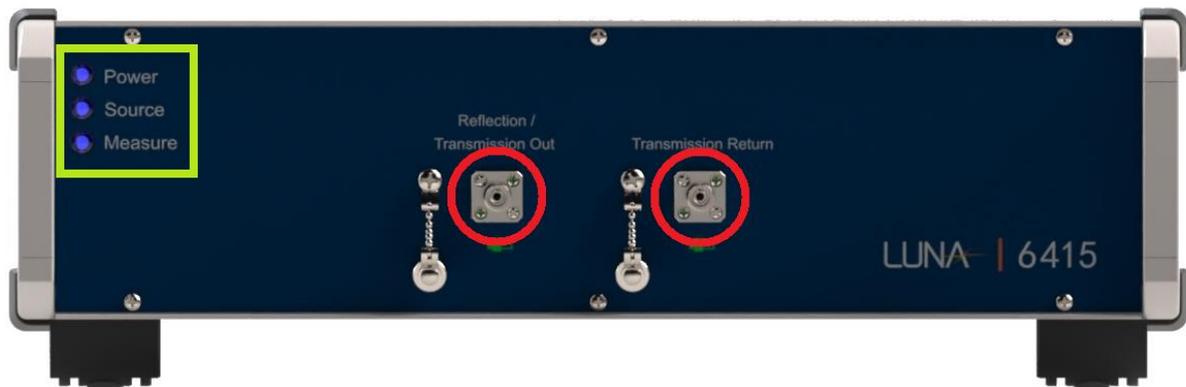

Figure 4-1 – Luna 6415 Front Panel

4.1.2 **Rear Panel**

The rear panel of the system contains all of the electrical connections to the system.

Power Entry Module

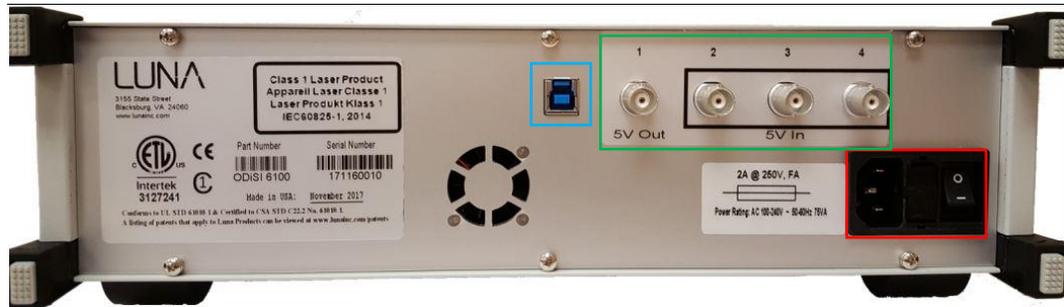BNC Triggers (three input and one output)

USB 3.1 Gen I Type B Port

Figure 4-2 – Luna 6415 Panel

4.1.3 **Air Vents**

Air vents are located on both the sides and rear of the Luna 6415. These vents should remain unobstructed whenever the system is powered on.

Figure 4-3 - Luna 6415 Air Vents

5 Hardware Setup

1. Remove all of the Luna 6415 components from the packaging and verify that no components are damaged or missing (see components list).

2. For best performance, place the unit on a stable surface capable of supporting the entire weight of the unit. This surface must be clear from any objects that may reduce the airflow into and out of the fan ducts at the side and rear of the unit.

3. Clean the duplex FC-APC connectors of the device to be tested using the provided Cletop connector cleaner (see Maintenance section).

4. Unpack and set up the laptop according to the manufacturer's instructions.

5. Connect the Luna 6415 to the laptop using the *USB 3.1 Gen I* cable.

6. Attach the power cords to the laptop and Luna 6415.

> ⚠️ ATTENTION: Luna requires the use of surge protected and grounded outlets with the Luna 6415.

5.1.1 Power on Sequence

1. Turn on the Luna 6415 using the power switch on the rear panel.

2. Turn on the laptop.

   Note: The Luna 6415 can be restarted without restarting the laptop.

6 Software Setup

This section provides a short introduction to the main displays in the Luna 6415 software. For complete instructions on how to start and configure the application, refer to the Luna 6415 User's Guide, which can be accessed from the Help menu on the Luna 6415 software.

