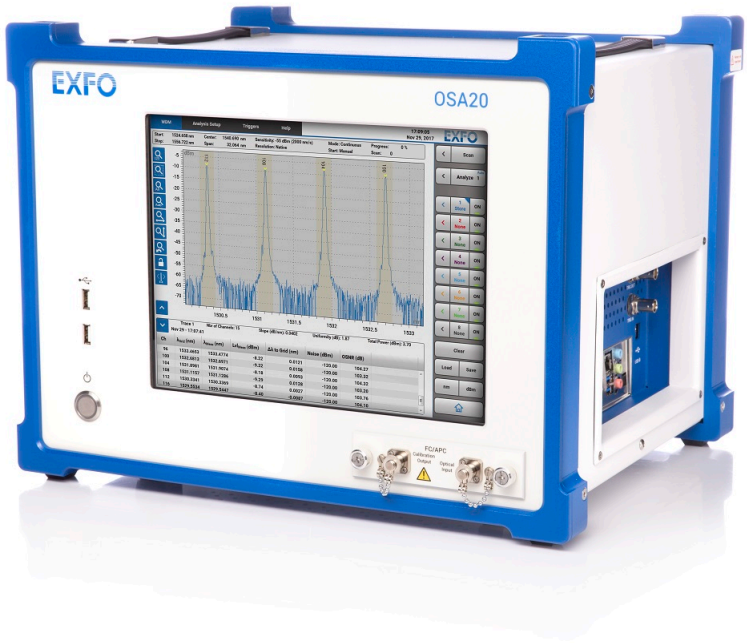
Getting Started

OSA20

Optical Spectrum Analyzer



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Contents

For full details on how to use the OSA20, see *CTP10 User Guide* available on the USB key provided with the instrument.

1 Introducing the OSA20

The OSA20 is a diffraction-grating based optical spectrum analyzer, using a touch sensitive display with multi-touch gesture control. It provides an extensive suite of built-in analysis functions enabling input signal measurement and analysis for many common applications.

A wide range of communication ports allows remote control operations and export of data.

The OSA20 features one general analysis mode and seven application-oriented modes. Each analysis mode has a full suite of analysis functions for a detailed spectrum analysis.

Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

Optical Measurement		
Wavelength	Spectral range	1250–1700 nm / 239.834–176.349 THz
	Span range	0.5 nm to full range (450 nm)
	Linearity[a]	±6 pm over 1500–1640 nm, ±20 pm over full range / 2.5 GHz @ 1550 nm
	Accuracy[a.]	±10 pm over 1500–1640 nm, ±25 pm over full range / 2.5 GHz @ 1550 nm
	Repeatability	±2 pm / 0.25 GHz @ 1550 nm
	Sampling resolution	2 pm / 0.25 GHz @ 1550 nm
	Sampling points	251 (span of 0.5 nm) to 225,001 (span of 450 nm)
	Reference	Built-in ELED (safety class 1) + Acetylene cell (user calibration by patch cord) Acetylene gas is a NIST standard Reference Material SRM 2517a. The P9 line is used in the case of OSA20
Monochromator	Resolution bandwidth[b, c, d]	20 pm native, adjustable over 50–2000 pm with 1 pm step
	Dynamic range (ORR)[e]	≥ 30 dB (> 35 dB typ.) beyond ±50 pm from peak ≥ 50 dB (> 55 dB typ.) beyond ±100 pm from peak ≥ 60 dB (> 63 dB typ.) beyond ±200 pm from peak
	Stray light suppression ratio[f]	≥ 73 dB

Optical Measurement			
Optical power	Input power per channel		≤ 20 dBm
	Total safe power		≤ 25 dBm
	Level sensitivity[g]	single scan	High (0.5 nm/s): < -76 dBm (-78 dBm typ.)
		with averaging (Avg *Nb of scans*)[h]	High (0.5 nm/s): -80 dBm (Avg 3), -85 dBm (Avg 30), -90 dBm (Avg 380) -75 dBm (2 nm/s): -80 dBm (Avg 7), -85 dBm (Avg 70), -90 dBm (Avg 800)
	Absolute level accuracy[a., i]		±0.4 dB at 1310 nm and 1550 nm
	Level linearity[j]		±0.07 dB over the full range (input level -50 to +3 dBm)
	Level/wavelength flatness[k]		±0.15 dB over 1500–1640 nm, ±0.25 dB over 1260–1680 nm
	Level sampling		±0.01 dB over -60 to +20 dBm
Sweep speed	Sensitivity[g.]		-55 dBm at 2000 nm/s to -75 dBm at 2 nm/s
	Sweep cycle/100 nm[l]		300 ms typ.
	Sampling rate		1 MHz typ.

a. After user calibration performed after 1 hour warm-up time.
b. Native 17–24 pm over 1500–1620 nm (except in -55 dBm sensitivity), 17–26 pm over 1250–1700 nm.
c. Adjustable resolution bandwidth is calculated from the native bandwidth.
d. Adjustable over 6–400 GHz with 0.1 GHz step on the abscissa in THz.
e. HeNe laser at 1523 nm with ±2 nm span.
f. Laser at 1523 nm with ±50 nm span, excluding ±2 nm around peak.
g. Noise level of 99 % of all data points over 1520–1620 nm.
h. Typical values.
i. Over 18–28°C all sensitivity settings except ±0.6 dB in -55 dBm and Burst sensitivities.
j. Measured @ 1310 nm and 1500 nm, except ±0.3 dB in -55 dBm and Burst sensitivities.
k. Except ±0.35 dB in -55 dBm and Burst sensitivities, except for water absorption lines, over 18–28°C all sensitivity settings.
l. Sweep cycle /100 nm at -60 dBm sensitivity at center wavelength of 1475 nm.

