DiCon
FIBEROPTICS, INC

MOA-3800 Rackmount Variable Attenuator

(Hardware Revision B) Operation Manual

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All international return shipments to DiCon, including packaging and airway bill, must be marked "Goods made in the United States; enter as American Goods Returned ('AGR')" and state the reason for the return to the United States. DiCon will refuse all returns that are not properly documented. All risks of any such refused shipment are the sole responsibility of Buyer.

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Contents

1. Safety Information

General 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.
- 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.

IMPORTANT

When you see the following symbol on your unit  , make sure that you understand and meet the required condition before using your product.

Electrical Safety Information

WARNING

- Ensure that your power supply is properly grounded and that the power cable and power supply are compatible with the unit.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- All wiring and installation must be in accordance with local building and electrical codes acceptable to the authorities in the countries where the equipment is installed and used.
- Use only the certified power cord that is suitable rated for the country where the unit is sold.
- Use this unit indoors only.
- 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 (cover, panels, etc.) is damaged.
- Consideration should be given to the connection of the unit to the supply circuit and the effect that overloading of the circuits might have on over-current protection and supply wiring. Appropriate consideration of equipment nameplate rating should be used when addressing this concern.
- To avoid the potential for an electrical shock hazard, you must reliably connect an earth ground conductor to the unit. Ensure to ground the unit using a grounding method that complies with your local regulations.

2. Product Overview

Introduction

Optimized for use with EXFO systems and software control, the MOA-3800 can precisely add attenuation to four, eight or sixteen different fibers, with each fiber able to be set independently. An optional Self Adjusting mode is also available, which automatically monitors and sets the output power to a desired power level.

With its remote-control capabilities using Standard Commands for Programmable Instruments (SCPI) over Ethernet, the MOA-3800 is the perfect solution for Bit-error-rate (BER) testing and system characterization, component or system loss simulation, optical margin analysis, WDM power balancing, and other applications.

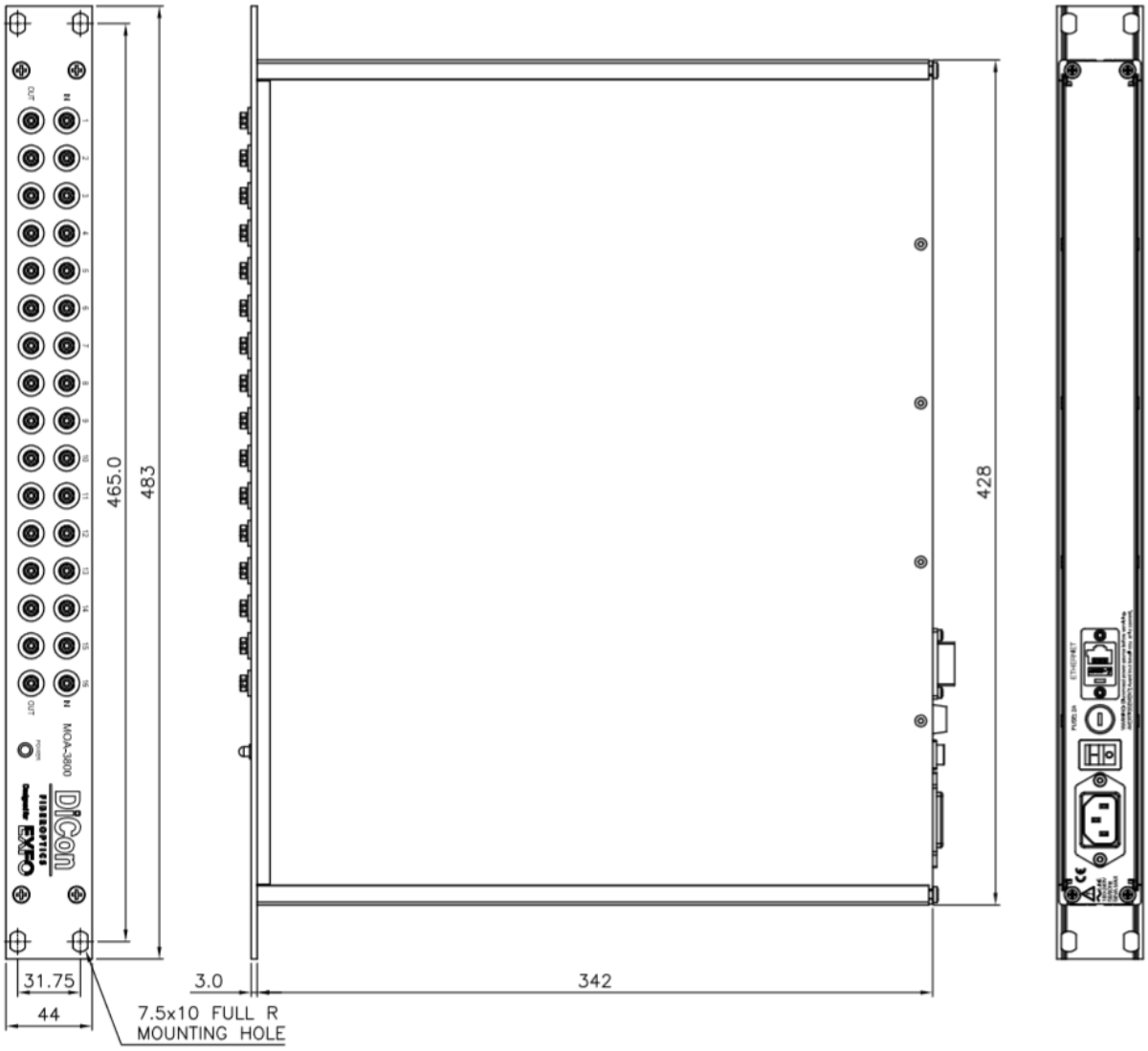
Electrical Specifications

Parameter	Specification
Supply Voltage	AC 100 - 240V, 50/60Hz
Latching Type	Non-latching
Control Type	Ethernet Interface with EXFO SCPI Command Set
Ethernet Interface	Control via the Perle IOLAN DS1 Device Server, RJ45 receptacle on the rear panel
Front Panel Power Status LED	LED will be lit up when power is turned on

Equipment Ratings

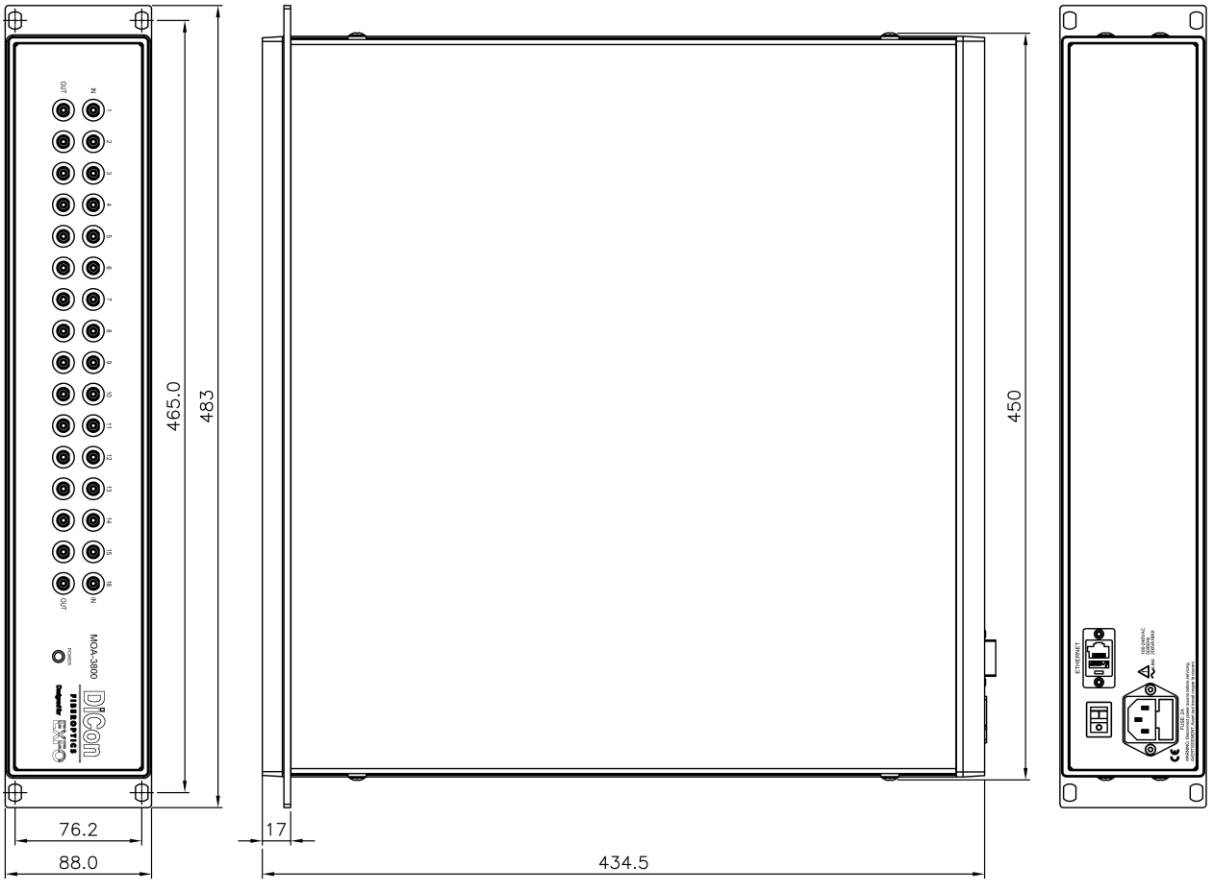
Parameter	Specification
Operation Temperature	0 °C to 50 °C (32 °F to 122 °F)
Storage Temperature	-20 °C to 60 °C (-4 °F to 140 °F)
Relative Humidity	0% to 80% non-condensing
Maximum Operation Altitude	2,000 m (6,561.68 ft)
Pollution Degree	2
Overvoltage Category	II
Input Power	AC 100-240 V (Not exceeding ±10% of the nominal voltage); 50/60 Hz; 2 A/1 A

Mechanical Dimensions – 4, 8 or 16-Ch Single-mode VOA



For illustrative purposes a MOA-3800 16-Ch Single-mode VOA is shown (Unit: mm)