6.1 Reflection Mode

When the Luna 6415 software is started, the system will initialize and then launch the hardware in reflection mode. When the "Measure" button is pressed, a measurement will be made and will be displayed to the screen.
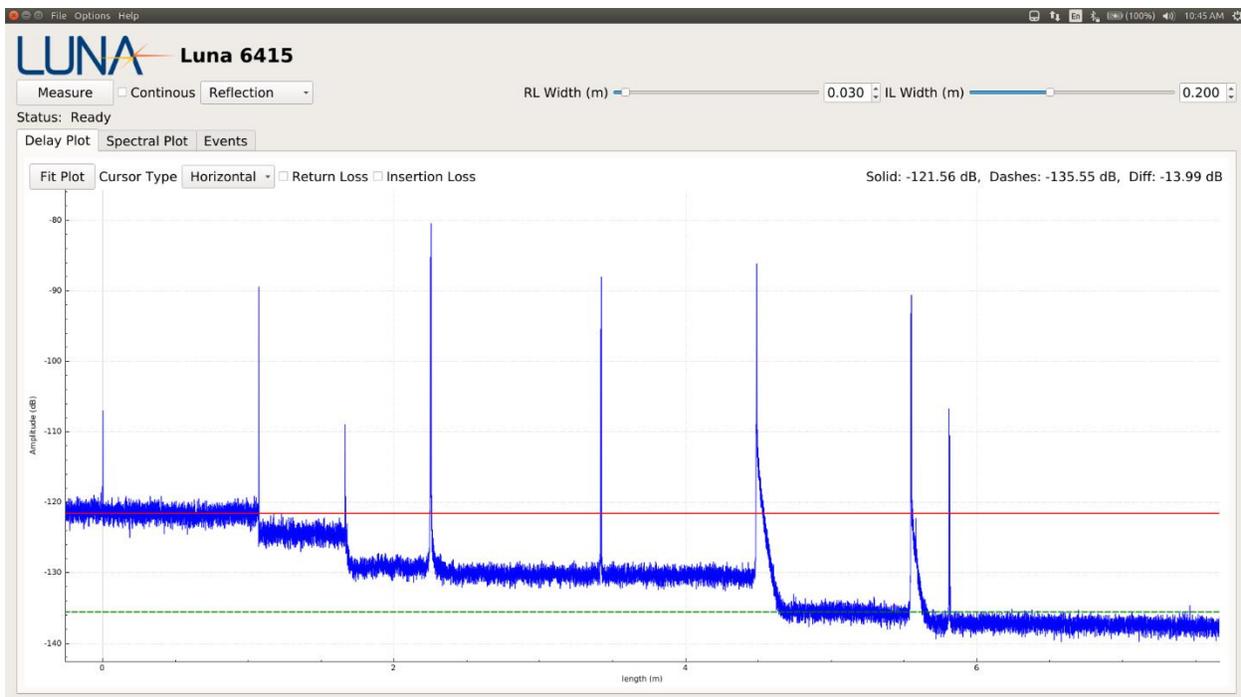

Figure 6-1 Reflection measurement of a fiber array

It is possible to view this data in different ways using the three plot types presented as tabs at the top of the plot.

- The "Delay Plot" shows the reflected light as a function of optical time of flight (generally shown in meters).

- The "Spectral Plot" allows you to see the spectral amplitude response from a subset of the delay data.

