User Guide

RTU-2

www.EXFO.com

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

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Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

The exhaustive list of patents is available at EXFO.com/patent.

Version number: 11.0.0.1

Contents

Regulatory Information

CAUTION

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

CAUTION

The emissions class and electromagnetic environment of some modules may differ from those specified for your unit. In this case, always ensure that you comply with the most restrictive conditions (either module or unit).

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. 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 documentation, 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.

Canada Electromagnetic Interference Regulatory Statement

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference.

Cet équipement génère, utilise et peut émettre de l'énergie radio-fréquence et, s'il n'est pas installé et utilisé conformément à la documentation de l'utilisateur, il peut occasionner une interférence néfaste aux communications radio. L'utilisation de cet équipement dans une zone résidentielle est susceptible d'occasionner une interférence néfaste.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Attention : Cet appareil n'est pas destiné à être utilisé dans des environnements résidentiels et peut ne pas assurer la protection adéquate à la réception radioélectrique dans ce type d'environnements.

This is a class A, group 1 product.

Ceci est un produit de classe A, groupe 1.

➤ Class A equipment: Equipment that is, by virtue of its characteristics, highly unlikely to be used in a residential environment, including a home business shall be classified as class A and shall comply with the class A limits specified in the applicable ICES standard. Characteristics considered in this assessment include price, marketing and advertising methodology, the degree to which the functional design inhibits applications suitable to residential environments, or any combination of features that would effectively preclude the use of such equipment in a residential environment.

Classe A : Matériel qui, en raison de ses caractéristiques, ne sera fort probablement pas utilisé dans un milieu domiciliaire ni par des entreprises établies à domicile. Parmi les caractéristiques considérées

dans cette évaluation, il y a le prix, les méthodes de commercialisation et de publicité, la mesure dans laquelle les fonctions de l'appareil font qu'il ne se prête pas à des applications convenant au milieu domiciliaire ou toute combinaison de ces caractéristiques qui aurait pour conséquence d'en prévenir effectivement l'utilisation à domicile. Utilisé également pour indiquer les limites d'émission correspondantes qui s'appliquent à un tel matériel.

- Class B equipment: Equipment that cannot be classified as Class A shall comply with the Class B limits specified in the applicable ICES standard.

  Classe B : Matériel qui ne peut pas être inclus dans la classe A. Utilisé également pour indiquer les limites d'émission correspondantes qui s'appliquent à un tel matériel.

- Group 1 equipment: group 1 contains all equipment which is not classified as group 2 equipment, and includes equipment such as laboratory and scientific equipment, industrial process, measurement and control equipment.

  Group 2 equipment: group 2 contains all ISM RF equipment in which radio-frequency energy in the frequency range 9 kHz to 400 GHz is intentionally generated and used or only used locally, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material for inspection/analysis purposes, or for transfer of electromagnetic energy.

  Appareils du groupe 1 : le groupe 1 réunit tous les appareils compris dans le domaine d’application de la présente Norme, qui ne sont pas classés comme étant des appareils du groupe 2. Le groupe 1 inclut les appareils scientifiques et de laboratoire, les processus industriels, appareils de mesure ou de contrôle.

  Appareils du groupe 2 : le groupe 2 réunit tous les appareils ISM à fréquences radioélectriques dans lesquels de l’énergie à fréquences radioélectriques dans la plage de fréquences comprises entre 9 kHz et 400 GHz est produite et utilisée volontairement ou uniquement utilisée localement sous forme de rayonnement électromagnétique, de

couplage inductif et/ou capacitif, pour le traitement de la matière, à des fins d'examen ou d'analyse ou pour le transfert d'énergie électromagnétique.

Supplier's Declaration of Conformity (SDoC)

The SDoC for your product is as follows:

CAN ICES-001 (A) / NMB-001 (A)

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. Your product is suitable for use in industrial electromagnetic environments.

Simplified EU and UK Declaration of Conformity

The full text of the declaration of conformity is available at the following Internet address: *www.exfo.com/en/resources/legal-documentation*.

EU Economic Operator

EXFO Solutions SAS
2, rue Jacqueline Auriol,

Saint-Jacques-de-la-Lande,

35091 Rennes Cedex 9

FRANCE

1 Introducing the RTU-2

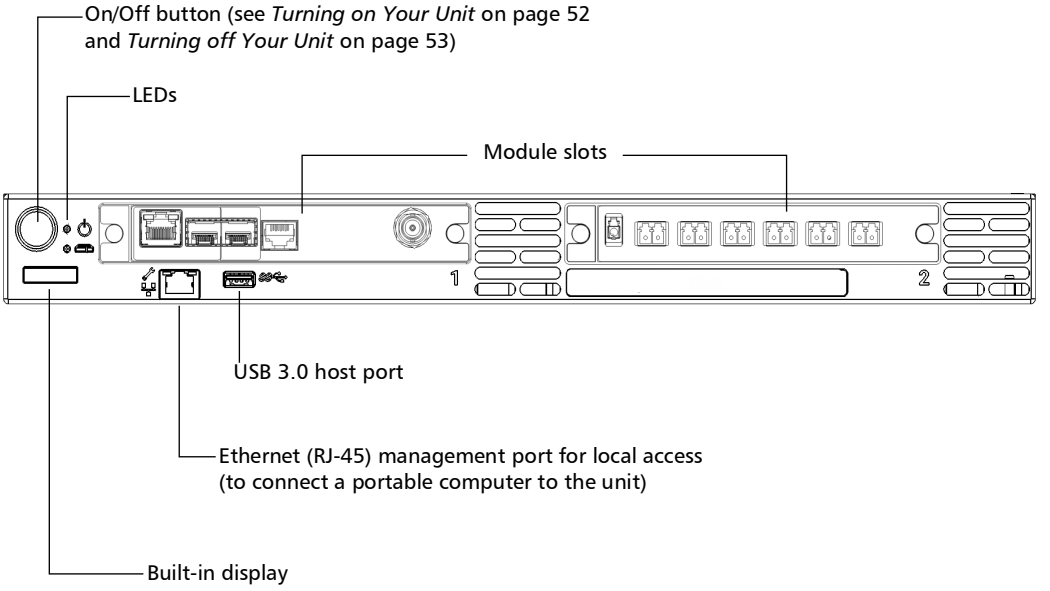
The RTU-2 is a modular remote test unit that can be seamlessly integrated with EXFO RFTM (Remote Fiber Testing & Monitoring). This fiber monitoring system is the central management software for all of EXFO's fiber monitoring probes such as the RTU-2, FG-750, and RTU-2 for point-to-point (P2P) and point-to-multipoint (P2MP) networks.

Main Features

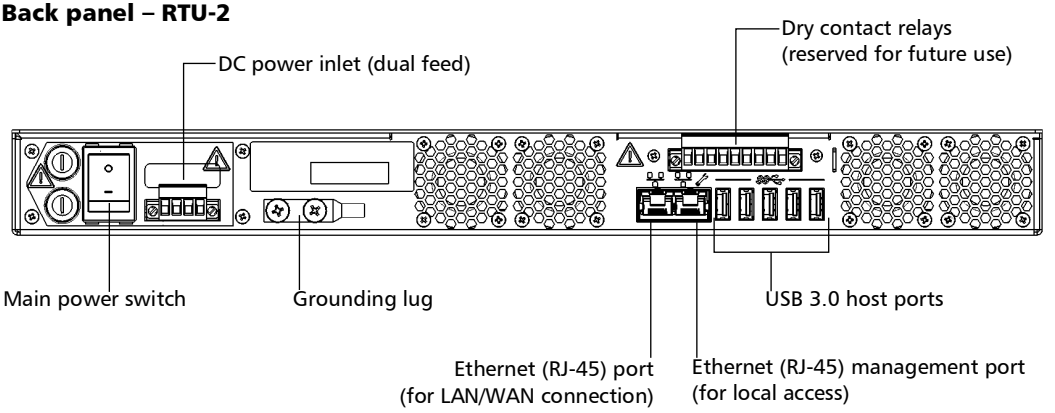
Your unit, which could be part of various EXFO solutions, offers the following:

- Two module slots
- Six USB 3.0 host ports
- LAN/WAN Ethernet port (10/100/1000 Base-T)
- Front and rear management Ethernet ports (10/100/1000 Base-T) for local access
- Installation in 19-inch racks or cabinets (with the provided brackets)
- Possibility to install an optional panel allowing to access the ports and connectors located on the back panel of the unit from the front of the rack instead
- Possibility to use with the RTUe-9110 and RTUe-9120 external switches
- Easy software updates

Front panel – RTU-2



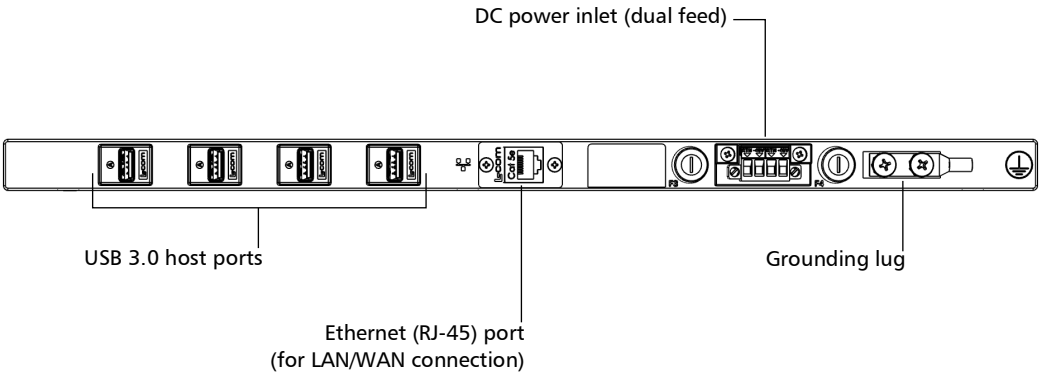
Back panel – RTU-2



Note: *You can also connect the unit to AC power with the AC/DC power adapter sold by EXFO.*

Note: *Depending on your particular setup needs, you can install an optional panel allowing you to access the ports and connectors of the back panel of the unit from the front of the rack instead. For more information, see* Installing the Optional Access (Junction) Panel *on page 20.*

Front view – Optional access panel



Note: *You can also connect the unit to AC power with the AC/DC power adapter sold by EXFO.*

LED Indicators Description

There are LED indicators located on the front panel of your unit, providing you with information about the power and system statuses.

The table below presents the possible statuses once the initial startup sequence is complete.

LED	Status	Meaning
Power	Green	Unit is on.
	Yellow	One of the unit's fuses is blown (see *Replacing Fuses* on page 93).
	Off	Unit is off.

LED	Status	Meaning
System[a]	Green	The unit is working properly and is ready.
	Green, blinking	The initialization of the unit or its shutdown is underway.
	Yellow	Non-critical hardware error detected. The temperature of the room where the unit is located could be slightly too low or too high, or there could be a hardware malfunction. Ensure that the temperature falls within the specified operating temperature range (see *Electrical Safety Information* on page 14). If the problem persists, contact EXFO.
	Red	Critical hardware error detected. The temperature of the room where the unit is located is critically too low or too high, or there could be a hardware malfunction. Ensure that the temperature falls within the specified operating temperature range (see *Electrical Safety Information* on page 14). If the problem persists, contact EXFO.
	Off	Unit is off.

a. If more than one error is detected at the same time, the color of the LED will be set according to the most severe error (red as the most severe, followed by yellow).

Product Registration

You can now register your new EXFO products online and benefit from every possible opportunity to optimize their performance. By doing so, you will always be notified of the latest software updates, key product enhancements and up-to-date support information related to your products.

To register your product online:

1. From a computer, open a Web browser and go to www.exfo.com.
2. Log in to your EXFO account.
3. Click **Support** > **Product registration**.
4. Under **My Products**, click **Register**.
5. Follow the on-screen instructions.

Technical Specifications

To obtain this product's technical specifications, visit the EXFO website at *www.exfo.com*.

Conventions

Before using the product described in this guide, you should understand the following conventions:

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

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

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.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

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.

WARNING

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING

Use only accessories designed for your unit and approved by EXFO. For a complete list of accessories available for your unit, refer to its technical specifications or contact EXFO.

CAUTION

This product does not contain any user-serviceable components, except if indicated otherwise in this document. Any unauthorized product changes or modifications will invalidate warranty and all applicable regulatory certifications and approvals.

IMPORTANT

Refer to the documentation provided by the manufacturers of any accessories used with your EXFO product. It may contain environmental and/or operating conditions limiting their use.

IMPORTANT

When you see the following symbol on your unit  **, make sure that you refer to the instructions provided in your user documentation. Ensure that you understand and meet the required conditions before using your product.**

IMPORTANT

When you see the following symbol on your unit  **, it indicates that the unit is equipped with a laser source, or that it can be used with instruments equipped with a laser source. These instruments include, but are not limited to, modules and external optical units.**

IMPORTANT

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.

Other Safety Symbols on Your Unit

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

Symbol	Meaning
	Direct current
	Alternating current
	The unit is equipped with an earth (ground) terminal.
	The unit is equipped with a protective conductor terminal.
	The unit is equipped with a frame or chassis terminal.
	On (Power)
	Off (Power)
 OR 	On/off (Power)
	Fuse

Laser Safety Information

Your instrument is in compliance with standard IEC 60825-1: 2014 + A11: 2021 and IEC 60825-1 Ed. 3.

WARNING

Viewing the laser output with telescopic optical instruments (for example, telescopes and binoculars) may pose an eye hazard and thus the user should not direct the beam into an area where such instruments are likely to be used.

ATTENTION

L'observation de la sortie optique avec certains instruments d'optique télescopiques (par exemple, des télescopes et des jumelles) peut présenter un danger pour les yeux; il convient donc que l'utilisateur ne dirige pas le faisceau dans une zone où ce type d'instrument est susceptible d'être utilisé.

The following label indicates that a product contains a Class 1M source:

Label affixed to the back of your unit.

INVISIBLE LASER RADIATION
DO NOT EXPOSE USERS OF TELESCOPIC OPTICS
CLASS 1M LASER PRODUCT

RAYONNEMENT LASER INVISIBLE
NE PAS EXPOSER LES UTILISATEURS DE DISPOSITIF OPTIQUE
TÉLESCOPIQUE
APPAREIL À LASER DE CLASSE 1M

Laser radiation may be encountered at the optical output port of the modules or instruments that you use with your unit.

Refer to the user documentation of the different modules for the relevant laser safety information.

The modules and instruments that you use with your unit may have different laser classes. Refer to their user documentation for the exact information.

Electrical Safety Information

WARNING

- **A readily accessible disconnecting device must be installed on the mains (AC or DC circuits). The power cord of the AC/DC power adapter can be considered the disconnecting device to the main power.**
- **If you intend to connect your RTU-2 to AC power, use only the listed and certified AC/DC power 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.**
- **Once the unit is installed in its final position, the disconnecting device must be clearly identified as the disconnecting device.**
- **DO NOT connect the unit interfaces metallically to OSP (Outside Plant) wiring. The unit interfaces are designed for use as intra-building surfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.**
- **The dry contact relay terminal block is intended to be connected to non-hazardous live external circuits. This terminal is considered secondary and is to be separated from mains supply by double or reinforced insulation. As such, any external circuit connected to this terminal must provide the necessary insulation.**
- **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 risk of fire.**

WARNING

- **Use this unit indoors only.**
- **Do not remove unit covers during operation.**
- **Make sure both disconnecting devices are turned off before servicing the unit.**
- **Do not replace any components while the disconnecting devices are turned on.**
- **Use only fuses with the required rated current and specified type (F10A L, 5 mm x 20 mm (0.197 in x 0.787 in), fast-acting, 250 V). Do not use repaired fuses or short-circuited fuse holders. For more information, see the section about replacing the fuses in this user documentation.**
- **Unless otherwise specified, all interfaces are intended for connection to ES1 circuits only.**

CAUTION

Position the unit so that the air can circulate freely around it.

Equipment Ratings	
Temperature	
➤ Operation	➤ unit connected to DC power: –5 °C to 50 °C (23 °F to 122 °F) ➤ unit connected to AC power (with AC/DC power adapter): 0 °C to 40 °C (32 °F to 104 °F)
➤ Storage	➤ –40 °C to 70 °C (–40 °F to 158 °F)

Equipment Ratings	
Temperature ➤ Operation	➤ unit powered by battery: FTB Lite: 10 °C to 50 °C (14 °F to 122 °F)[a,b] FTB Pro: 0 °C to 50 °C (32 °F to 122 °F) ➤ unit connected to AC power (with USB-C power adapter): 0 °C to 40 °C (32 °F to 104 °F)[c]
Relative humidity[d]	0 % to 95 % non-condensing
Maximum operation altitude	➤ 3000 m (9843 ft)
Pollution degree	2
Overvoltage category	I
Measurement category	Not rated for measurement categories II, III, or IV
Input power[e]	➤ FTB-Lite: ➤ unit: 15 V ⎓; 3 A ➤ 100 - 240 V ~; 50/60 Hz; 1.5 A ➤ 45 W Max DC output ➤ FTB-Pro: ➤ unit: 20 V ⎓; 5 A ➤ 100 - 240 V ~; 50/60 Hz; 1.8 A ➤ 100 W Max DC output
Input power[f]	➤ unit: –48 V ⎓;10 A[g] ➤ AC/DC power adapter (units connected to AC power only): 100 - 240 V ~; 50/60 Hz; 5 - 2.5 A

a. When the unit is used at an altitude of 5000 m, the maximum operating temperature is 32 °C (89.6 °F)
b. Operating time is dependent upon power consumption and temperature. If the unit is used at maximum power and maximum temperature, it will power off automatically any time after 10 minutes for safety reasons. If the unit is used with high power consuming modules, it will power off immediately.

c. When the ambient temperature is below 10 °C (50 °F) or when it reaches or exceeds about 40 °C, the batteries can either charge more slowly than usual, or not charge at all, depending on the internal temperature of your unit.
d. Measured in 0 °C to 31 °C (32 °F to 87.8 °F) range, decreasing linearly to 50 % at 40 °C (104 °F).
e. Not exceeding ± 10 % of the nominal voltage.
f. Not exceeding ± 10 % of the nominal voltage.
g. Range: –38.5 - –70 V.

CAUTION

- **The use of voltages higher than those indicated on the label affixed to your unit may damage the unit.**
- **The operation and storage temperatures, as well as the altitude and relative humidity values of some modules may differ from those specified for your unit. In this case, always ensure that you comply with the most restrictive conditions (either modules or unit).**

Automatic Fan Speed Management

Your unit will determine the most appropriate fan speed, depending on the power requirements and the type of modules you are using.

IMPORTANT

Fan speed is always determined to cool down the most heat-generating modules.

If the temperature keeps rising and reaches the limit, your unit will turn off to both protect itself and protect the modules it houses.

CAUTION

Make sure to use protective covers over empty slots of your unit to avoid overheating.

3 Getting Started with Your Unit

Preparing for Installation

WARNING

- **Your unit is designed to be installed in a limited access area, for example, Central Offices, Telecommunication Centers, computer rooms, wiring closet, Outside Plant/CELL-Site class 1, and similar type locations and in accordance with local codes.**
- **Only trained personnel can perform the unit installation and configuration tasks. These people have appropriate technical training and experience to be aware of the hazards to which a person can be exposed when performing these installation tasks.**

IMPORTANT

To ensure compliance with GR-1089-CORE, use only shielded cables for Ethernet connections to the unit. The shielded cables must be grounded at both ends.

Before installing your unit, you should take the following into consideration:

- The chosen location provides adequate clearance for maintenance procedures.
- The location is an environmentally-controlled area that meets the minimum operating parameters.
- The location is isolated from strong electromagnetic fields produced by electrical devices.
- The power cable and power supply are compatible with your power service.
- The power source is properly grounded and falls within the internal power supply rating.

Installing the Optional Access (Junction) Panel

Depending on your particular setup needs, you can install an optional panel allowing you to access the ports and connectors of the back panel of the unit from the front of the rack instead.

WARNING

For your safety and to avoid damaging your RTU-2 unit, always ensure that the disconnect devices to which the unit will be connected are turned off until you have completed all the installation procedures.