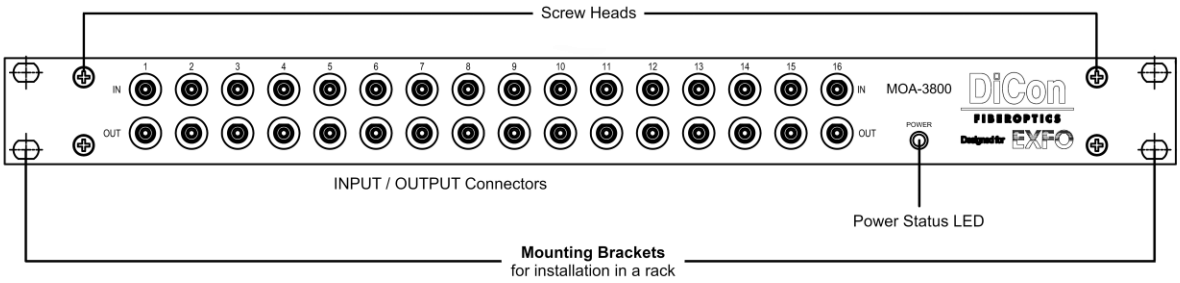
Mechanical Dimensions – 4, 8 or 16-Ch Multi-mode VOA



For illustrative purposes a MOA-3800 16-Ch Multi-mode VOA is shown (Unit: mm)

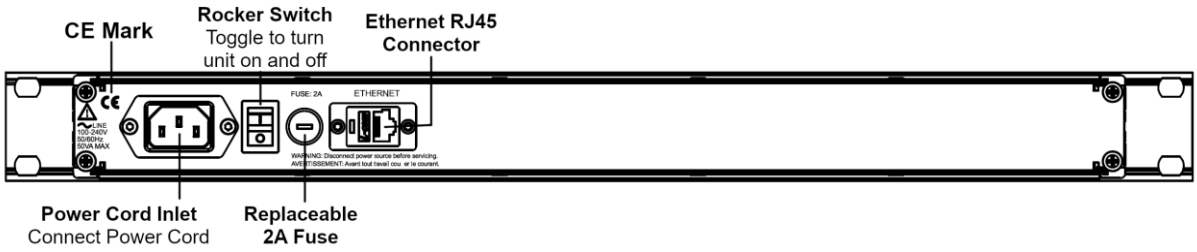
Panel Labeling – 4, 8 or 16-Ch Single-mode VOA

Front Panel Labeling



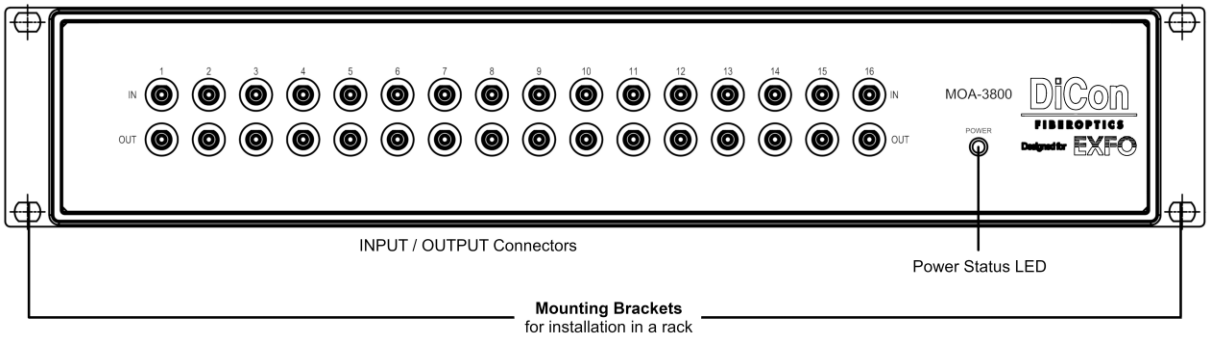
For illustrative purposes labeling shown for MOA-3800 16-Ch Single-mode VOA

Rear Panel Labeling



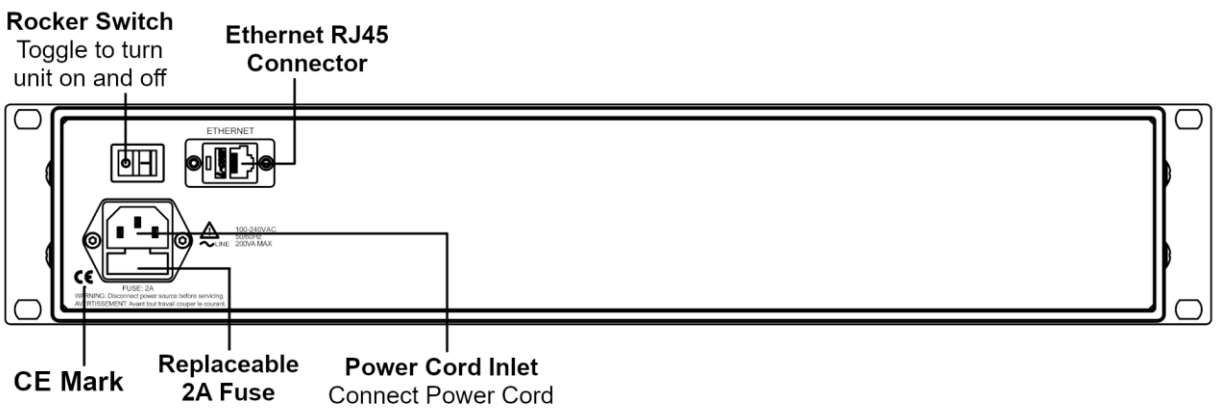
Panel Labeling – 4, 8 or 16-Ch Multi-mode VOA

Front Panel Labeling



For illustrative purposes labeling shown for MOA-3800 16-Ch Multi-mode VOA

Rear Panel Labeling



Items included in Shipping Box

- MOA-3800 Rackmount Variable Attenuator
- Power Cords, one each for use in the following:
  - North America (DiCon P/N: 50302-000 or equivalent)
  - Europe (DiCon P/N: 5040095-001 or equivalent)
  - UK (DiCon P/N: 5040096-001 or equivalent)
  - Japan (DiCon P/N: 50303-001 or equivalent)
  - China (DiCon P/N: 50304-001 or equivalent)
- Software CD: Includes Manual in PDF form & Device Server Installation Software
- Printed test report

3. Remote Operation

Overview

The MOA-3800 can be controlled remotely over the network via the Ethernet interface.

NOTE: The MOA-3800 has an integrated Perle IOLAN DS1 Device Server to enable network access to the native RS232 interface of the optical module inside the chassis. For simple setups, follow the steps described below. For more advanced setups and troubleshooting, the Perle IOLAN DS1 User Guide is provided in the Perle IOLAN DS1 Device Server Software CD.

Ethernet Setup

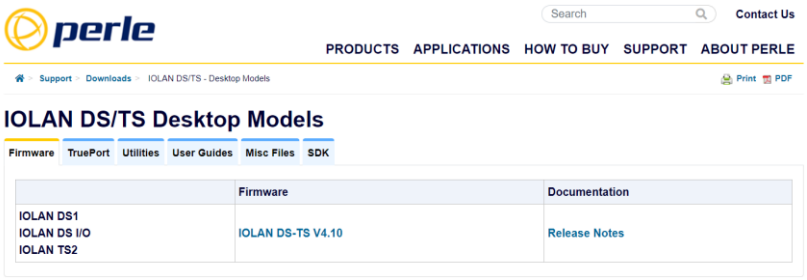
Follow the steps described below to set up the MOA-3800 for remote operation.

Getting Started

1. Connect an Ethernet cable from the network to the RJ45 port on the rear panel.
2. Turn on the unit using the rocker switch on the real panel.

Installing the DeviceManager Program

3. Insert the Perle IOLAN DS1 Device Server Software CD into your CD-ROM drive. If the CD does not launch automatically, browse the CD and start the installation program **device_manager/IOLAN_DeviceManager_v4.9.0.0.exe** (version may vary) manually.
4. Or download from: **https://www.perle.com/downloads/server_ds_ts.shtml#utilities**



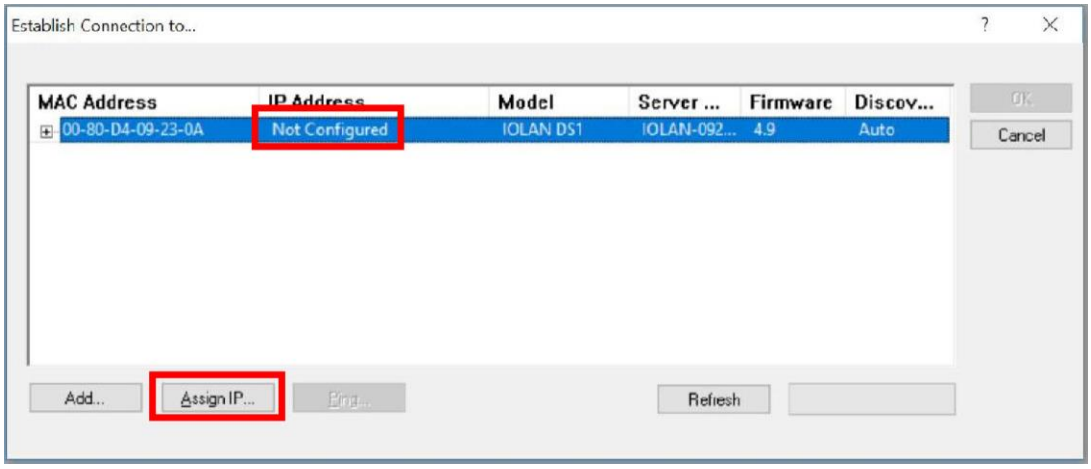
5. Follow the prompts to install the DeviceManager program.

Assigning an IP Address using the DeviceManager

Type the following credentials to access the Configuration Session:

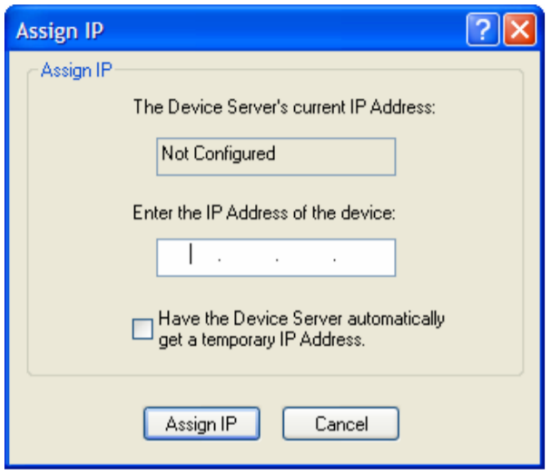
Password: superuser

6. Start the DeviceManager program.
7. To find the device, make sure the “EXFO Rackmount” is plugged in and powered on, then click the Refresh button. DeviceManager locates the unit and adds it to the list.
8. All discovered IOLAN devices (such as the MXS-9100 or MOA-3800) will be displayed on the list along with their name and IP address. When a new IOLAN device is discovered on the network, that has not yet been assigned an IP address, it will be displayed with an IP Address of Not Configured.
9. To configure the IP address, click on the device and then click the Assign IP button.