- The "Events" tab displays insertion loss and return loss measurements for any fiber events detected within the delay data.
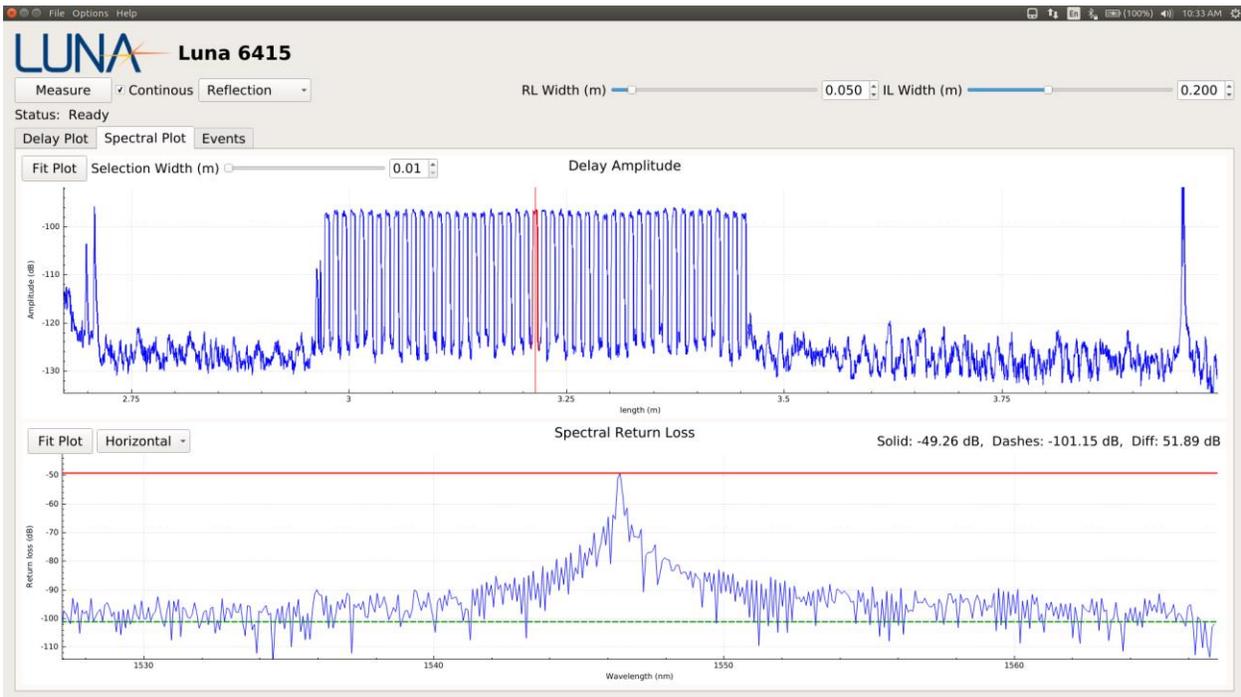
Figure 6-2 Spectral amplitude response plot showing the spectral amplitude of a single FBG
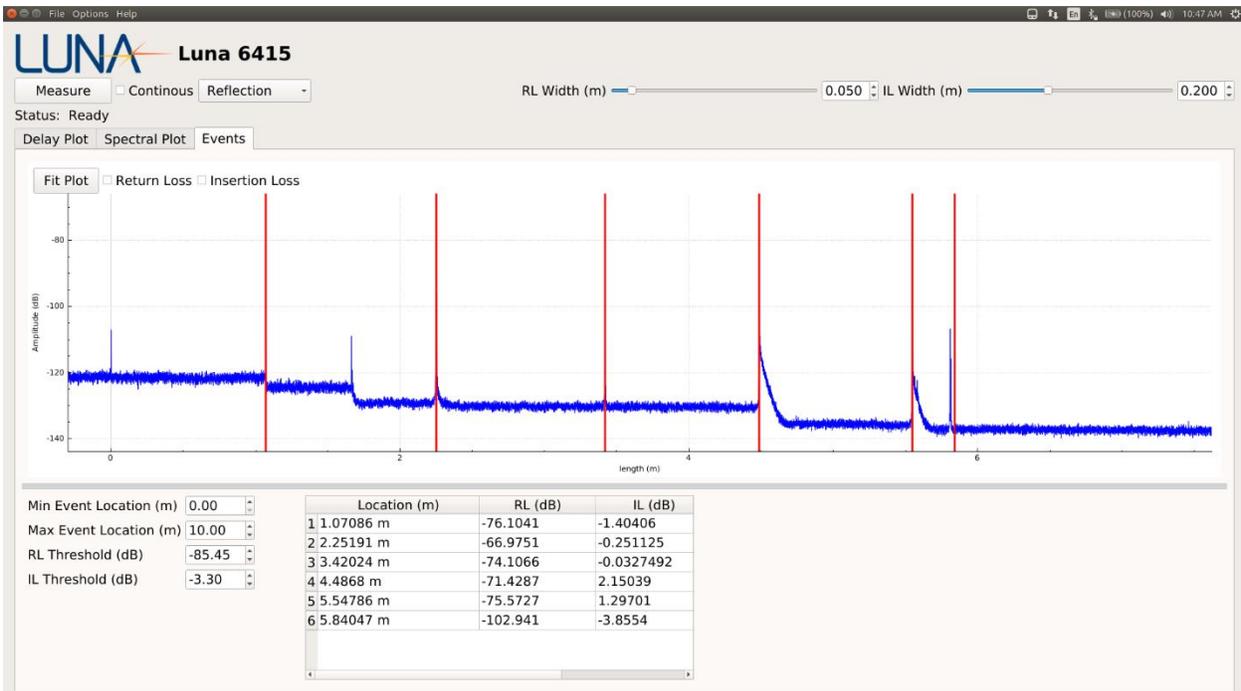