The validity of specifications depends on operating conditions (see *OSA20 User Guide*, *Recalibrating the OSA20* on page 146).

Interfaces and Electrical		
Optical interfaces	Optical input	SMF-28 type fiber
	User calibration output	Built-in ELED (safety class 1) + Acetylene cell (user calibration by patch cord)
	Connector (input and output)	FC/APC or FC/PC or SC/APC or SC/PC
	Return loss	> 38 dB (> 42 dB typ.) at 1310 nm and at 1550 nm (APC connector)
External devices	Screen	VGA Port (x1), DVI-D Port (x1), HDMI (x1)
	Mouse, keyboard, hard disk...	USB 2.0-A (x4), USB 3.0-A (x2)
	Serial ports (unused)	Male SUBD-9 (x2)
	Sound ports (unused)	Line-in (x1), Line-out (x1), Microphone (x1)
Remote interfaces	Ethernet (2x RJ45)	1 GB/s max.
	GPIB (1x IEEE 488)	7.2 MB/s max.
	USB (1x USB 2.0-B)	115 kB/s max.
Triggers	Trigger In (BNC)	High level: >3 V Low level: <2 V Input maximum range: 0–5.5 V
	Trigger Out (BNC)	High level: 4.5 to 5 V on high-impedance load (>10 kΩ) Low level: 0 to 0.5 V on high-impedance load (>10 kΩ)
Physical specifications	Display screen	12 inch capacitive touch-screen (res. 1024 x 768)
	Data Storage capacity	256 GB
	Dimensions & weight	W 413 x H 314 x D 385 mm, 15 kg
	Available accessory	Rack mount kit

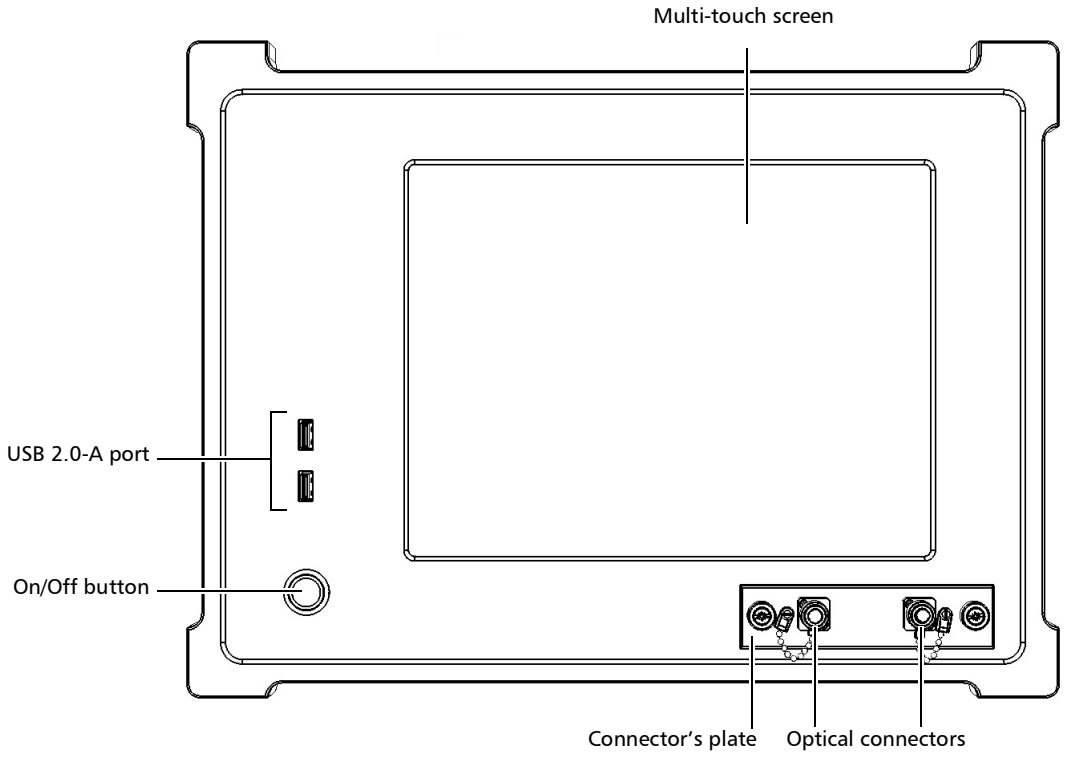
Product Overview

The OSA20 is delivered with the following accessories:

- 1 front panel protective cover
- 1 power supply cord
- 1 AC/DC power adapter (fastened on the rear panel)
- 1 jumper (for user calibration)
- 1 capacitive touch screen stylus
- 1 manual *Getting Started with OSA20*
- 1 USB key containing the system version installed on the OSA20 and the available drivers, examples, reports and user documentation.