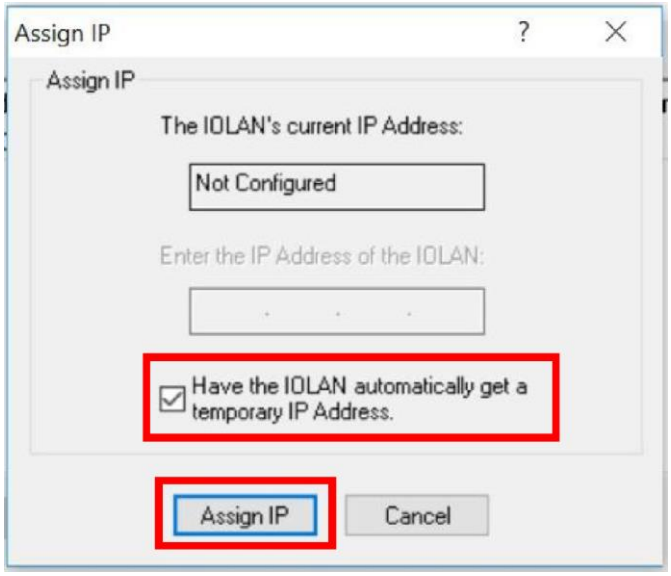


See the Manual (Chapter 3) on the CD drive for more details if needed.

10. There are two ways to assign IP:
    a. Type in the IP address that you want to assign to the device



b. Automatically have the device server assign a temporary IP address, this is done by checking the box with “Have the Device Server automatically get a temporary IP Address”.



Checking the box will turn on the DHCP/BOOTP server, DeviceManager will assign a temporarily IP address within the range of 169.254.0.1-169.254.255.255 that will be used only for the duration of the DeviceManager/IOLAN communication

11. Once an IP address has been typed in or assign automatically, click on Assign IP, you will be prompt on keying in credentials.

Type the following credentials to access the Configuration Session:

Password: superuser

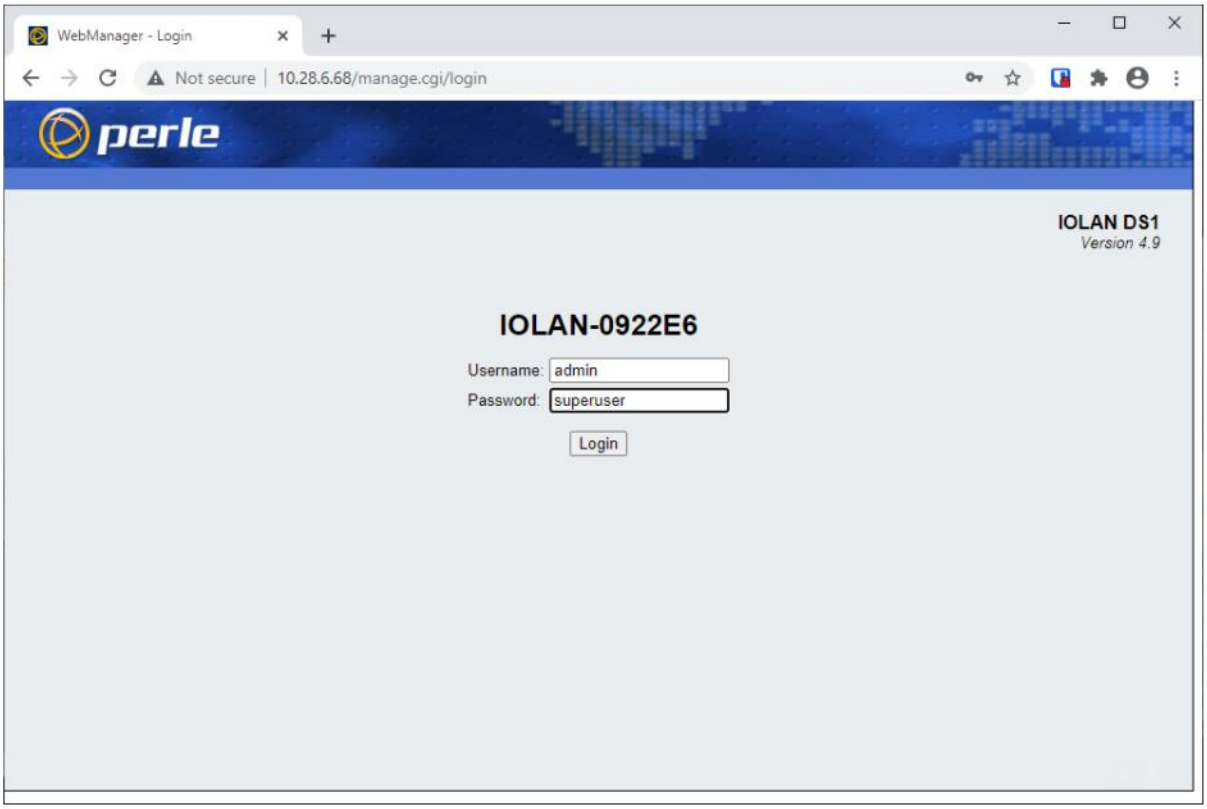
NOTE: Once the Perle Device Server has an IP, it can be configured. The default serial configuration is set at the factory and should not be changed. The DeviceManager program should normally be used only to find and set the IP address of the MOA-3800. Changing the serial configuration may cause communication problems.

Using the Perle WebManager

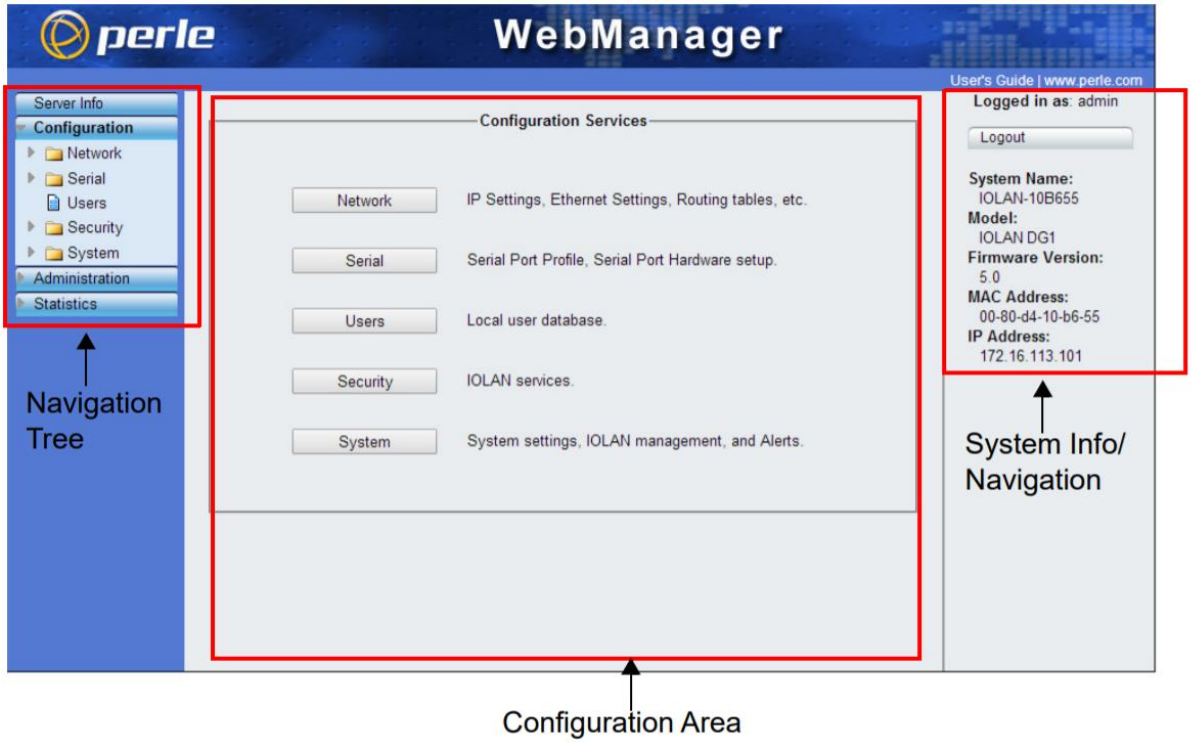
The Perle WebManager allows user to configure IP address.

To use the Perle WebManager, you must already have the MOA-3800 configured with an IP address via the DeviceManager.

To access the Perle WebManager, key in the assigned IP address into your browser (such as 164.254.192.18) and press ENTER, the following window would appear.



Key in the Username: admin and Password: superuser to access the WebManager interface below:



All settings from the Perle WebManager will be automatically downloaded when you select the apply button on each page however a reboot of the MOA-3800 is required for settings to take effect.

4. Operating the MOA-3800

Communicating with the MOA-3800

After the IP address has been assigned, you can open a TCP/IP connection with the MOA-3800 over the network. To start sending and receiving commands, initialize a connection with the MOA-3800 using the IP address and port 10001. A terminal program can be used to verify the connection and send commands manually.

Initial Startup

- Use ***IDN?** to make sure the firmware is alive
- Use **:INSTrument:CATalog:FULL?** to make sure all the devices are recognized by the firmware
- Use **:LINSx:OUTPut:STATe ON** to enable each channel in use

NOTE: All channels will be shuttered immediately after power-up or reset (***RST**). Each channel must be enabled before commands related to attenuation, or power (self-adjusting models), can be used.

The MOA-3800 is now ready to use. The next few sections provide guidance on using the power tracking functions available to self-adjusting models. Full details of all available commands are given in the MOA-3800 Command Set chapter.

Using the Power Tracking Functions

The self-adjusting models offer two operation modes: Attenuation and Power. The Attenuation mode allows you to work with a wide range of attenuation levels. The Power mode allows you to request a fixed output power value and the device automatically adjusts the attenuation according to that value.

