

IQS-636

Modular Tunable Laser Source Platform



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Units of Measurement

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

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Certification Information

North America Regulatory Statement

This unit was certified by an agency approved in both Canada and the United States of America. It has been evaluated according to applicable North American approved standards for product safety for use in Canada and the United States.

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

The limits set by these standards are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, maybe cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Reorient or relocate the receiving antenna.**
- **Increase the separation between the equipment and receiver.**
- **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- **Consult the dealer or an experienced radio/TV technician for help.**

Conventions

Before using the instrument described in this manual, 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.

1. Safety Information



WARNING

- † This instrument must be used with an approved IEC cable with an EARTH terminal. Do not attempt to use this instrument without a proper earth terminal, doing so may lead to a hazardous condition and/or damage to the equipment.
- † Do not install or terminate fibers while a light source is active. Care must be taken to ensure that the instrument has been turned OFF before inspecting the end face(s) of the instrument, or any optical patch cords connected to this instrument. Never look directly into a live fiber and ensure that your eyes are protected at all times.
- † The use of controls, adjustments and procedures other than those specified herein may result in exposure to hazardous situations or impair the protection provided by this unit.




CAUTION

- † The IQS-636 is equipped with fans for thermal regulation. Please ensure that there is at least a 15 cm clear space between the sides of the instrument and any surrounding objects.
- † The IQS-2800 expansion modules are sensitive to electrostatic discharge (ESD). Please be sure to store the modules that are not installed in protective electrostatic packaging.



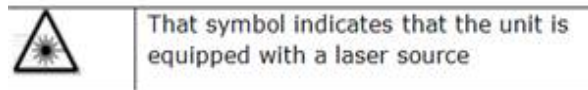
IMPORTANT

- † For electromagnetic compatibility, this instrument is a Class A product. It is intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

- † 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.

- † The AC mains socket is located on the back panel of the instrument. Above this socket there is a mains power isolation switch. Once you have connected the mains AC power, this isolation switch can be turned on. The switch will illuminate to show that AC power supply is live and the IQS-636 is ready to be powered on.

Your instrument is a Class 1M laser product in compliance with standards IEC 60825-1:2007 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.



VIEWING THE LASER OUTPUT WITH CERTAIN OPTICAL INSTRUMENTS (FOR EXAMPLE, EYE LOUPES, MAGNIFIERS AND MICROSCOPES) WITHIN A DISTANCE OF 100 MM MAY POSE AN EYE HAZARD



Figure 1 - Class 1M Laser Product Warning

L'OBSERVATION DE LA SORTIE DU LASER AVEC CERTAINS INSTRUMENTS D'OPTIQUE (PAR EXEMPLE LOUPES D'HORLOGER, LOUPES À MAIN ET MICROSCOPES) À UNE DISTANCE INFÉRIEURE À 100 MM PEUT PRÉSENTER UN DANGER POUR LES YEUX.



Figure 2 - Avertissement : Produit de classe laser 1M

2. Introducing the IQS-636 Modular Tunable Laser Source Platform

The IQS-636 Modular Tunable Laser Source Platform is a multi-channel Continuous Wave (CW) laser system. The laser sources are installed as modules with 2 or 4 lasers. With its high power output, narrow linewidth and the ability for high resolution tuning, the IQS-636 is a cost-effective and versatile solution for various applications including coherent detection of high speed complex modulation formats, DWDM component testing and optical sensor interrogation.

The modular chassis design of the IQS-636, with nine (9) expansion slots, can hold up to thirty six (36) tunable laser sources providing great flexibility to manage the number of laser sources to meet changing laboratory demands.



Figure 3 - EXFO IQS-636 Modular Tunable Laser Source Platform

All IQS-636 mainframes connected to the network can be managed remotely from a single client using the simple and intuitive Tunable Instrument Manager software interface.

Alternatively, VISA programming environments such as MATLAB can also be implemented to integrate with existing test software or data collection procedures.



Figure 4 - Tunable Instrument Manager Software

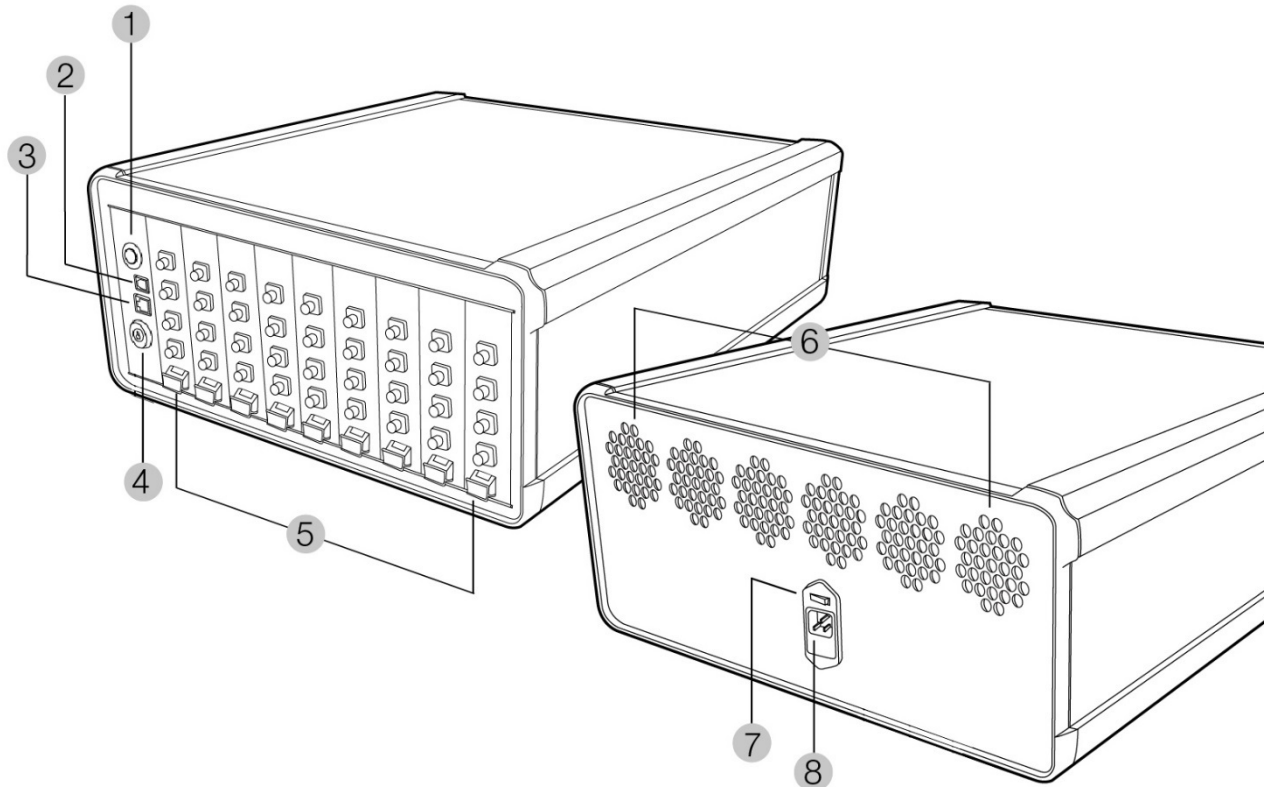
3. Features

IQS-636 Front Panel

1. Power On/Off
2. USB 2.0 Connection
3. Ethernet Connection
4. Laser Interlock (Output Enable/Disable)
5. *IQS-2800 Expansion Slots (9 Bays)

IQS-636 Back Panel

6. Thermal Regulation Fans (6)
7. Mains Power Isolation Switch
8. AC Power 100-240V, 50-60Hz



**Note: Your IQS-636 may have IQS-2800 expansion modules already installed.*

4. Hardware Connections

This section details the hardware connections required to setup the IQS-636 instrument. Depending on the hardware setup you are using, not all of the following connections may be required.

Connections for Remote Operation

The recommended form of communication between any client PC and the IQS-636 is via TCP/IP over the Ethernet. By default the IQS-636 is set to obtain an IP address automatically from a DHCP server. If there is no DHCP server on your network, you will have to configure a static IP for the IQS-636 using the USB connection web interface.

If an Ethernet network is not available a dedicated client PC can be used. This dedicated client PC will require an available USB 2.0 port.

Connecting the Ethernet (recommended)

Connect the IQS-636 Ethernet port to either:

1. The Ethernet Hub of your network to allow any network client the ability to connect remotely.
2. The Ethernet port of a dedicated client PC (this PC being the only client to have remote access) using:
 - 2a. an Ethernet cross-over cable
 - 2b. Ethernet patch cables and small network hub

Connecting the USB (optional)

To perform administrative tasks such as configuration of the network settings, updating firmware and downloading log files, the USB connection is required. You may also require use of the USB as a TCP/IP connection if no alternative Ethernet connection is available.



IMPORTANT

- † You may only have one IQS-636 connected via the USB at any time. If connections to more than one IQS-636 are required, an Ethernet network must be used.
- † The IP Addressing described below is for the USB network connection.
- † The IP Address for the IQS-636 is 192.168.96.201.

Windows 7 and Windows 8

1. Connect a USB cable (type male A to male B) between the USB 2.0 port at the back of the IQS-636 and any available USB 2.0 port on the client PC.
2. Once connected, Windows will automatically install the drivers for the USB Ethernet connection. If the drivers do not automatically install, please refer to the Manual Driver Installation instructions steps 1 to 9 below to install the USB driver.
3. The units USB connection has a static IP address of 192.168.96.201, subnet mask 255.255.255.0
4. The USB Ethernet is now configured.

Manual Driver Installation

1. In response to the 'Can Windows connect to Windows Update to search for software?' select 'No, not this time' and click Next.
2. Select 'Install from a list or specific location (Advanced)' and click Next.
3. Select 'Don't search. I will choose the driver to install' and click Next.
4. Click the 'Have Disk' button.
5. Click the 'Browse' button and locate the oem31.inf file, which can be found in the drivers folder within the supplied installation media. Click Next to continue.
6. Click 'Continue Anyway' when prompted that the driver has not verified its compatibility with Windows.
7. If prompted that 'The file 'usb8023x.sys' on Windows driver cabinet is needed', click the 'Browse' button and locate the file inside the drivers folder within the supplied installation media and click OK to continue.
8. The units USB connection has a static IP address of 192.168. 96.201, subnet mask 255.255.255.0
9. The USB Ethernet is now configured.