Figure 6-3 Event tab showing found events and their associated insertion and return losses

Note: It is important to disconnect any devices from the transmission port on the Luna 6415 when using the reflection measurement mode.

6.2 **Transmission Mode**

The 6415 can be swapped to transmission mode using the dropdown menu located in the upper left corner of the screen. The system will configure itself for transmission measurements and then you will be able to use the same three plot types to interpret the transmission data.

While in transmission mode, the delay plot shows the amount of transmitted light as a function of time of flight delay (shown in meters). For any single optical path, there should be one clear peak, located at the path length of the device being measured. The spectral plot and event plots work in the same manner as in when in the reflection mode.
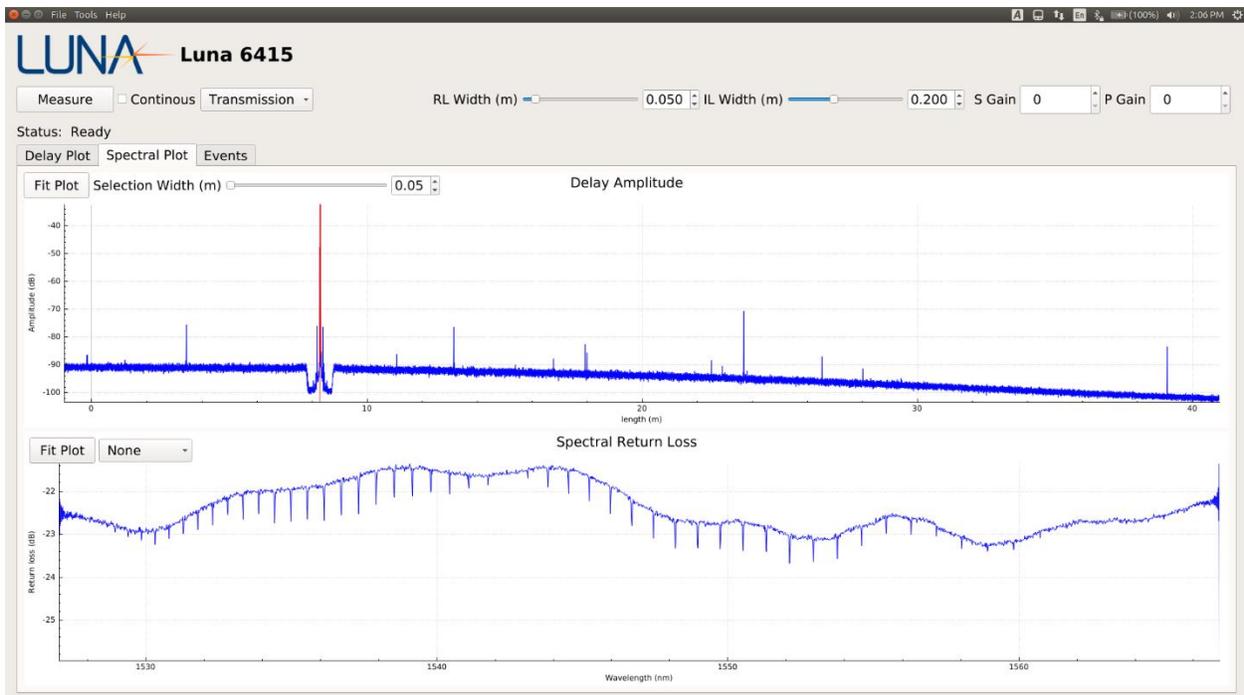

Figure 6-4 Transmission measurement of an optical network containing a gas absorption cell.

