2.2 PC Interfaces

2.2.1 PC Connectivity Options for Power/Energy Measurement

Sample data with Ophir power meter at up to 4000 points per second

Ophir sensor to USB interfaces with up to 4 channel connectivity

Ophir EA-1 Interface with Ethernet connectivity

Transmit real time data to PC at up to >25,000 points/s (sensor limited) via Ethernet

Transmit real time data to PC or real time data to PC via USB or RS232

Ophir Quasar interface with wireless connectivity

Transmit real time data to PC at 500 points per second via Bluetooth

Ophir Pyroelectric, Thermal and Photodiode sensors measure at up to 25,000 points per second

Ophir power meter capable of on board storage of data of up to 250,000 points and data storage rate of up to 4000 points per second

Transmit stored data or real time data to PC via USB

StarLab software (data transmitted via USB, Ethernet or Bluetooth)

StarCom software (data transmitted via RS232)
## 2.2.7 Summary of Computer Options for Ophir Meters and Interfaces

### Communications

With Ophir RS232, USB, Bluetooth, Ethernet and GPIB communication options you can transfer data from the sensor to the PC in real time or offline. You can also control your Ophir power meter from the PC.

- USB on Nova II, Vega, StarBright, Centauri (optional on StarLite) power meters and Juno, Juno+, Pulsar and USBI PC interfaces
- Bluetooth wireless on Quasar interface
- RS232 on LaserStar, Nova II, Vega, StarBright and Centauri optional on Nova
- GPIB optional on LaserStar
- Ethernet on EA-1 interface

### Ophir Power Meter and Interface Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Centauri</th>
<th>StarBright</th>
<th>Nova II / Vega</th>
<th>StarLite</th>
<th>LaserStar</th>
<th>Nova</th>
<th>Juno / Juno+</th>
<th>Pulsar-1, 2 or 4</th>
<th>EA-1</th>
<th>Quasar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Measurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power log period</td>
<td>1s to 1000hrs.</td>
<td>1s to 1000hrs.</td>
<td>12s to 600hrs.</td>
<td>N.A</td>
<td>12s to 600hrs.</td>
<td>5s to 24hrs.</td>
<td>5s to 500hrs.</td>
<td>5s to 500hrs.</td>
<td>5s to 500hrs.</td>
<td></td>
</tr>
<tr>
<td>Max points stored onboard</td>
<td>unlimited</td>
<td>unlimited</td>
<td>Nova II 5400 Vega 27000 unlimited</td>
<td>N.A</td>
<td>5400</td>
<td>300</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td></td>
</tr>
<tr>
<td>Max points direct on PC</td>
<td>unlimited</td>
<td>unlimited</td>
<td>Nova II 5400 Vega 27000 unlimited</td>
<td>N.A</td>
<td>unlimited</td>
<td>unlimited</td>
<td>unlimited</td>
<td>unlimited</td>
<td>unlimited</td>
<td></td>
</tr>
<tr>
<td>Analog output</td>
<td>1V, 2V, 5V, 10V F.S.</td>
<td>1V, 2V, 5V, 10V F.S.</td>
<td>1V, 2V, 5V, 10V F.S.</td>
<td>1V, 2V F.S.</td>
<td>1V F.S.</td>
<td>1V F.S.</td>
<td>N.A / 1V, 2V, 5V, 10V F.S.</td>
<td>N.A</td>
<td>N.A</td>
<td></td>
</tr>
<tr>
<td>Energy Measurement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max onboard data logging rate</td>
<td>25,000Hz</td>
<td>5000Hz</td>
<td>4000Hz[2]</td>
<td>N.A</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td></td>
</tr>
<tr>
<td>Data transfer rate of a data file from instrument to PC</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td>~500 points/s</td>
<td></td>
</tr>
<tr>
<td>Max points stored USB/onboard</td>
<td>unlimited</td>
<td>unlimited</td>
<td>Nova II 59,400 Vega 250,000</td>
<td>N.A</td>
<td>59,400</td>
<td>1000</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td></td>
</tr>
<tr>
<td>Trigger input and output</td>
<td>Trigger input to synchronize measurement of pulses</td>
<td>Trigger input to synchronize measurement of pulses</td>
<td>Trigger input to synchronize measurement of pulses</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td></td>
</tr>
<tr>
<td>Timing - time stamp for each pulse</td>
<td>resolution 1µs</td>
<td>resolution 1µs</td>
<td>resolution 1µs</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>resolution 1µs</td>
<td>resolution 1µs</td>
<td>resolution 1µs</td>
</tr>
<tr>
<td>LabVIEW VIs</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes[2]</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Maximum baud rate</td>
<td>PC file format</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>Unlimited</td>
</tr>
<tr>
<td>TTL Out</td>
<td>Number of sensors supported</td>
<td>2 / 1 sensors per unit. Can combine several units with software for display of up to 8 sensors on one PC</td>
<td>One sensor per unit. Can combine several units with software for display of up to 8 sensors on one PC</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
<td>N.A</td>
</tr>
<tr>
<td>compatable ASCII</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatible sensors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power supply</td>
<td>Powered from internal rechargeable battery power supply</td>
<td>Powered from internal rechargeable battery power supply</td>
<td>Powered from internal rechargeable battery power supply</td>
<td>N.A</td>
<td>Powered from internal rechargeable battery power supply</td>
<td>Powered from internal rechargeable battery power supply</td>
<td>Powered from USB</td>
<td>12V wall cube plugs into jack on rear</td>
<td>12V wall cube plugs into jack or PdE</td>
<td>Powered from internal rechargeable battery power supply</td>
</tr>
<tr>
<td>Dimensions</td>
<td>47 x 200 x 130mm</td>
<td>212 x 114 x 40mm</td>
<td>208 x 110 x 43mm / 210 x 80 x 29mm</td>
<td>N.A</td>
<td>211 x 114 x 40mm</td>
<td>194 x 228 x 57mm</td>
<td>205 x 95 x 39mm</td>
<td>77 x 55 x 23mm / 105 x 80 x 29mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes:
1. The above refers to the rate for logging every single point in turbo mode. Above that rate, the instrument will sample points but not log every single point.
2. For pyroelectric sensors, maximum guaranteed baud rate is 9600.
3. StarLite must be USB enabled in order to work with StarLab. If your StarLite has not been USB enabled, please contact your Ophir distributor in order to obtain a USB Activation Code.
2.3 Software Solutions