Front Panel

The OSA20 is delivered with a protective cover fastened on the front panel.



On/Off button

The ⏻ label identifies the On/Off button that enables you to turn on or off the OSA20 (see *Turning on the OSA20 and Accessing the Home Window* on page 20).

Multi-touch Screen

The multi-touch screen enables you to perform all possible operations on the OSA20.

To select a parameter, command or function on the screen, touch the corresponding command with the tip of your finger or the stylus, without tapping it.

The following gestures are available on the multi-touch screen:

Gesture	Description
Touch	Gently touch something on the screen with your finger or the stylus to select it.
Pan	Drag your finger or the stylus across the screen.
Pinch/Stretch	Pinch two fingers together or move them apart to zoom in or out: ➤ To zoom in, touch two points on the screen and move your fingers away from each other. ➤ To zoom out, touch two points on the screen and move your fingers toward each other.
Long press	Hold your finger or stylus on the graph until a complete circle appears around it to automatically activate the rectangle zoom (see *OSA20 User Guide*, *Adjusting the Scale of the Graph* on page 60).

USB ports

The  label identifies the two USB 2.0 type-A ports located on the front panel. They enable you to connect USB devices such as:

- Keyboard and mouse if needed (see *OSA20 User Guide*, *Connecting a Mouse and Keyboard to the OSA20* on page 19)
- USB key or hard disk to export your measurement results
- An external multi-touch screen

The USB ports are SELV classified; you must only connect them to interfaces of the same type.

Optical Connectors

The two following optical connectors, protected by a dust cap, are located on the front panel:

- The **Calibration Output** label identifies the ELED and acetylene source output, used for user calibration of the wavelength (see *OSA20 User Guide*, *Performing a User Calibration* on page 144).

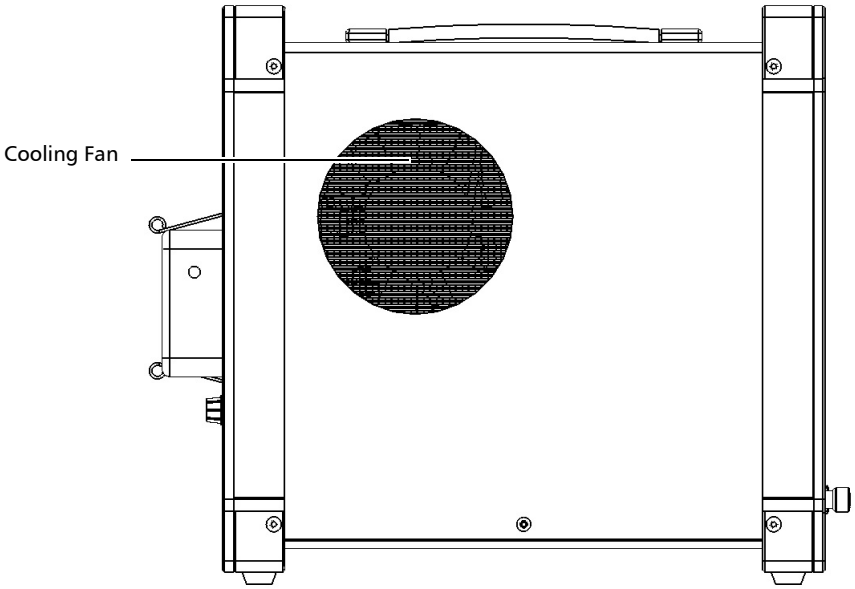
  The  label indicates an injury hazard. The user calibration output requires special safety instructions for proper use: see *OSA20 User Guide*, *Performing a User Calibration* on page 144.

- The **Optical Input** label identifies the optical input, used to connect a light source.

  The two optical connectors are mounted on a plate, which enables you to access the internal optical connectors for cleaning (see *OSA20 User Guide*, *Cleaning Optical Connectors* on page 143).

Left-side Panel: Cooling Fan

The cooling fan, located on the left-side panel of the OSA20, extracts warm air from inside. A cover grid protects it.