7 Maintenance and Cleaning

7.1 Optical Connector Cleaning Materials

It is extremely important to clean connectors before attaching optical fibers to the Luna 6415 for testing. Failure to do so may result in noisy data or damaged equipment. Optical fiber connectors on cables should be cleaned before every connection to the Luna 6415. The bulkhead connectors on the front panel should be cleaned frequently, roughly once every 25 connections.

The cleaning supplies used with the Luna 6415 are:

- CLETOP connector cleaner – P/N F1-6270

- CLETOP connector cleaner replacement reel – P/N F1-6271

- Cletop 2.5mm Stick (5/package) – P/N F10400

These supplies can be ordered from:

> FIS Incorporated
> 161 Clear Road
> Oriskany, NY 13424
> Web: www.fiberinstrumentsales.com
> E-mail: info@fiberinstrumentsales.com

Important: Use only cleaners approved for use with fiber optic bulkheads and fiber connectors. Do not use any type of cleaning fluid, cotton swabs, or cloths. Using unapproved cleaning tools or fluids may result in erroneous or noisy data, or may damage the fibers and Luna 6415 components.

The optical fiber connector cleaner is used for cleaning connectors:

Figure 7-1 - Connector Cleaner

Cletop sticks are used for cleaning the Luna 6415 bulkhead connectors:

Figure 7-2 – Cletop 2.5mm Sticks

7.2 Cleaning Optical Connectors

1. Expose the cleaning tape by pushing down the cover release lever.

Figure 7-3 - Exposing the Cleaning Tape

1. Hold the fiber connector perpendicular to the cleaner tape surface

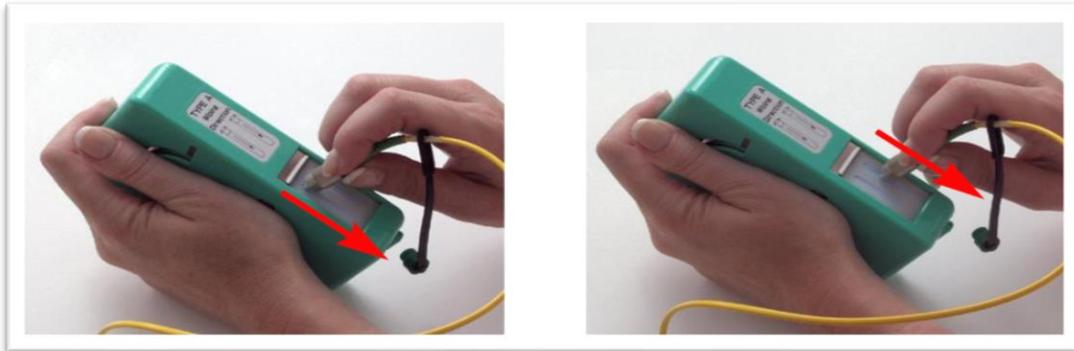2. Swipe the tip of the connector down the first cleaning strip, then swipe on the second strip.

Figure 7-4 - Cleaning the Connector on the Tape

3. Close the cleaning tape cover before swiping another connector. This advances the cleaning tape.

7.3 Cleaning Optical Bulkhead Connections

Important: The bulkhead should be cleaned approximately every 25 connections. Dirty connections can lead to connector damage and poor system performance.

1. Turn off the Luna 6415.

2. Make sure that no devices are connected to the Luna 6415.

3. Open the protective cover on the front panel.

4. Gently insert one of the supplied cleaning sticks, as shown below.

5. Twist the stick in one direction and then remove.

Sticks should be discarded after a single use.

Figure 7-5 - Cleaning Optical Bulkhead Connections

7.4 Cleaning the Air Filter

The left side of the system contains an air filter intended to limit dust buildup within the chassis. This filter should be cleaned or replaced yearly or as soon as dust buildup is visible on the filter foam.