Note: Refer to section 12 - USB Connection Web Interface for details on the administrative tasks available over the USB network connection.

Rack Mounting the IQS-636 (optional)



WARNING

DO NOT attempt the following rack mounting procedures without assistance. Before mounting the IQS-636, remove all IQS-2800 tunable lasers sources



CAUTION

Make sure **ALL** cables that are connected to the IQS-636 are removed before attempting to mount the IQS-636 within the instrument rack.



IMPORTANT

Fasteners will be required to attach the IQS-636 to the instrument rack. Please consult the documentation of your instrument rack to ensure the fasteners supplied with the IQS-636 are correct for your installation.

Note: You will need a Phillips screwdriver to fasten the rack mount attachments in place.

1. Fasten the rack mount attachments (supplied in the IQS-636 accessory box) to the threaded holes located at the front of both sides of the IQS-636. Ensure all four screws of both rack attachments are securely fastened.

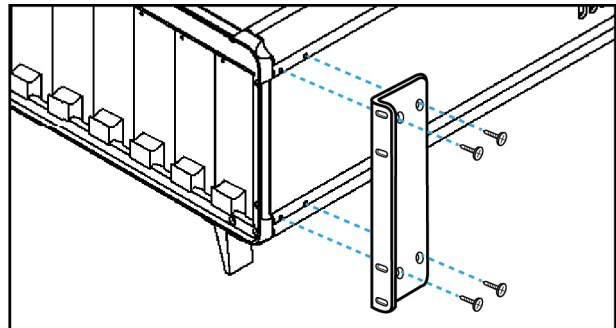


Figure 5 - Fastening Rack Mount Attachment

2. With assistance the IQS-636 can now be held in place within the instrument rack.
3. While the IQS-636 is being held in position, securely fasten the rack mount attachments to the instrument rack with the correct fasteners.

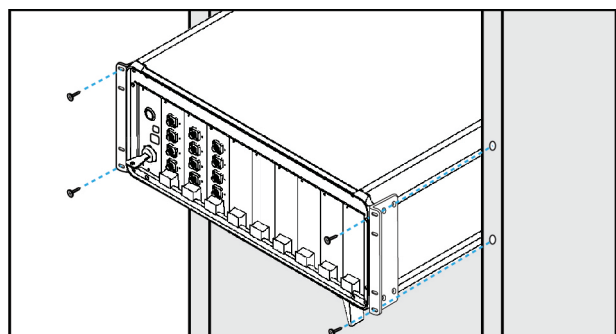


Figure 6 - Fasten the IQS-636 to the Instrument Rack

5. Connecting Optical Output



IMPORTANT

To ensure maximum power and to avoid erroneous readings always inspect fiber ends and make sure that they are clean as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.



CAUTION

The type of optical connectors on the IQS-636 is specific to the IQS-2800 modules installed. The connectors will be of type PM FC/UPC or PM SC/UPC. This information can be found printed on the front plate of the IQS-2800 module. Joining mismatched connectors will damage the ferrules.

Cleaning and Connecting Optical Fibers

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection microscope. If the fiber is clean, proceed to connecting it to the port. If the fiber is dirty, clean it as explained below.
2. Clean the fiber ends as follows:
 - 2a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.
 - 2b. Use compressed air to dry completely.
 - 2c. Visually inspect the fiber end to ensure its cleanliness.
3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces. If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.
4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact. If your connector features a screw sleeve, tighten the connector enough to firmly maintain the fiber in place. Do not over tighten, as this will damage the fiber and the port.

Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

EXFO uses good quality connectors in compliance with EIA-455-21A standards.

To keep connectors clean and in good condition, EXFO strongly recommends inspecting them with a fiber inspection probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation in measurements.

6. Operating the IQS-636

Output Enable/Disable

The *Laser Interlock* switch is used to enable and disable the laser output. While this key switch is OFF (Horizontal), it will override any software configuration settings disabling the output of all lasers installed in the unit and the output state of the lasers cannot be changed. While this key switch is ON (Vertical) the software controls the laser output state.

Note: When the Laser Interlock is switched ON, the output state of the lasers before the key was switched OFF is not restored. The laser states will have to be re-enabled in the software.

Powering On/Off the IQS-636

To power on the IQS-636 simply press the *Power On/Off* switch; the switch will become illuminated to verify the instrument is powered on.



IMPORTANT

After powering on the IQS-636, please wait at least 2 minutes before attempting to communicate with the instrument. This will allow the IQS-636 enough time to finish boot procedures and initialize the communication server.

To power off the IQS-636 press the *Power On/Off* switch. The switch will no longer be illuminated to show the instrument is off.

Remote Operation of the IQS-636

Management and operation of the IQS-636 is all performed remotely (TCP/IP over Ethernet or USB) from a client PC, either using the provided Tunable Instrument Manager software or VISA programming environments.

Tunable Instrument Manager Software

The Tunable Instrument Manager software provides an easy to use graphical interface for configuration and management of the installed laser sources. See section 8, 'Tunable Instrument Manager' for details of the use and functionality of this software.

Programming using Virtual Instrument Software Architecture (VISA)

Programming of the IQS-636 can be achieved using programming environments that support VISA such as MATLAB. Please read section 'VISA Programming Example: MATLAB' for detailed information.

7. Installing the Software



IMPORTANT

Make sure the client PC is connected to the same network as the IQS-636 and the IQS-636 is also powered on before proceeding with software installation.

Client System Minimum Requirements

| | |
|-----------------------------|--|
| † Operating System | Windows 7 or later |
| † Minimum Screen Resolution | 800x600 |
| † Free Hard Disk Space | 1GB |
| † Communication Port | USB 2.0 (Ethernet and USB 2.0 recommended) |

Tunable Instrument Manager Software Installation

Begin the installation by running the '*EXFO IQS-636_setup_[version].exe*' file located on the supplied media. This will start the installation of the Tunable Instrument Manager software package.

1. When the installation begins, you will see the Welcome screen. Click on Next to begin the installation.
2. Please read the license agreement. If you choose to accept the agreement, click on the "*I accept the terms of the License Agreement*" check box and then click "*Install*". If you do not wish to accept the terms of the agreement, click on "*Cancel*" to terminate the software installation.
3. Once the license agreement has been accepted the installation will begin and the file progress will be displayed throughout the installation.
4. When the installation has completed you can click on "*Finish*" with the check box ticked (by default) to immediately start the Tunable Instrument Manager software.
5. The installer will also place a Tunable Instrument Manager application shortcut on your desktop.

8. Tunable Instrument Manager

Start-up

When the Tunable Instrument Manager is run, the start-up screen will be displayed. Click anywhere within the window to initiate the Device Discovery.

Click and drag the desired IQS-636 devices from the 'Discovered devices' to the 'Selected devices' list to enable management of these devices.

Once you have selected all the IQS-636 devices you wish to manage, click 'Apply' to open the main Tunable Instrument Manager interface.



Figure 7 - Tunable Instrument Manager Start-up Device Select

Note: If there are no devices listed in the 'Discovered devices' list, refer to section Discover for instruction on how to detect your IQS-636 devices.

Tunable Instrument Manager Interface

1. Device Selection
2. Main Display
3. Laser Selection Control
4. Laser Output Control
5. Laser Parameter Control
6. Tool Buttons

Note: The Laser Selection Control (3) and Laser Parameter Control (5) are not populated until a selection of laser sources has been made, see below.

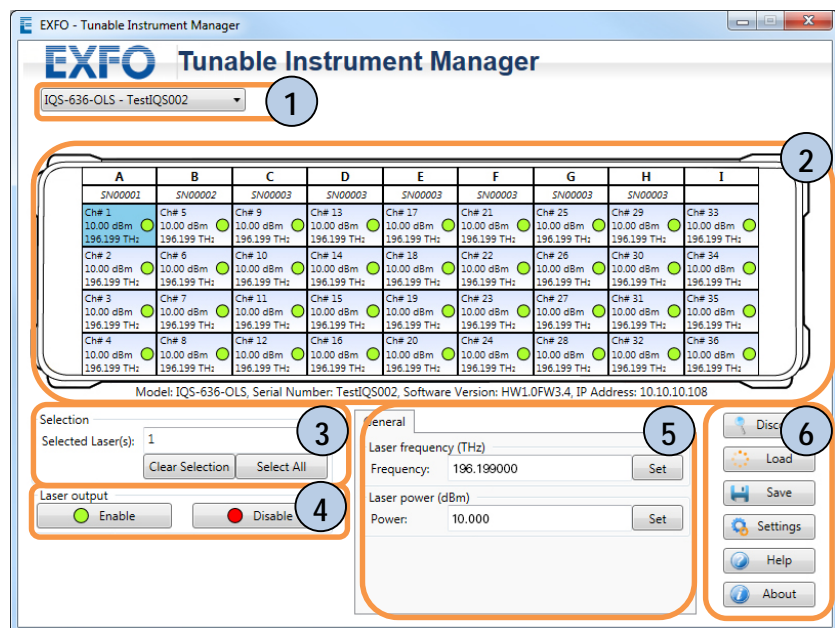


Figure 8 - Test Instrument Manager Interface

Device Selection

The *Device Selection* menu lists all the devices that were selected for management in the *Device Discovery* interface.

Click the drop-down box and select the desired device to be the currently managed unit. This unit will now be shown in the *Main Display*.

Main Display

The *Main Display* is the primary information panel of the software interface. It displays the IQS-636 device and all the installed modules in a format that simulates the configuration of the actual device.