When you use the power tracking function, by activating the Automatic Leveling Control (ALC) loop, the internal power meter monitors the output power level and constantly adjusts the attenuation to ensure that the power does not exceed the limits set (drift tolerance). For example, if the power of the source used for the test drifts over time, the attenuation is adjusted so that the output power remains within the preset limits.

Setting the Drift Tolerance

The drift tolerance should be set using the **:LINSx:OUTPut:DTOlerance** command before activating the ALC loop. Larger drift tolerance values are recommended for the multimode MOA-3800 in order to avoid constantly operating the mechanical VOAs inside, shortening their life. A value of 0.1 dB or larger is recommended, unless your setup absolutely requires a

tighter tolerance. The single-mode MOA-3800 utilizes long-life MEMS VOAs and has no such limitation.

Setting the Active Power Mode

You must first define the control mode with the **:LINSx:CONTrol:MODE** command. ATTenuation and POWer control modes each have two active power modes to choose from using the **:LINSx:OUTPut:APMode** command.

For ATTenuation control mode:

Active Power Mode	Description
ABSolute mode	<relativeAttenuation> = absolute attenuation + offset value
REFerence mode	<relativeAttenuation> = absolute attenuation - reference value + offset value

Offset values are set with **:LINSx:INPut:OFFset** and reference values are set with **:LINSx:INPut:REFerence**.

For POWer control mode:

Active Power Mode	Description
ABSolute mode	<relativePower> = absolute power + power offset value
REFerence mode	<relativePower> = absolute power - power reference value + power offset value

Offset values are set with **:LINSx:OUTPut:OFFset** and reference values are set with **:LINSx:OUTPut:REFerence**.

NOTE: ABSolute mode is the default for both control modes.

Activating the Automatic Leveling Control (ALC) loop

Activate the ALC loop by using **:LINSx:OUTPut:ALC[:STATe]** command. Once enabled it will actively adjust the attenuators according to the settings covered above.

5. MOA-3800 Command Set

Command Conventions

The MOA-3800 remote commands and conventions are described below.

Command Interface Notes

- Tokens enclosed in angled brackets **< >** represent input parameters. Replace these tokens with data specific to the task.
- **<wsp>** represents a single white space punctuation character (ASCII #23).
- Commands prefixed with **:LINS<x>** effect only the chosen channel. Replace **<x>** with the channel/device you wish to control.
- Portions of commands that are lowercase are optional. The uppercase portions are required, though commands are not case-sensitive.

  For example, the following commands are identical:
  :LINS2:INPut:ATTenuation MAXimum
  :LINS2:INP:ATT MAX
  :lins2:inp:att max
- Commands and replies are terminated with a Carriage Return character (ASCII #13).
- Commands may be combined with other commands using a semicolon character (“**;**”).

  Example:
  LINS2:INP:ATT MAX;LINS4:INP:ATT MIN
  LINS1:CONT:MODE POW;LINS3:CONT:MODE POW

SCPI Commands

SCPI Command Set (Part 1 of 3)

Command	Description
:LINSx:CALibration:ZERO	Returns the attenuator to its home position.
:LINSx:CONTrol:MODE	This command selects the attenuator's control mode.
:LINSx:CONTrol:MODE?	This query returns the attenuator's control mode.
:LINSx:CONTrol:MODE:CATalog?	This query returns a comma-separated list of available control modes.
:LINSx:INPut:ARESolution?	This query returns the smallest attenuation step available.
:LINSx:INPut:ATTenuation	This command sets the absolute attenuation to a specific value.
:LINSx:INPut:ATTenuation?	This query returns a value indicating either the current or the minimum/maximum absolute attenuation value.
:LINSx:INPut:OFFSet	This command sets an offset value for the attenuation.
:LINSx:INPut:OFFSet?	This query returns a value indicating either the current or the minimum/maximum attenuation offset value.
:LINSx:INPut:RATTenuation	This command sets the relative attenuation to a specific value.
:LINSx:INPut:RATTenuation?	This query returns either the current or the minimum/maximum relative attenuation.
:LINSx:INPut:REFerence	This command sets, for the current wavelength, a reference value for the attenuation.
:LINSx:INPut:REFerence?	This query returns either the current or the minimum/maximum reference value for the attenuation.
:LINSx:INPut:WAVelength	This command selects a specific wavelength.
:LINSx:INPut:WAVelength?	This query returns a value indicating either the current or the minimum/maximum wavelength.
:LINSx:OUTPut:ALC[:STATe]	This command activates or deactivates power tracking that controls the output power level.
:LINSx:OUTPut:ALC[:STATe]?	This query indicates if the power tracking that controls the output power level has been activated or not.
:LINSx:OUTPut:APMode	This command selects the operation mode for the active control mode.
:LINSx:OUTPut:APMode?	This query returns the current operation mode.
:LINSx:OUTPut:DTOlerence	This command specifies the drift tolerance that will be used for power tracking via the ALC loop.

SCPI Command Set (Part 2 of 3)

Command	Description
:LINSx:OUTPut:DTOlerence?	This query returns the drift tolerance that is used for power tracking via the ALC loop.
:LINSx:OUTPut:OFFSet	This command sets a power offset value. The power offset value will be added to the absolute output power.
:LINSx:OUTPut:OFFSet?	This query returns a value indicating either the current or the min/max power offset setting.
:LINSx:OUTPut:POWer	This command sets the absolute output power to a specific value.
:LINSx:OUTPut:POWer?	This query returns a value indicating either the current or the min/max absolute power value.
:LINSx:OUTPut:READ[:SCALar]:POWer:DC?	This query returns the power measured at the instrument's output port.
:LINSx:OUTPut:REFerence	This command sets a power reference value for the current wavelength.
:LINSx:OUTPut:REFerence?	This query returns either the current or the min/max output power reference value.
:LINSx:OUTPut:RPOWer	This command sets the relative power to a specific value.
:LINSx:OUTPut:RPOWer?	This query returns a value indicating either the current or the min/max relative power value.
:LINSx:OUTPut[:STATe]	This command controls the state of the instrument's shutter.
:LINSx:OUTPut[:STATe]?	This query returns the state of the instrument's shutter.
:LINSx:READ[:SCALar]:POWer:DC?	This query returns the power measured at the instrument's input port.
:LINSx:RST	This command resets the attenuator to its default configuration.
:LINSx:SENSe:CORRection:COLLect:ZERO	This command performs an offset nulling on the internal power meter.
:SNUMber?	This query returns a value indicate the instrument's serial number.
:STATus?	This query returns a value indicating the status of the instrument.
:STATus:OPERation:BIT<n>:CONDition?	This query returns the state of a specific bit in the OPERation register set.
:STATus:QUEStionable:BIT<n>:CONDition?	This query returns the state of a specific bit in the QUEStionable register set.

SCPI Command Set (Part 3 of 3)

Command	Description
:INSTrument:CATalog?	This query returns a comma separated list containing the names and groups of all logical instruments.
:INSTrument:CATalog:FULL?	This query returns a comma separated list containing pairs of "name" and associated logical instrument number for all logical instruments.
:SYSTem:ERRor?	This query returns an Error code and description.
:SYSTem:VERsion?	This query returns the SCPI version.
***CLS**	Clear Status
***ESE**	Standard Event Status Enable
***ESE?**	Query Standard Event Status Enable
***ESR?**	Query Event Status Register
***IDN?**	Query Identification
***OPC**	Operation Complete
***OPC?**	Operation Complete Query
***RST**	Reset
***SRE**	Service Request Enable
***SRE?**	Query Service Request Enable
***STB?**	Query Status Byte
***TST?**	Self-Test
***WAI**	Wait-to-Continue

:LINSx:CALibration:ZERO

Description Returns the attenuator to its home position, 0 dB.

Syntax :LINS<x>:CALibration:ZERO

Parameter(s) none

Response none

Notes This command could take up to 15 seconds to complete.

Examples

:LINS1:CALibration:ZERO	Returns channel 1 to its home position
:LINS2:CAL:ZERO	Returns channel 2 to its home position
lins4:cal:zero	Returns channel 4 to its home position

:LINSx:CONTrol:MODE

Description This command selects the attenuator's control mode. All models of the MOA-3800 default to Attenuation mode. For self-adjusting models that are equipped with integrated power meters an optional output POWer mode is available.

Syntax :LINS<x>:CONTrol:MODE<wsp><parameter>

Parameter(s) option(s): ATTenuation | POWer

Response none

Notes At ***RST**, the control mode is ATTenuation.

See also **:LINSx:CONTrol:MODE:CATalog?**

Examples

:LINS1:CONTrol:MODE POWer	Sets channel 1's control mode to POWER
:LINS2:CONT:MODE ATT	Sets channel 2's control mode to ATTENUATION
lins4:cont:mode att	Sets channel 4's control mode to ATTENUATION

:LINSx:CONTrol:MODE?

Description This query returns the attenuator's control mode.

Syntax :LINS<x>:CONTrol:MODE?

Parameter(s) none

Response "ATTENUATION" | "POWER"

Notes At ***RST**, the control mode is ATTenuation.

Examples

:LINS1:CONTrol:MODE?	Returns channel 1's control mode
:LINS2:CONT:MODE?	Returns channel 2's control mode
lins4:cont:mode?	Returns channel 4's control mode

:LINSx:CONTrol:MODE:CATalog?

Description This query returns a comma-separated list of available control modes. All models of the MOA-3800 default to Attenuation mode. For self-adjusting models, that are equipped with integrated power meters, an optional output POWer mode is available.

Syntax :LINS<x>:CONTrol:MODE:CATalog?

Parameter(s) none

Response "ATTENUATION" | "ATTENUATION, POWER"

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:LINS1:CONTrol:MODE:CATalog?	Returns channel 1's available control modes
:LINS2:CONT:MODE:CAT?	Returns channel 2's available control modes
lins4:cont:mode:cat?	Returns channel 4's available control modes

:LINSx:INPut:ARESolution?

Description	This query returns the smallest attenuation step available, i.e. the attenuator's resolution.
Syntax	:LINS<x>:INPut:ARESolution?
Parameter(s)	none
Response	<NR3 NUMERIC RESPONSE DATA> Typical Response: "1.000000E-02" *depends on the instrument*
Notes	Use this command to determine the maximum resolution of the attenuator. This command is an event and has no associated ***RST** condition or query form.

Examples

:LINS1:INPut:ARESolution?	Returns the resolution of channel 1's attenuator
:LINS2:INP:ARES?	Returns the resolution of channel 2's attenuator
lins4:inp:ares?	Returns the resolution of channel 4's attenuator

:LINSx:INPut:ATTenuation

Description

This command sets the absolute attenuation to a specific value. This value is used only when the ATTenuation control mode is active. The valid range of <attenuation> values depends on the type of instrument and the current wavelength.