The optional access panel kit includes the following:

- Access panel assembly itself
- Cable retainer
- Cover
- Two mounting brackets (left and right)
- Four USB cables
- One Ethernet cable
- Four M3 x 8 pan-head (#1054071) screws
- Four M3 x 4 pan-head (#1044122) screws
- Eight M4 x 8 flat-head (#1052740) screws
- Three M3 x 5 flat-head (#1067832) screws
- One 80 mm x 2.3 mm (#1001051) cable tie

To install the optional access panel:

1. Ensure that your RTU-2 unit is turned off.

CAUTION

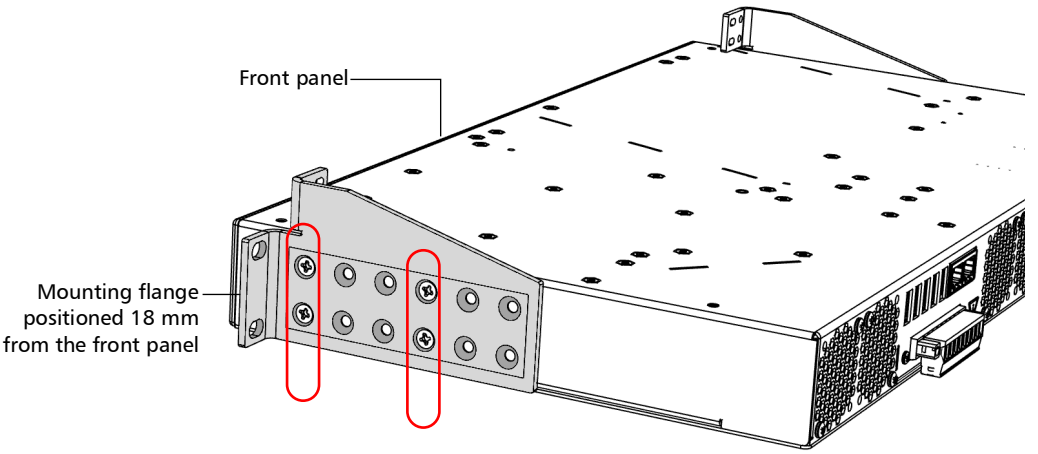
You should remove all your modules from the RTU-2 unit before installing the access panel. Otherwise, they could be damaged or their calibration could be affected.

2. Ensure that no USB or electrical cables are connected to the RTU-2.

3. Position the RTU-2 so that its *top* panel rests on a flat surface such as a table.

4. Install the mounting brackets as follows:

4a. Align the holes of the first bracket with the holes of the unit's casing so that the mounting flange of the bracket is positioned 18 mm from the front panel of the RTU-2.

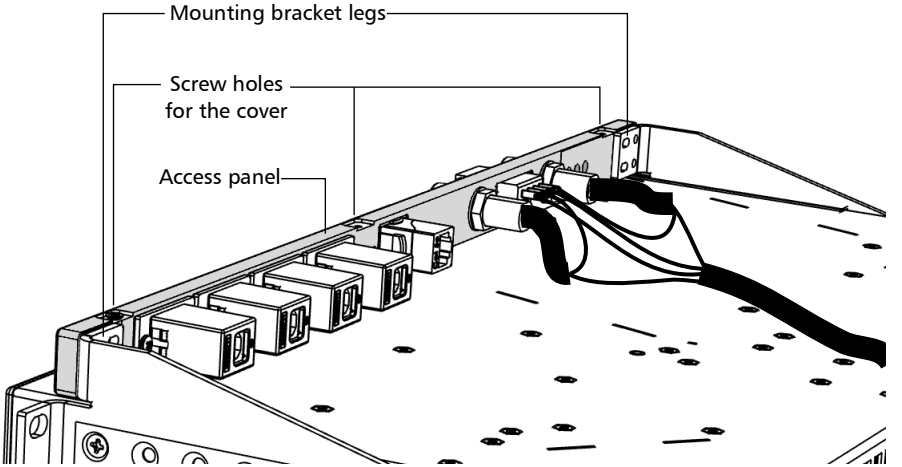


4b. Fix the first bracket on the unit with four M4 x 8 flat-head (#1052740) screws.

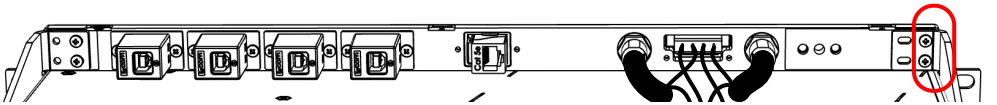
4c. Repeat steps 3b and 3c with the other bracket, ensuring that you place the bracket at the exact same position (set of holes on the bracket and on the unit's casing).

5. Attach the access panel as follows:

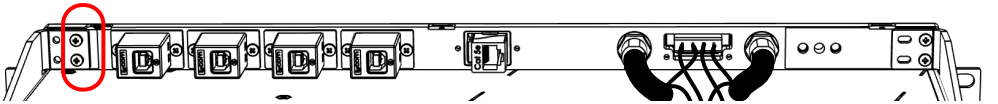
5a. Place the access panel (shown in gray below) on the RTU-2 so that the screw holes for the cover are visible. Ensure that the access panel is positioned *in front of* the mounting bracket legs.



5b. Fix the access panel to the *round* screw holes of the first bracket leg with two M3 x 8 pan-head (#1054071) screws.



5c. Fix the access panel to the *slotted* screw holes of the second bracket leg with two M3 x 8 pan-head (#1054071) screws.

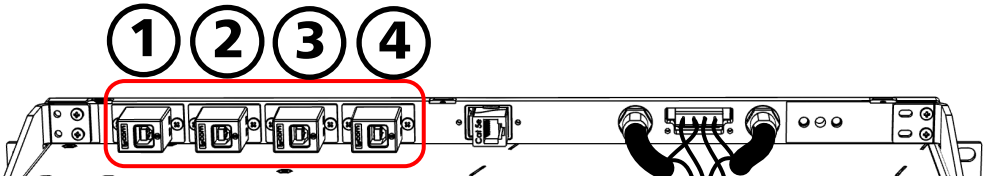


IMPORTANT

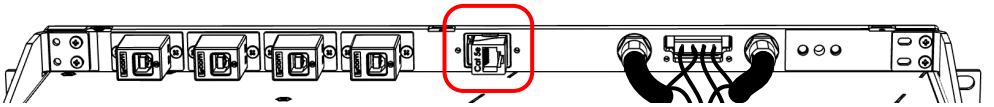
For a cleaner installation and easier maintenance, EXFO recommends to connect the USB cables as suggested below.

6. Connect the USB and Ethernet cables as follows:

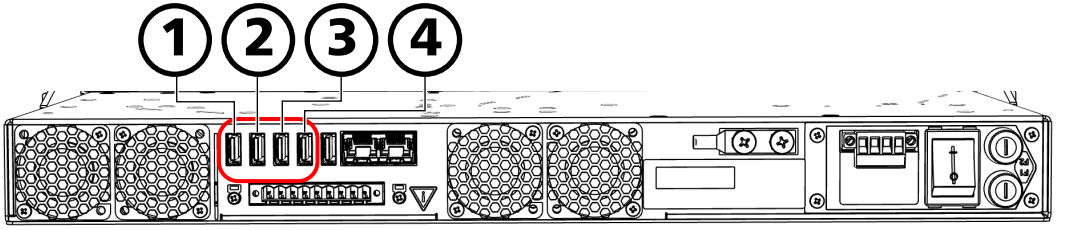
6a. Connect the straight part of the USB cables to the corresponding ports located at the back of the access panel (number 1 represents the first USB cable).



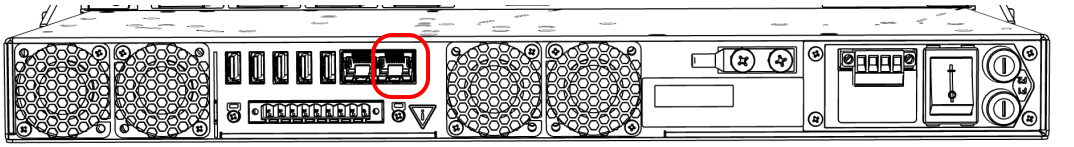
6b. Connect the straight part of the Ethernet cable to the corresponding port located at the back of the access panel.



6c. Connect the angled part of the USB cables to one of the corresponding ports located at the back of the RTU-2.

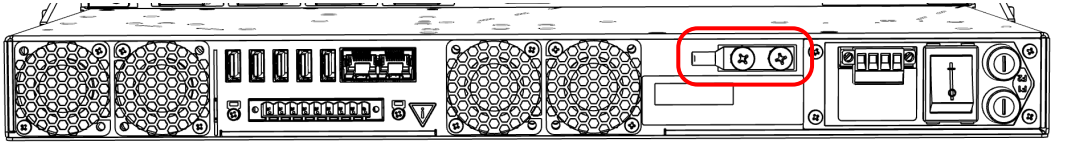


6d. Connect the angled part of the Ethernet cable to the LAN/WAN Ethernet port (🖧) located at the back of the RTU-2.



7. Move the grounding lug as follows:

7a. Remove the two Phillips screws and the grounding lug from the back panel of the RTU-2.

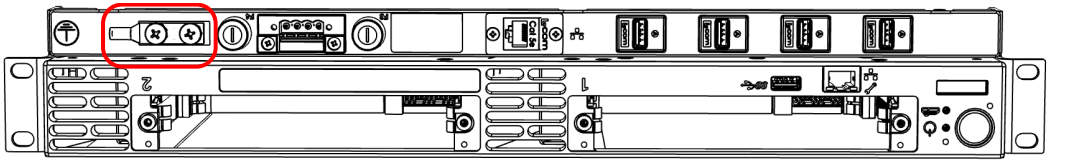


7b. Place the assembly so that you can see the front of the access panel.

7c. If you are ready to ground the unit, see Grounding Your Unit *on page 33*.

OR

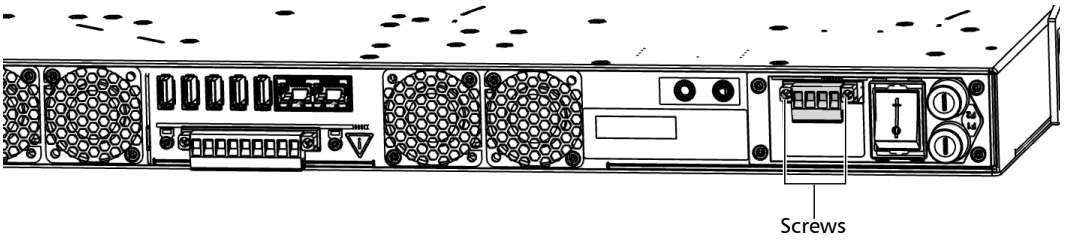
If you prefer to ground the unit later, use the two Phillips screws to attach the grounding lug to the front of the access panel.



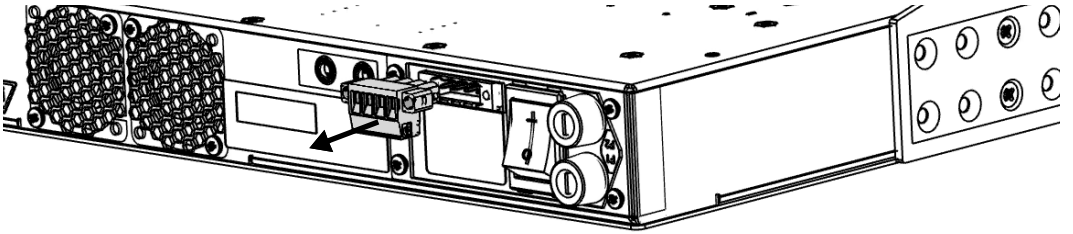
8. Ensure that the RTU-2 is not already equipped with a terminal block and if so, remove it as follows:

8a. Place the assembly so that you can see the back panel of the RTU-2.

8b. Unscrew the two screws holding the terminal block in place.



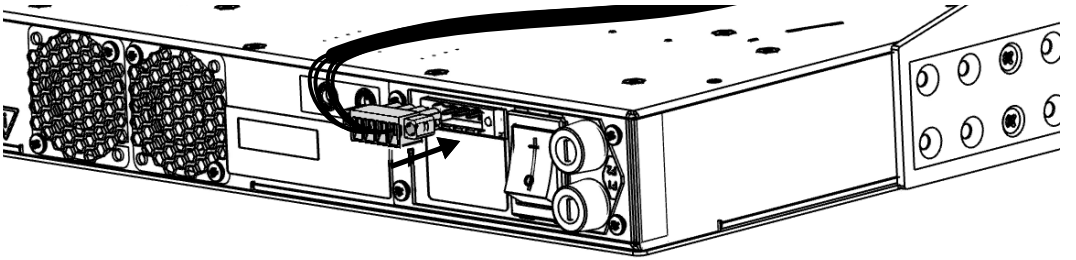
8c. When the terminal block is loose, gently pull it toward you to remove it, and expose the electrical connectors. You can discard this terminal block as you will no longer need it.



Note: *If no terminal block was attached to the RTU-2 at time of purchase, but one was provided separately in a bag, you can simply discard this terminal block as you will not need it.*

9. Prepare the access panel for power connection as follows:

9a. Position the power cable of the access panel so that its connector is aligned properly with the bay containing the electrical connectors of the RTU-2.



9b. Slide the connector all the way into the bay until it stops.

9c. Secure the connector in place with the two screws.

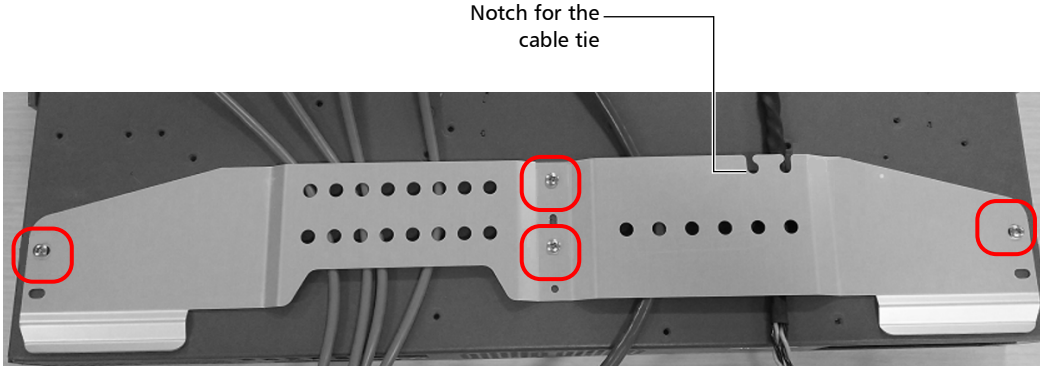
9d. If you are ready to make the connections for AC or DC power, see Connecting Your Unit to a Power Source *on page 44*.

OR

If you prefer to make these connections later, go to next step.

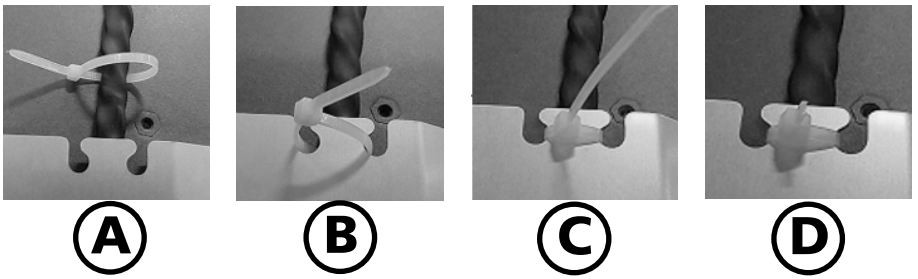
10. Install the cable retainer as follows:

10a. Position the cable retainer as shown below, ensuring that the power cable is well aligned with the notch for the cable tie.



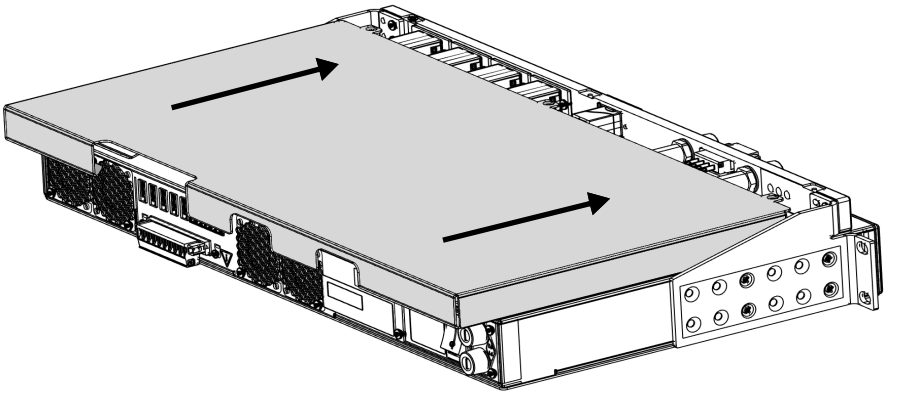
10b. Fix the cable retainer with four M3 x 4 pan-head (#1044122) screws.

11. Secure the power cable with the 80 mm x 2.3 mm (#1001051) cable tie, as shown below. Once the power cable is secured, cut off the excess length of the cable tie. Otherwise, you will not be able to install the cover later.

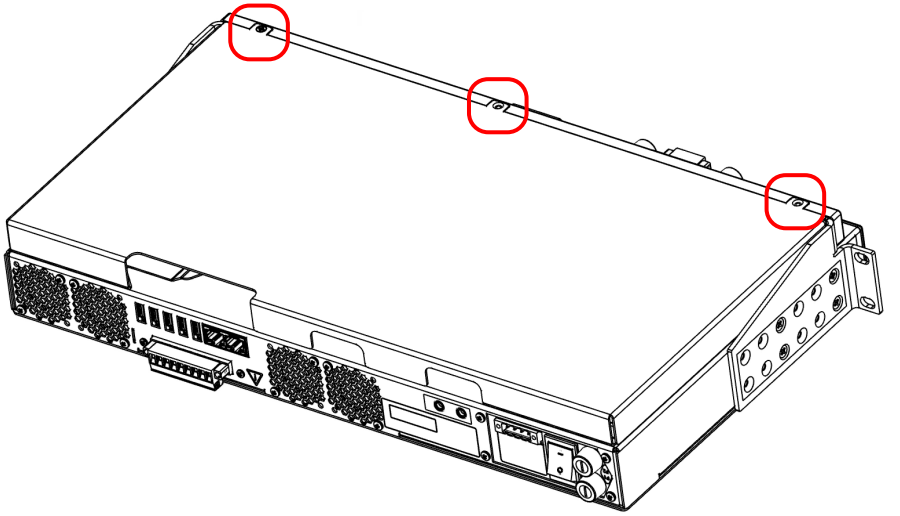


12. Install the cover on the access panel as follows:

12a. From the back of the access panel, slide the cover forward until it clips unto the cable retainer.



12b. Secure the cover in place with three M3 x 5 flat-head (#1067832) screws.



The access panel is now installed properly and ready to use.

Installing Your Unit and the Optional Front Access Panel in a Rack

- Your unit and its optional front access panel are designed to be installed in 19-inch racks only with the provided mounting brackets. They will not fit into 21-inch (ETSI) and 23-inch racks.
- The rack should provide sufficient vertical clearance to insert the unit and the front access panel (if applicable).
  - The height of the unit alone is one rack unit (1U) high or 44,45 mm (1.75 in.).
  - The total height of the unit and the front access panel is one and a half rack unit (1.5U) high or 66,68 mm (2.63 in.).
- Your unit has front air intakes and rear air exhausts. Mount or position your unit so that air can circulate freely around it. When operating the unit, select a location that provides at least:
  - 75 mm (3 in.) of clearance at the rear
  - 75 mm (3 in.) of clearance on the front

CAUTION

Failure to provide adequate cooling clearance may result in an excessive internal temperature, thus reducing the reliability of your RTU-2 unit.

Note: *There is no need to leave an empty slot between units when you stack them one on top of the other inside a rack.*

WARNING

- **The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more units are extended in front of the rack on slides. You must also consider the weight of any other device installed in the rack. A crush hazard exists if the rack tilts forward, which could cause serious injury.**
- **Mounting of the unit in a rack or cabinet should be such that a hazardous condition is not achieved due to uneven mechanical loading.**

IMPORTANT

Unless you intend to use an optional access panel, to let the front USB and management ports free for potential maintenance, EXFO recommends to keep all non-optical connections to the back of the unit.

To install your unit in a rack:

1. Ensure that your unit is turned off.

CAUTION

You should remove all your modules from the RTU-2 unit before installing it into a rack. Otherwise, they could be damaged or their calibration could be affected.