1. Ensure that the system is powered down and unplugged.

2. Remove the four screws on the side panel of the system using a #1 Phillips head screw driver.

Figure 7-6 - Cleaning Air Filter: Remove Screws

3. Remove the side panel to expose the air filter.

Figure 7-7 - Cleaning Air Filter: Remove Filter

4. Remove the air filter and clean with running water. Allow the filter to dry before reassembly.

5. Insert the air filter back into the space between the top and bottom panels.

6. Replace the side panel and secure using four screws.

7.5 **Cleaning the Case**

1. Clean the case by wiping it with a soft cloth dampened with water or a mild, non-abrasive cleaning fluid such as window cleaner.

Warning ⚠️

Do not spray any fluid directly on case surfaces. It may seep into the interior of the case and damage components.

7.6 **Replacing Fuses**

The fuse drawer is located on the power module of the instrument on the back panel.

Warning ⚠️

To avoid the risk of serious injury or death, ensure that the power cord is disconnected from the instrument when checking or replacing fuses.

1. Disconnect the instrument power cord.

2. Place the blade of a screwdriver or similar tool in the slot at the bottom of the fuse drawer, then gently pry the drawer out of the power module.
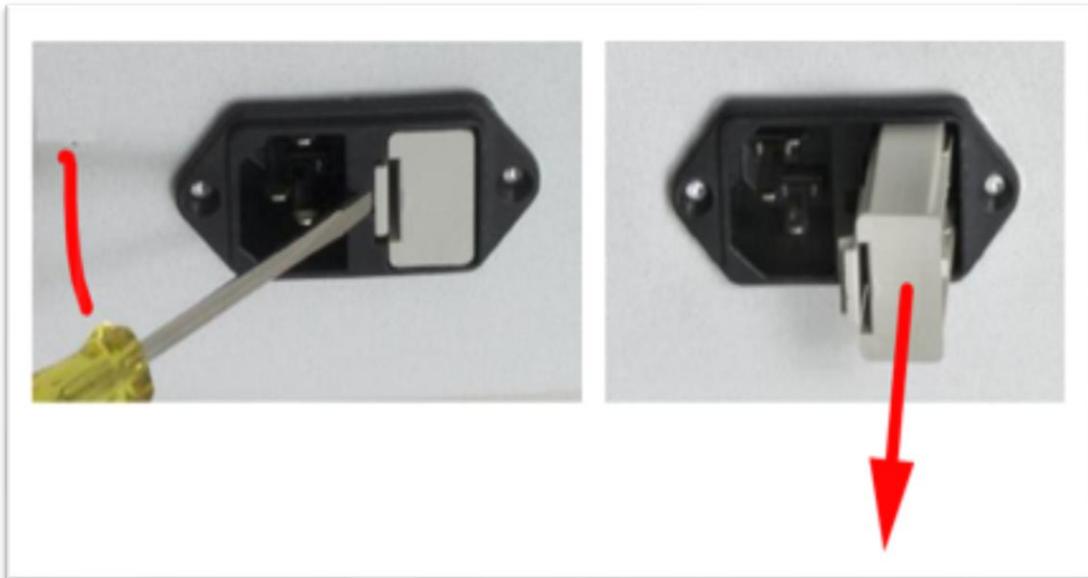

Figure 7-8 - Remove Fuse Drawer

3. Replace fuses with Bussmann AGC-2 type 2A @ 250VAC 1 ¼" x ¼" fast acting (FA) fuses, rated FS01008.
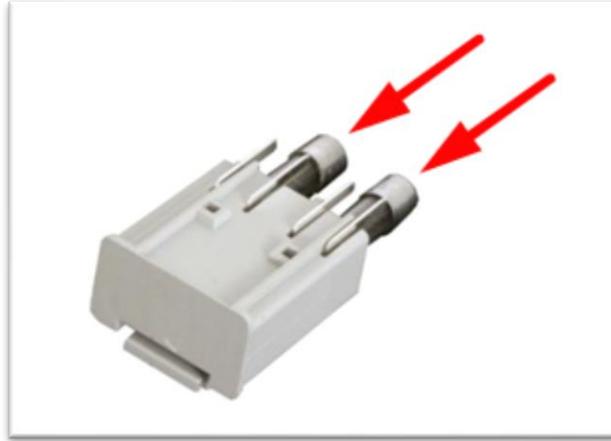

Figure 7-9 - Insert New Fuses

4. Push the drawer back into the power module until it snaps into place.

5. Reconnect the power cord.