Syntax

:LINS<x>:INPut:ATTenuation<wsp><parameter>

Parameter(s)

option(s): <attenuation> | MINimum | MAXimum | DEFault

The program data syntax for <attenuation> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<attenuation> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response

none

Notes

In POWer mode, the device adjusts to match the desired output power. For this reason, changes made to attenuation via INPut:ATT command are not taken into account.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:INPut:ATTenuation?**

Examples

:LINS1:INPut:ATTenuation MINimum	Sets channel 1's attenuation to the minimum supported value
:LINS2:INP:ATT MAX	Sets channel 2's attenuation to the maximum supported value
lins4:inp:att 20 db	Sets channel 4's attenuation to 20 dB

:LINSx:INPut:ATTenuation?

Description This query returns a value indicating either the current or the minimum/maximum absolute attenuation value.

Syntax :LINS<x>:INPut:ATTenuation?<wsp><parameter>

Parameter(s) option(s): MINimum | MAXimum | DEFault

Without a parameter the command returns the current attenuation value.
MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response <NR3 NUMERIC RESPONSE DATA>

The response represents either the current or the MINimum/MAXimum absolute attenuation, in dB.

Notes You can use the ATTenuation? MIN and MAX queries to determine a valid attenuation range for the current wavelength.

At ***RST**, the absolute attenuation value that will be set depends on the instrument you have.

Examples

:LINS1:INPut:ATTenuation? MINimum	Returns channel 1's minimum supported attenuation value
:LINS2:INP:ATT? MAX	Returns channel 2's maximum supported attenuation value
lins4:inp:att?	Returns channel 4's current attenuation value

:LINSx:INPut:OFFSet

Description

This command sets an offset value for the attenuation. The offset is only taken into account when the INPut:RATTenuation command is used. This offset value will be added to the absolute attenuation. The same offset value will be used for all wavelengths.

Syntax

:LINS<x>:INPut:OFFSet<wsp><parameter>

Parameter(s)

option(s): <offset> | MINimum | MAXimum | DEFault

The program data syntax for <offset> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<offset> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response

none

Notes

This value is used only when ATTenuation control mode is active.

At ***RST**, the offset value is set to 0 dB.

Examples

:LINS1:INPut:OFFSet MINimum	Sets channel 1's attenuation offset value to the minimum supported value
:LINS2:INP:OFFS MAX	Sets channel 2's attenuation offset value to the maximum supported value
lins4:inp:offs 1	Sets channel 4's attenuation offset value to 1 dB

:LINSx:INPut:OFFSet?

Description	This query returns a value indicating either the current or the minimum/maximum attenuation offset value.
Syntax	:LINS<x>:INPut:OFFSet?<wsp><parameter>
Parameter(s)	option(s): MINimum | MAXimum | DEFault Without a parameter the command returns the current offset value. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response	<NR3 NUMERIC RESPONSE DATA> The response represents either the current or the MINimum/MAXimum offset setting, in dB.
Notes	At ***RST**, the current value is set to 0 dB.

Examples

:LINS1:INPut:OFFSet? MINimum	Returns channel 1's minimum supported attenuation offset value
:LINS2:INP:OFFS? MAX	Returns channel 2's maximum supported attenuation offset value
lins4:inp:offs?	Returns channel 4's current attenuation offset value

:LINSx:INPut:RATTenuation

Description This command sets the relative attenuation to a specific value.

Syntax :LINS<x>:INPut:RATTenuation<wsp><parameter>

Parameter(s) option(s): <relativeAttenuation> | MINimum | MAXimum | DEFault

The program data syntax for <relativeAttenuation> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<relativeAttenuation> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response none

Notes The valid range of values depends on the type of instrument, the configuration, and the current wavelength. This value is used only when the ATTenuation control mode is active.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

a) In ABSolute mode, <relativeAttenuation> = absolute attenuation + offset value

b) In REFerence mode, <relativeAttenuation> = absolute attenuation - reference value + offset value

Examples

:LINS1:INPut:RATTenuation MINimum	Sets channel 1's relative attenuation value to the minimum supported value
:LINS2:INP:RATT MAX	Sets channel 2's relative attenuation value to the maximum supported value
lins4:inp:ratt 12.5	Sets channel 4's relative attenuation value to 12.5 dB

:LINSx:INPut:RATTenuation?

Description

This query returns either the current or the minimum/maximum relative attenuation.

Syntax

:LINS<x>:INPut:RATTenuation?<wsp><parameter>

Parameter(s)

option(s): MINimum | MAXimum | DEFault

Without a parameter the command returns the current relative attenuation value.
MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response

<NR3 NUMERIC RESPONSE DATA>

The response represents either the current or the MINimum/MAXimum relative attenuation, in dB.

Notes

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

a) In ABSolute mode, <relativeAttenuation> = absolute attenuation + offset value

b) In REFerence mode, <relativeAttenuation> = absolute attenuation - reference value + offset value

Examples

:LINS1:INPut:RATTenuation? MINimum	Returns channel 1's minimum supported relative attenuation value
:LINS2:INP:RATT? MAX	Returns channel 2's maximum supported relative attenuation value
lins4:inp:ratt?	Returns channel 4's current relative attenuation value

:LINSx:INPut:REFerence

Description

This command sets, for the current wavelength, a reference value for the attenuation.

Syntax

:LINS<x>:INPut:REFerence<wsp><parameter>

Parameter(s)

option(s): <reference> | MINimum | MAXimum | DEFault

The program data syntax for <reference> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<reference> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response

none

Notes

When the instrument is used in REFerence mode, the attenuation configured with the INPut:RATTenuation command is relative to this reference value. This command will have no effect when the instrument is used in Absolute mode. This value is used only when the ATTenuation control mode is active.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

Examples

:LINS1:INPut:REFerence MINimum	Sets channel 1's attenuation reference value to the minimum supported value
:LINS2:INP:REF MAX	Sets channel 2's attenuation reference value to the maximum supported value
lins4:inp:ref 2	Sets channel 4's attenuation reference value to 2 dB

:LINSx:INPut:REFerence?

Description

This query returns either the current or the minimum/maximum reference value for the attenuation.

Syntax

:LINS<x>:INPut:REFerence?<wsp><parameter>

Parameter(s)

option(s): MINimum | MAXimum | DEFault

Without a parameter the command returns the current reference value.
MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response

<NR3 NUMERIC RESPONSE DATA>

The response represents either the current or the MINimum/MAXimum reference value, in dB.

Notes

When the instrument is used in REFerence mode, the attenuation configured with the INPut:RATTenuation command is relative to this reference value. This value will have no effect when the instrument is used in Absolute mode. This value is used only when the ATTenuation control mode is active.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

Examples

:LINS1:INPut:REFerence? MINimum	Returns channel 1's minimum supported reference value
:LINS2:INP:REF? MAX	Returns channel 2's maximum supported reference value
lins4:inp:ref?	Returns channel 4's current reference value

:LINSx:INPut:WAVelength

Description This command selects a specific wavelength.

Syntax :LINS<x>:INPut:WAVelength<wsp><parameter>

Parameter(s) option(s): <wavelength> | MINimum | MAXimum | DEFault

The program data syntax for <wavelength> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, NM.

<wavelength> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response none

Notes At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:INPut:WAVelength?**

You can use the INPut:WAVelength? MAX and MIN queries to determine a valid range for the wavelength.

Supported wavelength values:

Single-mode – 1310, 1550 & 1590 nm
(single-mode units will operate over 1290-1650 nm, but is calibrated to a single specified wavelength)

Multi-mode – 850 & 1310 nm

Examples

:LINS1:INPut:WAVelength MINimum	Sets channel 1's selected wavelength to the smallest supported value
:LINS2:INP:WAV MAX	Sets channel 2's selected wavelength to the greatest supported value
lins4:inp:wav def	Sets channel 4's selected wavelength to the devices default value

:LINSx:INPut:WAVelength?

Description This query returns a value indicating either the current or the minimum/maximum wavelength.

Syntax :LINS<x>:INPut:WAVelength?<wsp><parameter>

Parameter(s) option(s): MINimum | MAXimum | DEFault

Without a parameter the command returns the current wavelength value.
MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response <NR3 NUMERIC RESPONSE DATA>

The response represents either the current or the MINimum/MAXimum wavelength, in NM.

Notes At ***RST**, the value that will be set is device-dependent.

Supported wavelength values:

Single-mode – 1310, 1550 & 1590 nm
(single-mode units will operate over 1290-1650 nm, but is calibrated to a single specified wavelength)

Multi-mode – 850 & 1310 nm

Examples

:LINS1:INPut:WAVelength? MINimum	Returns channel 1's smallest supported wavelength value
:LINS2:INP:WAV? MAX	Returns channel 2's greatest supported wavelength value
lins4:inp:wav?	Returns channel 4's current wavelength value

:LINSx:OUTPut:ALC[:STATe]

Description This command activates or deactivates the power tracking that controls the output power level.

Syntax :LINS<x>:OUTPut:ALC:STATe<wsp><state>

Parameter(s) option(s): 1 | ON | 0 | OFF

ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.

1 | ON: Power tracking is activated.
0 | OFF: No power tracking will be performed.

Response None

Notes Only available to models with the optional Self Adjusting mode.

The power tracking is done via the ALC (Automatic Leveling Control) loop. The state of the ALC loop (on or off) is used only when the POWer control mode is active.

At ***RST**, this value is set to off.

Examples	
:LINS1:OUTPut:ALC:STATe ON	Activates power tracking for channel 1
:LINS2:OUTP:ALC:STAT 1	Activates power tracking for channel 2
lins4:outp:alc:stat 0	Deactivates power tracking for channel 4

:LINSx:OUTPut:ALC[:STATe]?

Description	This query indicates if the power tracking that controls the output power level has been activated or not.
Syntax	:LINS<x>:OUTPut:ALC:STATe?
Parameter(s)	none
Response	<NR1 NUMERIC RESPONSE DATA> The response corresponds to the state of the ALC loop. 0: No power tracking will be performed. (default) 1: Power tracking is activated.
Notes	The power tracking is done via the ALC (Automatic Leveling Control) loop. The state of the ALC loop (on or off) is used only when the POWer control mode is active. At ***RST**, this value is set to off.