1. IQS-2800 Module
2. Laser Source

Laser source information:

- † Channel number
- † Optical Power (dBm or mW)
- † Frequency or Wavelength
- † State Symbol
(Output ●: on, ●: off,
⚠ : malfunction)

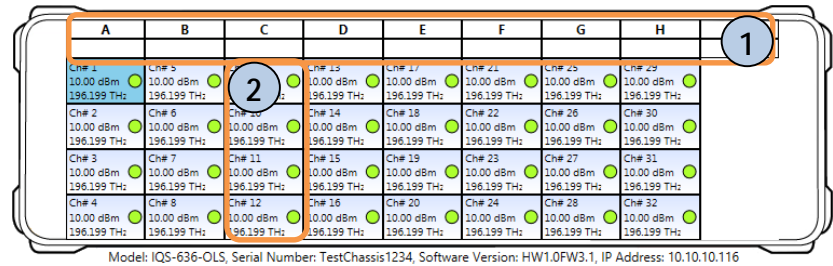


Figure 9 - Main Display

To view more information for a single laser source at a glance, hover the mouse pointer over the laser source and a pop-up information window will appear (as seen in Figure 10).

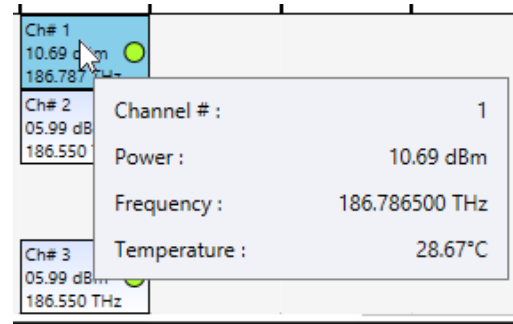


Figure 10 - Laser Information Pop-up

This pop-up window will display the channel number, power, frequency (or wavelength) and the laser temperature.

Selection of laser sources can be done by clicking on a laser to select (or deselect), selected laser sources are then highlighted in blue. Any combination of the laser sources can be selected in this manner, including lasers from multiple IQS-636. See the following section for details on the *Laser selection control*.

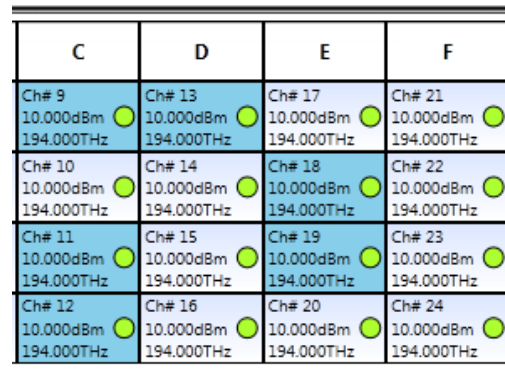


Figure 11 - Example Laser Selections

Laser Selection Control

The *Laser Selection Control* allows you to specify the selected lasers by entering a valid range into the '*Selected Laser(s)*' edit box manually, or by clicking '*Select All*' to select all installed laser sources. You can also click '*Clear Selection*' to deselect all lasers.

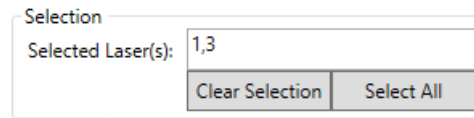


Figure 12 - Laser Selection Control

When you click to select and deselect lasers in the *Main Display*, you will see this '*Selected Laser(s)*' edit box content change accordingly. Laser numbers for multiple IQS-636 systems are sequential.

Example selection ranges:

1 - 4, 6, 9. This will select lasers 1, 2, 3, 4, 6 and 9.
1, 3 - 6. This will select lasers 1, 3, 4, 5 and 6.

Laser Output Control



IMPORTANT

The *Laser Interlock* key when OFF sets and maintains the output state of all installed lasers to disabled. When the *Laser Interlock* key is switched ON, the output state of the selected laser (or selection of lasers) is set using the *Laser Output Control*.

As seen previously, within the *Main Display* of the interface, the laser source information is graphically represented. Each laser source (or channel) will have a *State Symbol* which shows the output state by color (●: on or ●: off).



Figure 13 - Laser Output Control

To change the output state of the selected laser source(s), simply click *Enable* or *Disable*. The *State Symbol* outline changes to show that the laser source is updating and when complete the appropriate state color will be shown.

Laser Parameter Control

When you click to select lasers in the *Main Display*, you will see the controls for changing the laser parameters become available according to the number of selected laser sources.

●, ●: The *State Symbol* not only shows the output state of the laser source, but will also show command progress as well.

●, ●: If the *State Symbol* changes to have a rotating animated dashed outline then this laser source is currently undergoing parameter changes.

General Parameters (changing frequency or wavelength)

Using the general tab in the Laser Parameter Control panel, the power and frequency or wavelength (depending on the *Environment Settings*) can be set for the selected laser sources.

General

Laser frequency (THz)
 Frequency: 186.786500 Set

Laser power (dBm)
 Power: 10.68 Set

Figure 14 - Laser Parameters Single Laser

General

Laser frequency range (THz)
 Start: 186.787 Step: 0 Set

Laser power range (dBm)
 Start: 10.68 Step: 0 Set

Figure 15 - Laser Parameters Multiple Laser Selection

When a single laser source is selected you can enter the desired values and click 'Set'. The laser source *Status Symbol* will reflect the progress of the 'Set' request.

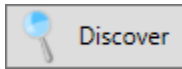
If multiple laser sources are selected, a *Start* value for the power, frequency or wavelength is entered along with a *Step* size value.

For example, with four (4) laser sources selected, when you click 'Set' to apply parameter changes, the first selected laser source will be set at the *Start* value. The remaining laser sources in the selection will be set to values $Start + (Step)$, $Start + (2*Step)$, $Start + (3*Step)$.

Note: The software will provide a warning when you attempt to 'Set' values that are not valid or out of the operating range of the laser sources.

Tool Buttons

Discover



To change the current IQS-636 unit(s) to manage, click the 'Discover' button.

The *Device Discovery* interface will open and scan the network for IQS-636 devices. Scanned devices will show up in the 'Discovered devices' list.

Click and drag the desired IQS-636 devices to the 'Selected devices' list to enable management of these devices.

Once you have selected all the IQS-636 devices you wish to manage, click 'Apply' to open the main Tunable Instrument Manager interface.

Note: Make sure you save the configuration for the current IQS-636 selection before starting the Device Discovery interface.

If no devices are displayed in the 'Discovered devices' list then click the 'Network Settings' button to manually enter an IP address search range. Tick 'Enable Scan' and enter the IP address range. Once you click 'Ok' The Tunable Instrument Manager will search through this IP address range for all IQS-636 devices and add them to the 'Discovered devices' list.

Note: If your device is still not shown in the 'Discovered devices' list; please ensure both your PC and the IQS-636 devices are connected to the network correctly. If the IP address was obtained automatically from a DHCP server, set the corresponding values as limits for the search range.

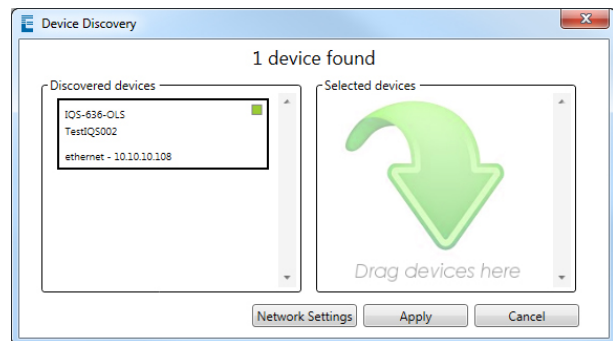


Figure 16 - IQS-636 Device Discovery

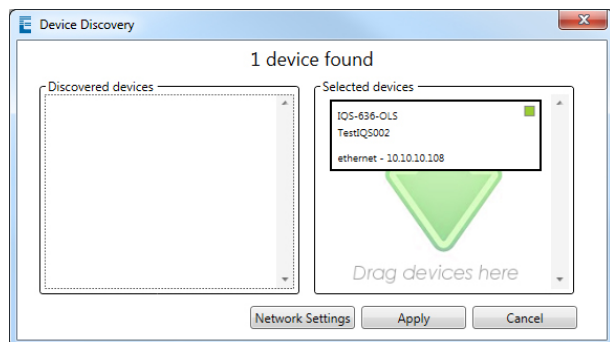


Figure 17 - IQS-636 Selected Dees

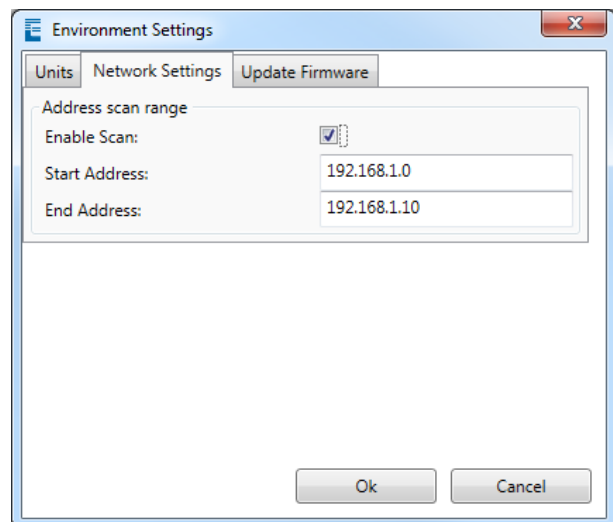


Figure 18 - Network Settings

Load

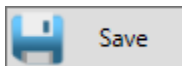


To change to a previous configuration for the current IQS-636. Click 'Load' and the 'Open' dialog will appear.

Navigate to the desired configuration folder and select the desired configuration file then click 'Open'.

Loading configuration files will change the parameters for all the laser sources defined when the file was created. If new modules have been installed since the configuration file was created, these will have to be manually changed and the configuration file should then be updated using the 'Save' tool.

Save

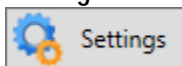


The configuration of the current IQS-636 can be saved to an '.xml' configuration file. When you click the 'Save' button a 'Save As' dialog will open.

Navigate to the desired location to save the configuration file. Click 'Save' to accept the default, or type in the desired *File name* and then click 'Save'.

Configuration files will store the current parameters for all the laser sources installed in the unit.

Settings



To change the *Environment Settings* of the Tunable Instrument Manager software click the 'Settings' button.

The *Environment Settings* window will appear providing tabs to configure 'Units' and 'Network Settings'.

While in the 'Units' tab, radio buttons allow the selection of the different units. Selections can be made between displaying frequency or wavelength and optical power in mW or dBm by clicking the relevant radio buttons.