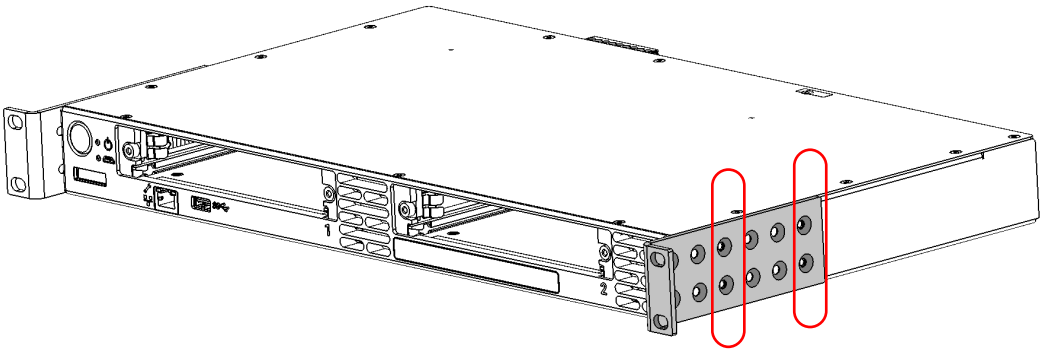
2. Ensure that no USB or electrical cables are connected to the unit.

3. If you are using the unit without the optional access panel, install the mounting brackets as follows:

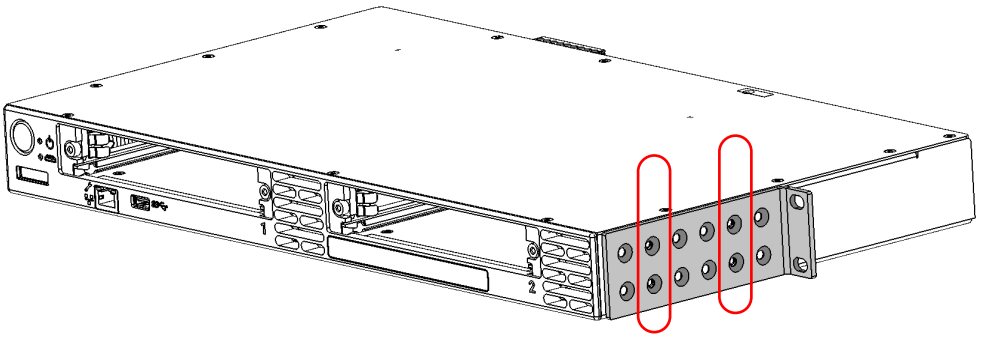
3a. Position the unit so that its bottom panel rests on a flat surface such as a table.

3b. Align the holes of the first bracket with the holes of the unit's casing at the position that best suits your installation needs. You can even invert position of the mounting bracket if necessary.

Brackets in standard position



Brackets in inverted position



3c. Fix the first bracket on the unit with the supplied screws (four screws per bracket).

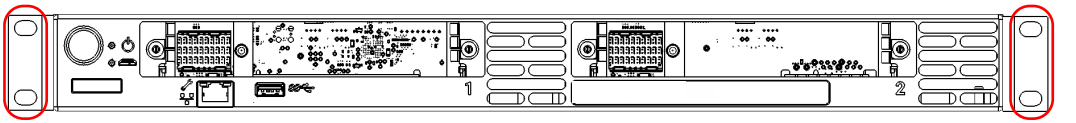
3d. Repeat steps 3b and 3c with the other bracket, ensuring that you place the bracket at the exact same position (orientation of the bracket, set of holes on the bracket and on the unit's casing).

4. Place the unit in the rack at the desired height.

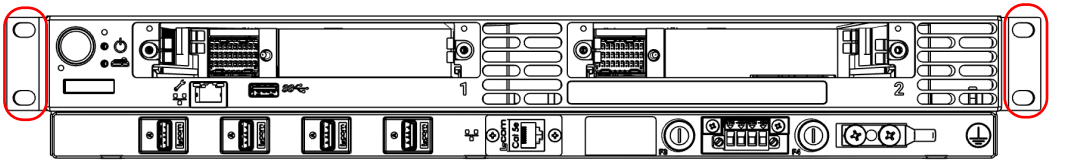
5. Fix the unit in place using the hardware supplied with the rack. Use two screws per side.

To ground your unit properly, you must ensure that there is a metal-to-metal contact between the rack and the mounting hardware. For this reason, EXFO recommends to use thread-forming screws, star (tooth) lock washers, or similar hardware that remove any paint or non-conductive coatings. For more information, see *Grounding Your Unit* on page 33.

RTU-2 without access panel



RTU-2 with access panel



Grounding Your Unit

To avoid the potential for an electrical shock hazard, you must reliably connect an earth grounding conductor to the unit or to the optional front access panel if you are using one.

Note: *The DC units are intended for installation with an isolated DC return (DC-I) and are to be installed in a Common Bonding Network (CBN) per GR-1089-CORE.*

WARNING

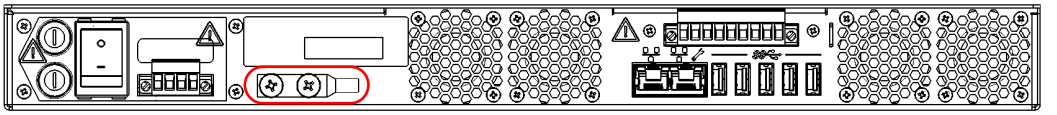
All wiring and installation must be in accordance with local building and electrical codes acceptable to the authorities in the countries where the equipment is installed and used.

If you are not sure on how to proceed, consult a certified electrician.

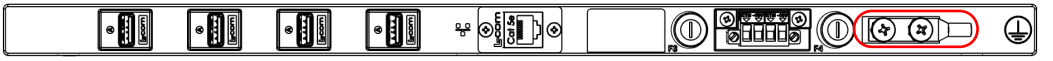
To ground your unit:

1. Remove the two Phillips screws and the grounding lug from the back panel of your unit or from the front of the optional access panel if you are using one.

Back panel – RTU-2



Front view – Optional access panel



2. Prepare the ground wire (#14 AWG, green), and attach one of its ends to the unit's or access panel's grounding lug using a crimping tool.
3. Use the two Phillips screws to attach the grounding lug and wire assembly to the back panel of your unit or to the front of the optional access panel.
4. Ground the other end of the wire as per your local regulation.

   Your unit is now grounded properly.

Connecting a Monitoring Device to the Dry Contact Relays

Your unit is equipped with dry contact relays that enable you to connect your own monitoring device if you wish to do so.

There are three dry contact relays (max. ⎓ 60 V; 0.46 A) on the back panel of the unit:

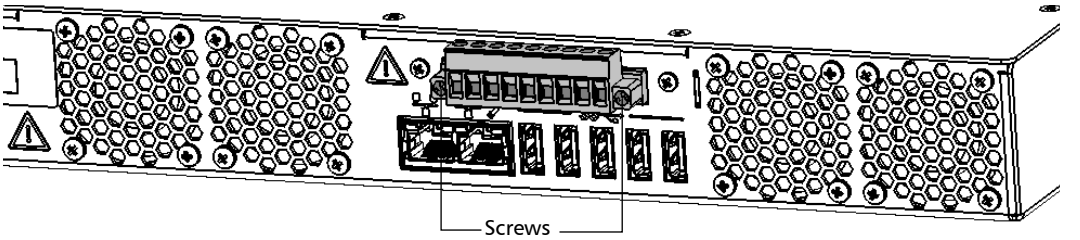
- Application relay (reserved for future use): Configurable by an application for a specific task.
- Power relay: Activated when all components related to the unit are powered on (the power LED is lit and does not blink).
- System relay: Activated when all the system components are working normally (the system LED is green).

CAUTION

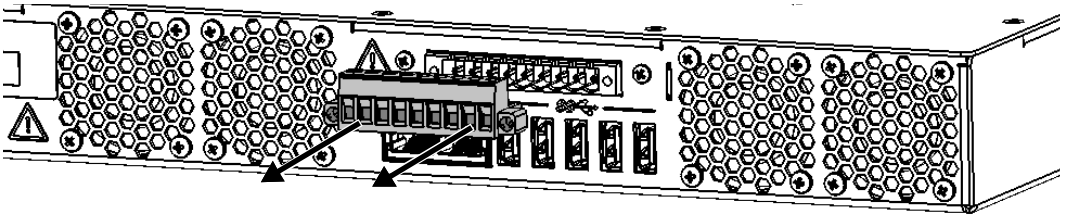
For optimum performance and safety, you must either crimp a terminal (ferrule) onto the stranded conductors, or tin them before installing them in the terminal block.

To connect a monitoring device to the dry contact relays:

1. Unscrew the two screws holding the terminal block for dry contact relays in place.

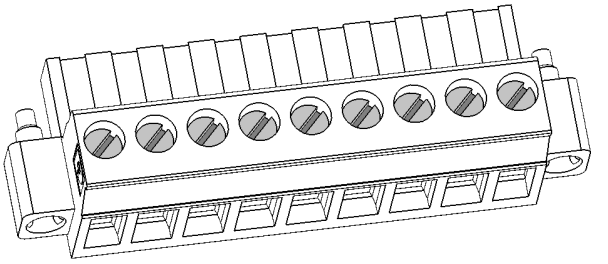


2. When the terminal block is loose, gently pull it toward you to remove it, exposing the pins.

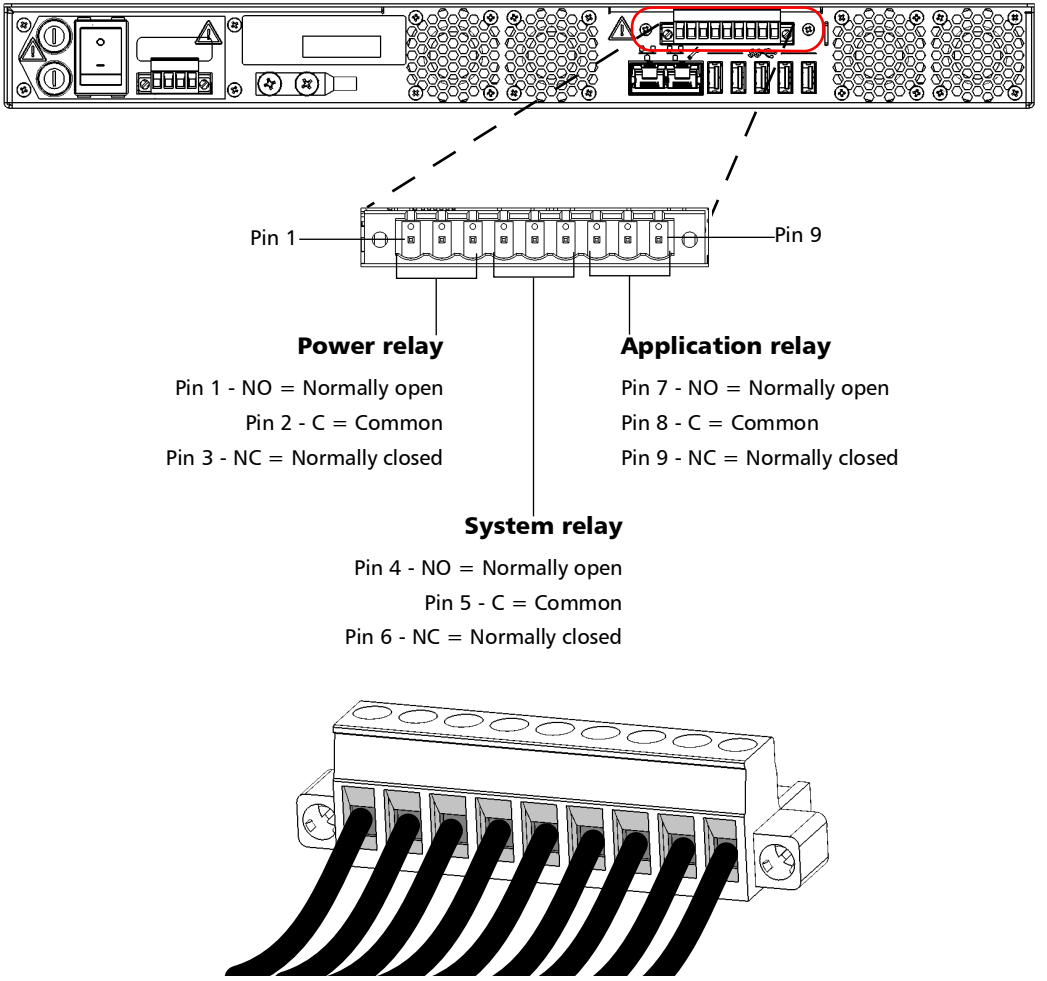


3. Crimp each wire with a terminal (ferrule) or tin each of them.

4. Unscrew the screws (shown in grey) located at the top of the terminal block.

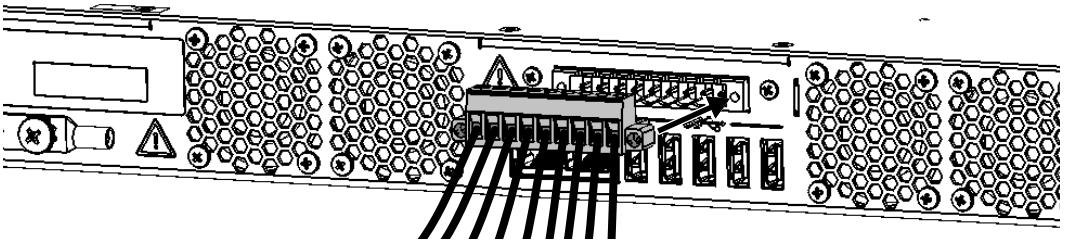


5. Connect the wires using the diagram below as a guide.



6. Tighten the screws located at the top of the terminal block to secure the wires in place.

7. Ensure that the terminal block is aligned properly with the bay containing the pins.



8. Slide the terminal block all the way into the bay until it stops.

9. Screw the two screws to secure the terminal block in place.

The dry contact relays are now installed properly.

Inserting and Removing Test Modules

CAUTION

- **Never insert or remove a module while the RTU-2 unit is turned on. This will result in immediate and irreparable damage to both the module and unit.**
- **To avoid damaging your unit, use it only with modules approved by EXFO.**

To insert a module into the unit:

1. If it is not already done, turn off your unit by pressing the on/off button.
2. Insert the protruding edges of the module into the grooves of the receptacle's module slot.
3. Push the module all the way to the back of the slot, until it stops.
4. Turn the two retaining screws clockwise until they are tightened to secure the module into its "seated" position. The faceplate of the module should be flush with the front panel of the unit.

Note: *If you have not connected to the web interface and performed the complete configuration of your unit yet, just disregard step 5 and the rest of the current procedure. The necessary steps will be explained in the section about using your unit for the first time.*

5. Turn on the unit by pressing the on/off button. The module will be detected automatically during the startup sequence.
6. Using the web interface, from the **Status** window, confirm that the detection of the module is completed.
7. Connect the optical fibers as needed.

8. From the FMS, proceed as follows:

8a. If the RTU-2 unit was already attached before you inserted a module, detach it.

8b. Attach the RTU-2 unit hosting the newly inserted module.

8c. Perform an on-demand test as needed to confirm that all the fibers have been properly connected.

8d. Configure optical routes as needed.

Note: *For more information about the FMS, refer to its user documentation.*

To remove a module from the unit:

1. Turn off your unit by pressing the on/off button.

2. Disconnect any optical fibers.

3. Turn the two retaining screws counterclockwise until they are loose (do not remove them completely).

4. Hold the module by its sides or by the retaining screws (*NOT by the optical connectors*) and pull it out.

Note: *The retaining screws can be used as handles to pull out the module safely.*

CAUTION

Pulling out a module by its optical connectors could seriously damage both the module and connectors. Always pull out a module by its casing or the retaining screws.

5. Cover empty slots with the supplied protective covers.

CAUTION

Failure to reinstall protective covers over empty slots will result in ventilation problems.

6. Turn on the unit by pressing the on/off button.
7. Using the web interface, from the **Status** window, confirm that the removal of the module is completed.
8. Reconnect the optical fibers as needed.

9. From the FMS, proceed as follows:

9a. If the RTU-2 unit was already attached before you removed a module, detach it.

9b. Attach the RTU-2 unit from which you have just removed a module.

9c. Perform an on-demand test as needed to confirm that all the fibers have been properly reconnected.

9d. Reconfigure optical routes as needed.

Note: *For more information about the FMS, refer to its user documentation.*

Connecting RTUe-9110/RTUe-9120 External Switches to Your Unit

Depending on your testing needs, you may want to connect external switches to your unit to increase the number of optical ports available.

If you want to remove an external switch from the system, ensure that no test is underway, and then simply disconnect the optical fibers and the USB cable.

Note: *Once you have connected or disconnected an external switch, you need to update your test setup in the FMS. You must first detach and reattach the corresponding RTU-2 unit, and then select the desired switch and ports when applicable. For more information on how to attach or detach units, refer to the user documentation of the FMS.*

IMPORTANT

Unless you intend to use an optional access panel, if you work with an RTUe-9110, to let the front USB and management ports free for potential maintenance, EXFO recommends to keep all non-optical connections to the back of the unit.

To connect a single switch to your unit:

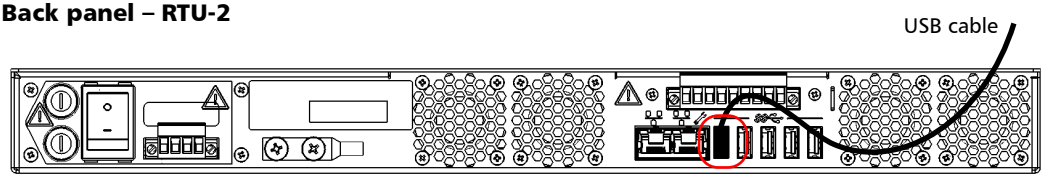
1. Connect the provided USB cable to the USB port (B type) located on the back panel (RTUe-9110) or on the front panel (RTUe-9120) of the switch.

RTUe-9110 – Back panel

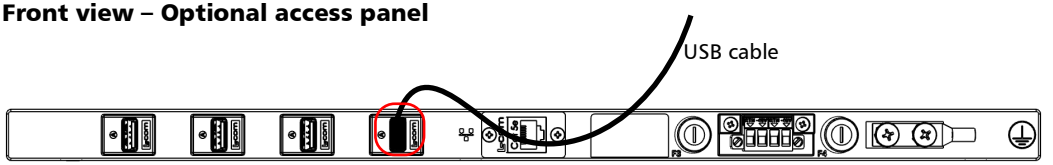
RTUe-9120 – Front panel

2. Connect the other end of the USB cable to one of the USB ports located on the back panel of the unit or on the front of the optional access panel.

Back panel – RTU-2



Front view – Optional access panel



Note: *For more information on how to connect several switches to your unit, refer to the Optical Switch user guide.*

Connecting Your Unit to a Power Source

Before starting to work with your unit, you must connect it to a power source (AC or DC). There is a specific procedure for each of these types of power sources.

WARNING

- **A certified over-current protecting device that is suitably rated must be installed at the source.**
- **All electrical installation and accessories must be done and selected as per local electrical code and regulation.**
- **To avoid fire hazards and ensure your safety, when you intend to connect your unit to DC power, always select a wire gauge according to the RTU-2 unit's ratings, cable length, and local electrical code.**

CAUTION

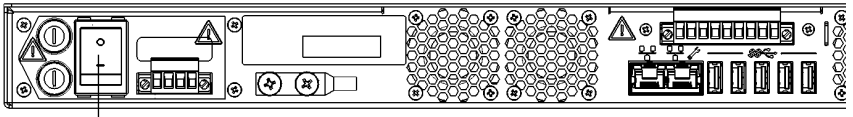
- **For optimum performance and safety, you must either crimp a terminal (ferrule) onto the stranded conductors, or tin them before installing them in the terminal block.**
- **To avoid damaging your unit, always ensure that the disconnect devices to which the unit will be connected are turned off before connecting it to DC or AC power.**

Note: *The AC/DC power adapter is not covered by the NEBS certification.*

To connect your unit to DC power:

1. If you are not using the optional access panel, ensure that the unit's main power switch is in the off position.

Back panel



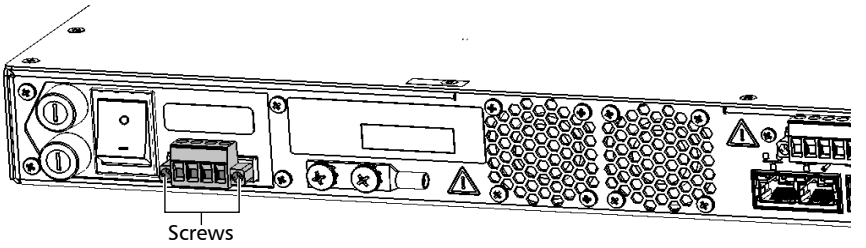
2. Ensure all power is off or disconnected at the source.