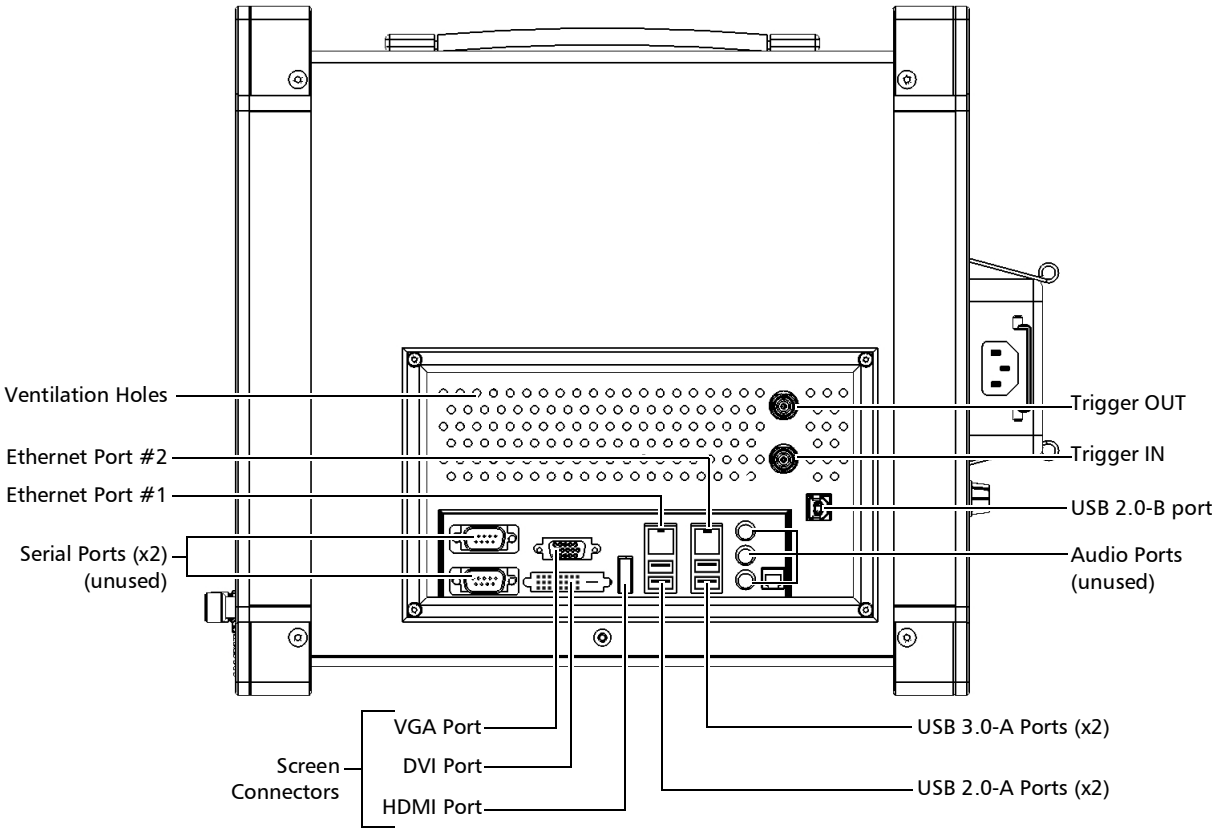
Right-side Panel: Connectors

The right-side panel of the OSA20 contains:

➤ A complete set of communication ports and interfaces for remote control and export of data.

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

➤ Ventilation holes for air input.



External Screen Connectors

You can connect an external screen to the following ports:

- **VGA** port
- **DVI** port
- **HDMI** port

For more details on how to configure the external screen settings, see *OSA20 User Guide*, *Sharing the OSA20 Display with an External Screen* on page 29.

Trigger Ports

The trigger ports enable you to synchronize scans with a signal (see *Interfaces and Electrical* on page 3 for more details on signal levels).

- **TRIG OUT**: BNC connector for outputting trigger signals. For more details, see *OSA20 User Guide*, *Generating Output Trigger Signals* on page 51.
- **TRIG IN**: input BNC connector for starting scan in synchronization with an external trigger signal, as described in *OSA20 User Guide*, *Triggering the Optical Spectrum Acquisition* on page 50.

  In RLT mode, this port is used as a gate: in *OSA20 User Guide*, see paragraphs **RLT – Recirculating Loop Transmission on page 37** and **Gate Acquisition *(RLT mode only)* on page 45**.

USB Ports

- **USB 2.0-A** and **USB 3.0-A**: these ports enable you to connect USB devices such as:
  - Keyboard and mouse if needed (see *OSA20 User Guide*, *Connecting a Mouse and Keyboard to the OSA20* on page 19)
  - USB key or hard disk to export your measurement results
  - An external multi-touch screen

  The USB ports are SELV classified; you must only connect them to interfaces of the same type.
- **USB 2.0-B**: this port enables you to perform remote control operations from a connected computer. For more information, see *OSA20 User Guide*, *Using the OSA20 in Remote Control* on page 137.

Ethernet Ports

The two Ethernet ports enable you to perform remote control operations.

- Ethernet port #1:

  This port is associated with a DHCP server. It can be used to connect directly a computer that will be assigned automatically an IP address.
- Ethernet port #2:

  You can configure this port manually or automatically through a remote DHCP server.

For more information, see *OSA20 User Guide*, *Using the OSA20 in Remote Control* on page 137.