2.3.1 StarLab

StarLab turns your PC into a laser power/energy multi-channel station

Extensive Graphic Display of Data
- Line Plot, Histogram, Bar chart, Simulated Analog Needle
- Multiple data sets on one graph or separate graphs on the same screen

Advanced Measurement Processing
- Power/Energy Density, Scale Factor, Normalize against a reference
- Multi-channel comparisons
- User defined mathematical equations: channels A/B, (A-B)/C etc.
- Position & size measurement with BeamTrack sensors

Data Logging for Future Review
- Can be displayed graphically or saved in text format
- Easily exported to an Excel spreadsheet

Fully supports Centauri, StarBright, StarLite, Vega, Nova II, Pulsar, Juno, Juno+, Quasar, EA-1 and USBi devices with all standard Ophir sensors

Flexible Display Options with StarLab

Choose which channels to display

Maximize one of the sources

Choose line graph

or histogram

One of the above screens is maximized

You may choose to display them separately

110.7mW

75.40mW  1.967uW

32.79uW  2.668uJ

117.4mW

188.2mW
Multiple Sensors displayed together

Click on one of the channels

The numerical values are from the channel chosen

Here multi line graph display has been chosen

Settings and functions may be opened to adjust then minimized as needed

Additional functions are available from the "Functions" tab

Here multi line histogram display has been chosen

2.3.1
Functions and Logging

Functions

Click on f(x) to open another trace combining measured values

Define function combining measured values

New trace is now added per defined function

Logging

Files are stored here. They may be viewed graphically OR numerically

Click on log button and logging of values starts

For latest updates, please visit www.ophiropt.com/photonics
BeamTrack Power/Position/Size Screens

Open Measuring type tab and choose Track

Power

Click on this tab and choose “stability”

Position

Displays beam center wander weighted for dwell time at each position

Size

Power / Position / Size screen

Position stability screen
2.3.2 System Integrator Solutions

Besides their use as stand-alone, fully featured laser power/energy meters, Ophir devices are easily incorporated into larger end-user applications. This allows system integrators to leverage Ophir’s excellence in measurement capabilities with legacy analysis packages.

Communication Protocols

All Ophir devices support one or two forms of communication with the PC.

<table>
<thead>
<tr>
<th>Device</th>
<th>USB</th>
<th>RS232</th>
<th>GPIB</th>
<th>Bluetooth</th>
<th>Ethernet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centauri</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>StarBright</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vega</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nova I</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*StarLite</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LaserStar</td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nova</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juno / Juno+</td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EA-1</td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulsar</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USBI</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quasar</td>
<td>●</td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*With USB activation code

USB

Ophir provides a common interface for communication and control of all of our USB speaking devices. OphirLMMeasurement is a COM object that is included as part of the StarLab installation (StarLab 2.10 and higher) that allows the system integrator to take control of the Centauri, StarBright, StarLite, Juno, Juno+, Nova II, Pulsar, USBI and Vega devices; integrating them into his in-house measurement and analysis package.