Note: *A certified over-current protection of 10 A must be installed at the power secondary distribution.*

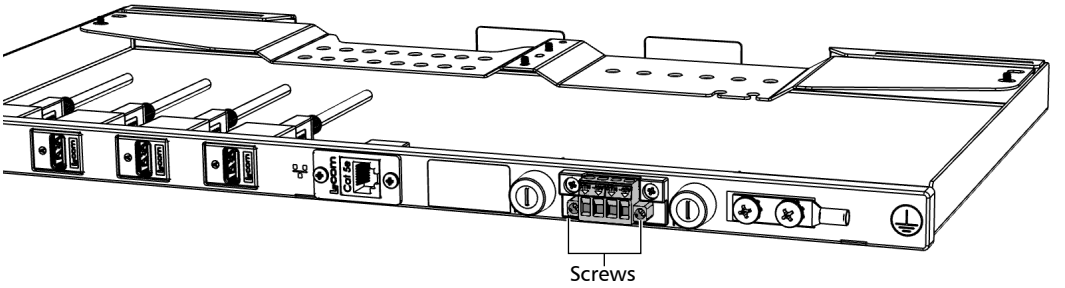
3. Ensure that the unit is grounded properly. For more information, see *Grounding Your Unit* on page 33.

4. From the back panel of your unit or the front of the optional access panel, unscrew the two screws holding the terminal block in place.

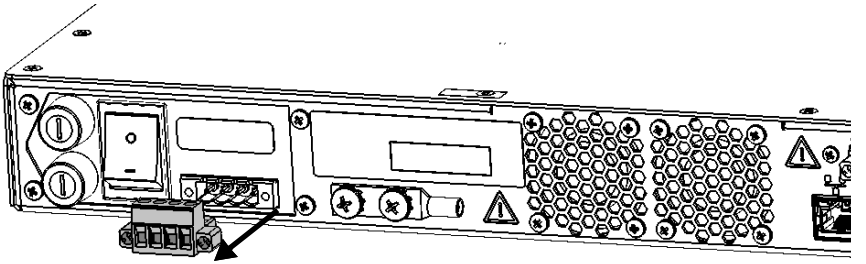
Back panel – RTU-2



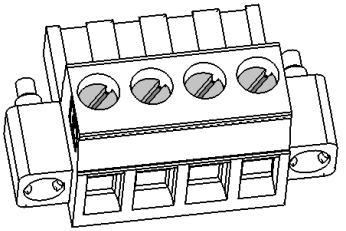
Front view – Optional access panel



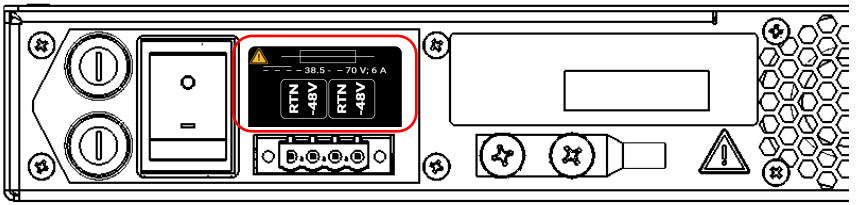
5. When the terminal block is loose, gently pull it toward you to remove it, exposing the electrical connectors.

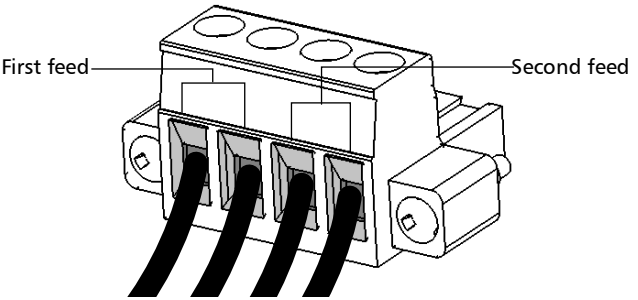


6. Crimp each power lead (maximum 14 AWG) with a terminal (ferrule) or tin each of them. Unscrew the four screws (shown in grey) located at the top of the terminal block.



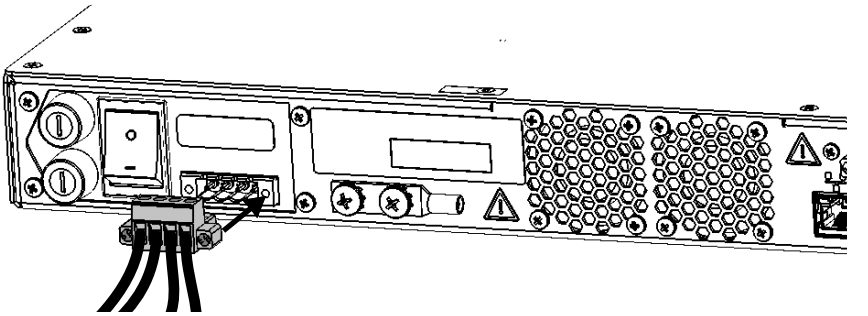
7. Pair the power leads with the appropriate power terminal for each of the feed, respecting the polarity as indicated just above the terminal block (unit) or on the terminal block (optional access panel).





8. Tighten the four screws located at the top of the terminal block to secure the wires in place.

9. Ensure that the terminal block is aligned properly with the bay containing the electrical connectors.

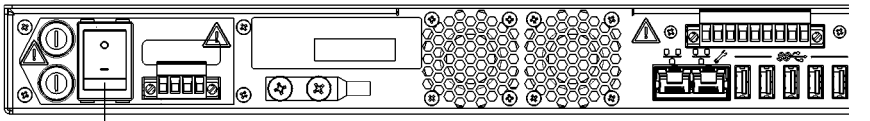


10. Slide the terminal block all the way into the bay until it stops.

11. Screw the two screws to secure the terminal block in place.

12. Turn on the disconnect device that is connected to the unit or to the optional access panel.

13. If you are not using the optional access panel, flip the unit's main power switch to the on position.

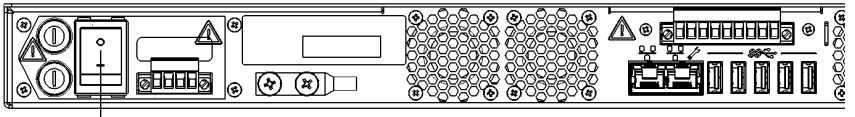


You are now ready to turn on the unit (see *Turning on Your Unit* on page 52).

To connect your unit to AC power:

1. If you are not using the optional access panel, ensure that the unit's main power switch is in the off position.

Back panel



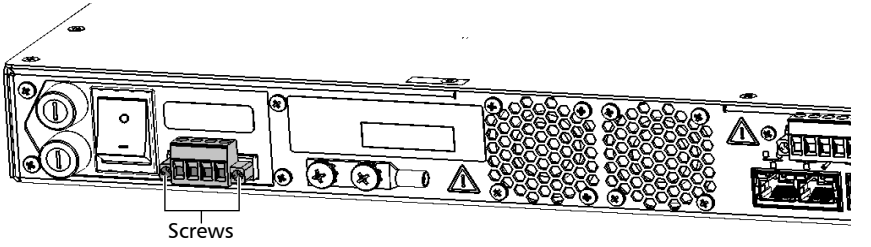
2. Ensure all power is off or disconnected at the source.

3. Ensure that the unit is grounded properly. For more information, see *Grounding Your Unit* on page 33.

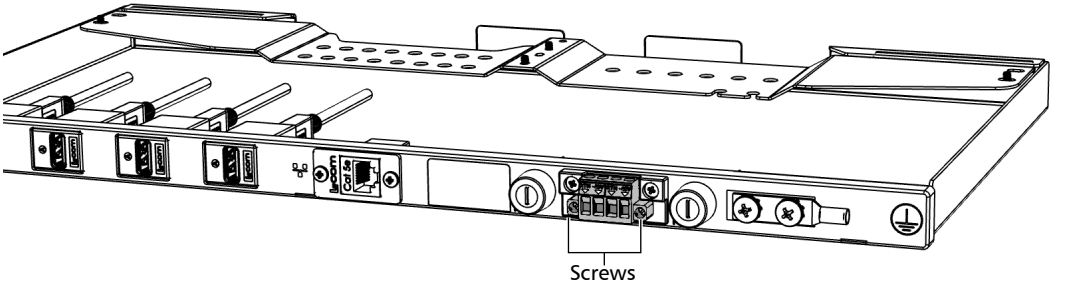
4. If necessary, remove the block terminal as follows:

4a. From the back panel of your unit or the front of the optional access panel, unscrew the two screws holding the terminal block in place.

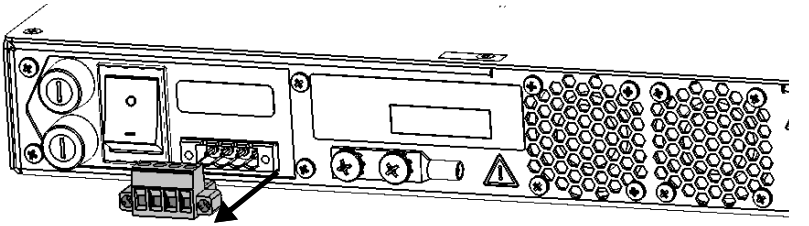
Back panel – RTU-2



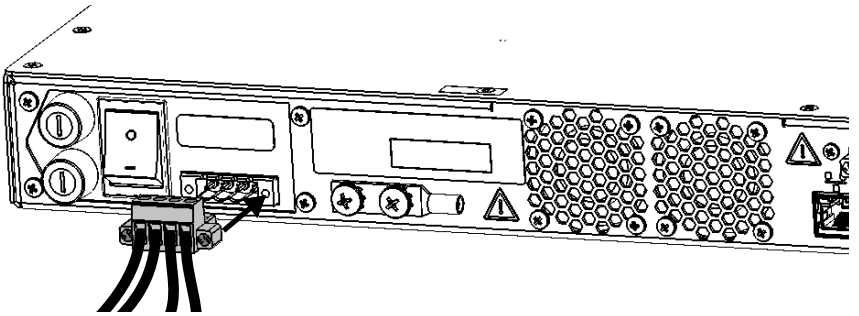
Front view – Optional access panel



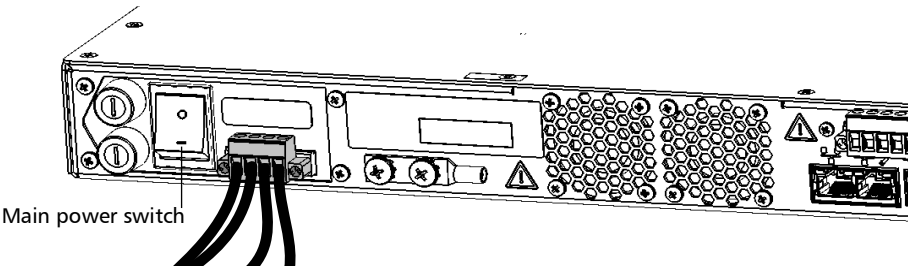
4b. When the terminal block is loose, gently pull it toward you to remove it, exposing the electrical connectors.



5. Ensure that the connector of the AC/DC power adapter is aligned properly with the bay containing the electrical connectors.



6. Slide the connector of the AC/DC power adapter all the way into the bay until it stops.
7. Screw the two screws to secure the connector of the AC/DC power adapter in place.
8. Ensure that the removable power cord is connected to the other end of the AC/DC power adapter, and then connect the adapter to the power outlet.
9. If necessary, turn on the disconnect device.
10. If you are not using the optional access panel, flip the unit's main power switch to the on position.



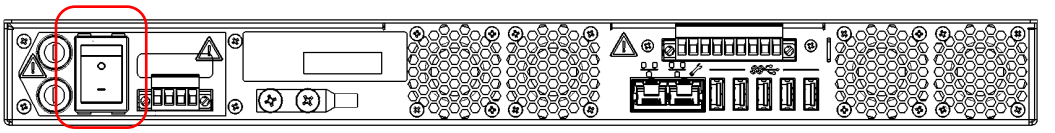
You are now ready to turn on the unit (see *Turning on Your Unit* on page 52).

Turning on Your Unit

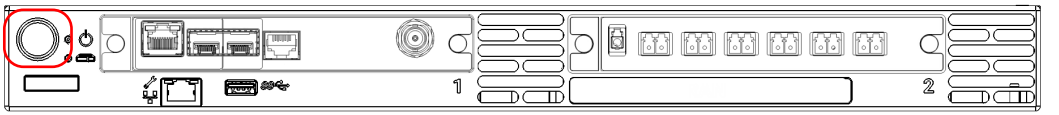
Before you turn on the unit for the very first time, EXFO recommends that you read the safety and installation instructions, including how to connect the unit to AC or DC power.

To turn on the unit:

1. If it is not already done, connect your unit to an AC or a DC power source (see the corresponding section for safety information and detailed instructions).
2. If it is not already done, ensure that the main power switch, located at the back of your unit is set to the on position.



3. Press the on/off button. For more information about working with your unit for the very first time, see the corresponding section in this documentation.



Turning off Your Unit

Your unit will shut down when you press the power button. It will perform a complete restart routine the next time you use it, and start in Windows.

Note: *Should the unit ever stop responding, first try to turn it off normally. If this does not work, if you can, flip the main power switch (located at the back of the unit) to the off position, and then flip it back to the on position. If you do not have access to the main power switch, turn off the disconnect devices to which the unit is connected.*

In the event of a power outage, your unit is configured to automatically return to the state into which it was before the outage (on or off). This means that if your unit was on before the outage, it will automatically restart when the power comes back.

CAUTION

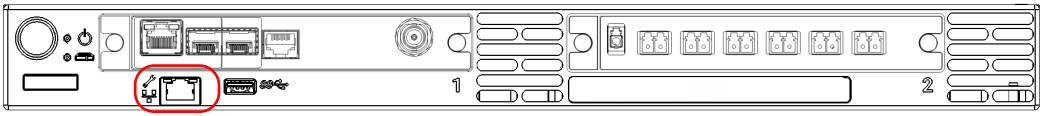
To avoid damaging your unit when you need to disconnect it from its external power source, first turn the unit off. Then, turn off the disconnect devices to which the unit is connected before proceeding.

To turn off the unit completely from the unit itself:

Press the on/off button.

To restart the unit or turn it off completely from the web interface:

1. If it is not already done, connect one end of a network cable to the management port of your unit and the other end to an Ethernet port on the computer.



2. Ensure that the (System) LED is steady green.
3. From your computer, open a web browser and type 169.254.10.10 in the address bar to access the web interface.

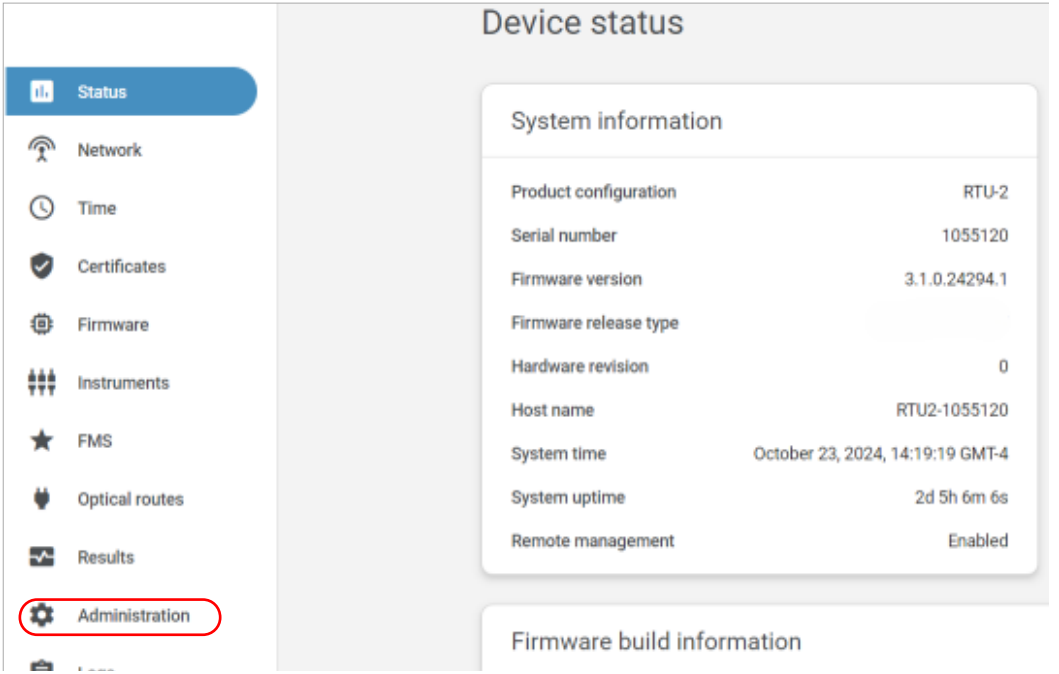
Note: *It may take a few seconds before you can see the web interface if your computer needs to reconfigure its network to a link-local address first.*

4. When the application prompts you, enter the connection information.
   - ➤ The default user name is: localadmin
   - ➤ The default password is: admin

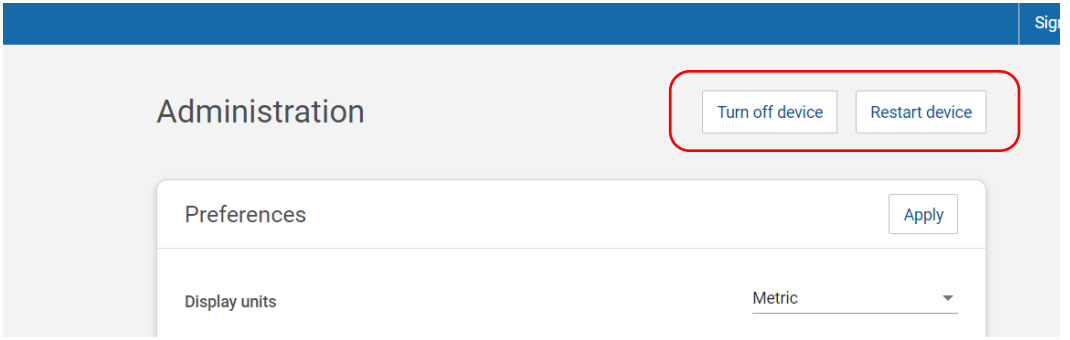
IMPORTANT

The application will lock your account after a certain number of unsuccessful connection attempts. Before entering your connection information again, you will have to wait a few minutes. The waiting time starts increasing after the fifth unsuccessful connection attempt up to a maximum of fifteen minutes.

5. From the list, select **Administration**.



6. Click the **Restart device** or the **Turn off device** button, depending on the operation that you want to perform.



Working With Your Unit for the First Time

By starting to use your unit, you implicitly agree to the EXFO and third-party EULAs related to your unit and instruments.

You will need a computer (laptop) and a network cable to connect to your RTU-2 unit.

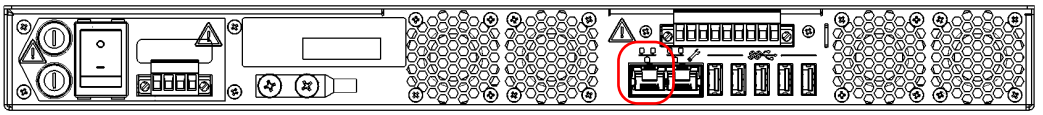
By default, the management of your unit is done locally by connecting a laptop to your unit. However, if you prefer to be able to manage your unit remotely (via LAN or WAN) after the first connection, you can enable a feature allowing you to do so. For more information on how to connect remotely to your unit, see *Accessing Your Unit Remotely* on page 87.

The following procedure takes into account that you have already mounted your unit in a rack, grounded it, inserted the test modules, etc. For more information, see the corresponding sections presented earlier in this chapter.

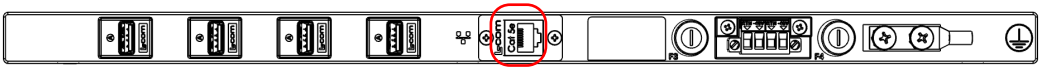
To start working with your unit:

1. If it is not already done, connect your unit to a LAN/WAN network (port on the back panel of the RTU-2 or on the front of the optional access panel, depending on your setup).

Back panel – RTU-2



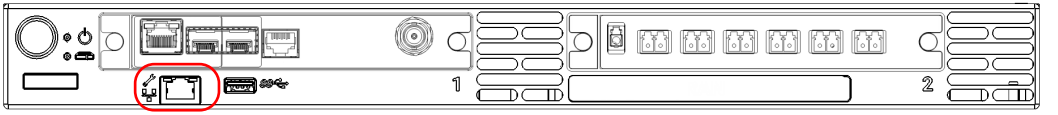
Front view – Optional access panel



2. If it is not already done, turn on the unit (see *Turning on Your Unit* on page 52).
3. Wait for your unit to be ready (its (System) LED will be steady green).

Note: *The startup process may take a few minutes to complete.*

4. Connect one end of a network cable to the management port of your unit and the other end to an Ethernet port on the computer.