IMPORTANT

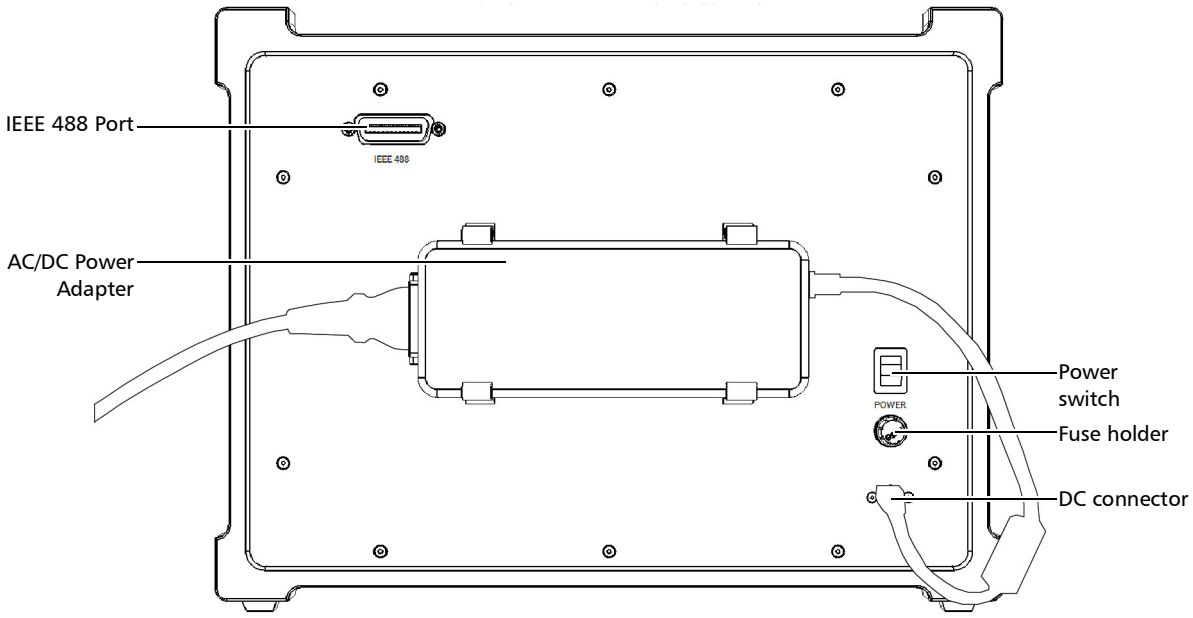
The Ethernet ports can only be used for remote control of the OSA20. Any other use is not possible.

Audio and Serial Ports

Unused ports.

Rear Panel

The rear panel holds the power adapter, power switch, fuse holder and GPIB connector.



IEEE 488 Port

This port (also known as GPIB port) enables you to perform remote control operations. For more information, see *OSA20 User Guide*, *Using the OSA20 in Remote Control* on page 137.

The IEEE 488 port is SELV classified; you must only connect it to interfaces of the same type.

AC/DC Power Adapter and Power Cord

The AC/DC power adapter is fastened on the rear panel for convenient purpose.

It is plugged to the 48 V DC connector, identified by the ⎓ label.

CAUTION

To ensure the smooth functioning of the OSA20, you must only use the power adapter provided by EXFO.

The 48 V DC connector is SELV classified and must only be connected to interfaces of the same type.

Fuse Holder

The fuse holder contains a fuse (see *Technical Specifications* on page 1 for fuse type) to protect the OSA20 from overcurrent.

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.

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.

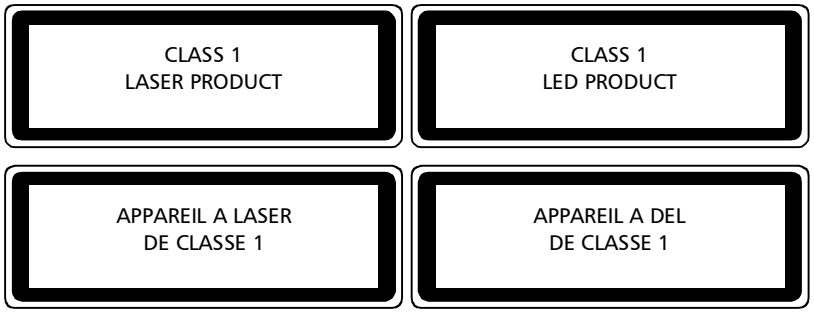
Symbol	Meaning
	Direct current
	Alternating current
	The unit is equipped with an earth (ground) terminal.
	The unit is equipped with a protective conductor terminal.
	The unit is equipped with a frame or chassis terminal.
	On (Power)
	Off (Power)
 OR 	On/off (Power)
	Fuse

Laser Safety Information

Your instrument is in compliance with standards IEC 60825-1: 2007 and 2014.

Laser radiation may be encountered at the optical output port.

The following labels indicate that a product contains a Class 1 laser or LED source:



Complies with standards 21 CFR 1040.10, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

Electrical Safety Information

Your unit uses an external AC/DC power adapter connected to an international safety standard three-wire power cable.