While the 'Network Settings' tab is open (Figure 18), you are able to enter the IP address search range for device discovery.

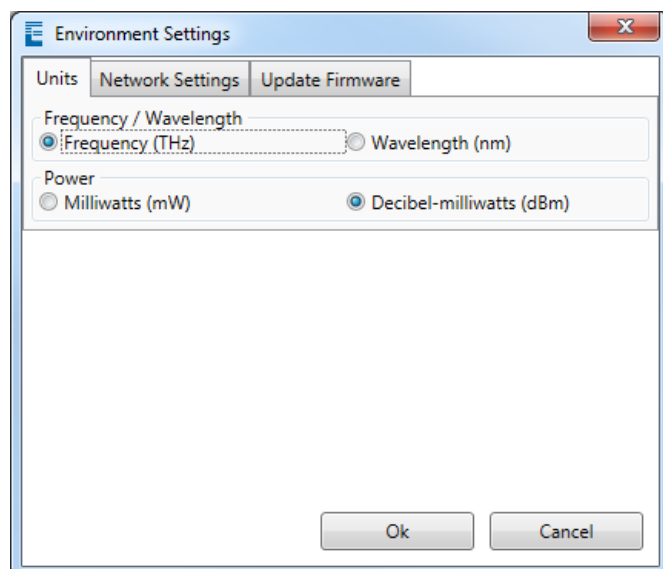


Figure 19 - Unit Settings

If a firmware update is required. The 'Update Firmware' tab can be used to upload the new firmware to the instrument. Use the browse button, to locate the firmware update file. Once a file is opened the target instrument can be selected.

The '*Instrument*' drop down menu is used to select the device to upgrade, which can be identified by the serial number.

The '*Module*' drop down menu is used to select the specific IQS-2800 module to upgrade, which can be identified by the slot location within the IQS-636.

The current versions of the firmware of both the selected system and module are listed within the '*Current versions*' panel.

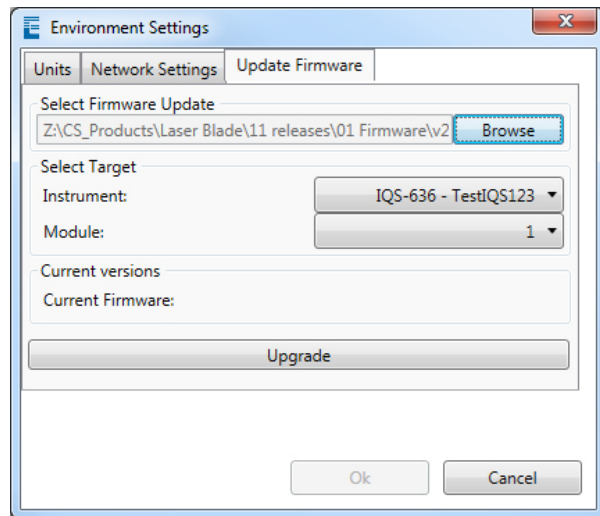



Figure 20 - Update Firmware Settings


System Update

To perform an update of an IQS-636 system:

1. Select the target system from the '*Select System*' drop down menu.
2. Make sure the '*System*' radio button is selected in the '*Select Target*' panel.
3. Use the navigation button, , to locate the firmware update file.
4. Click upgrade to perform the update procedure.

Module Update

To perform an update of an IQS-2800 module:

1. Select the target system from the '*Select System*' drop down menu.
2. Select the target module from the '*Select Module*' drop down menu.
3. Make sure the '*Module*' radio button is selected in the '*Select Target*' panel.
4. Use the navigation button, , to locate the firmware update file.
5. Click upgrade to perform the update procedure.

Once the desired selections are made within the *Environment Settings*, click '*Ok*' to commit the changes and return to the Tunable Instrument Manager interface. These settings choices will be preserved after the Tunable Instrument Manager application has been closed, so next time the Tunable Instrument Manager is run the previous *Environment Settings* will be used.

About



To view EXFO company information, click the '*About*' button.

9. Installing an IQS-2800 Expansion Module



WARNING

DO NOT attempt to remove or adjust any component of the IQS-636 while the power is on. Make sure you follow the correct procedures below and power down the IQS-636 first.



CAUTION

- † Do not remove the IQS-2800 from the antistatic packaging until instructed during the following installation procedure.
- † The IQS-2800 is sensitive to ESD. Please be sure to wear a grounded wrist strap at all times when handling the IQS-2800 module to prevent such damage.
- † Take care not to handle the connector on the IQS-2800 module once they are exposed as this may leave corrosive residue which can damage the connector.

Note: You will need a Phillips screwdriver to both unfasten the blanking module and secure the new IQS-2800 module in place.

Power down the IQS-636

1. Press the *Power On/Off* switch. The switch will no longer be illuminated indicating that the instrument is off.

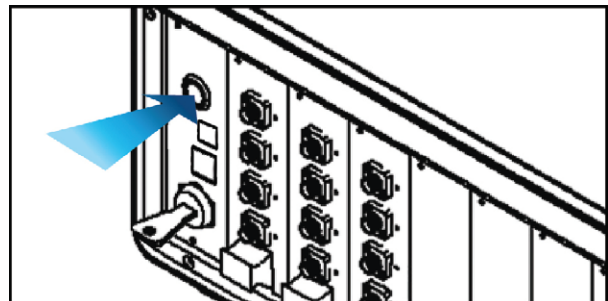


Figure 21 - Turn Off Power

Remove the blanking module

2. To remove the *blanking module* of the desired slot, loosen the screw underneath the *release latch*. Do not attempt to remove the screw completely as they are designed to stay inside the *release latch*.

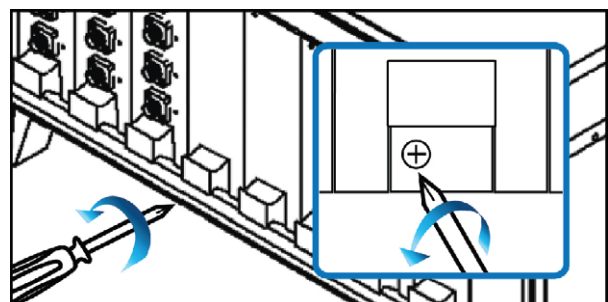


Figure 22 - Unfasten screw under Release Latch

- Slide the *blanking module* out to remove it and store the *blanking module* near the IQS-636 for future use.

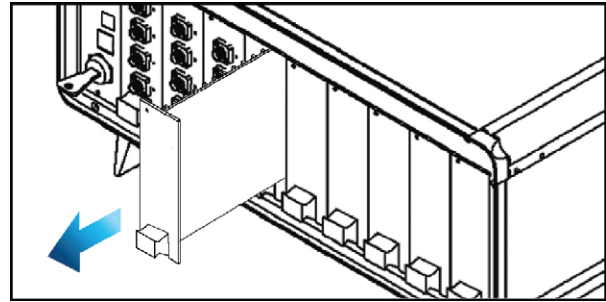


Figure 23 - Removing Blanking Module

Remove the IQS-2800 from packaging

- Unpack the IQS-2800 module from the antistatic packaging, making sure to store the packaging near the IQS-636 so it is available to safely store any IQS-2800 that may be removed in the future.

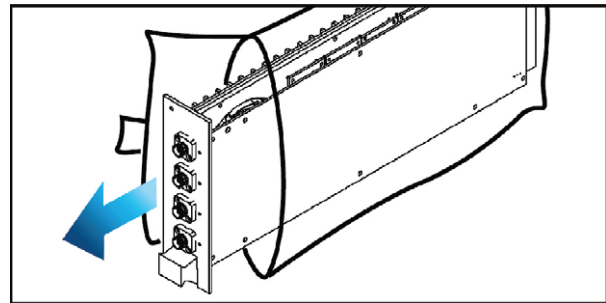


Figure 24 - Remove and store Antistatic Packaging

Insert the IQS-2800 securing into place

- Slide the IQS-2800 into the available slot using the guide rails.

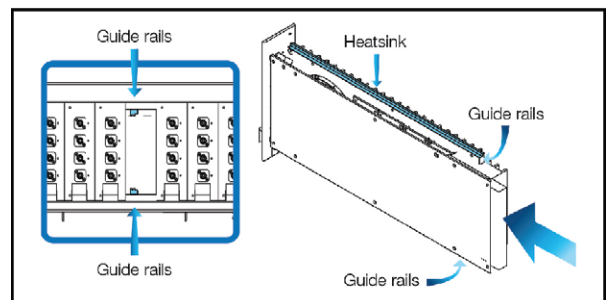


Figure 25 - IQS-636 and IQS-2800 Guide Rails

- Once the IQS-2800 reaches the connector at the end of the slot, press your thumbs on the *release latch* and the top of the IQS-2800 module as shown in Figure 27 to make sure the IQS-2800 seats correctly.

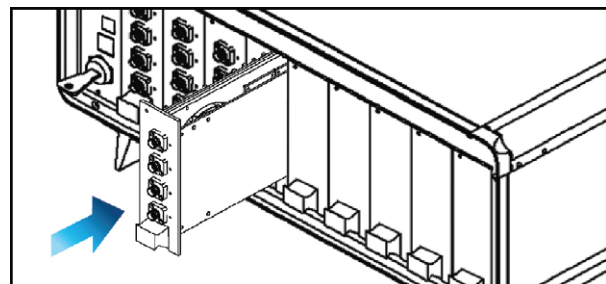


Figure 26 - Installing the IQS-2800 Module

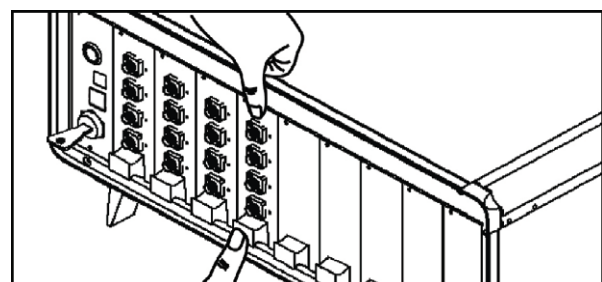


Figure 27 - Press the IQS-2800 Module to seat it into the Connector

- Once the IQS-2800 is installed, fasten the screw in the *release latch* to lock the IQS-2800 into place.