5. From your computer, open a Web browser and type 169.254.10.10 in the address bar to access the web interface.

Note: *It may take a few seconds before you can see the web interface if your computer needs to reconfigure its network to a link-local address first.*

6. When the application prompts you, enter the connection information.

- The default user name is: localadmin
- The default password is: admin

IMPORTANT

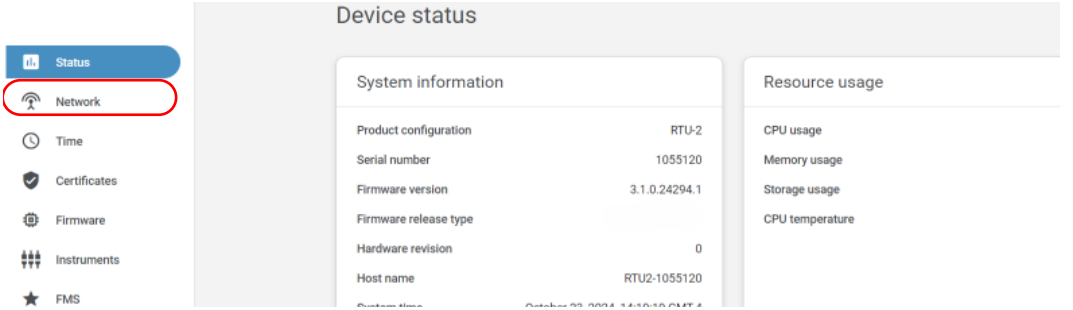
The application will lock your account after a certain number of unsuccessful connection attempts. Before entering your connection information again, you will have to wait a few minutes. The waiting time starts increasing after the fifth unsuccessful connection attempt up to a maximum of fifteen minutes.

7. For security reasons, when the application prompts you, change the password. The password must have a minimum of eight characters and include characters from at least three of the following categories:

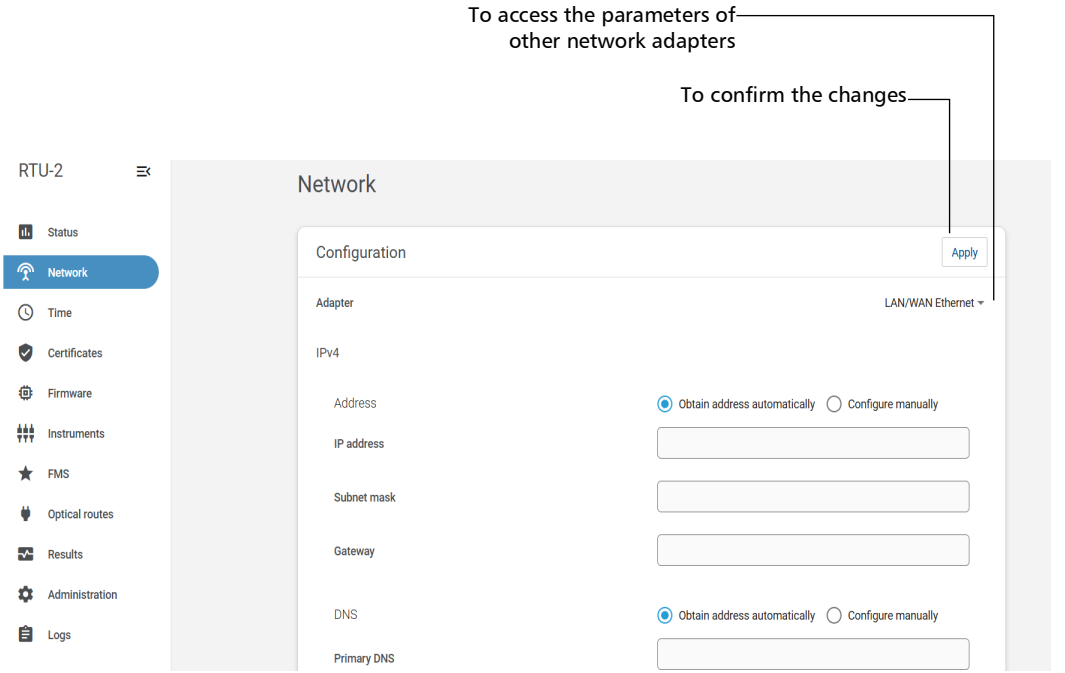
- Lowercase letters (‘a’ - ‘z’)
- Uppercase letters (‘A’ - ‘Z’)
- Numbers (0 - 9)
- Special characters

8. Configure the network as follows:

8a. From the list, select **Network**.



8b. Set the IP address and various parameters as needed, and then click **Apply** to confirm.



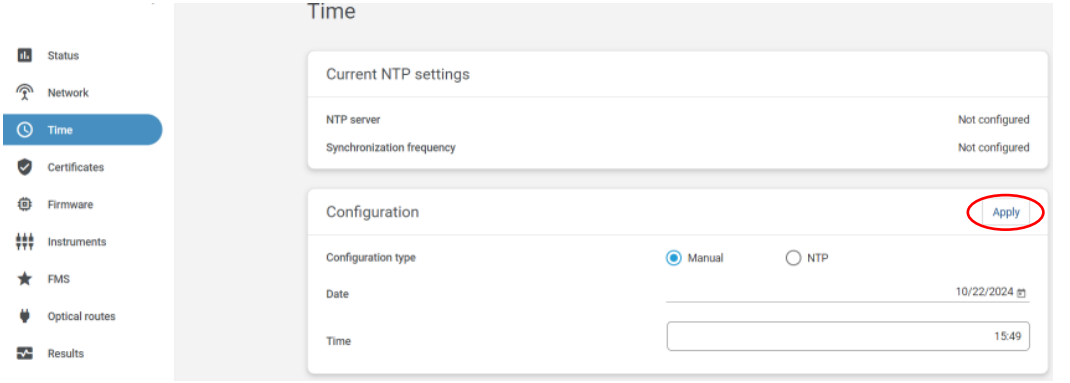
Note: *You can view detailed information about network connectivity under* ***Connection details****.*

IMPORTANT

To avoid connection problems between your unit and the FMS, ensure that the date and time set on your unit correspond to the current date and time.

9. Configure the date and time as follows:

9a. From the list, select **Time**.



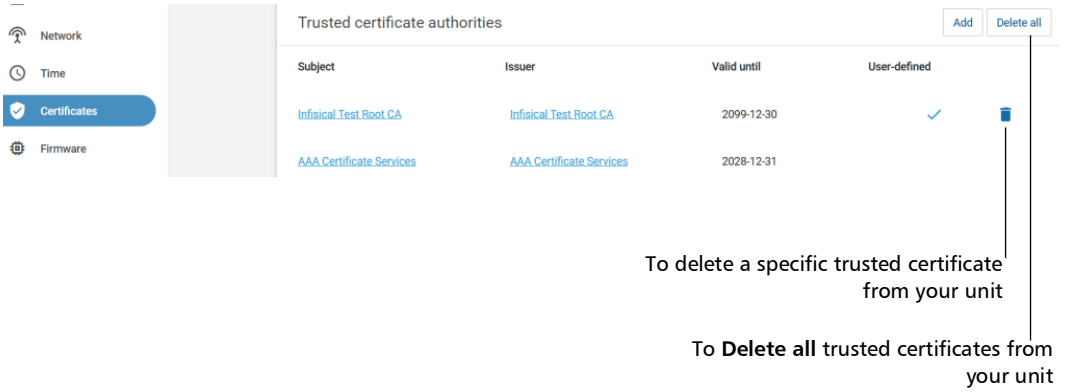
9b. By default, the application sets the date and time values to those of the Web browser you are currently using, but you can change them as needed. You can set the date and time manually or use an NTP server. You can also determine the frequency of the synchronization with the NTP server. Click **Apply** to confirm.

Note: *After a successful connection between the FMS and your unit, the FMS will provide its own NTP server.*

10. Configure the list of trusted certificates as follows:

10a. From the list, select **Certificates**.

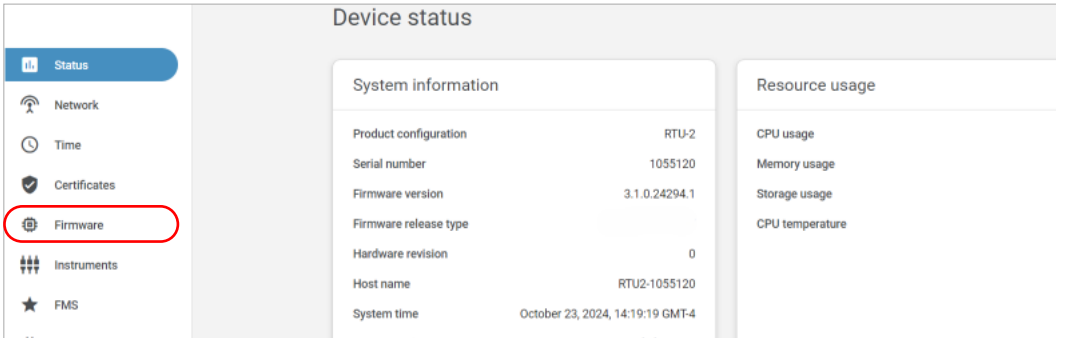
10b. Click **Add** to add a trusted certificate to the list. The certificate file that you provide must be in PEM format.



10c. Follow the instructions on screen.

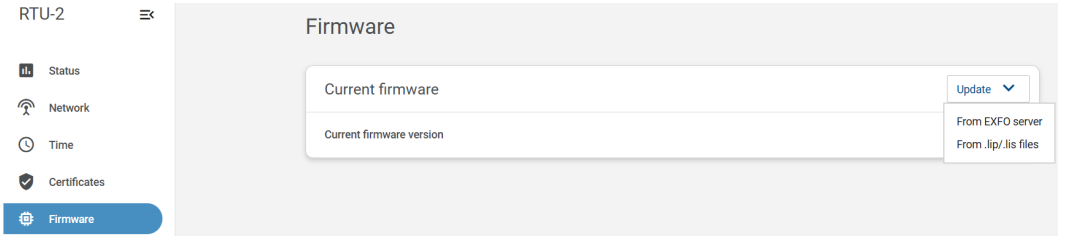
11. If desired, ensure that your unit is up to date as follows:

11a. From the list, select **Firmware**.



The **Current firmware version** is displayed.

11b. From the **Update** drop-down menu, select either **From EXFO server** or **From .lip/.lis files**.



11c. **From EXFO server**: If there are updates available, you will be notified via a popup window and then have the option to proceed with the **Update** or **Close** to cancel.

If no updates are available, the popup window will prompt you to **Close** the window.

Note: *Your unit must have access to an Internet connection to be able to download updates and install them.*

11d. **From .lip/.lis files**: Select the .LIP and .LIS files that you want to use. The upgrade starts automatically and your unit will restart at the end of the operation.

IMPORTANT

You must select both the .LIP and .LIS files to be able to start the upgrade.

Note: *In both cases, the operation may take a few minutes to complete.*

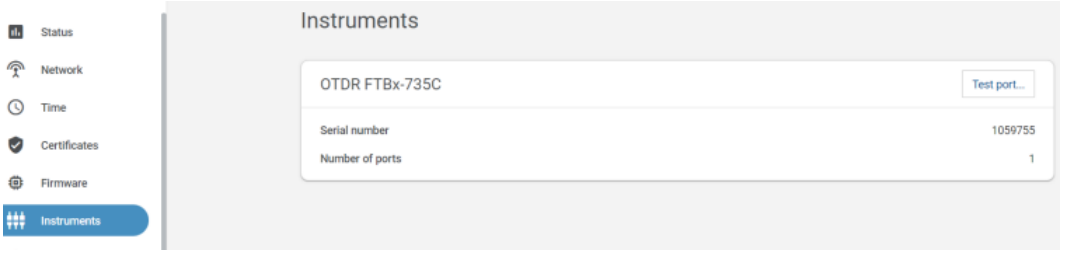
11e. Wait for your unit to be ready (its  (System) LED will be steady green), and then connect again to the Web application.

CAUTION

- **For a trouble-free upgrade, ensure that your unit remains on during all the process.**
- **Turning off your unit (or disconnecting it from its power source) could result in unexpected behavior of the test applications, instability of the system, or even severely damage your unit, depending on the operation underway when the unit is turned off.**
  Damaged units will need to be sent back to EXFO for repair.

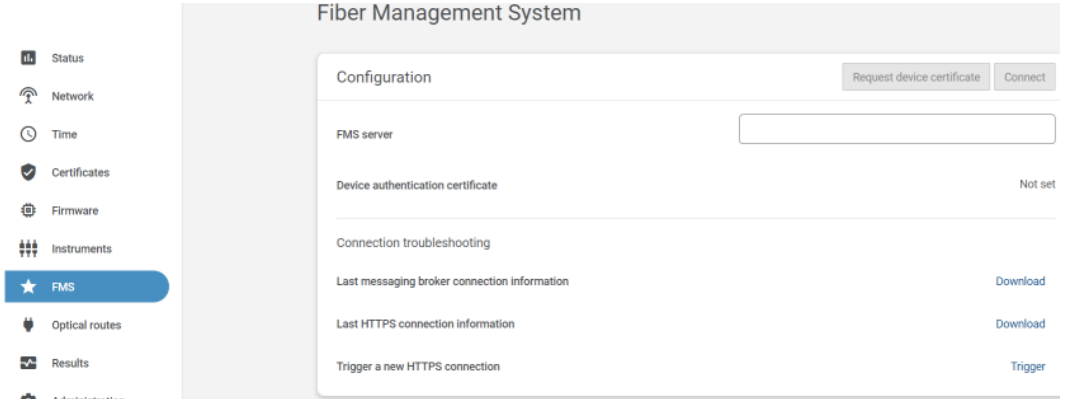
Note: *After a successful connection between the FMS and your unit, the FMS will provide the updates if your unit is running a compatible version. Refer to the RFTM FMS Readme for the complete compatibility information.*

12. From the **Instruments** page, ensure that the modules and external switches have been detected as expected.

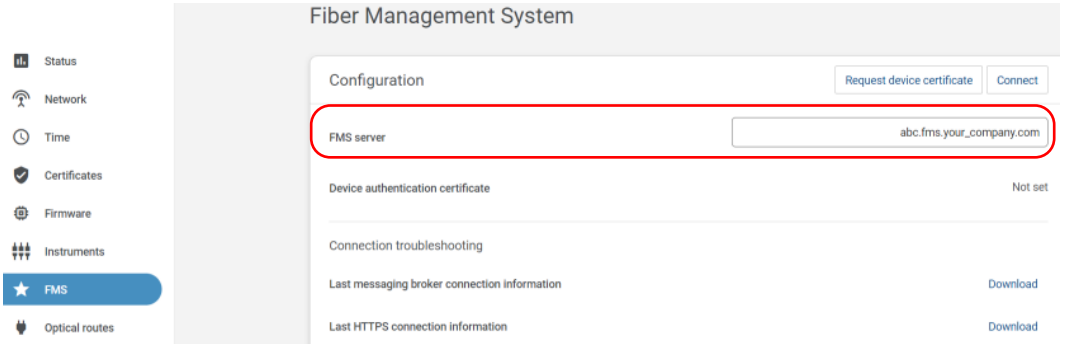


13. Connect your unit to the **Fiber management System** as follows:

13a. From the list, select **FMS**.



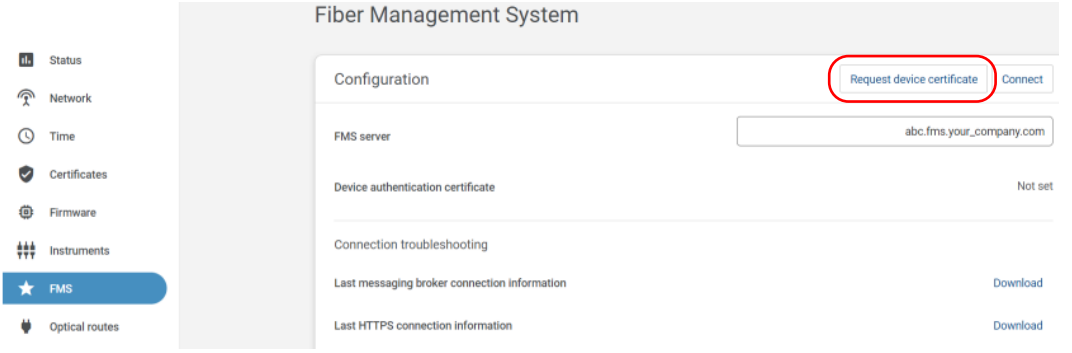
13b. In the **FMS server** box, enter the name of your server (for example: *abc.fms.your_company.com*).



13c. If your system is configured so that the FMS requires the authentication of all RTU-2 units, click **Request device certificate**.

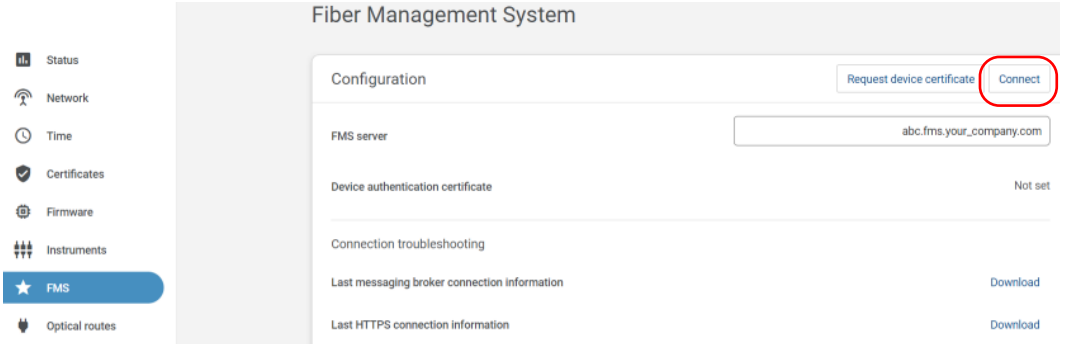
OR

If the FMS does not require the authentication of the RTU-2 units, go directly to step 13e.



13d. When the application prompts you, enter the username and password for certificate retrieval that was provided by your system administrator. As soon as the application notifies you that the certificate has been updated, you are ready for the connection.

13e. Click **Connect** to establish the connection with the FMS.



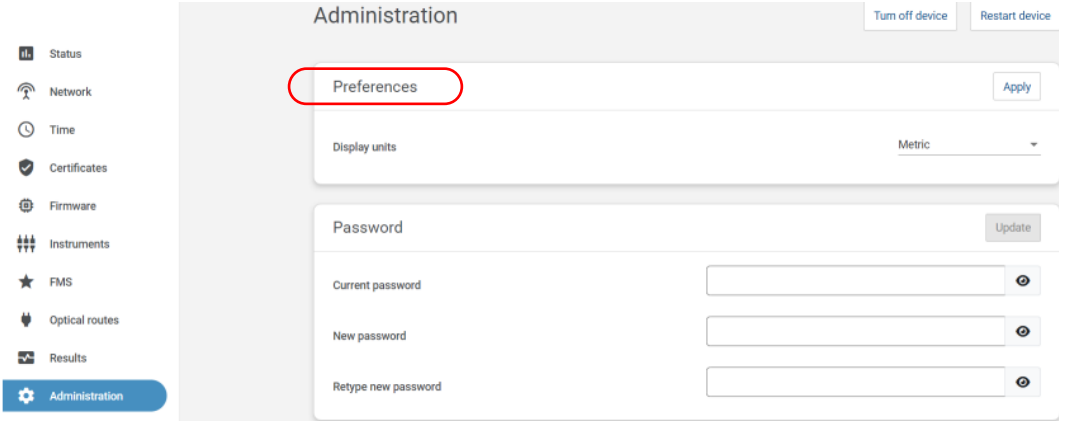
Note: *The status of the connection is visible from the **Status** page. The status goes from "Not configured" to "Connecting" to "Established". If any connection problem occurs, the application will display "Connecting" along with the last error, and the RTU-2 will periodically try to reconnect to the FMS server.*

Note: *The log streaming status shows whether logs are sent or not to the FMS server. This information is visible from **Status** > **Fiber Management System**, next to **Log streaming status**.*

Note: *If you need to detach your unit from the link, you can click **Disconnect**. At this point, since there are no monitoring data acquired so far, no data can be lost.*

14. To select the measurement units to be displayed in the **Results** and **result viewer** windows:

14a. From the list, select **Administration**.