WARNING

- **Use the external power supply (AC/DC power adapter) indoors only.**
- **Never connect the unit to the AC mains (with the AC/DC power adapter) when it is used outdoors.**
- **Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.**
- **To avoid electrical shock, do not operate the unit if any part of the outer surface (covers, panels, etc.) is damaged.**
- **Only authorized personnel should carry out adjustments, maintenance or repair of opened units under voltage. A person qualified in first aid must also be present. Do not replace any components while the power cable is connected.**
- **Unless otherwise specified, all interfaces are intended for connection to Safety Extra Low Voltage (SELV) circuits only.**
- **Capacitors inside the unit may be charged even if the unit has been disconnected from its electrical supply.**

WARNING

➤ **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.**

CAUTION

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

Equipment Ratings		
Temperature	Operation	+5 °C to +40 °C (+41 °F to +104 °F)[a]
	Storage	-10 °C to +50 °C (+14 °F to 122 °F)
	Performance Guaranteed	+18 °C to +28 °C (+64.4 °F to +82.4 °F)
Relative humidity[2]		➤ unit: 80 % for temperatures up to 31°C decreasing linearly to 50 % relative humidity at 40°C ➤ AC/DC power adapter: 5-95 % RH, non-condensing
Maximum operation altitude		2000 m (6562 ft)
Pollution degree		2
Overvoltage category		➤ unit: II ➤ AC/DC power adapter: I
Measurement category		Not rated for measurement categories II, III, or IV
Input power[3]		➤ unit: 48 V ⎓ ; 3 A (protected by fuse) ➤ AC/DC power adapter: 100 - 240 V ∼ ; 50/60 Hz; 1.5 A (Output power: 48 V ⎓ ; 3.13 A)

a. Scan stops if temperature > 35°C

CAUTION

➤ **The use of voltages higher than those indicated on the label affixed to your unit may damage the unit.**

3 Getting Started with Your OSA20

This section explains how to properly install and connect the OSA20.

Unpacking and Installing the OSA20

This section explains how to install the OSA20 as a bench top instrument.
To install the OSA20 into a rack, EXFO has designed a special rack mount (for more details, contact your sales representative). The procedure to install the OSA20 into a 19-inch rack is available in the manual delivered with the rack mount kit.

The OSA20 is designed for indoor use only, and is not dedicated to wet locations. It must be operated under proper environment conditions, as explained in the following procedure.

CAUTION

- **To ensure proper environment conditions, make sure the location where the OSA20 will be installed meets the environmental characteristics listed in *Technical Specifications* on page 1.**
- **Do not install the OSA20 near any source of heat or cold.**
- **To ensure proper ventilation and cooling, make sure there is sufficient clearance below, on top and at the sides of the OSA20 in the place where it will be installed.**

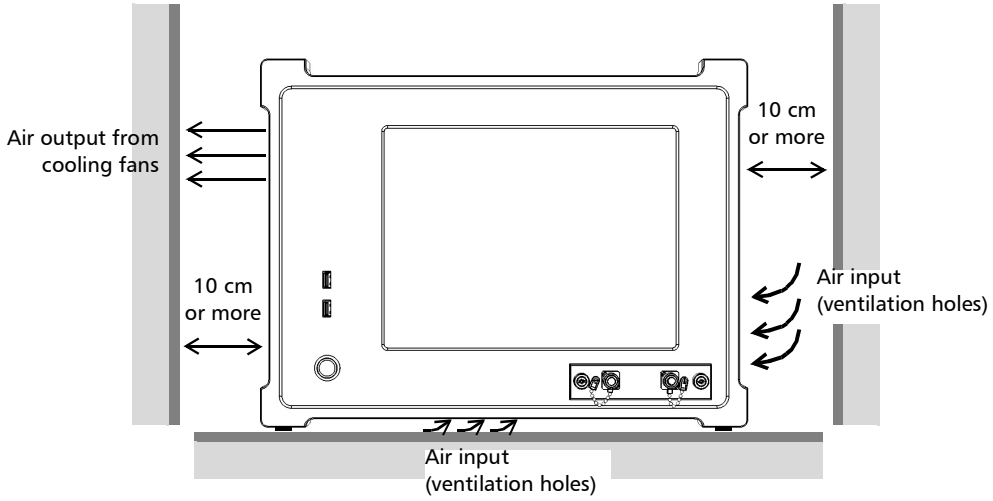
To unpack and install the OSA20:

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

IMPORTANT

When unpacking, handle the device with care and do not damage the original shipping container in case the OSA20 needs to be returned to EXFO.

2. Remove the tape that closes the plastic bag, and open the plastic bag that contains the OSA20 to make visible the two handles.
3. Pull out the OSA20 vertically from its packaging: hold it by its two retractable handles and keep it horizontal.
4. Set the OSA20 on a flat stable surface free of excessive vibration.
5. Allow the flow of air to circulate freely around the OSA20 and remove any equipment or paper that could block the air flow. Ventilation holes are located on the right and bottom sides of the OSA20.
6. Do not place anything under or at the sides of the OSA20, as illustrated in the following figure.