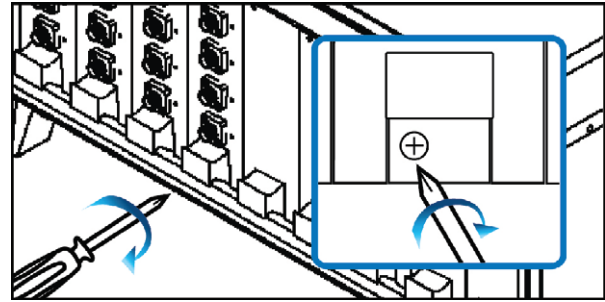


Figure 28 - Fasten screw in Release Latch

Power on the IQS-636

- Power on the IQS-636 by pressing the *Power On/Off* switch. The switch will become illuminated to verify that the instrument is powered on.

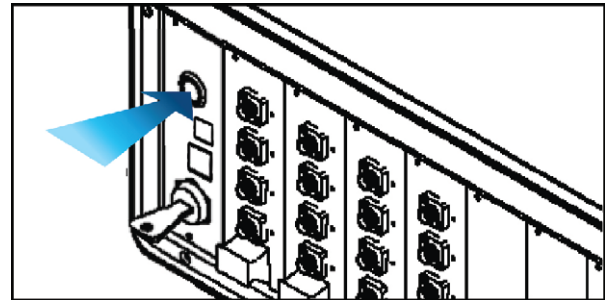


Figure 29 - Powering On the IQS-636



IMPORTANT

After powering on the IQS-636, please wait at least 2 minutes before attempting to communicate with the instrument. This will allow the IQS-636 enough time to finish boot procedures and initialize the communication server.

Configure the new IQS-2800

- Use your preferred method of communicating with the IQS-636 to configure the newly installed IQS-2800.

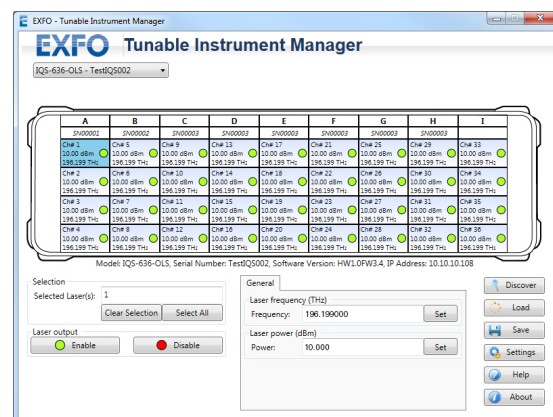


Figure 30 - Configure the IQS-2800

10. Removing an IQS-2800 Expansion Module



WARNING

DO NOT attempt to remove or adjust any component of the IQS-636 while the power is on. Make sure you follow the correct procedures below and power down the IQS-636 first.



CAUTION

- † Do not remove the IQS-2800 from the antistatic packaging until instructed during the following installation procedure.
- † The IQS-2800 is sensitive to ESD. Please be sure to wear a grounded wrist strap at all times when handling the IQS-2800 module to prevent such damage.
- † Take care not to handle the connector on the IQS-2800 module once they are exposed as this may leave corrosive residue which can damage the connector.
- †



IMPORTANT

- † A Blanking module will be required to replace the removed IQS-2800 module. Please make sure you have a blanking module available. The specifications of the IQS-2800 are only valid when all empty slots have blanking modules.
- † You will need antistatic packaging to store the IQS-2800 upon removal at the appropriate step in the following installation procedures. Please make sure this packaging is immediately available before continuing with the following procedure.

Note: You will need a Phillips screwdriver to both unfasten the blanking module and secure the new IQS-2800 module in place.

Acquire storage electrostatic packaging and blanking module

1. In preparation for removal of the IQS-2800 module, locate and retrieve the antistatic packaging the IQS-2800 was supplied in. This should have been stored near the IQS-636 when the IQS-2800 was installed.
2. Also you will require a *blanking module* to install once the IQS-2800 has been removed.



IMPORTANT

Do not continue unless you have the *blanking module* and appropriate storage packaging for the removed IQS-2800. If the IQS-2800 is not stored correctly it may be affected by ESD. The specifications of the IQS-2800 are only valid when all slots have blanking modules.

Power down the IQS-636

3. Press the *Power On/Off* switch. The switch will no longer be illuminated indicating that the instrument is off.

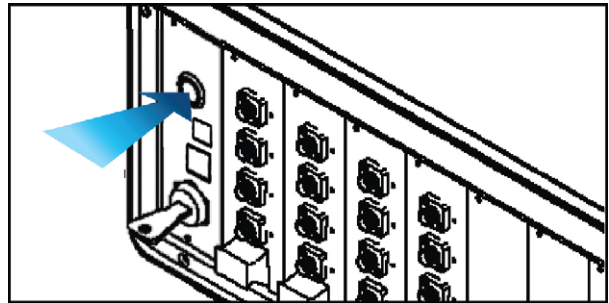


Figure 31 - Turn Off Power



WARNING

Take care when handling the IQS-2800 as during operation the IQS-2800 module may be very hot.

Remove the IQS-2800

4. To remove the desired IQS-2800 module, loosen the screw underneath the *release latch*. Do not try to remove the screw completely as they are designed to stay inside the *release latch*.

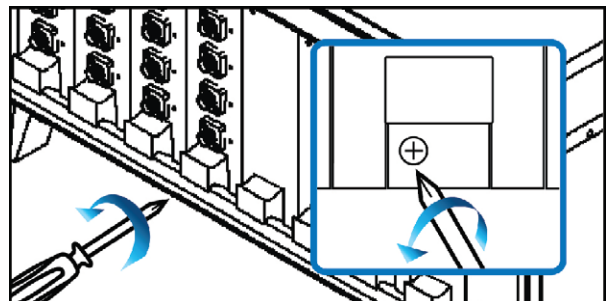


Figure 32 - Unfasten screw under Release Latch

5. Press downward on the *release latch* to unseat the IQS-2800 module from the back connector as shown in Figure 33.

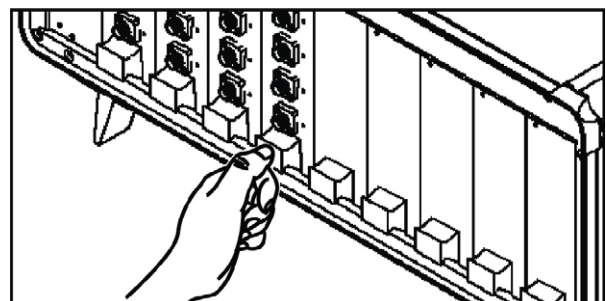


Figure 33 - Press down on the Release Latch

- Slide the IQS-2800 module out to remove.

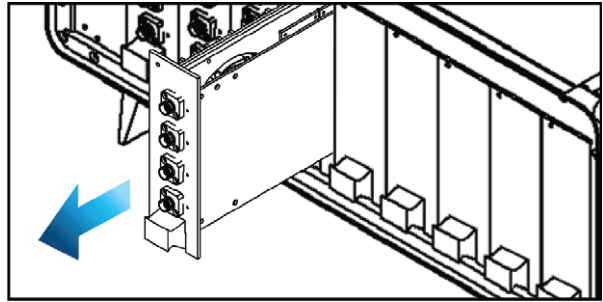


Figure 34 - Slide out the IQS-2800 Module

Package the IQS-2800 for storage

- Once removed, put the IQS-2800 module into the antistatic packaging for storage. This will ensure the IQS-2800 is not subject to ESD.

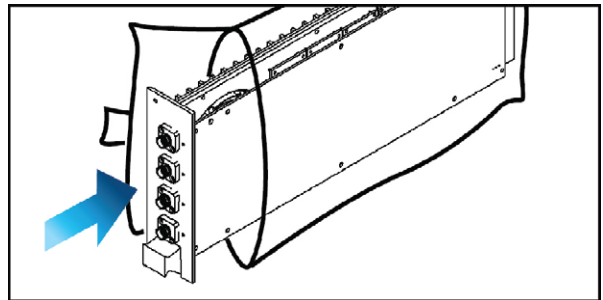


Figure 35 - Storing the IQS-2800 Module

- Slide the *blanking module* into the empty slot using the guide rails.

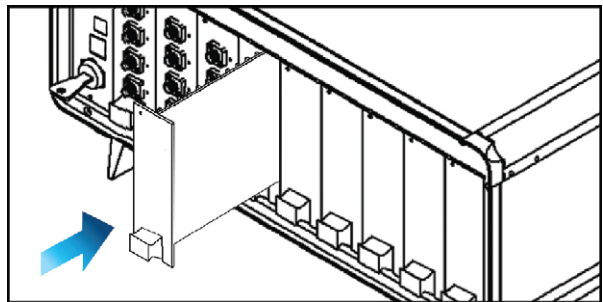


Figure 36 - Installing the Blanking Module

- Once the *blanking module* is fully inserted, fasten the screw in the *release latch* to secure the *blanking module* into place.

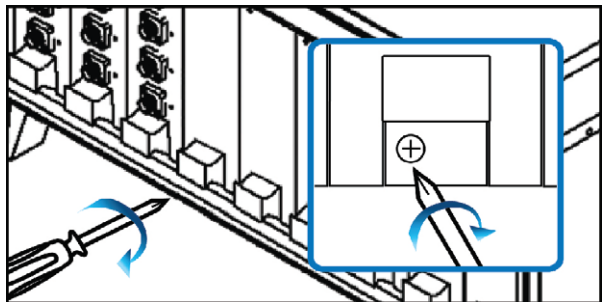


Figure 37 - Fasten screw under Release Latch

Power on the IQS-636

- Power on the IQS-636 by pressing the *Power On/Off* switch. The switch will become illuminated to verify that the instrument is powered on.