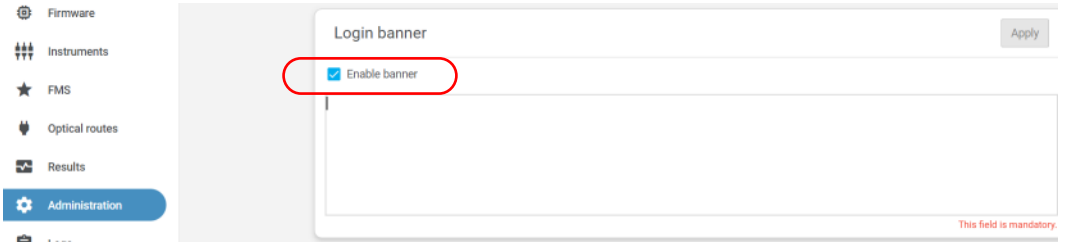


14b. Under **Preferences**, select either **Metric** or **Imperial**.

14c. Click **Apply** to confirm your selection.

15. If you need to define a **Login banner**, you can do so as follows:

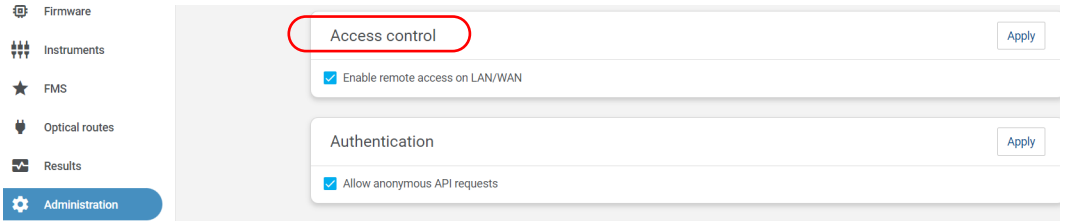
15a. In the **Administration** window, select the **Enable banner** check box.



15b. Enter the desired text, and then click **Apply** to confirm.

16. If you want to be able to access your unit remotely, proceed as follows:

16a. Under **Access control**, select the **Enable remote access on LAN/WAN** check box.



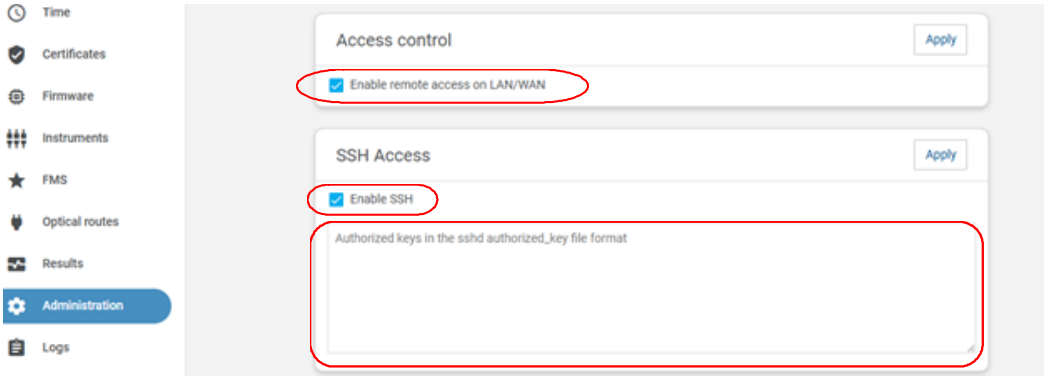
16b. Click **Apply** to confirm.

Your RTU-2 unit is now configured properly.

17. In case the UI is not accessible for any reason other than network connection, you can enable troubleshooting in your unit via SSH protocol, as follows:

17a. Ensure remote access on LAN/WAN is enabled.

17b. Select the Enable SSH checkbox.



17c. Enter one or more valid SSH public keys. The keys must follow the standard format, typically starting with ssh-rsa, ssh-ed25519, or another supported type, followed by the key string and an optional comment.

17d. Click **Apply** to confirm.

17e. Once SSH is enabled, you will be able to connect to the unit by using a console SSH with one of the private keys corresponding to the public SSH keys added in the SSH configuration. Only the user **localadmin** will be allowed to access the device by SSH.

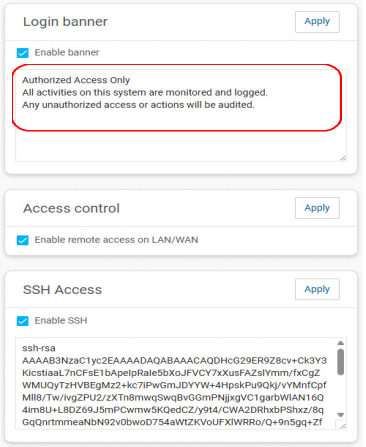
For example, you can use a command similar as follows to establish a SSH connection:

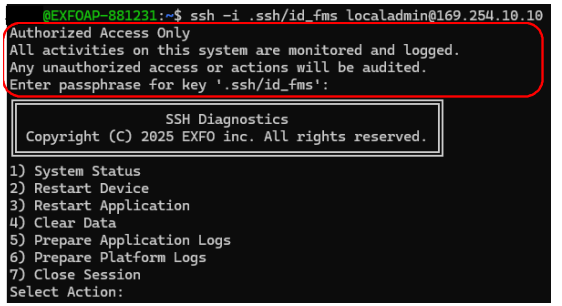
ssh -i .ssh/id_fms **localadmin**@10.28.250.20

18. Once the SSH access feature is established, you have a dedicated user to access by using a private key that matches one of the public keys you entered in the Administration page.

18a. To open an SSH session, type the command:

ssh -i <path-to-private-key> localadmin@<device's IP> a terminal console.

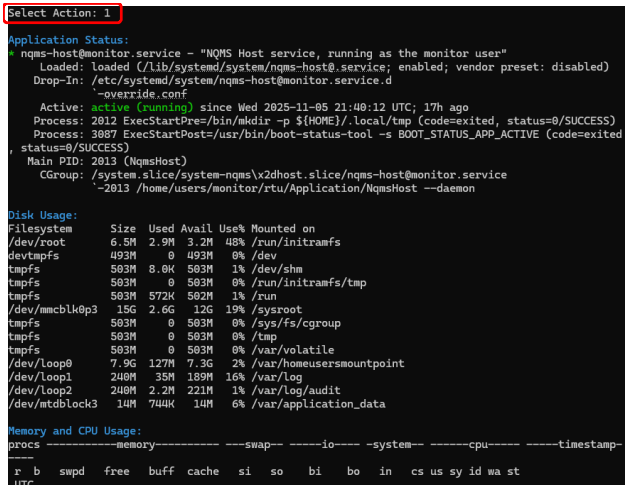




Note: *The same message set as Login Banner is presented at the beginning of the SSH session.*

18b. SSH menu has 6 actions:

1. **System Status** - Displays information on the management application service, disk usage, memory, and cpu indicators.



2. **Restart Device** - Restart of the device, that is, the entire system with all services. This action will not affect the connection to FMS; the device will continue the monitoring process after the restart process.

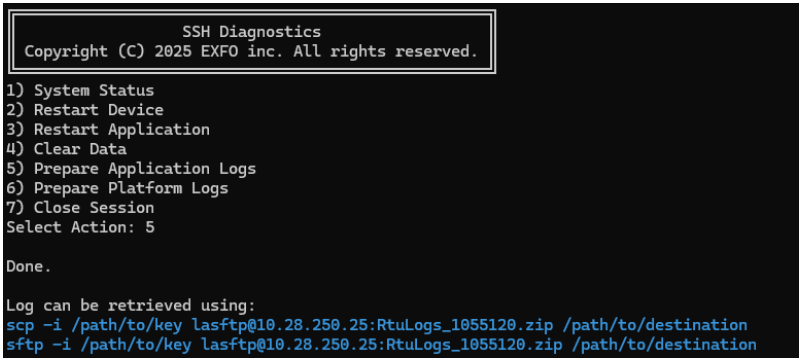
3. **Restart Application** - Restart the device management web application, useful for a quick workaround for performance issues without restarting the device. This action will not affect the connection to FMS; the device will continue the monitoring process after the restart process.

4. **Clear Data** provides the ability to clear selected data, such as:

- Clear Temporary Files
- Clear Logs

5. **Prepare Application Logs** generates a zip file containing the application log files that can then be retrieved from the device, for example, retrieve zip file using scp.

6. **Prepare Platform Logs** generates a zip file containing the platform log files, that can then be retrieved from the device, for example, retrieve zip file using scp.



7. **Close Session** closes the current ssh session. This action will not affect other users' open sessions.

4 Performing Tests

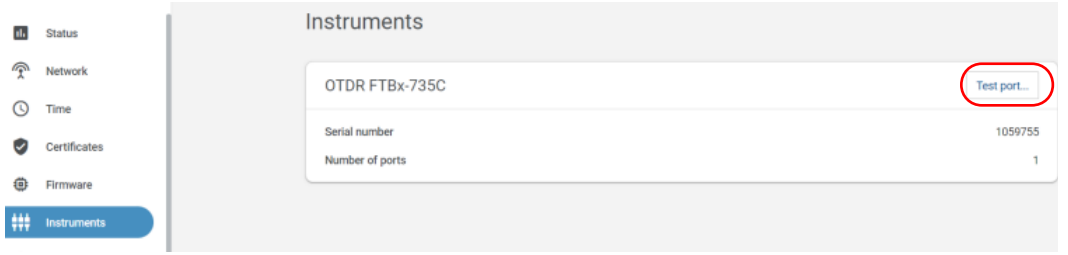
The application allows you to test the optical ports as well as manage optical routes.

Optical Ports

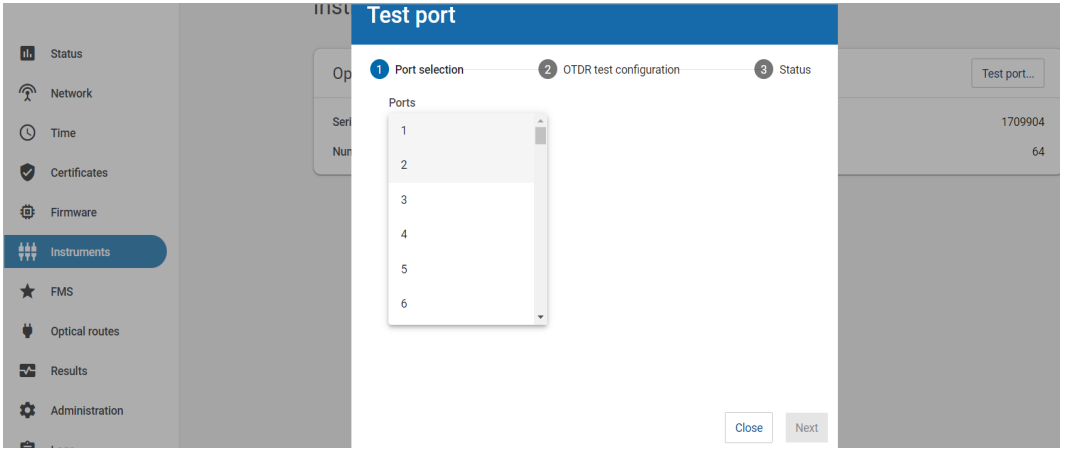
You can test optical ports on the RTU-2 without creating optical routes.

To perform an ad hoc test on an optical port:

1. Go to the **Instruments** page.
2. Select **Test port...**.

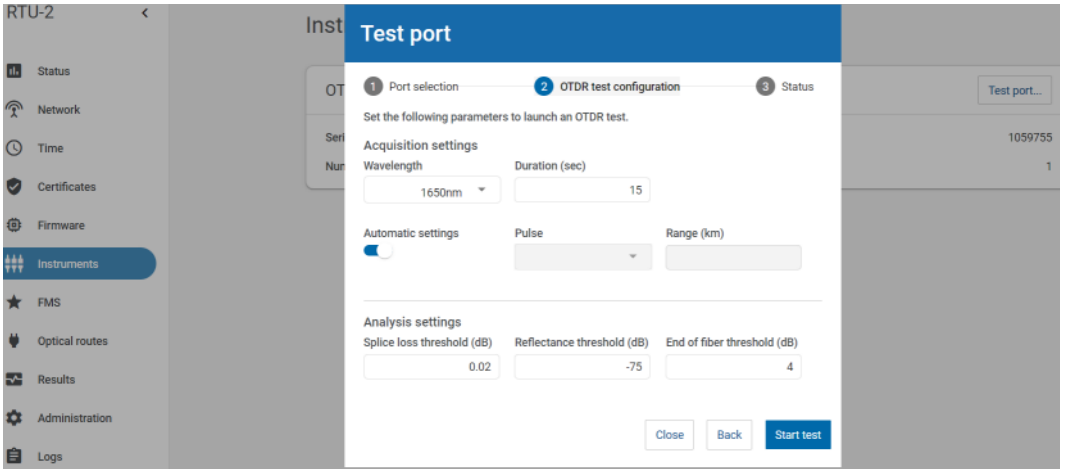


3. Select the port to be tested from the scroll down menu.



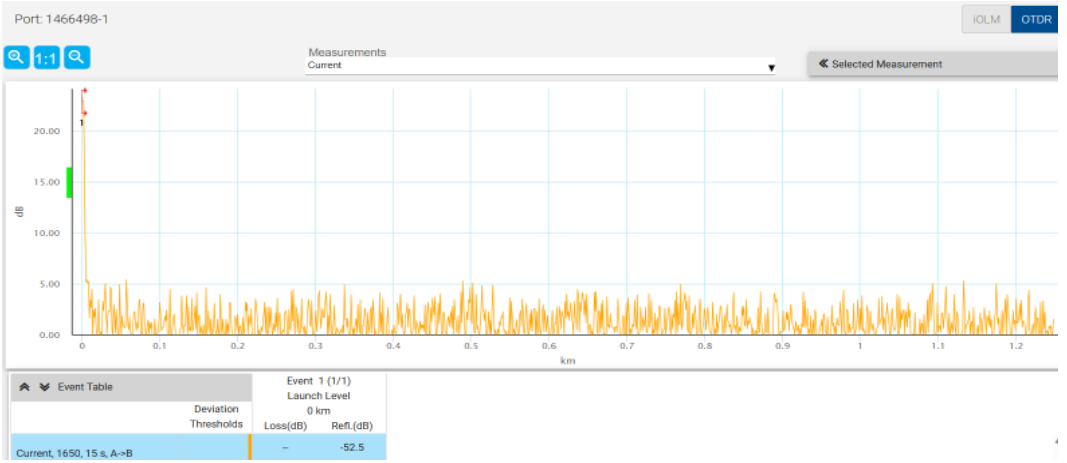
4. Click **Next** to configure the OTDR test settings.

5. You can either configure the settings manually or let the application configure them automatically. You can manually change **Duration**, **Pulse**, and **Range** accordingly.

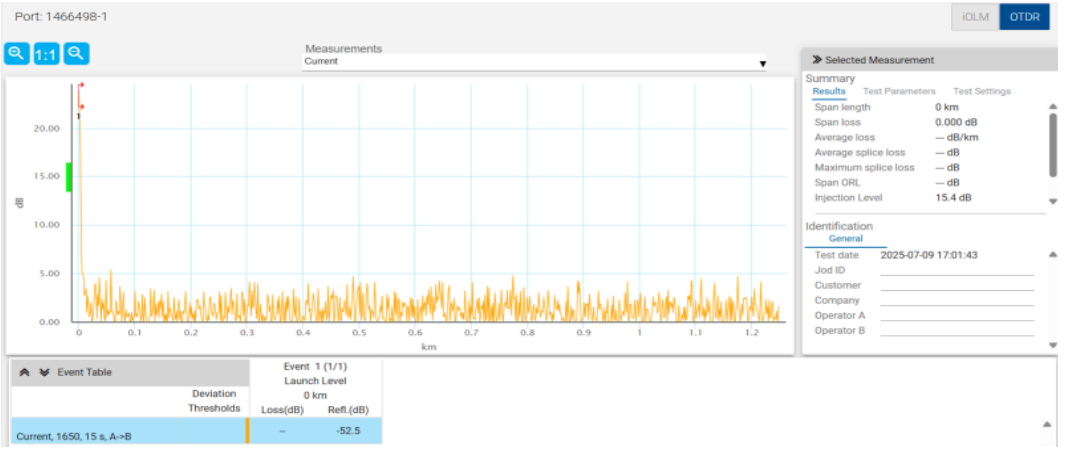


6. Click **Start test**.

7. When the test is completed, click **View** to open the OTDR trace and display the **Measurements** and **Event Table**.



8. To view the **Summary** and **Identification** of measurements, click **Selected Measurements**.



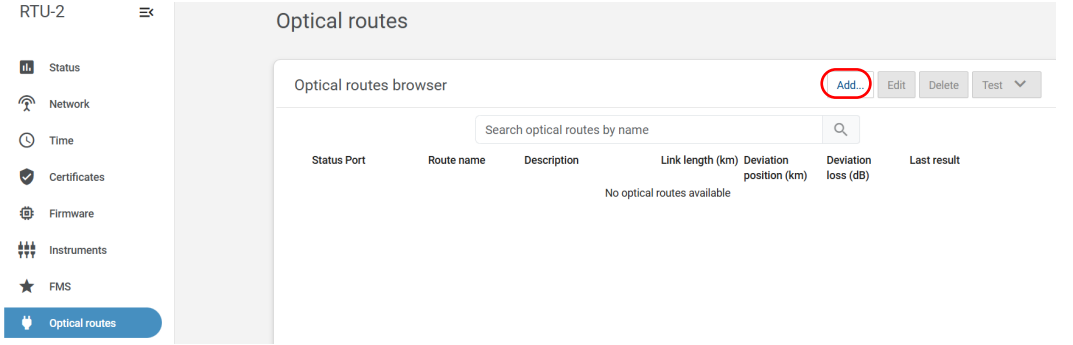
9. To save the trace, see *Saving Results* on page 83.

Managing Optical Routes

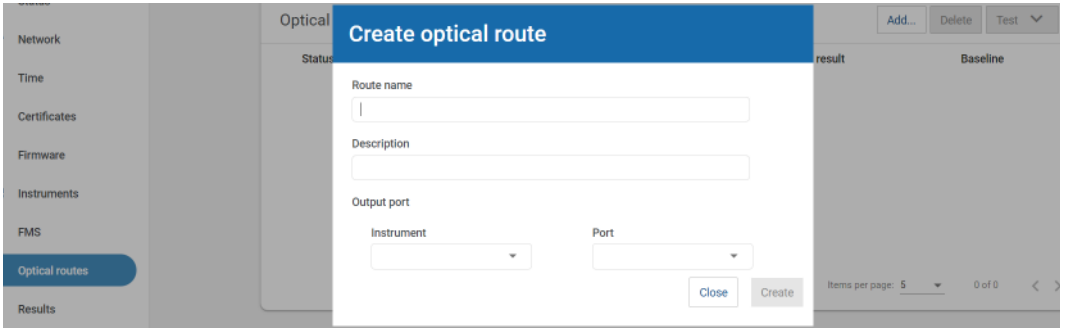
You can add optical routes to quickly view results or trigger optical tests. Once routes are created, you can modify their name and description if necessary.

To add a route:

1. Go to **Optical routes** page, then go to **Add...**.



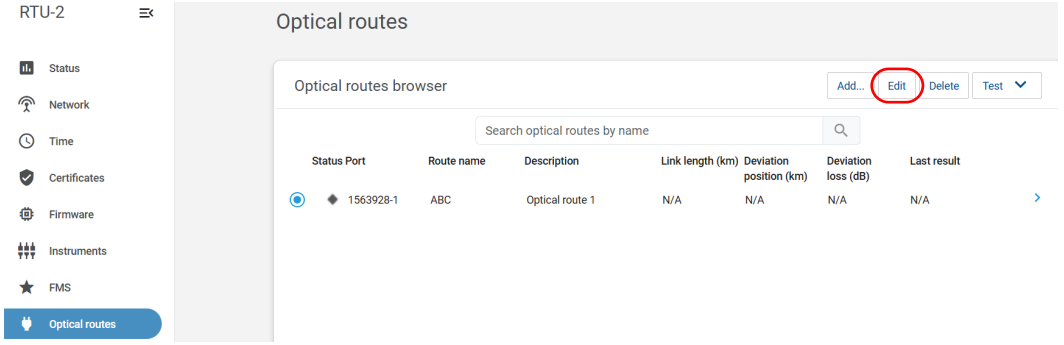
2. Type in the **Route name** and select the appropriate **Port** (and **Instrument**, if applicable) to which it is associated.