7. On the rear panel (see *Rear Panel* on page 9), make sure the power switch is set to **O**.

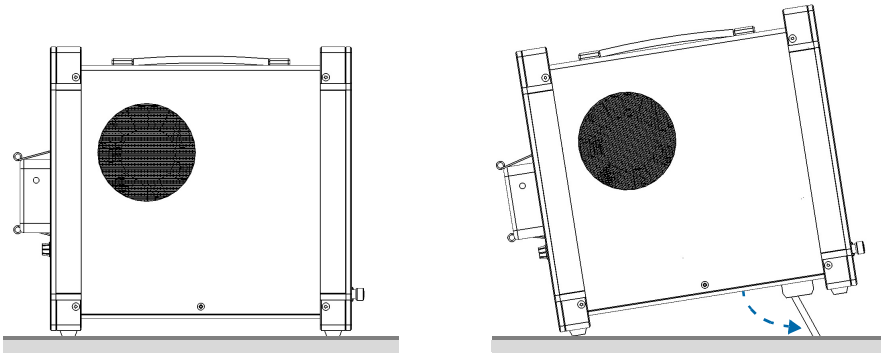
8. Remove the protective cover from the front panel:

8a. Hold your hands on the two lateral edges of the protective cover.

8b. Slightly splay the lateral edges of the protective cover to unfasten the two side tabs from the back of the front frame.

8c. Gently pull horizontally the protective cover out of the front panel.

9. To tilt the OSA20 upward, deploy the two retractable legs located below it.



Connecting the OSA20 to a Power Source

The OSA20 is dedicated to be connected to a SELV circuit.

Connecting the OSA20 to the Wall Socket Using the Power Adapter

The OSA20 has a chassis connected to ground via the power supply cord. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

You must use the AC/DC adapter provided with the OSA20. For voltage specifications, see *Technical Specifications* on page 1.

WARNING

- **Make sure the wall socket on which the OSA20 will be plugged is protected by a 16 A max circuit breaker.**
- **Make sure the OSA20 power source does not apply more than 265 Volts RMS between the supply conductors and the ground.**
- **To avoid the possibility of injury, make sure the socket outlet in which the power supply cord will be plugged is equipped with a protective ground contact, and that the electrical installation fulfills the local safety requirements.**

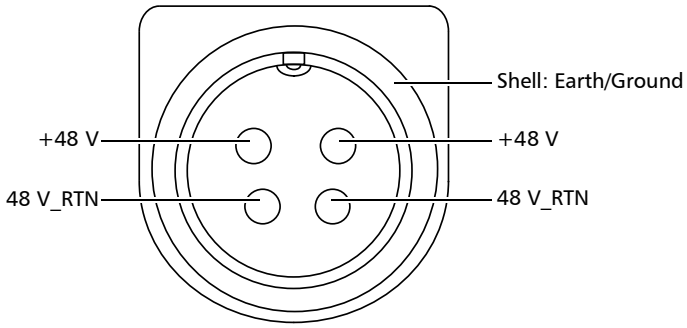
To connect the OSA20 with the power adapter:

1. Make sure the AC/DC adapter is not plugged to the wall socket.
2. Make sure the power switch is set to **O**.
3. On the rear panel, connect the cord of the adapter to the 48 V connector.
4. Connect one end of the provided power supply cord to the AC/DC adapter located on the rear panel and plug the other end to the proper voltage wall socket outlet (to know the voltage requirement, see *Technical Specifications* on page 1).
5. On the rear panel, set the power switch to **I**.

Connecting the OSA20 to a 48 V DC Power Source

You can directly connect the OSA20 to a 48 V DC power source by following the instructions given in this section.

The following figure describes the 48 V connector located on the rear panel:



CAUTION

- **Make sure the voltage of the power source is in the range 48–60 V and complies with the requirements of SELV circuit, as defined in the IEC60950-1 standard.**
- **Make sure you have a Kycon KPPX-4P connector.**
- **Make sure the cord you associate with the Kycon KPPX-4P connector fits your requirements. The choice of the cord is under your responsibility.**

To connect the OSA20 to a 48 V DC power source:

1. Make sure the power switch is set to **O**.
2. On the rear panel, connect the Kycon KPPX-4P connector to the 48 V connector and make sure the five pins are connected.
3. On the rear panel, set the power switch to **I**.

Connecting a Light Source to the OSA20

You can connect any type of light source whose output power is in the range indicated in the technical specifications (see *Technical Specifications* on page 1).

CAUTION

- **Make sure you use the appropriate connector type, corresponding to the one mounted on your OSA20 (see *Interfaces and Electrical* on page 3 for available models).**
- **Make sure optical connectors are perfectly clean. It is essential to achieve optimum system performance (see *OSA20 User Guide*, *Cleaning Optical Connectors* on page 143).**

To connect a light source to the OSA20:

1. Remove the protective cap from the **Optical input** connector.

IMPORTANT

Keep protective caps on optical connectors when not in use.

2. Connect the light source to the optical input of the OSA20 with the appropriate jumper corresponding to the connector type mounted on your product, as indicated on the connector's plate (see *Front Panel* on page 4).

Connecting a Mouse and Keyboard to the OSA20

To operate the OSA20, you can connect a USB mouse and keyboard to the USB-A 2.0 and USB-A 3.0 ports located on the front and right-side panels of the OSA20 (see *Product Overview* on page 4).