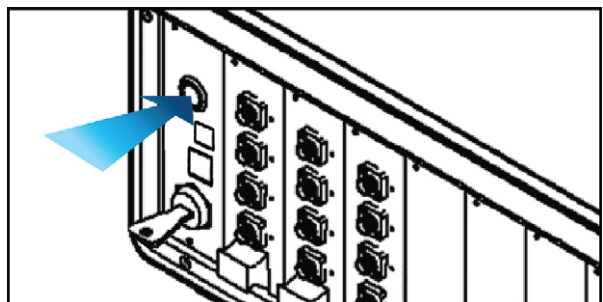


Figure 38 - Power on the IQS-636



IMPORTANT

After powering on the IQS-636, please wait at least 2 minutes before attempting to communicate with the instrument. This will allow the IQS-636 enough time to finish boot procedures and initialize the communication server.

11. Programming Guide

Introduction

Remote communication with the IQS-636 is achieved through the Standard Commands for Programmable Instruments (SCPI). Support for VISA I/O API over TCP/IP is provided by a VXI-11 server running internally on the IQS-636. With VISA communication drivers installed on the client, the implementation of VISA programming within environments such as MATLAB becomes available. This guide provides general information on the commands available to communicate with the IQS-636 remotely using the VISA I/O.

Programming Conventions

This section details the programming and measurement conventions to follow while executing the commands for the IQS-636.

Table 1 - Valid Units and Data Formats

| Parameter | Default Unit | Alternative Units |
|----------------------|--------------|-----------------------|
| Power | dBm | mdBm |
| Frequency | Hz | THz , GHz , MHz , kHz |
| Frequency (Fine) | Hz | THz , GHz , MHz , kHz |
| Wavelength | m | nm , μ m |
| Grid size | Hz | THz , GHz , MHz , kHz |
| SBS Dither Rate | Hz | THz , GHz , MHz , kHz |
| SBS Dither Frequency | Hz | THz , GHz , MHz , kHz |

| Argument | Data Format |
|--------------------|--|
| <wsp> | Specifies whitespace character (01 ₁₆ – 09 ₁₆ , 0B ₁₆ – 20 ₁₆). |
| <value> | Is numerical data, an integer, a decimal, exponential (10e-9 or 5.8e6) or string |
| [VALUE1 VALUE2] | This is a parameter choice. The ' ' separates the unique parameters available, only one of the choices can be used. In the example you can use the input parameter [VALUE1] or [VALUE2] not both. Some commands may have more than two choices available. This parameter can be omitted where the command has a default defined in the command description. |

Index Addressing of Modules (slot, source) and Lasers (channel)

When executing commands, it is almost always necessary to provide the index of a specific IQS-2800 module or an index of a specific laser source.

For the commands that require index values:

† [n]: is the slot (or source) index of the specific module, this is an integer, <1 to 9>

† [m]: is the channel index of a specific laser, this is an integer, <1 to 4>

Message Queues

Information is exchanged in the form of messages. These messages are held in input and output queues.

The output queue stores responses to query commands. The IQS-636 transmits any data in the output queue when a read request is received.

Unless explicitly specified otherwise in the command description, all output response data is transmitted in ASCII format.

Common Command Summary

To comply with Standard Commands for Programmable Instruments (SCPI) 1999 standards, the IQS-636 provides the following common commands.

Table 2 - IQS-636 GPIB Common Commands

| Command | Name |
|---------|---|
| *CLS | Clear Status Command ¹ |
| *IDN? | Identification Query |
| *OPC? | Operation Complete Query ^{1,2} |
| *OPT? | Option Identification Query |

1. IQS-636 firmware FW2.5 and above.
2. IQS-2800 firmware FW1.2 and above.

Common Command Descriptions

| | |
|--------------------|---|
| Command | *CLS |
| Syntax | *CLS |
| Description | Clears data structures in the Message Queues (Output and Error) |
| Parameters | None |
| Response | None |
| Example | *CLS |

| | |
|--------------------|--|
| Command | *IDN? |
| Syntax | *IDN? |
| Description | Query the device for manufacturer information strings |
| Parameters | None |
| Response | Comma separated string containing the <manufacturer>, <part number>, <serial number>,<hardware version><firmware version> |
| Example | *IDN? -> "EXFO,IQS-636-OLS,CSL-1170,HW1.0FW2.2" <i>Note: Hardware and firmware versions are combined and not separated by a comma</i> |

| | |
|--------------------|---|
| Command | *OPC? |
| Syntax | *OPC? |
| Description | Query the Operation Complete status |
| Parameters | None |
| Response | 1: If the IQS-636 and all IQS-2800 modules are ready to execute commands. 0: If the IQS-636 or any IQS-2800 modules still have commands in the input queue to be executed. |
| Example | *OPC? -> 0 |

| | |
|--------------------|---|
| Command | *OPT? |
| Syntax | *OPT? |
| Description | Query the modules installed on the slot |
| Parameters | None |
| Response | The response will be a comma separated string containing the part numbers of the installed IQS-2800 modules. If a slot is not occupied by a module, it will not return any string. |
| Example | *OPT? -> "IQS-2800-1-2-C-S-89,IQS-2800-1-2-C-S-89,,,IQS-2800-1-2-A-S-89,,,," In the example, there are identical model IQS-2800 modules in slot1 and slot2 and a different model IQS-2800 in slot5. Slot3, slot4 and slot6 to slot9 are all currently empty. |

Specific Command Summary

Table 3 - IQS-636 SCPI Specific Commands

| Slot commands | Description |
|--|--|
| :SLOT[n] :OPC? :OPTions? :IDN? | -Query the status of the Operation Complete bit ^{1,2} -Query the modules installed on the slot -Query the Identifier for the slot; returns the manufacturer, part number, serial number, hardware and firmware versions |
| Configuration commands | Description |
| :OUTPut[n]:CHANnel[m] :POWer:UNIT? :STATE/? :SOURce[n]:CHANnel[m] :POWer/? :WAVelength/? :FREQuency/? :FINE/? :GRID/? :SBS/? [:STATE/?] :RATE? :FREQuency/? :TEMPerature? | -Query the power measurement unit used ¹ -Set or query the optical output state of the laser -Set or query the laser power -Set or query the laser wavelength -Set or query the laser frequency -Set or query the laser frequency fine tuning -Set or query the grid spacing -Set or query the state of the SBS dither -Query the dither rate intended for SBS suppression -Set or query the SBS dither frequency modulation -Query the laser temperature |

1. IQS-636 firmware FW2.5 and above.
2. IQS-2800 firmware FW1.2 and above.

Specific Command Descriptions

Slot Commands

| | |
|--------------------|--|
| Command | :SLOT[n]:OPC? |
| Syntax | :SLOT[n]:OPC? |
| Description | Query the Operation Complete status for the module |
| Parameters | None |
| Response | 1 is returned if the module is ready to execute a new operation 0 is returned if the module is busy |
| Example | SLOT1:OPC? -> 1 |

| | |
|--------------------|---|
| Command | :SLOT[n]:OPTions? |
| Syntax | :SLOT[n]:OPTions? |
| Description | Get the modules installed on the slot |
| Parameters | None |
| Response | The response will be a comma separated string of lasers installed in the IQS-2800. If a laser is not installed in a channel, it will not return any identification string. |
| Example | SLOT1:OPT? -> "1,1,, " |

| | |
|--------------------|---|
| Command | :SLOT[n]:IDN? |
| Syntax | :SLOT[n]:IDN? |
| Description | Get the Identifier for the slot |
| Parameters | None |
| Response | Comma separated string containing the <manufacturer>, <part number>, <serial number>,<hardware version><firmware version> |
| Example | SLOT1:IDN? -> "EXFO,IQS-2800-1-2-A-S-89,CSL-1186,HW1.0FW0.8" Note: Hardware and firmware versions are combined and not separated by a comma |

Configuration Commands

| | |
|--------------------|---|
| Command | :OUTPut[n]:CHANnel[m]:POWer:UNIT? |
| Syntax | :OUTPut[n]:CHANnel[m]:POWer:UNIT? |
| Description | Query the power unit of measurement currently set for the specified laser |
| Parameters | None |
| Response | Returns the string for the power unit of measurement of the specified laser |
| Example | OUTP1:CHAN1:POW:UNIT? -> dBm |

| | |
|--------------------|---|
| Command | :OUTPut[n]:CHANnel[m]:STATE |
| Syntax | :OUTPut[n]:CHANnel[m]:STATE<wsp>[ON OFF] |
| Description | Set the laser output state |
| Parameters | ON OFF: To set the output state on or off |
| Response | None |
| Example | OUTP1:CHAN1:STATE ON |

| | |
|--------------------|---|
| Command | :OUTPut[n]:CHANnel[m]:STATE? |
| Syntax | :OUTPut[n]:CHANnel[m]:STATE? |
| Description | Query the laser output state |
| Parameters | None |
| Response | Returns the current output state of the laser |
| Example | OUTP1:CHAN1:STATE? -> ON |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:POWER |
| Syntax | :SOURce[n]:CHANnel[m]:POWER<wsp><value> |
| Description | Set the power of the laser |
| Parameters | <value>: A valid numerical value which is in the range between the MIN and MAX response queried with the POWER? command seen below, or found in the IQS-2800 specifications |
| Response | None |
| Example | SOUR1:CHAN1:POW 10.5 |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:POWER? |
| Syntax | :SOURce[n]:CHANnel[m]:POWER?<wsp>[MIN MAX SET ACT ALL] |
| Description | Query the power of the selected laser |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value SET: Get the desired set value ACT: Get the current value (default). ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum, set or actual (current) power for the laser as specified by parameters |
| Example | SOUR1:CHAN1:POW? SET -> 14.5 |



IMPORTANT

If the laser STATE is ON while setting Wavelength, FREQUENCY or FREQUENCY:FINE. Please note that there will be a minimal non-stable output generated during the transition to the new value when the configuration commands are executed.