Examples

:LINS1:OUTPut:ALC:STATe?	Returns channel 1's ALC loop power tracking state
:LINS2:OUTP:ALC:STAT?	Returns channel 2's ALC loop power tracking state
lins4:outp:alc:stat?	Returns channel 4's ALC loop power tracking state

:LINSx:OUTPut:APMode

Description	This command selects the operation mode for the active control mode.
Syntax	:LINS<x>:OUTPut:APMode<wsp><parameter>
Parameter(s)	option(s): ABSolute | REFerence ABSolute selects Absolute mode. REFerence selects Reference mode.
Response	none
Notes	Only available to models with the optional Self Adjusting mode. Since the operation mode applies to the active control mode, you must first define the control mode with the CONTrol:MODE command. At ***RST**, the operation mode is ABSolute for both control modes (ATTenuation and POWer). See also **:LINSxCONTrol:MODE, :LINSx:INPut:RATTenuation,** and **:LINSx:OUTPut:RPOWer**

Examples	
:LINS1:OUTPut:APMode ABSolute	Sets channel 1's operation mode to ABSolute
:LINS2:OUTP:APM REF	Sets channel 2's operation mode to REFerence
lins4:outp:apm abc	Sets channel 4's operation mode to ABSolute

:LINSx:OUTPut:APMode?

Description	This query returns the current operation mode.
Syntax	:LINS<x>:OUTPut:APMode?
Parameter(s)	none
Response	“ABSOLUTE”	“REFERENCE”
Notes	At ***RST**, the operation mode is ABSolute for both control modes (ATTenuation and POWer).

Examples

:LINS1:OUTPut:APMode?	Returns channel 1’s operation mode
:LINS2:OUTP:APM?	Returns channel 2’s operation mode
lins4:outp:apm?	Returns channel 4’s operation mode

:LINSx:OUTPut:DTOlerence

Description

This command specifies the drift tolerance that will be used for power tracking via the ALC loop.

Syntax

:LINS<x>:OUTPut:DTOlerence<wsp><parameter>

Parameter(s)

option(s): <drift> | MINimum | MAXimum | DEFault

The program data syntax for <drift> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<drift> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response

none

Notes

Only available to models with the optional Self Adjusting mode.

This value is only taken into account when the ALC loop is active (OUTPut:ALC[:STATe] ON). The value is used only when POWer control mode is active.

The <drift> parameter corresponds to a valid drift tolerance for the power tracking via the ALC loop in dB. You can use the OUTPut:DTOlerence? MAX and MIN queries to determine a valid range for the drift tolerance. Larger drift tolerance values are recommended for the multimode MOA-3800 in order to avoid constantly operating the mechanical VOAs inside, shortening their life. A value of 0.1 dB or larger is recommended, unless your setup absolutely requires a tighter tolerance. The single-mode MOA-3800 utilizes long-life MEMS VOAs and has no such limitation.

At ***RST**, the value that will be set is device-dependent.

Examples

:LINS1:OUTPut:DTOlerence MINimum	Sets channel 1's drift tolerance to the minimum supported value
:LINS2:OUTP:DTO MAX	Sets channel 2's drift tolerance to the maximum supported value
lins4:outp:dto 0.1	Sets channel 4's drift tolerance value to 0.1 dB

:LINSx:OUTPut:DTOlerence?

Description	This query returns the drift tolerance that is used for power tracking via the ALC loop.
Syntax	:LINS<x>:OUTPut:DTOlerence?<wsp><parameter>
Parameter(s)	option(s): MINimum | MAXimum | DEFault Without a parameter the command returns the current drift value. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retreive the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response	<NR3 NUMERIC RESPONSE DATA> The response represents either the current or the MINimum/MAXimum drift, in DB.
Notes	At ***RST**, the value that will be set is device-dependent.

Examples

:LINS1:OUTPut:DTOlerence? MINimum	Returns channel 1’s minimum supported drift tolerance value
:LINS2:OUTP:DTO? MAX	Returns channel 2’s maximum supported drift tolerance value
lins4:outp:dto?	Returns channel 4’s current drift tolerance value

:LINSx:OUTPut:OFFSet

Description This command sets a power offset value. The power offset value will be added to the absolute output power.

Syntax :LINS<x>:OUTPut:OFFSet<wsp><parameter>

Parameter(s) option(s): <powerOffset> | MINimum | MAXimum | DEFault

The program data syntax for <powrOffset> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DB.

<powerOffset> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response none

Notes Only available to models with the optional Self Adjusting mode.

This offset value will be added to the absolute output power. The same power offset value will be used for all wavelengths. The offset is only taken into account when the OUTPut:RPOWer command is used. This value is used only when the POWer control mode is active.

At ***RST**, the current value is set to 0 dB.

Examples

:LINS1:OUTPut:OFFSet MINimum	Sets channel 1's power offset value to the minimum supported value
:LINS2:OUTP:OFFS MAX	Sets channel 2's power offset value to the maximum supported value
lins4:outp:offs -13.2	Sets channel 4's power offset value to -13.2 dB

:LINSx:OUTPut:OFFSet?

Description	This query returns a value indicating either the current or the min/max power offset setting.
Syntax	:LINS<x>:OUTPut:OFFSet?<wsp><parameter>
Parameter(s)	option(s): MINimum | MAXimum | DEFault Without a parameter the command returns the current power offset value. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response	<NR3 NUMERIC RESPONSE DATA> The response represents either the current or the MINimum/MAXimum power offset value, in dB.
Notes	At ***RST**, the current value is set to 0 dB.

Examples

:LINS1:OUTPut:OFFSet? MINimum	Returns channel 1's minimum supported power offset value
:LINS2:OUTP:OFFS? MAX	Returns channel 2's maximum supported power offset value
lins4:outp:offs?	Returns channel 4's current power offset value

:LINSx:OUTPut:POWer

Description	This command sets the absolute output power to a specific value.
Syntax	:LINS<x>:OUTPut:POWer<wsp><parameter>
Parameter(s)	option(s): <power> | MINimum | MAXimum | DEFault The program data syntax for <power> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DBM. <power> allows to set the instrument to the specified value. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value.
Response	none
Notes	Only available to models with the optional Self Adjusting mode. The <power> parameter is a valid output power in dBm. This value is only used when the POWer control mode is active. The valid range of values depends on the type of instruments, the configuration, the current wavelength, and the input power. You can use the OUTPut:POWer? MAX and MIN queries to determine a valid range for the output power. At ***RST**, the value that will be set is device-dependent.

Examples

:LINS1:OUTPut:POWer MINimum	Sets channel 1's absolute output power to the minimum supported value
:LINS2:OUTP:POW MAX	Sets channel 2's absolute output power to the maximum supported value
lins4:outp:pow -10.0 dbm	Sets channel 4's absolute output power value to -10 dBm

:LINSx:OUTPut:POWer?

Description	This query returns a value indicating either the current or the min/max absolute power value.
Syntax	:LINS<x>:OUTPut:POWer?<wsp><parameter>
Parameter(s)	option(s): MINimum | MAXimum | DEFault Without a parameter the command returns the current absolute power value. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response	<NR3 NUMERIC RESPONSE DATA> The response represents either the current or the MINimum/MAXimum absolute power value, in dBm.
Notes	At ***RST**, the value that will be set is device-dependent.

Examples

:LINS1:OUTPut:POWer? MINimum	Returns channel 1's minimum supported absolute output power value
:LINS2:OUTP:POW? MAX	Returns channel 2's maximum supported absolute output power value
lins4:outp:pow?	Returns channel 4's current absolute output power value

:LINSx:OUTPut:READ[:SCALar]:POWer:DC?

Description	This query returns the power measured at the instrument's output port.
Syntax	:LINS<x>:OUTPut:READ:SCALar:POWer:DC?
Parameter(s)	none
Response	<NR3 NUMERIC RESPONSE DATA> The response represents the current output power.
Notes	Only available to models with the optional Self Adjusting mode. This command is an event and has no associated ***RST** condition or query form.

Examples

:LINS1:OUTPut:READ:SCALar:POWer:DC?	Returns the power measured at channel 1's output
:LINS2:OUTP:READ:SCAL:POW:DC?	Returns the power measured at channel 2's output
lins4:outp:read:scal:pow:dc?	Returns the power measured at channel 4's output

:LINSx:OUTPut:REFerence

Description This command sets a power reference value for the current wavelength.

Syntax :LINS<x>:OUTPut:REFerence<wsp><parameter>

Parameter(s) option(s): <powerReference> | MINimum | MAXimum | DEFault

The program data syntax for <powerReference> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DBM.

<powerReference> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response none

Notes Only available to models with the optional Self Adjusting mode.

When the instrument is used in REFerence mode, the power is relative to this reference value. This command will have no effect when the instrument is used in Absolute mode. This value is used only when the POWer control mode is active.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

Examples

:LINS1:OUTPut: REFerence MINimum	Sets channel 1's power reference value to the minimum supported value
:LINS2:OUTP:REF MAX	Sets channel 2's power reference value to the maximum supported value
lins4:outp:ref -1.2	Sets channel 4's power reference value to -1.2 dB

:LINSx:OUTPut:REFerence?

Description	This query returns either the current or the min/max output power reference value.
Syntax	:LINS<x>:OUTPut:REFerence?<wsp><parameter>
Parameter(s)	option(s): MINimum | MAXimum | DEFault Without a parameter the command returns the current reference value. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response	<NR3 NUMERIC RESPONSE DATA> The response represents either the current or the MINimum/MAXimum reference value, in dBm.
Notes	At ***RST**, the value that will be set is device-dependent.

Examples

:LINS1:OUTPut:REFerence? MINimum	Returns channel 1's minimum supported output power reference value
:LINS2:OUTP:REF? MAX	Returns channel 2's maximum supported output power reference value
lins4:outp:ref?	Returns channel 4's current output power reference value

:LINSx:OUTPut:RPOWer

Description This command sets the relative power to a specific value.

Syntax :LINS<x>:OUTPut:RPOWer<wsp><parameter>

Parameter(s) option(s): <relativePower> | MINimum | MAXimum | DEFault

The program data syntax for <relativePower> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element, DBM.

<relativePower> allows to set the instrument to the specified value.
MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.
DEFault allows the instrument to select a value.

Response none

Notes Only available to models with the optional Self Adjusting mode.

The <relativePower> parameter is a valid relative power in dBm. This value is only used when the POWer control mode is active. The valid range of values depends on the type of instruments, the configuration, and the input power. You can use the OUTPut:RPOWer? MAX and MIN queries to determine a valid range for the power.