To connect mouse and keyboard:

Connect the USB mouse and keyboard to one of the available USB ports (you do not need to restart the OSA20).

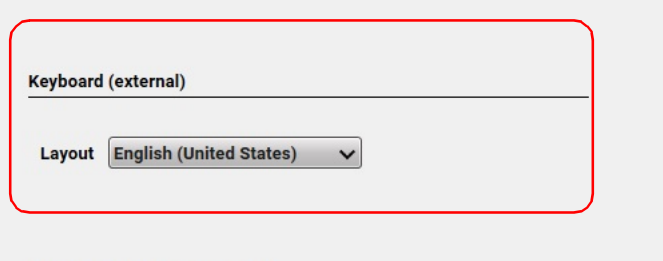
- All operations available using the multi-touch screen are also accessible using the mouse and keyboard.
- The Windows keyboard shortcuts are deactivated.
- The default keyboard setting is QWERTY.

To configure your keyboard using the GUI:

The following procedure explains how to set the language layout corresponding to the keyboard you have connected. After connection, the default keyboard setting is QWERTY.

1. In the OSA20 home window, touch the **Settings** button.

   The **Keyboard** area enables you to switch between QWERTY and AZERTY keyboard.



2. Select the appropriate keyboard in the **Layout** list:
   - French (France): AZERTY keyboard
   - English (United States): QWERTY keyboard
3. Touch the  button to go back to the OSA20 home window.

Turning on the OSA20 and Accessing the Home Window

The home window enables you to access the wanted analysis mode and the main configuration settings of the OSA20.

Make sure the OSA20 is properly installed: see *Unpacking and Installing the OSA20* on page 14.

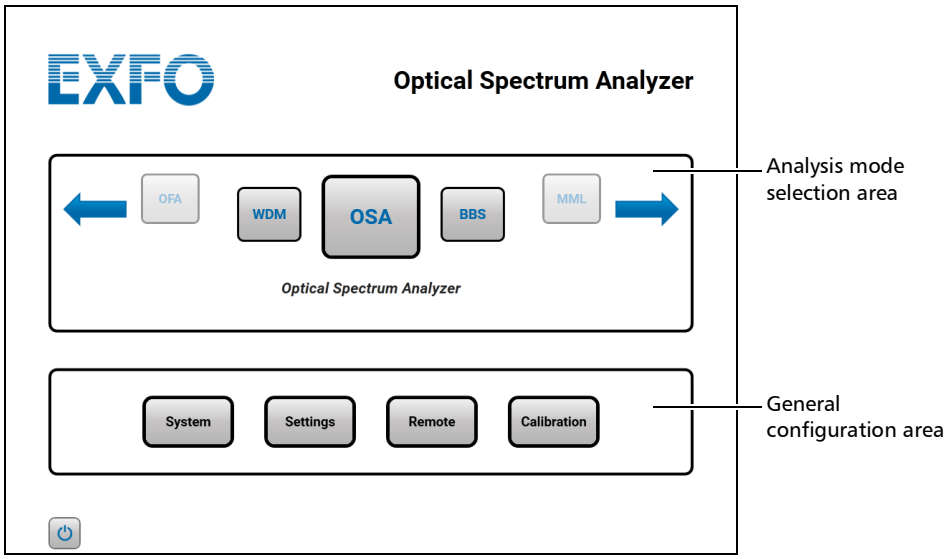
To display the OSA20 Home window:

On the front panel, press the ⏻ button.

After a few seconds, the button lights up. The startup procedure takes approximately 1 minute and 30 seconds.

Once started, the OSA20 home window appears.

For more details, see *OSA20 User Guide* available on the USB key provided with the OSA20.



➤ Analysis mode selection area

Each analysis mode has its own traces and analysis tools. For more details, see section *Accessing an Analysis Mode* on page 37.

➤ General configuration area

Button	Description
System	Provides information about the OSA20 and a customer support contact list. The **More** button gives access to additional information on the system and to remote assistance tools (see *OSA20 User Guide*, *Using Remote Assistance Tools* on page 152).
Settings	Enables you to set the OSA20 general parameters.

Button	Description
Remote	Enables you to set the remote control parameters of the OSA20. For more details, see *OSA20 User Guide*, *Using the OSA20 in Remote Control* on page 137.
Calibration	Opens the OSA20 user calibration application, which enables you to reference the monochromator to one of the acetylene absorption lines. For more details, see *OSA20 User Guide*, *Performing a User Calibration* on page 144.

Turning off the OSA20

The following procedure explains how to correctly turn the OSA20 off.

CAUTION

Never turn the OSA20 off by directly setting the power switch to O.

To turn the OSA20 off:

1. Do one of the following:

   Touch the  button and in the home window, touch the  button.

   OR

   On the front panel, shortly press the  button.

   A confirmation message appears.

2. Touch **Yes**.

   The OSA20 stops.

3. On the rear panel, set the power switch to **O**.

For full details on how to use the OSA20, see *OSA20 User Guide* available on the USB key provided with the instrument.

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