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:WAVelength |
| Syntax | :SOURce[n]:CHANnel[m]:WAVelength<wsp><value> |
| Description | Set the laser wavelength |
| Parameters | <value>: A valid numerical value which is in the range between the MIN and MAX response queried with the WAVelength? command seen below, or found in the IQS-2800 specifications |
| Response | None |
| Example | SOUR1:CHAN1:WAV 1.561419e-06 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:WAVelength? |
| Syntax | :SOURce[n]:CHANnel[m]:WAVelength?<wsp>[MIN MAX SET LOCK ALL] |
| Description | Get the laser wavelength |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value SET: Get the set value (default) LOCK: Query whether the laser is currently at the SET wavelength ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set value for the laser wavelength as specified by parameters. The lock parameter will return as TRUE or FALSE |
| Example | SOUR1:CHAN1:WAV? MAX -> 1.561419e-06 |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:FREQuency |
| Syntax | :SOURce[n]:CHANnel[m]:FREQuency<wsp><value> |
| Description | Set the laser frequency |
| Parameters | <value> is a valid numerical value which is in the range between the MIN and MAX response queried with the FREQuency? command seen below, or found in the IQS-2800 specifications |
| Response | None |
| Example | SOUR1:CHAN1:FREQ 1.92e+14 |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:FREQuency? |
| Syntax | :SOURce[n]:CHANnel[m]:FREQuency?<wsp>[MIN MAX SET LOCK ALL] |
| Description | Get the laser frequency |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value SET: Get the desired set value (default) LOCK: Query whether the laser is currently at the SET frequency ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set frequency for the laser as specified by parameters. The lock parameter will return as <i>true</i> or <i>false</i> |
| Example | SOUR1:CHAN1:FREQ? MAX -> 1.92000000e+14 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:FREQuency:FINE |
| Syntax | :SOURce[n]:CHANnel[m]:FREQuency:FINE<wsp><value> |
| Description | Set or the laser frequency fine tuning |
| Parameters | <value>: A valid numerical value in the frequency fine tuning range. Fine tuning can increase or decrease the frequency (positive or negative value). Valid range is from -6 GHz to 6 GHz in 1 MHz increments as detailed in the specifications. |
| Response | None |
| Example | SOUR1:CHAN1:FREQ:FINE 2e+06 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:FREQuency:FINE? |
| Syntax | :SOURce[n]:CHANnel[m]:FREQuency:FINE?<wsp>[MIN MAX ALL] |
| Description | Get the laser frequency fine tuning |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set fine tuning frequency for the laser as specified by parameters. |
| Example | SOUR1:CHAN1:FREQ:FINE? -> 2.00000000e+06 |



IMPORTANT

The Laser STATE must always be set to OFF before attempting to change the GRID spacing.

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:GRID |
| Syntax | :SOURce[n]:CHANnel[m]:GRID<wsp><value> |
| Description | Set the channel grid spacing |
| Parameters | <value>: Is the channel grid spacing within the specification range given by the MIN and MAX response queried with the GRID? command below. |
| Response | None |
| Example | SOUR1:CHAN1:GRID 5e+10 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:GRID? |
| Syntax | :SOURce[n]:CHANnel[m]:GRID?<wsp>[MIN MAX ALL] |
| Description | Query the grid spacing |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set grid spacing for the laser as specified by parameters. |
| Example | SOUR1:CHAN1:GRID? MAX -> 5.000000e+10 |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:SBS |
| Syntax | :SOURce[n]:CHANnel[m]:SBS<wsp>[ON OFF] |
| Description | Set the state of the SBS dither |
| Parameters | ON OFF: Set the SBS dither state to on or off |
| Response | None |
| Example | SOUR1:CHAN1:SBS ON |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:SBS? |
| Syntax | :SOURce[n]:CHANnel[m]:SBS? |
| Description | Query the state of the SBS dither |
| Parameters | None |
| Response | Returns the current state of the SBS dither |
| Example | SOUR1:CHAN1:SBS? -> ON |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:SBS:STATE |
| Syntax | :SOURce[n]:CHANnel[m]:SBS[:STATE]<wsp>[ON OFF] |
| Description | Set the state of the SBS dither |
| Parameters | ON OFF: Set the SBS dither state to on or off |
| Response | None |
| Example | SOUR1:CHAN1:SBS:STATE ON |

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:SBS:STATE? |
| Syntax | :SOURce[n]:CHANnel[m]:SBS:STATE? |
| Description | Query the state of the SBS dither |
| Parameters | None |
| Response | Returns the current state of the SBS dither |
| Example | SOUR1:CHAN1:SBS:STATE? -> ON |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:SBS:RATE? |
| Syntax | :SOURce[n]:CHANnel[m]:SBS:RATE?<wsp>[MIN MAX ALL] |
| Description | Queries the dither rate intended for SBS suppression |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set SBS dither rate for the laser as specified by parameters |
| Example | SOUR1:CHAN1:SBS:RATE? -> 2.000e+04 |



IMPORTANT

SBS Dither STATE must always be set to OFF before attempting to change the SBS frequency.

| | |
|--------------------|---|
| Command | :SOURce[n]:CHANnel[m]:SBS:FREQuency |
| Syntax | :SOURce[n]:CHANnel[m]:SBS:FREQuency<wsp><value> |
| Description | Set the SBS dither frequency modulation. |
| Parameters | <value>: The desired frequency value within the range MIN and MAX given by the FREQ? query command below. |
| Response | None |
| Example | SOUR1:CHAN1:SBS:FREQ 1e+08 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:SBS:FREQuency? |
| Syntax | :SOURce[n]:CHANnel[m]:SBS:FREQuency?<wsp>[MIN MAX ALL] |
| Description | Query the SBS dither frequency |
| Parameters | MIN: Get the minimum programmable value MAX: Get the maximum programmable value ALL: Returns all of the above parameters |
| Response | Returns the minimum, maximum or currently set SBS dither frequency for the laser as specified by parameters |
| Example | SOUR1:CHAN1:SBS:FREQ? -> 1.00000000e+08 |

| | |
|--------------------|--|
| Command | :SOURce[n]:CHANnel[m]:TEMPerature? |
| Syntax | :SOURce[n]:CHANnel[m]:TEMPerature? |
| Description | Get the laser temperature |
| Parameters | None |
| Response | Numerical temperature in degrees Celsius |
| Example | SOUR1:CHAN1:TEMP? -> 26.88 |

VISA Programming Example: MATLAB



IMPORTANT

MATLAB R2010x or later with the *Instrument Control Toolbox* is required to execute the code detailed in this section.

VISA IO Driver Installation

To communicate with the FLS-2800 in MATLAB the installation of a VISA IO driver is required. These drivers enable the creation of the *Interface Object* for instrument communication.

Optional links to download third party VISA drivers:

- † Agilent IO Suite - <http://www.agilent.com/find/iosuite>
- † National Instruments NI-VISA (5.3) - <http://joule.ni.com/nidu/cds/view/p/id/3823/lang/en>

MATLAB Test and Measurement Tool (`tmtool`)

The *Test and Measurement tool* is part of the *Instrument Control Toolbox*.

Note: To easily verify you have this feature installed type `tmtool` at the command line. The *Test and Measurement tool* will open in a new window if it is installed.

1. Type `tmtool` at the command line and the *Test and Measurement tool* will open in a new window.
2. Double click on the '*Instrument Objects*' entry in the '*Instrument Control Toolbox*'.

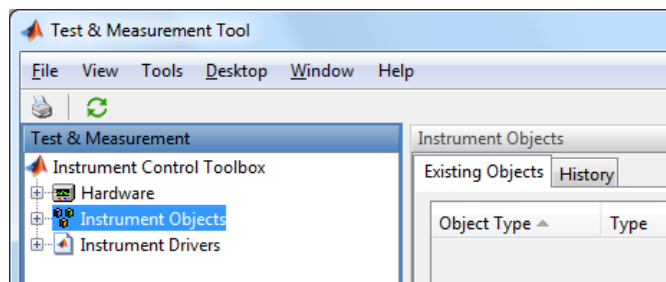


Figure 39 - MATLAB Test and Measurement Tool

3. Right click on '*Interface Objects*' to bring up the context menu. Now select '*Create New Interface Object...*'

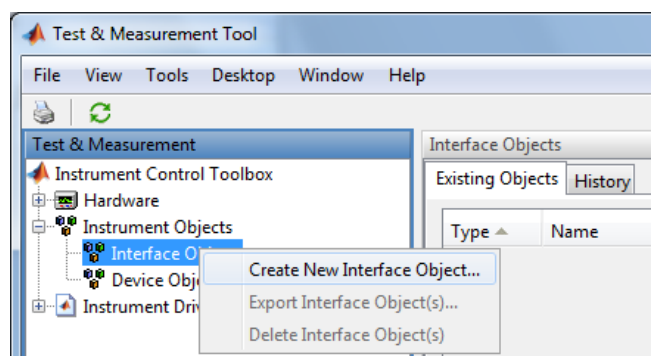


Figure 40 - MATLAB Create New Interface Object

- Modify the options within the 'New Object Creation' window to the following:
Interface object type:
 VISA
Vendor:
 <the VISA IO driver vendor>
Resource name:
 TCP/IP::<IP address of the IQS-636>::inst0
 Then click 'OK'

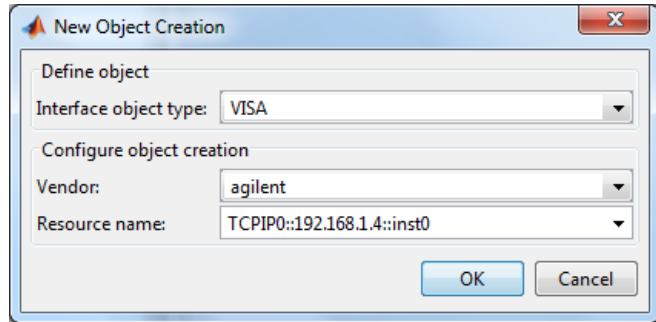


Figure 41 - MATLAB New Object Creation Window

- Once the VISA object is created you can click 'Connect' which will open the connection to the IQS-636 ready for communication.

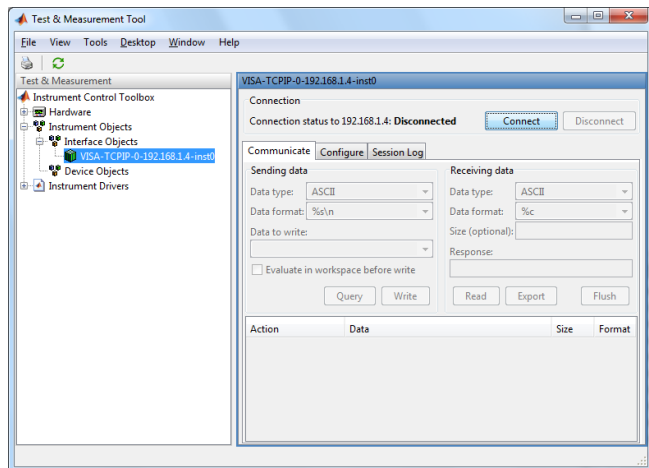


Figure 42 - MATLAB VISA Object Connect

- While connected, using the 'Communicate' tab, commands can be entered into the 'Data to write' edit box (which also keeps a command history). Then clicking 'Query' or 'Write', depending on the type of command you are attempting to execute, 'Action' entries will be added to the window giving the relative information about the command execution. For example response data will be listed here.