At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

a) In ABSolute mode, <relativePower> = absolute power + power offset value

b) In REFerence mode, <relativePower> = absolute power - power reference value + power offset value

Examples

:LINS1:OUTPut:RPOWer MINimum	Sets channel 1's relative power value to the minimum supported value
:LINS2:OUTP:RPOW MAX	Sets channel 2's relative power value to the maximum supported value
lins4:outp:rpow 2	Sets channel 4's relative power value to 2 dB

:LINSx:OUTPut:RPOWer?

Description This query returns a value indicating either the current or the min/max relative power value.

Syntax :LINS<x>:OUTPut:RPOWer?<wsp><parameter>

Parameter(s) option(s): MINimum | MAXimum | DEFault

Without a parameter the command returns the current relative power value.
MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response <NR3 NUMERIC RESPONSE DATA>

The response represents either the current or the MINimum/MAXimum relative power value, in dBm.

Notes At ***RST**, the value that will be set is device-dependent.

See also **:LINSx:OUTPut:APMode**

a) In ABSolute mode, <relativePower> = absolute power + power offset value

b) In REFerence mode, <relativePower> = absolute power - power reference value + power offset value

Examples

:LINS1:OUTPut:RPOWer? MINimum	Returns channel 1’s minimum supported relative power value
:LINS2:OUTP:RPOW? MAX	Returns channel 2’s maximum supported relative power value
lins4:outp:rpow?	Returns channel 4’s current relative power value

:LINSx:OUTPut[:STATe]

Description	This command controls the state of the instrument's shutter. Switching the state to 1 or ON enables the channel, allowing it to transmit light. Each channel must be enabled before it can be sent commands related to attenuation or power.
Syntax	:LINS<x>:OUTPut:STATe<wsp><parameter>
Parameter(s)	option(s): 1 | ON | 0 | OFF ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. 1 | ON: Allows light transmission. 0 | OFF: No light is transmitted.
Response	none
Notes	When OFF, this command translates the VOA into an optical off position. At ***RST**, this value is set to OFF (shuttered).

Examples

:LINS1:OUTPut:STATe ON	Channel 1's shutter is open
:LINS2:OUTP:STAT 1	Channel 2's shutter is open
lins4:outp:stat 0	Channel 4's shutter is closed

:LINSx:OUTPut[:STATe]?

Description This query returns the state of the instrument's shutter.

Syntax :LINS<x>:OUTPut:STATe?

Parameter(s) none

Response <NR1 NUMERIC RESPONSE DATA>

The response corresponds to the state of the shutter.
0: No light is transmitted.
1: Allows light transmission.

Notes At ***RST**, this value is set to off (shuttered).

Examples

:LINS1:OUTPut:STATe?	Returns state of channel 1's shutter
:LINS2:OUTP:STAT?	Returns state of channel 2's shutter
lins4:outp:stat?	Returns state of channel 4's shutter

:LINSx:READ[:SCALar]:POWer:DC?

Description	This query returns the power measured at the instrument's input port.
Syntax	:LINS<x>:READ:SCALar:POWer:DC?
Parameter(s)	none
Response	<NR3 NUMERIC RESPONSE DATA> The response represents the current input power.
Notes	Only available to models with the optional Self Adjusting mode. This command is an event and has no associated ***RST** condition or query form.

Examples	
:LINS1:READ:SCALar:POWer:DC?	Returns the power measured at channel 1's input
:LINS2:READ:SCAL:POW:DC?	Returns the power measured at channel 2's input
lins4:read:scal:pow:dc?	Returns the power measured at channel 4's input

:LINSx:RST

Description	This command resets the attenuator to its default configuration.
Syntax	:LINS<x>:RST
Parameter(s)	none
Response	none
Notes	This command is an event and has no associated ***RST** condition or query form.

Examples	
:LINS1:RST	Resets channel 1 to its default configuration
:LINS2:RST	Resets channel 2 to its default configuration
lins4:rst	Resets channel 4 to its default configuration

:LINSx:SENSe:CORRection:COLLect:ZERO

Description	This command performs an offset nulling on the internal power meter.
Syntax	:LINS<x>:SENSe:CORRection:COLLect:ZERO
Parameter(s)	none
Response	none
Notes	Only available to models with the optional Self Adjusting mode. This command is an event and has no associated ***RST** condition or query form.

Examples

:LINS1:SENSe:CORRection:COLLect:ZERO	Performs offset nulling on channel 1's internal power meter
:LINS2:SENS:CORR:COLL:ZERO	Performs offset nulling on channel 2's internal power meter
lins4:sens:corr:coll:zero	Performs offset nulling on channel 4's internal power meter

:SNUMber?

Description	This query returns a value indicate the instrument's serial number.
Syntax	:SNUMber?
Parameter(s)	none
Response	<STRING RESPONSE DATA> The response represents a string containing the instruments serial number.
Notes	This command is an event and has no associated ***RST** condition or query form.

Examples

:SNUMber?	Returns the instrument's serial number
snum?	Returns the instrument's serial number

:STATus?

Description This query returns a value indicating the status of the instrument.

Syntax :STATus?

Parameter(s) none

Response <CHARACTER RESPONSE DATA>

The response represents the instrument state, where:

UNINITIALIZED means the instrument has not yet been initialized.
INITINPROGRESS means the instrument's initialization is in progress.
READY means the instrument is ready.
BUSY means the instrument is busy.
DISCONNECTED means the instrument is disconnected.
DEFECTIVE means the instrument is defective.

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:STATus?	Returns the instrument’s status
stat?	Returns the instrument’s status

:STATus:OPERation:BIT<n>:CONDition?

Description This query returns the state of a specific bit in the OPERation register set.

Syntax :STATus:OPERation:BIT<n>:CONDition?

The <n>, ("Bit <n>"), indicates for which bit the infromation must be retrieved in the :STATus:OPERation status register. The <n> value must be a number from 8 to 12.

Parameter(s) none

Response <NR1 NUMERIC RESPONSE DATA>

The response represents the current operation condition of the instrument. The meaning of the response depends on the value returned for bit <n>.

Bit <8>: When the returned value is 1, the instrument is currently adjusting the attenuation to reach a new set point. When the returned value is 0, the new set point is reached and the attenuation is stable.

Bit <9>: When the returned value is 1, the instruments mechanism is being repositioned at its home position (CALibration:ZERO).

Bit <10>: When the returned value is 1, the nulling of the offsets on the internal power meter is in progress.

Notes At ***RST**, the value that will be set is device-dependent.

Examples

:STATus:OPERation:BIT8:CONDition?	Returns whether the instrument is actively adjusting attenuation
:STAT:OPER:BIT9:COND?	Returns whether the instrument is moving to its home position
stat:oper:bit10:cond?	Returns whether internal power meter nulling is in progress

:STATus:QUEStionable:BIT<n>:CONDition?

Description This query returns the state of a specific bit in the QUEStionable register set.

Syntax :STATus:QUEStionable:BIT<n>:CONDition?

The <n>, ("Bit <n>"), indicates for which bit the infromation must be retrieved in the :STATus:QUEStionable status register. The <n> value must be a number from 9 to 12.

Parameter(s) None

Response <NR1 NUMERIC RESPONSE DATA>

The response represents the current questionable condition of the instrument. The meaning of the response depends on the value returned for bit <n>.

Bit <9>: When the returned value is 1, it's recommended that the instrument mechanism be returned to its home position (CALibration:ZERO). This operation must be performed after many moves of the instrument's mechanism or when variations in temperature occur.

Bit <10>: When the returned value is 1, the operation temperature is outside the recommended operation temperature range as indicated in the instrument's specifications.

Notes At ***RST**, the value that will be set is device-dependent.

Examples

:STATus:QUEStionable:BIT9:CONDition?	Returns whether a home position calibration is recommended
:STAT:QUES:BIT9:COND?	Returns whether a home position calibration is recommended
stat:ques:bit10:cond?	Returns whether operating temperature is outside recommended operating range

:INSTrument:CATalog?

Description This query returns a comma separated list containing the names and groups of all logical instruments.

Syntax :INSTrument:CATalog?

Parameter(s) None

Response <STRING RESPONSE DATA>

The response represents a string containing a comma-separated list of the names and groups of all instruments.

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:INSTrument:CATalog?	Returns a list of all logical instruments
inst:cat?	Returns a list of all logical instruments

:INSTrument:CATalog:FULL?

Description This query returns a comma separated list containing pairs of "name" and associated logical instrument number for all logical instruments.

Syntax :INSTrument:CATalog:FULL?

Parameter(s) None

Response <STRING RESPONSE DATA>

The response represents a string containing a comma-separated list of name and logical instrument number pairs for all logical instruments.

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:INSTrument:CATalog?	Returns a list of all logical instruments and their channel number
inst:cat?	Returns a list of all logical instruments and their channel number

:SYSTem:ERRor?

Description This query returns an Error code and description.

Syntax :SYSTem:ERRor?

Parameter(s) none

Response <NR1 NUMERIC RESPONSE DATA>, <STRING RESPONSE DATA>

The response represents a numeric error code followed by a string containing the error's description.

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:SYSTem:ERRor?	Returns the next error code and description in the error buffer
syst:err?	Returns the next error code and description in the error buffer

:SYSTem:VERsion?

Description This query returns the SCPI version.

Syntax :SYSTem:VERsion?

Parameter(s) none

Response <NR2 NUMERIC RESPONSE DATA>

The response represents the current SCPI version number.

Notes This command is an event and has no associated ***RST** condition or query form.

Examples

:SYSTem:VERsion?	Returns the instruments SCPI version
syst:ver?	Returns the instruments SCPI version

IEEE 488.2 SCPI Commands

*CLS

Description	Clear Status
Syntax	*CLS
Parameter(s)	none
Response	none
Notes	Clears the event registers in all register groups. Also clears the Status Byte and Error Queue. If ***CLS** immediately follows a program message terminator (<NL>), then the Output Queue and the MAV bit are also cleared.

*ESE

Description	Standard Event Status Enable
Syntax	*ESE<wsp><parameter>
Parameter(s)	option(s): <mask> The program data syntax for <mask> is defined as a <numeric_value> element. <mask> allows to set the value of mask to the Standard Event Status Enable Register.
Response	none
Notes	Enables bits in the enable register for the Standard Event Status group. A 1 in the bit position enables the corresponding event. The selected bits are then reported to the ESB bit of the Status Byte Register. The query reads the enable register and returns a decimal value which corresponds to the binary-weighted sum of all bits set in the register. The events are defined in **Table 1** one the next page. Any or all of the enabled events of the Standard Event Status Event Register are logically ORed to cause the Event Summary Bit (ESB) of the Status Byte Register to be set. To determine if an enabled event has occurred, execute a Status Byte Query command (***STB?**) and evaluate the ESB. To determine which event took place, execute an Event Status Register Query command (***ESR?**). See Section **IEEE 488.2 Status Registers** for more details. ***CLS** does not clear the enable register, but does clear the event register.