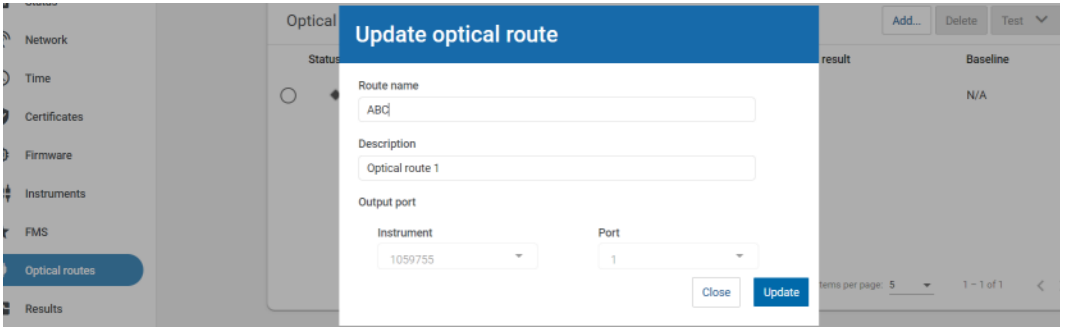
3. Click **Create** or **Close** (to cancel the action).

To rename a route or modify its description:

1. Go to the **Optical routes** page and select a **Route name**. You can also **Search optical routes by name** in the browser window.



2. Click **Edit**.

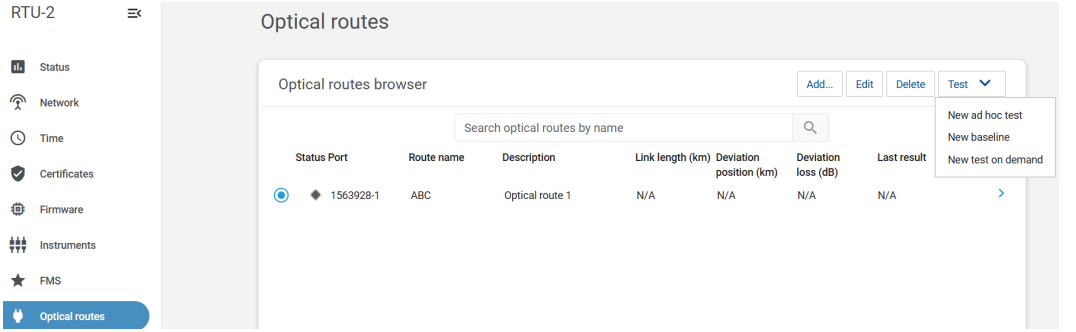


3. Edit the **Route name** and **Description**.
4. Click **Update** or **Close** (to cancel the action).

Performing Tests on Optical Routes

To perform a test on an optical route:

1. Go to **Optical routes** page.
2. Select a route.
3. Select **Test** scroll down menu.
4. Click on the desired test:
   - ➤ **New ad hoc test**
   - ➤ **New** or **Renew baseline**
   - ➤ **New test on demand**



If you have already created a **New baseline** test, you can click **Renew baseline**.

Performing tests on an optical route updates its status. The result's final verdict would be the iOLM analysis combined to its deviation state. The route's status is the final verdict of its latest test on demand or **None** by default. For a final deviation verdict, it is the same whether the verdict is **None** or **Pass**.

Note: *You can only trigger a test on demand if a **Baseline** has been performed for the same Port/Optical route.*

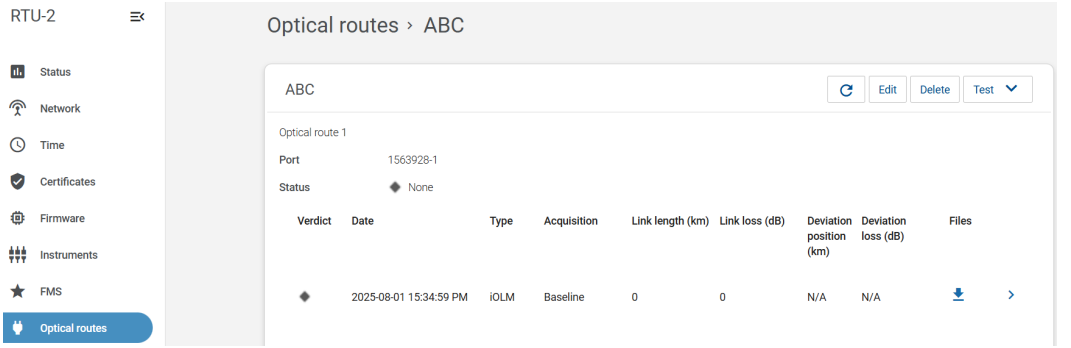
Note: *Naturally, a baseline cannot have a deviation.*

Note: *Renewing a baseline clears the test on demand results made with the baseline being replaced.*

iOLM Analysis	Deviation from Baseline	Result Final Verdict	Icon
None	No	**None**	
	Yes	**Deviation**	
Pass	No	**Pass**	
	Yes	**Deviation**	
Fail	No	**Fail**	
	Yes	**Deviation**	
Error	N/A	**Error**	

Working with a Single Route

You can view the measurement history of an optical route by opening the optical route details. To do so, use the arrow at the end of the optical route's row in the **Optical routes browser**. You can also choose to open the optical route details in a new tab/window with right-click.



The **Optical route** details screen also allows editing the route name or description as well as launching tests and deleting the route.

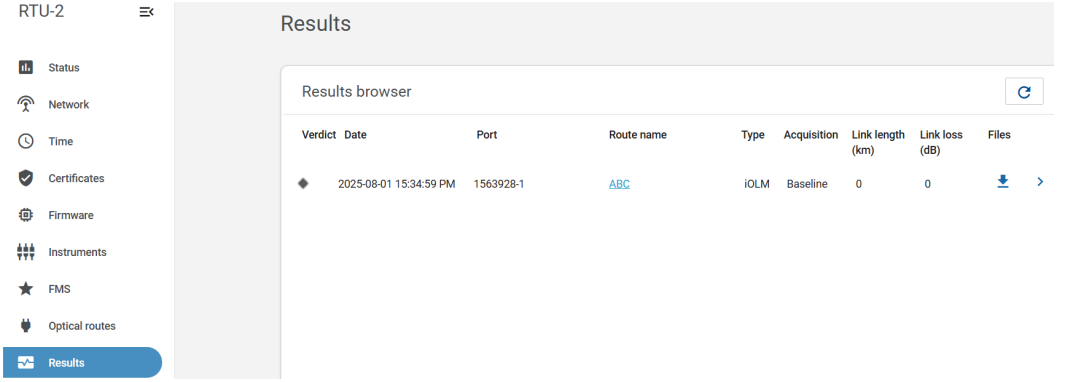
5 Working with Results

Viewing Results

To view all the results stored on the device:

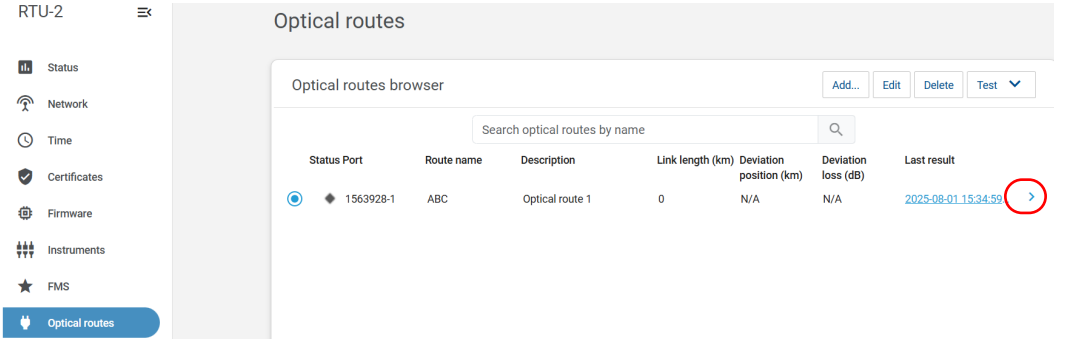
Click on the **Results** page.

The **Results browser** will show past results by **Date**, **Route name**, **Port** as well as the **link length/loss**.



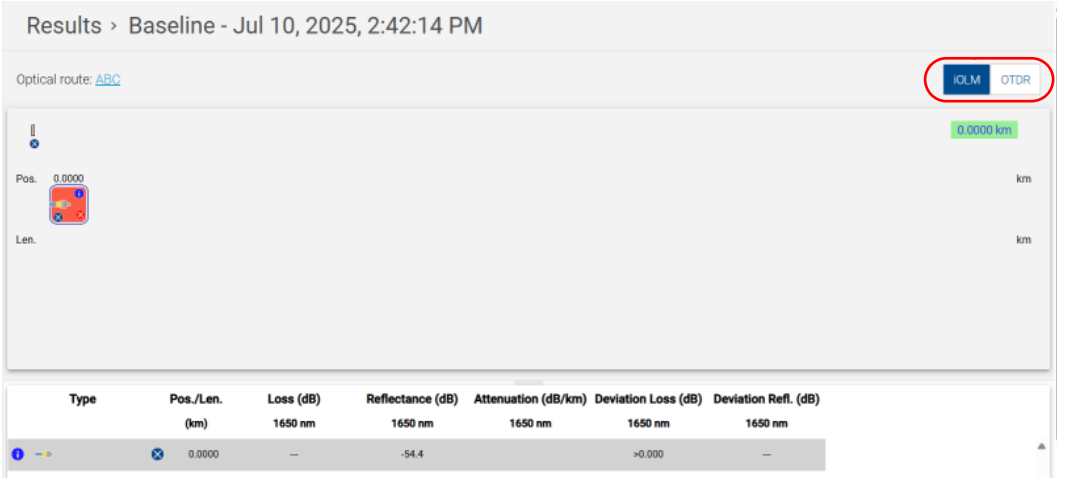
To view the results of a single route:

1. Open the optical route details using the **Optical routes** page.



2. By right-clicking on the right arrow, you can **Open link in new tab/window**.

When viewing results from an optical route, you can toggle through the iOLM and OTDR view.

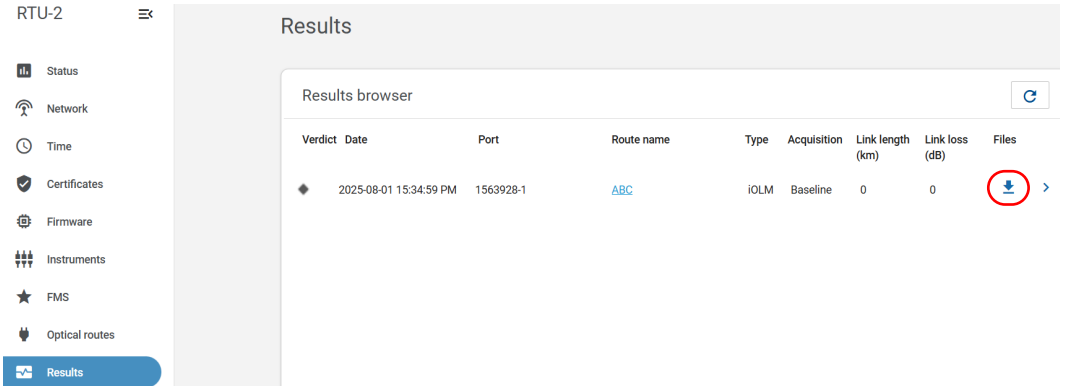


Saving Results

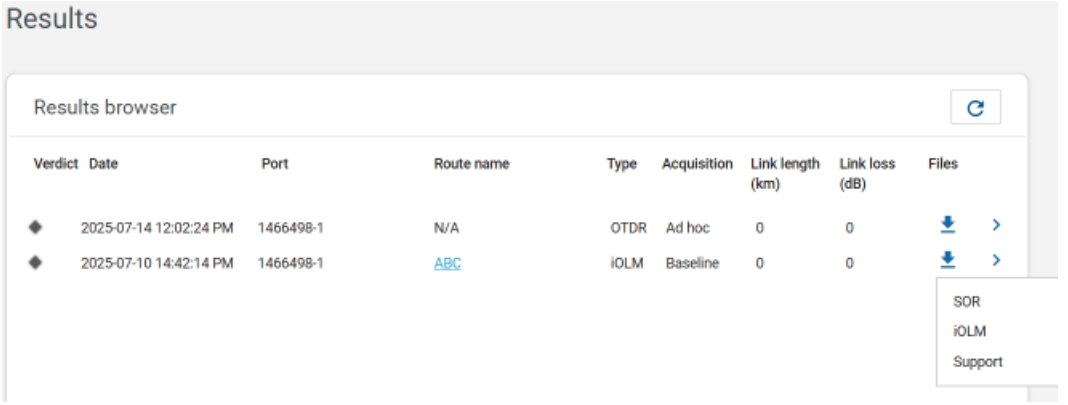
You can save the results locally on a computer.

To save the results:

1. Go to **Results/Results browser** page.
2. Click on the download arrow for the desired result.



Different types of files can be downloaded locally on the computer: Support, iOLM, or SOR files.



6 Maintenance

To help ensure long, trouble-free operation:

- Always inspect fiber-optic connectors before using them and clean them if necessary.
- Keep the unit free of dirt and dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.

WARNING

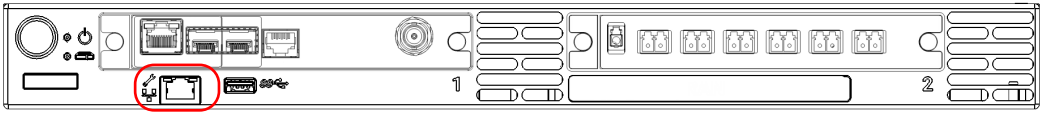
The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.

Accessing Your Unit Locally

You will need a computer (laptop) and a network cable to connect to your RTU-2 unit.

To access your unit locally:

1. If it is not already done, connect one end of a network cable to the management port of your unit and the other end to an Ethernet port on the computer.



2. Ensure that the (System) LED is steady green.
3. From your computer, open a Web browser and type 169.254.10.10 in the address bar to access the web interface.

Note: *It may take a few seconds before you can see the web interface if your computer needs to reconfigure its network to a link-local address first.*

4. When the application prompts you, enter the connection information.
   - ➤ The default user name is: localadmin
   - ➤ The default password is: admin

IMPORTANT

The application will lock your account after a certain number of unsuccessful connection attempts. Before entering your connection information again, you will have to wait a few minutes. The waiting time starts increasing after the fifth unsuccessful connection attempt up to a maximum of fifteen minutes.

Accessing Your Unit Remotely

By default, the management of your unit is done locally by connecting a laptop to your unit. However, if you prefer to be able to manage your unit remotely (via LAN or WAN) after the first connection, you can enable a feature allowing you to do so.

The following procedure takes into account that you have already configured your unit for remote access. If it is not the case, you will need to connect locally to your unit, and then, from the web interface ensure you have enabled the remote access (**Administration** page).

To access your unit remotely:

1. Ensure that the unit is reachable with your computer.
2. On your computer, open a Web browser of your choice.
3. Type *https://<IP_address_of_your_unit>*.

Note: *The unit uses a self-signed certificate, which could cause Web browsers to display a message about security issues.*

Changing the Administrator Password

By default, the administrator user account (user name: localadmin), is protected with the *admin* password.

For security reasons, EXFO recommends that you change the default password for a password of your choice after the first connection, and then periodically, according to your own security policy.

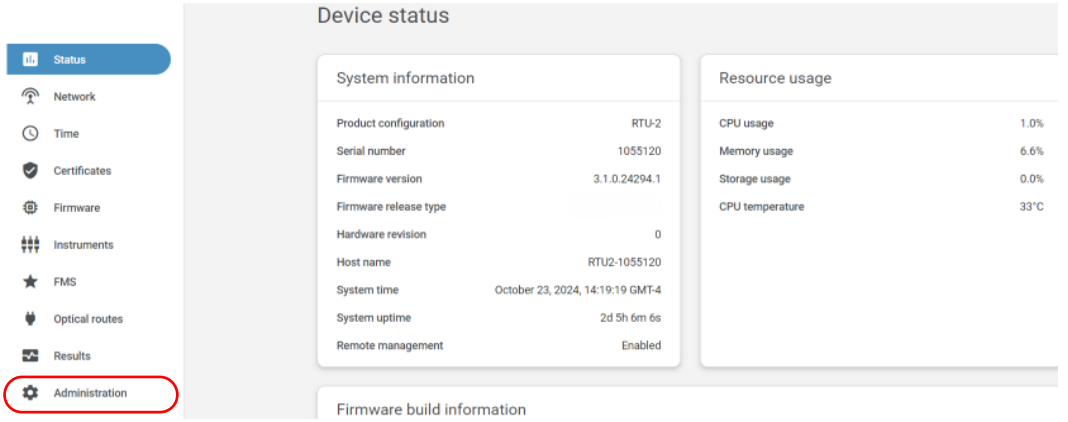
To change the administrator password:

1. Connect to your unit, either locally or remotely. For more information, see *Accessing Your Unit Locally* on page 86 or *Accessing Your Unit Remotely* on page 87.
2. When the application prompts you, enter the connection information.
   - ➤ The default user name is: localadmin
   - ➤ The default password is: admin

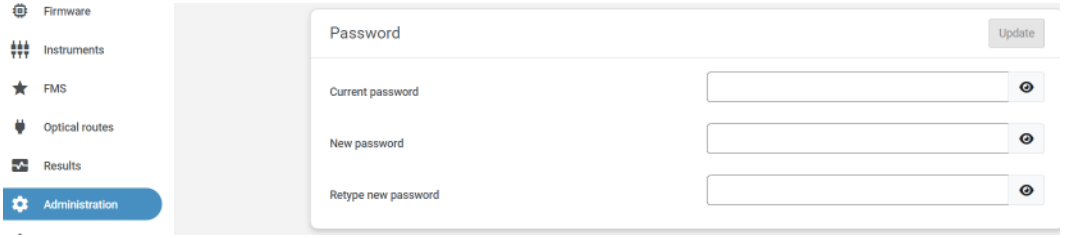
IMPORTANT

The application will lock your account after a certain number of unsuccessful connection attempts. Before entering your connection information again, you will have to wait a few minutes. The waiting time starts increasing after the fifth unsuccessful connection attempt up to a maximum of fifteen minutes.

3. From the list, select **Administration**.



4. Under **Password,** enter the information.



The new password must have a minimum of eight characters and include characters from at least three of the following categories:

- Lowercase letters (‘a’ - ‘z’)
- Uppercase letters (‘A’ - ‘Z’)
- Numbers (0 - 9)
- Special characters

5. Click **Update** to confirm.

The new password is taken into account immediately.

Upgrading the Firmware

The required firmware has been preinstalled at the factory. However, you may have to upgrade it when new versions become available. Keeping both the FMS and the firmware (on your unit) up to date ensures the optimum performance of your system.

After a successful connection between the FMS (Fiber Management System) and your unit, the FMS will provide the updates if your unit is running a compatible version. The updates will be performed automatically. Refer to the RFTM FMS Readme for the complete compatibility information and to the FMS user documentation for more information.

Note: *Your unit must have access to an Internet connection to be able to download updates from the EXFO server and install them manually.*

CAUTION

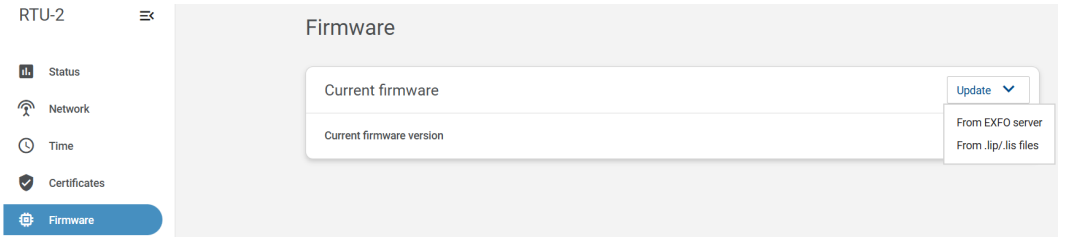
- **For a trouble-free upgrade, ensure that your unit remains on during all the process.**
- **Turning off your unit (or disconnecting it from its power source) while doing the update could result in unexpected behavior of the test applications, instability of the system, or even severely damage your unit, depending on the operation underway when the unit is turned off.**
  Damaged units will need to be sent back to EXFO for repair.
- **The upgrade could take several minutes to complete. Your unit could restart several times during the operation. You will know that the upgrade is finished when the (System) LED turns steady green again.**

IMPORTANT

- **If the manual firmware update results in a downgrade of versions, some data could be lost in the process. You may want to back up your data before the update.**
- **Performing a manual firmware update DOES NOT update the image used to revert the unit to its factory state. For this reason, if you revert your unit to its factory state after performing a manual firmware update, the compatibility between the FMS and the unit's firmware will be lost again. You will need to perform a new update.**

To upgrade the firmware:

1. For updates from the EXFO server, ensure that your unit has access to the Internet.
2. Connect to your unit, either locally or remotely. For more information, see *Accessing Your Unit Locally* on page 86 or *Accessing Your Unit Remotely* on page 87.
3. When the application prompts you, enter your connection information.
4. From the list, select **Firmware**.The **Current firmware version** is displayed.