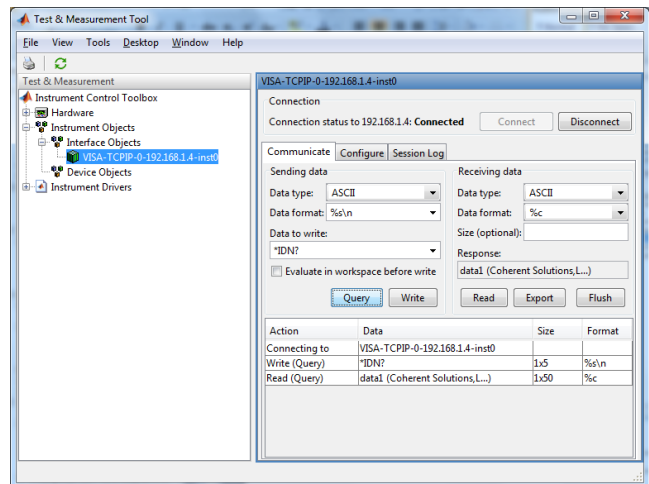


Figure 43 - MATLAB VISA Object Query

7. Once commands have been executed in the 'Communicate' tab, clicking on the 'Session Log' tab now shows MATLAB script code that will perform all the commands that were executed in the 'Communicate' tab.
8. By clicking 'Save Session...' you are able to save the MATLAB .m file of these executed commands.

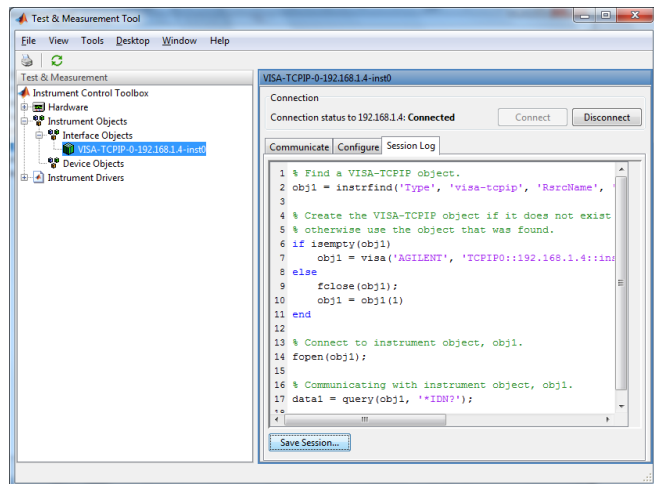


Figure 44 - MATLAB VISA Session Log

MATLAB Example Code: Query the IQS-636

```
% Find a VISA-TCPIP object. This is if the VISA object has already be
% created with tmtool etc, or has been removed from the workspace without
% first being closed (cleanly disconnected)
IQS_636 = instrfind('Type', 'visa-tcpip', ...
    'RsrcName', 'TCPIP0::192.168.1.4::inst0::INSTR', 'Tag', '');

% Create the 'agilent' VISA-TCPIP object if it does not exist
% otherwise use the object that was found.
if isempty(IQS_636)
    IQS_636 = visa('agilent', 'TCPIP0::192.168.1.4::inst0::INSTR');
else
    fclose(IQS_636);
    IQS_636 = IQS_636(1);
end

% Open the connection to the VISA object
fopen(IQS_636);

% Query the IQS-636.
response = query(IQS_636, '*IDN?');
disp('The *IDN query response:');
disp(response);

response = query(IQS_636, '*OPT?');
disp('The *OPT query response:');
disp(response);

% Close the connection to the object
fclose(IQS_636);

% Clean up all objects.
delete(IQS_636);
```

Notes: The IP address (192.168.1.4) used in the code is an example only. You will need to substitute in the IP address of your IQS-636.

12. USB Connection Web Interface

The USB web interface provides network configuration and log retrieval tools. This web interface is only available when connected by USB.

To access the USB web interface, open your internet browser and enter the address 'http://192.168.96.201'. This will connect to the USB web interface welcome screen.

Note: The IP address 192.168.96.201 is a factory set IP for the IQS-636 USB connection.

From this web page you can click on the links to the available administration tasks.



Figure 45 - USB Web Interface, Welcome Screen

Network Configuration (Ethernet)

The Ethernet IP address for the IQS-636 is requested from a DHCP server by default (*Obtain an IP address automatically*), however if no DHCP server is available, the configuration of the IQS-636 Ethernet networking must be performed using this USB web interface.



IMPORTANT

The IP Addressing described below is specifically used for Ethernet interface network connectivity. Please ensure this is never configured to 192.168.96.201 which will conflict with the USB web interface.

To change the Ethernet IP address of the IQS-636 to a static IP, select '*Use the following IP address:*' and the edit boxes will become active allowing you to enter the desired *IP address* and *Subnet mask*.

To set the Ethernet IP address to DHCP, select '*Obtain an IP address automatically*'.

Always confirm the *IP address* and *Subnet mask* with your network administrator before updating any network configuration settings.

Once entered, click '*Update Network Settings*' to apply the network configuration.

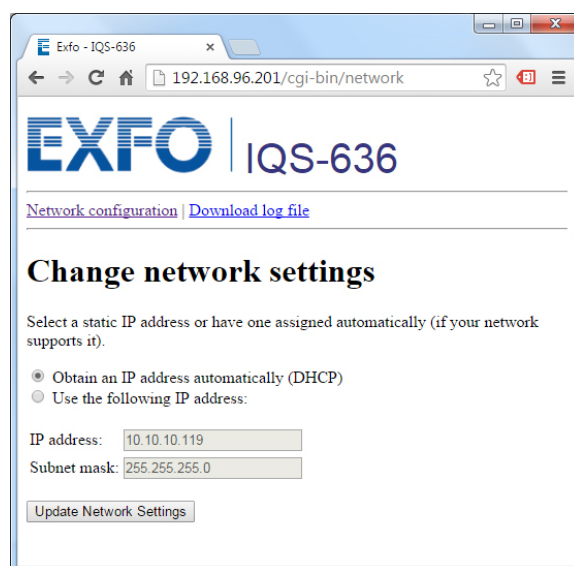


Figure 46 - USB Web Interface, Network Configuration

Download Log File

If a copy of the IQS-636 system log files is required, the *Download log file* link can be used to retrieve this data.

Clicking this link will initiate a download of the *logfile.zip*. Click 'Save' and then navigate to the desired location to save this zip file and click 'Save' again.



Figure 47 - USB Web Interface, Download Log Files

13.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 dust.
- † Always use blanking modules in slots that do not have an IQS-2800 laser module.
- † 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.
- † If any liquids are spilled on or into the unit, turn off the power immediately, disconnect from any external power source, remove the batteries and let the unit dry completely.



WARNING

The use of controls, adjustments and procedures other than those specified herein may result in exposure to hazardous situations or impair the protection provided by this unit.

Recycling and Disposal (Applies to European Union only)

For complete recycling/disposal information as per European Directive WEEE 2012/19/UE, visit the EXFO Web site at www.exfo.com/recycle

NOTICE

通告

CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES 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 GZHQ 产品中的有毒有害物质或元素的名称和含量"

| | |
|---|---|
| O | Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 |
| X | Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。 |

| Part Name 部件名称 | Toxic or hazardous Substances and Elements 有毒有害物质和元素 | | | | | |
|--|---|----------------------|----------------------|--|--|--|
| | 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 电子和电子组件 | 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 |

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 ^a | 5 |  |

a. If applicable.
如果适用

14. Technical Support

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@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.

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.

You may also be requested to provide software and module version numbers. This information, as well as technical support contact information, can be found in the 'About' window.

Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The IQS-636 should be moved, lifted or otherwise transported without any IQS-2800 modules in the expansion slots.

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.



IMPORTANT

Keep this manual close at hand as it contains important details about your product.

15. Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year 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:

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

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, transportation 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

EXFO will charge a fee for replacing optical 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 45). 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 45).

EXFO Service Centers Worldwide

If your product requires servicing, contact the 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

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| | | |
|------------------------|--|--|
| CORPORATE HEADQUARTERS | 400 Godin Avenue | Quebec (Quebec) G1M 2K2 CANADA Tel.: 1 418 683-0211 · Fax: 1 418 683-2170 |
| EXFO AMERICA | 3400 Waterview Parkway Suite 100 | Richardson, TX 75080 USA Tel.: 1 972-761-927 · Fax: 1 972-761-9067 |
| EXFO EUROPE | Winchester House, School Lane | Chandlers Ford, Hampshire S053 4DG ENGLAND Tel.: +44 2380 246 800 · Fax: +44 2380 246 801 |
| EXFO ASIA-PACIFIC | 100 Beach Road, #25-01/03 Shaw Tower | SINGAPORE 189702 Tel.: +65 6333 8241 · Fax: +65 6333 8242 |
| EXFO CHINA | Beijing Global Trade Center, Tower C, Room 1207, 36 North Third Ring Road East, Dongcheng District | Beijing 100013 P. R. CHINA Tel.: +86 (10) 5825 7755 · Fax: +86 (10) 5825 7722 |
| EXFO SERVICE ASSURANCE | 270 Billerica Road | Chelmsford MA, 01824 USA Tel.: 1 978 367-5600 · Fax: 1 978 367-5700 |
| EXFO FINLAND | Elektroniikkatie 2 | FI-90590 Oulu, FINLAND Tel.: +358 (0) 403 010 300 · Fax: +358 (0) 8 564 5203 |
| TOLL-FREE | (USA and Canada) | 1 800 663-3936 |

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**Telecom Test and
Service Assurance**