Table 1. Standard Event Status Enable Register

Name	Description	Bit	Decimal
OPC	Operation Complete	0	1
RQC	Request Control (N/A, always 0)	1	2
QYE	Query Error	2	4
DDE	Device Dependent Error	3	8
EXE	Execution Error	4	16
CME	Command Error	5	32
URQ	User Request	6	64
PON	Power On	7	128

*ESE?

Description Query Standard Event Status Enable

Syntax *ESE?

Parameter(s) none

Response <NR1 NUMERIC RESPONSE DATA>

The response represents the binary-weighted sum of all bits set in the Standard Event Status Enable Register.

Notes The events are defined in **Table 1**, the Standard Event Status Enable Register table.

Enabled event bits are set to 1. Disabled bits are set to 0.

*ESR?

Description	Query Event Status Register
Syntax	*ESR?
Parameter(s)	none
Response	<NR1 NUMERIC RESPONSE DATA> The response represents the contents of the Standard Event Status Register.
Notes	This query clears the Standard Events Status Register upon returning its contents. When an event takes place, the corresponding bit in the Standard Event Status Register bit is set. If you have enabled the corresponding bit in the Standard Event Status Enable Register using the Event Status Enable command (***ESE**), the Event Summary Bit (ESB) of the Status Byte Register is also set to 1. See Section **IEEE 488.2 Status Registers** for more details.

*IDN?

Description	Query Identification
Syntax	*IDN?
Parameter(s)	none
Response	<STRING RESPONSE DATA> The response represents a string containing device identification information: DiCon Fiberoptics Inc, MOA-3800, [serial], [revision]
Notes	Returns instrument's identification string, which contains four comma-separated fields. The first field is the manufacturer's name, the second field is the instrument model number, the third field is the serial number, and the fourth field is the firmware revision.

*OPC

Description	Operation Complete
Syntax	*OPC
Parameter(s)	none
Response	none
Notes	This command sets the Operation Complete (OPC) bit of the Standard Event Status Register when all pending device operations are complete. Note that the Operation Complete Query (***OPC?**) is fundamentally different from the Operation Complete command (***OPC**). While the ***OPC** command sets a bit in the Event Status Register when pending operations complete, the ***OPC?** query sends a response directly to the output queue when pending operations complete.

*OPC?

Description	Operation Complete Query
Syntax	*OPC?
Parameter(s)	none
Response	1 Returns 1 to the output buffer after all pending commands are complete.
Notes	Other commands cannot be executed until this command completes. The purpose of this command is to synchronize you application with the instrument.

*RST

Description	Reset
Syntax	*RST
Parameter(s)	none
Response	none
Notes	Reset command resets the instrument to pre-defined values that are either typical or safe. ***RST** forces the ABORt command. This cancels any trigger actions presently in process, and resets the WTG bit in the Status Operation Condition register.

*SRE

Description	Service Request Enable
Syntax	*SRE
Parameter(s)	option(s): <mask> The program data syntax for <mask> is defined as a <numeric_value> element. <mask> allows to set the value of mask to the Service Request Enable Register.
Response	none
Notes	This command assigns the value of mask to the Service Request Enable Register. The bits in the Service Request Enable Register correspond to events defined in **Table 1**, the Standard Event Status Enable Register table. To enable an event bit, set the bit to 1. Set disabled bits to 0. When an enabled event takes place, the module sets the RQS bit in the Status Byte Register. To determine which event took place use the ***STB?** query. See Section **IEEE 488.2 Status Registers** for more details. ***CLS** clears the event register, but not the enable register. An event register is a read-only register that latches events from the condition register. While an event bit is set, subsequent events corresponding to that bit are ignored.

*SRE?

Description	Query Service Request Enable
Syntax	*SRE?
Parameter(s)	none
Response	<NR1 NUMERIC RESPONSE DATA> The response represents the binary-weighted sum of all bits set in the Service Request Enable Register.
Notes	The events are defined in the Standard Event Status Enable Register table posted in the notes section of the ***ESE** command. Enabled event bits are set to 1. Disabled bits are set to 0.

*STB?

Description	Query Status Byte
Syntax	*STB?
Parameter(s)	none
Response	<NR1 NUMERIC RESPONSE DATA> The response represents the binary-weighted sum of all bits set in the Status Byte Register.
Notes	This query returns the contents of the Status Byte Register. The Status Byte is defined in the **Table 2** on the next page. See Section **IEEE 488.2 Status Registers** for more details.

Table 2. Status Byte Register

Name	Event	Bit	Decimal
MAV	0 - No messages in the output queue. 1 - There is a message in the output queue.	4	16
ESB	0 - No standard event occurred. 1 - A standard event occurred.	5	32
RQS	0 - No enabled service request occurred. 1 - An enabled service request occurred.	6	64

*TST?

Description Self-Test

Syntax *TST?

Parameter(s) none

Response <NR1 NUMERIC RESPONSE DATA>

The response represents the results of the self-test.

Notes Performs an instrument self-test. A 0 (zero) indicates the instrument passed self-test. If self-test fails, one or more error messages will provide additional information. Use **:SYSTem:ERRor?** to read the error queue.

***TST?** also forces a ***RST** command.

*WAI

Description Wait-to-Continue

Syntax *WAI

Parameter(s) none

Response none

Notes Pauses additional command processing until all pending operations are complete. See ***OPC** for more information.

IEEE 488.2 Status Registers

The MOA-3800 supports four status registers.

Table 3. IEEE 488.2 Status Registers

Acronym	Name	Description
ESE	Event Status Enable Register	Event flags that trigger ESB in the Status Byte Register. This register is user-set.
ESR	Event Status Register	Event flags that have occurred. This register is set by the module.
SRE	Service Request Enable Register	Status Byte flags that trigger RQS. This register is user-set.
STB	Status Byte Register	Status flags that have occurred. This register is set by the module.

Each bit in these registers is a flag that represents a condition or event.

In pseudo code, the following rules apply.

1. IF (ESE & ESR) THEN STB |= ESB
2. IF (SRE & STB) THEN STB |= RQS

Note: The above rules use bit-wise AND.
Note: The values of the ESB and RQS bits are defined with the ***STB?** command.

6. Handling Fiberoptic Components and Cables

Fiber optic components require special handling. Follow these guidelines when handling the cables and connectors.

Handling Fiber Optic Cables

To avoid cable damage and to minimize optical loss, follow these guidelines when handling fiber optic cables.

- Handle the fiber pigtail outputs carefully.
- The minimum bend radius for most optical cables is 35mm. Never bend an optical cable more sharply than this specification. Optical performance will degrade, and the cable might break.
- Avoid bending the optical cable near a cable strain relief boot. Bending an optical cable near a strain relief boot is one of the easiest ways to permanently damage the optical fiber.
- Avoid bending the optical cable over a sharp edge.
- Avoid using cable tie wraps to hold optical cable. Tie wraps when tightened can create micro-bends or break an optical cable. Microbends can cause a dramatic reduction in optical performance.
- Do not pull on the bare fiber as this can break the fiber inside the component.
- Avoid using soldering irons near optical cables. Accidental damage can easily occur when a soldering iron is used near an optical cable. In addition, solder splatter can contaminate and permanently damage optical fiber connectors.
- To assure the most stable, repeatable optical performance after the optical cables have been connected, immobilize the cables using wide pieces of tape or another form of mechanical cushion.

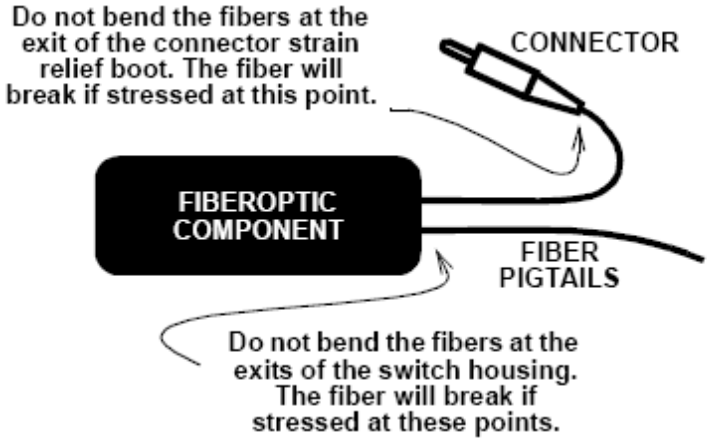


Figure 1. Optical Component Handling

Storing Optical Connectors

All switches that include optical connectors are shipped with dust caps covering those optical connectors. Optical connectors should remain covered at all times when the instrument is not in use.

Cleaning Optical Connectors

Clean any exposed connector using a cleaning kit supplied by the connector manufacturer or high-grade isopropyl alcohol and a cotton swab. To clean with alcohol and a swab, dab the tip of a cotton swab in alcohol and then shake off any excess alcohol. The tip should be moist, not dripping wet. Stroke the swab tip gently across the surface of the connector and around the connector ferrule. Either allow the connector a minute to dry, or blow-dry the connector using compressed air. Be careful when using compressed air: improper use may deposit a spray residue on the connector.

Mating Optical Connectors

Follow these instructions when mating optical connectors.

- Clean both connectors prior to mating. Any small particles trapped during the mating process can permanently damage the connector.
- Smoothly insert the appropriate connector ferrule into the adapter. Do not allow the fiber tip to contact any surface. If the tip accidentally contacts a surface before mating, stop. Re-clean the connector and try again.
- Tighten the connector until it is finger tight or to the torque specified by the connector manufacturer. Do not over-tighten the connector as this can lead to optical loss and connector damage.
- Check the optical insertion loss. If the loss is unacceptable, remove the connector, re-clean both ends of the mate, and reconnect them. You may have to repeat this process several times before a low-loss connection is made.
- After you make the connection, monitor the stability of the optical throughput for a few minutes. Optical power trending (slowly increasing or decreasing) is caused by the slow evaporation of alcohol trapped in the connector. Continue to monitor optical power until it stabilizes. If the loss is unacceptable, re-clean the connectors and start again.

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