5. From the **Update** drop-down menu, select either **From EXFO server** or **From .lip/.lis files**.

5a. **From EXFO server**: If there are updates available, you will be notified via a popup window and then have the option to proceed with the **Update** or **Close** to cancel.

If no updates are available, the popup window will prompt you to **Close** the window.

5b. **From .lip/.lis files**: Select the .LIP and .LIS files that you want to use. The upgrade starts automatically and your unit will restart at the end of the operation.

IMPORTANT

You must select both the .LIP and .LIS files to be able to start the upgrade.

Note: *In both firmware update cases, the operation may take a few minutes to complete.*

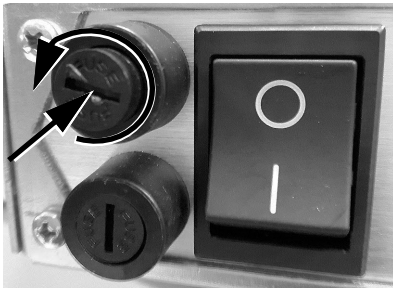
5c. Wait for your unit to be ready (its (System) LED will be steady green), and then connect again to the Web application.

Replacing Fuses

The unit contains two F10A L type fuses (5 mm x 20 mm (0.197 in x 0.787 in), fast-acting, 250 V). The fuse carriers are located at the back of the unit, to the left of the main power switch.

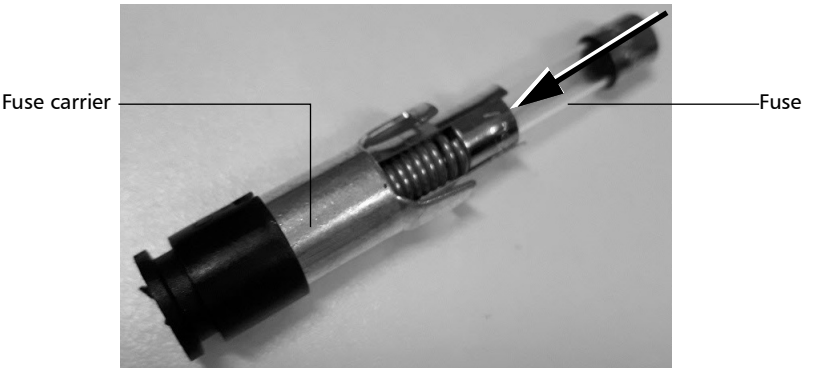
To replace a fuse:

1. Turn off the unit and disconnect it from the power source.
2. With a flat-head screwdriver, slightly push in the cap of the fuse carrier while turning counterclockwise until the fuse carrier is released from the unit.



3. Gently pull on the fuse carrier to remove it.
4. Repeat with the second fuse carrier.
5. Check and replace the fuses, if necessary.

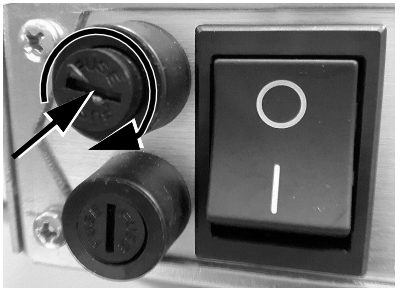
6. Insert the new fuse into the fuse carrier.



7. Make sure the fuses are placed firmly in the carrier prior to reinsertion.

8. Slide back the first fuse carrier into the unit.

9. With a flat-head screwdriver, slightly push in the cap of the fuse carrier while turning clockwise until the fuse carrier is secured in place.



10. Repeat with the second fuse carrier.

11. Connect the unit to the power source and turn on the unit.

Recalibrating Your Modules

When they are used exclusively in a system based on the RTU-2, the FTBx-730C OTDR modules have a recommended calibration interval of three years. This value takes precedence over the recommended interval specified in their respective user guides.

For detailed information about the recalibration of these modules, refer to their user guide.

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 information, visit the EXFO Web site at www.exfo.com/recycle.

7 Troubleshooting

Solving Common Problems

Before calling EXFO's technical support, you may want to consider the following solutions to problems that could occur.

Problem	Possible Cause	Solution
My unit does not start. Its power LED (⏻) remains off when I press the on/off button.	There is a problem related to electrical power.	➤ If your unit is connected to DC power, make sure that the disconnect device is turned on. If your unit is connected to AC power, make sure that the external power supply is connected at both ends, and that the disconnect device is turned on. ➤ Ensure that the main power switch, located at the back of your unit, is in the on position. ➤ Check the fuses (see *Replacing Fuses* on page 93). ➤ If the unit is connected to DC power, ensure that the wires are connected properly, respecting polarity (see *Connecting Your Unit to a Power Source* on page 44).

Problem	Possible Cause	Solution
The RTUe-9110/RTUe-9120 external switch that I have just connected is not working.	The switch has not been detected.	Disconnect, then reconnect the switch.
		Ensure that the RTU-2 unit is on and that its System LED () is green and not blinking.
The unit does not recognize a test module.	Defective module.	If the unit recognizes other modules, the faulty module could be defective. Return it to EXFO for repairs.
	Module is not supported on your unit.	Refer to the unit's technical specifications for the complete list of supported modules.
I cannot sign in to my account with my user name and password.	The application locked your account after five or more unsuccessful connection attempts.	Wait a few minutes before attempting a new connection. After eight unsuccessful attempts, you will have to wait 15 minutes before trying again.
	You forgot or lost your password.	Create a new password with the FMS. For more information about the FMS, refer to its user documentation.

Restoring Your Unit to Normal Operation

If you ever encounter major problems with your unit (for example, the unit does not behave the way it used to), you can revert it to its initial state (as it was at time of purchase).

When you reset your unit to its factory settings:

- All data files will be lost once the operation is complete.
- If you have installed products and updates since you purchased your unit, you will have to reinstall them.

IMPORTANT

Resetting your unit to its factory settings will disable the remote management if it was enabled. This means that, once the operation is complete, you will no longer be able to connect remotely to your unit.

CAUTION

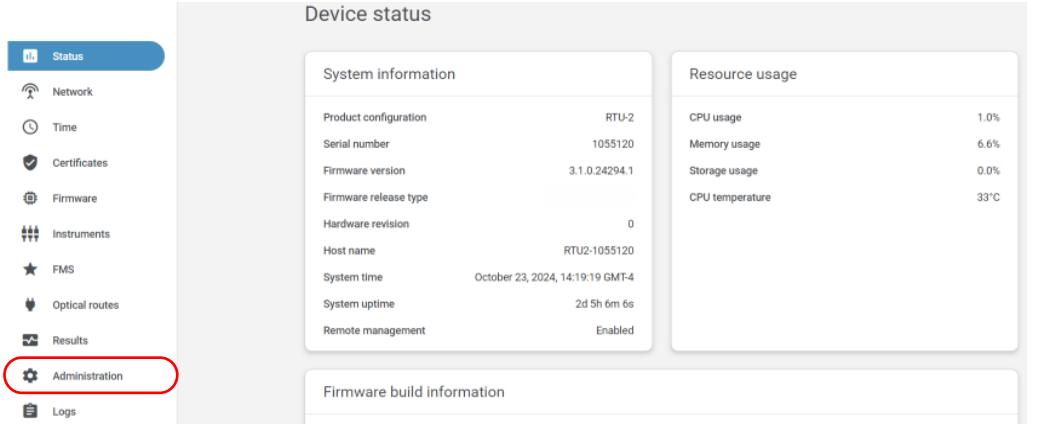
DO NOT TURN OFF your unit while the recovery operation is underway. Doing so may severely damage your unit. Damaged units will need to be sent back to EXFO for repair.

You can perform this operation from the web interface or manually, especially if you cannot access the web interface.

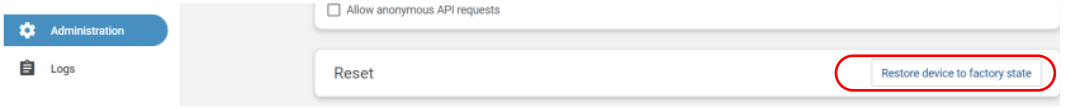
To restore your unit to factory state with the web interface:

1. Connect to your unit, either locally or remotely. For more information, see *Accessing Your Unit Locally* on page 86 or *Accessing Your Unit Remotely* on page 87.
2. When the application prompts you, enter your connection information.

3. From the list, select **Administration**.



4. Click **Restore device to factory state**.



5. Follow the on-screen instructions.

The restoring process is now underway and the (System) LED will keep blinking rapidly. Your unit will restart automatically.

Once your unit has restarted, its (System) LED will blink slowly during the whole initialization. You will know that the operation is complete when the LED becomes steady green.

Note: *The restoring process may take a few minutes to complete.*

6. Configure your unit as you did when you first received it. However, use the following credentials to establish a connection:

- User name: admin
- Password: admin

Note: *Depending on when your unit was manufactured, the default user name could be* admin *or* localadmin.

For more information, see *Working With Your Unit for the First Time* on page 56.

To restore your unit to its factory state without the web interface:

1. Turn off you unit.
2. Connect a keyboard to one of your unit's USB ports.
3. Turn on your unit and then start pressing and holding down the R key until the (System) LED starts blinking.

Note: *You could also launch the restoring process by pressing (and releasing) the Down arrow key repeatedly during about ten seconds, and then pressing Enter.*

The (System) LED will blink during the whole restoring operation. Your unit will restart automatically.

You will know that the operation is complete when the (System) LED becomes steady green.

Note: *The restoring process may take a few minutes to complete.*

4. Configure your unit as you did when you first received it (see *Working With Your Unit for the First Time* on page 56).

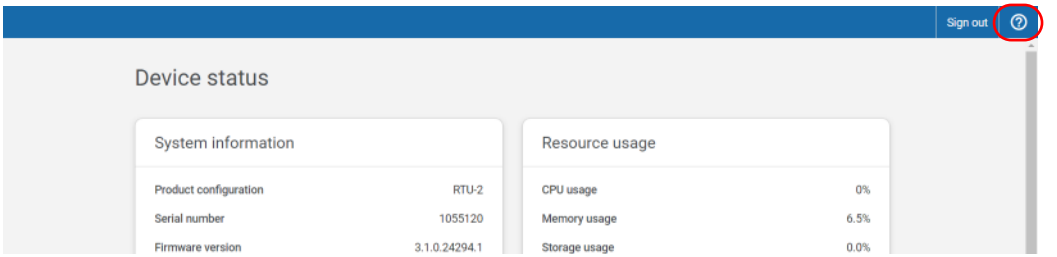
Accessing the User Documentation

You can access the user documentation in PDF format at all times from your unit.

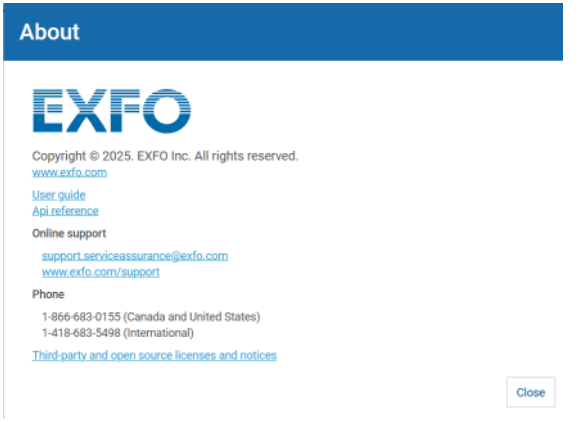
Note: *The user guides of all products are also available from the Resources section of the EXFO Web site (www.exfo.com) for download in PDF format.*

To view the user documentation:

1. From the title bar of the web interface, click  to open the **About** window.



2. Click on the desired link.



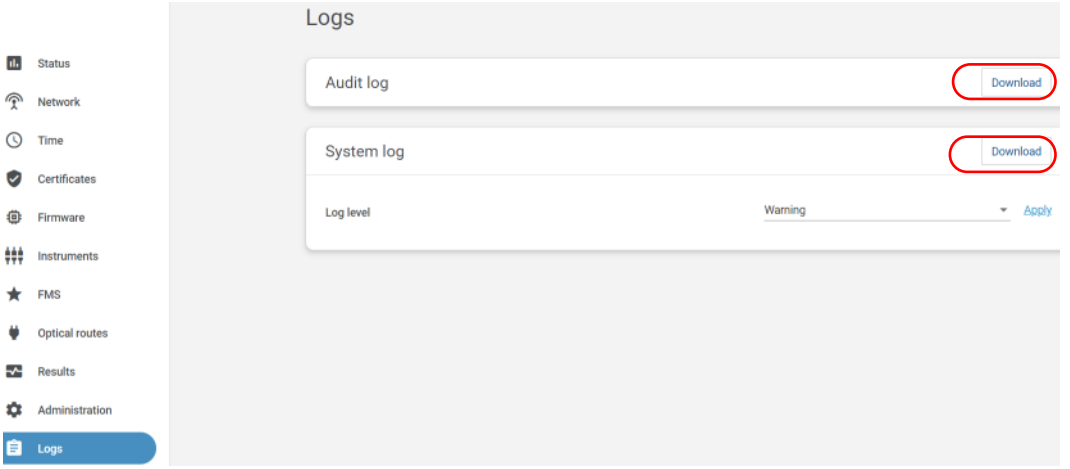
Retrieving Logs

There are two types of logs that you can retrieve from the web interface:

- The audit log that lists events and changes that occurred on the RTU-2 unit.
- The system log that provides special information that you can send to the technical support team at EXFO for further analysis.

To retrieve logs:

1. Connect to your unit, either locally or remotely. For more information, see *Accessing Your Unit Locally* on page 86 or *Accessing Your Unit Remotely* on page 87.
2. From the web interface, go to the **Logs** page.
3. Go to the section corresponding to the type of log that you want to retrieve, and then click the corresponding **Download** link.



Note: *If necessary, the technical support team will ask you to change the level to another value for subsequent actions. The* Debug *level should be used temporarily as it can slow down the system. EXFO recommends to set the level back to* Warning *once the debug operation is complete.*

Note: *The time necessary to retrieve a log will vary with its size.*

Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support.serviceassurance@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.

If you have comments or suggestions about this user documentation, you can send them to customer.feedback.manual@exfo.com.

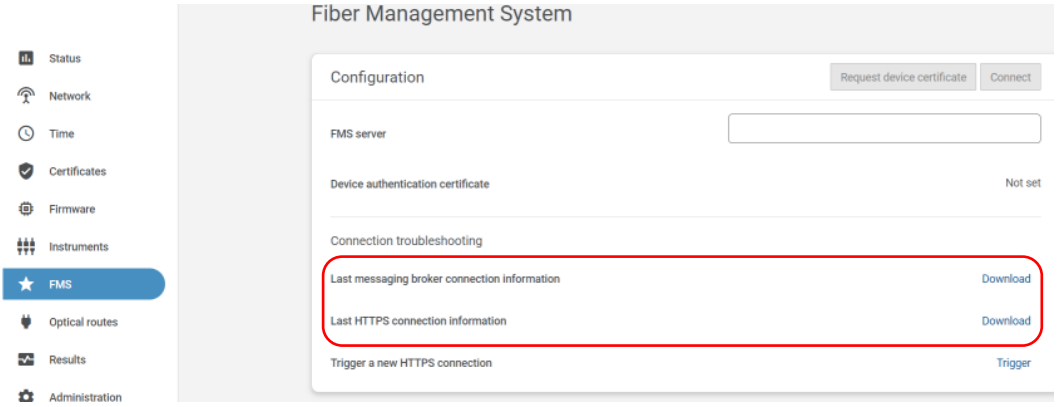
To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.

Sharing the FMS Connection Information with the Technical Support Group

After contacting EXFO for support, you may need to share connection information to the FMS (Fiber Management System) server with the technical support group for further investigation.

To share information with the technical support group:

1. Connect to your unit, either locally or remotely. For more information, see *Accessing Your Unit Locally* on page 86 or *Accessing Your Unit Remotely* on page 87.
2. From the web interface, go to the **FMS** page.



3. Click the **Download** link corresponding to the type of information that the technical support requires for investigation. The application generates a text file and sends it to the download folder of your computer automatically.
4. Provide the downloaded file(s) to the technical support group.

Note: *If someone from the technical group ask you to trigger a new HTTPS connection, simply click the **Trigger** link. You will then need to download a new HTTPS connection information file.*

Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

8 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of two years from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Gray Market and Gray Market Products

Gray market is a market where products are traded through distribution channels that are legal but remain unofficial, unauthorized, or unintended by the original manufacturer. Intermediaries using such channels to distribute products are considered to be part of the gray market (hereafter unauthorized intermediary).

EXFO considers that a product originates from the gray market (hereafter gray market product) in the following situations:

- A product is sold by an unauthorized intermediary.
- A product is designed and destined for a particular market and sold on a second market.
- A product is resold, despite being reported lost or stolen.

When products are purchased on the gray market, rather than through an authorized EXFO distribution channel, EXFO is unable to guarantee the source and quality of those products nor the local safety regulations and certifications (CE, UL, etc.).

EXFO will not honor warranty, install, maintain, repair, calibrate, provide technical support nor make any support contracts available for gray market products.

For complete information, refer to EXFO's policy regarding gray market products at www.exfo.com/en/how-to-buy/sales-terms-conditions/gray-market/

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of EXFO.

IMPORTANT

In the case of products equipped with optical connectors, EXFO will charge a fee for replacing connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 111). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 111).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

EXFO Europe Service Center
Winchester House, School Lane
Chandlers Ford, Hampshire S053 4DG
ENGLAND

Tel.: +44 2380 246800
Fax: +44 2380 246801
support.europe@exfo.com

EXFO Telecom Equipment (Shenzhen) Ltd.
3rd Floor, Building C,
FuNing Hi-Tech Industrial Park, No. 71-3,
Xintian Avenue,
Fuhai, Bao'An District,
Shenzhen, China, 518103

Tel: +86 (755) 2955 3100
Fax: +86 (755) 2955 3101
support.asia@exfo.com

To view EXFO's network of partner-operated Certified Service Centers nearest you, please consult EXFO's corporate website for the complete list of service partners:
https://www.exfo.com/en/services/field-network-testing/exfo-service-centers.

A API

You can configure and operate your unit using an API available on the management port, and optionally on the LAN/WAN port if the remote access is enabled (see *Working With Your Unit for the First Time* Procedure Step 16).

A complete list of commands allowing you to remotely control your unit is available at all times from a Swagger UI. It details the commands with examples and appropriate syntax.

Accessing the API and Its Documentation

The API and the related documentation are accessible as follows:

- API base path: <device address>/api
- Swagger UI: <device address>/help/api

  The Swagger UI is also available using the **API reference** link in the **About** box.

Using the API Without Authentication

You can use the API without authentication by allowing anonymous API requests.

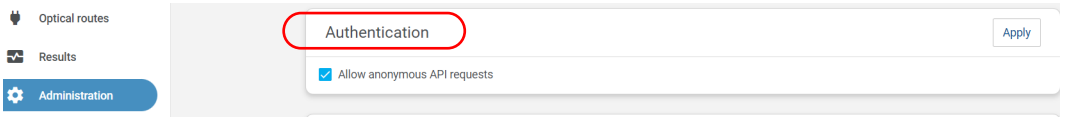
IMPORTANT

The setting will also be applied to the LAN/WAN port if the remote access is enabled.

To use the API without authentication:

1. Ensure that your computer is connected to your unit.
2. If it is not already done, from your computer, open a Web browser and type 169.254.10.10 in the address bar to access the web interface.

3. From the list, select **Administration**.
4. Select the **Allow anonymous API requests** check box.



5. Click **Apply**.

The API can now be used without authentication.

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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

Part Name 部件名称	Lead 铅 （Pb）	Mercury 汞 （Hg）	Cadmium 镉 （Cd）	Hexavalent Chromium 六价铬 （Cr(VI)）	Polybrominated biphenyls 多溴联苯 （PBB）	Polybrominated diphenyl ethers 多溴二苯醚 （PBDE）
Enclosure 外壳	O	O	O	O	O	O
Electronic and electrical sub-assembly 电子和电气组件	X	O	X	O	X	X
Optical sub-assembly[a] 光学组件 [a]	X	O	O	O	O	O
Mechanical sub-assembly[a] 机械组件 [a]	O	O	O	O	O	O

Note:
注：
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

Product 产品	Environmental protection use period (years) 环境保护使用期限 （年）	Logo 标志
This EXFO product 本 EXFO 产品	10	
Battery[a] 电池	5	

a. If applicable.
如果适用。

P/N: 1090112

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