For communication via USB, device drivers and additional support software must be installed on your PC. These components are installed as part of the StarLab application’s installation process.

RS232

RS232 communication is the simplest to integrate into your Customized Solutions (OEM) application. Integrated Development Environments (IDE’s) such as Microsoft Visual Studio provide functions and methods for accessing the PC’s com port.

The following is all that you need to get your RS232 applications up and running

- User Commands document contains an alphabetical listing and detailed description of all commands available with the Centauri, StarBright, Vega and Nova II devices.
- Appendix A5 of the StarCom User Manual contains an alphabetical listing and detailed description of all commands available with the Nova and LaserStar devices.
- Appendix A4 of the StarCom User Manual gives an example of polling the Nova device for measurements. This was written in VB6.
- An appropriate RS232 assembly
- Nova RS232 Assembly (P/N 7Y78105) for use with the Nova device
- Nova II / Vega RS232 cable (P/N 7E01206) for use with the Nova II and Vega devices (included with the Nova II / Vega)
- LaserStar RS232 cable (P/N 7E01121, included with the LaserStar)
- StarBright / Centauri RS232 cable (P/N 7E01213, included with the StarBright and Centauri)

GPIB

Besides RS232, the LaserStar can also communicate via GPIB (IEEE 488.1). Using the SDK supplied by the vendor of your GPIB controller hardware, a LaserStar IEEE cable (P/N 7Y78300) and the StarCom User Manual, you can integrate the LaserStar into your GPIB solution.

Bluetooth

Bluetooth system integration for the Quasar is easily accomplished, in a similar way to our RS232 devices. For more information (and a list of commands), please contact Ophir.

Ethernet

The EA-1 Ethernet Adapter device provides system integration using a Telnet connection over an Ethernet network. A list of user commands is provided, similar to the RS232 commands described above. See the EA-1 User Manual for more details, available on the website.
System Integrators will need the following components:

- OphirLMMeasurement COM Object.pdf, lists and describes the methods and events available for configuring, controlling and uploading measurements from Ophir devices.
- OphirLMMeasurement.dll. COM object component developed and supplied by Ophir for communication with the Centauri, StarBright, StarLite, Juno, Juno+, Nova II, Pulsar, USBI and Vega devices. The COM object is registered when the application is installed. OphirLMMeasurement COM Object.pdf describes how to register it on another PC where the Ophir application has not been installed.
- Standard USB cable (P/N 7E01202) for use with the Pulsar and USBI devices (included).
- Standard mini-B USB cable (P/N 7E01217) for use with the Juno and Juno+ devices (included).
- Nova II / Vega USB cable (P/N 7E01205) for use with the Nova II and Vega devices (included).
- StarBright / StarLite / Centauri micro-B USB cable (P/N 7E01279) for use with StarBright, StarLite and Centauri devices (included).

Ophir provides example projects of COM Object clients in VC#, VB.NET and LabVIEW. These are found in the Automation Examples subdirectory of our StarLab PC Application.

Note: (a) P/N 7Y78105 replaces P/N 78105
Note: (b) P/N 7Y78300 replaces P/N 78300

2.3.3 StarCom

This software is supplied with the Nova II, LaserStar, Vega and Nova with RS232 option. It allows you to measure, analyze and record power and energy from any Ophir sensor.

You can log the data from each sensor simultaneously to file.
2.3.4 LabVIEW Solutions

Ophir has long recognized the growing LabVIEW community of developers. For over 10 years, we have been providing LabVIEW libraries for all of our devices. These are full open-source applications that can be used as is or tailored by the LabVIEW programmer to his specific needs.

These starter applications are basic software only that allows the LabVIEW programmer to experiment freely to fully feel the strength of our devices’ respective command sets.

These applications contain VIs (Virtual Instruments) to control the instrument. You can combine VIs to create successively larger and more versatile larger VIs by simply connecting them together. Users can create sophisticated, custom applications in minutes. In most cases, applications can be built and tested even before the instrument even arrives. The versatility of these tools is limitless.

All of our LabVIEW libraries can be downloaded from our web site: www.ophiropt.com

VI Libraries

Ophnova.llb
Library supplied for use with the Nova. Communication is in RS232 and is based on NI-VISA.

Ophistrd.llb
Library supplied for use with the Dual-Channel LaserStar. Communication can be set to RS232 or GPIB and is based on NI-VISA.

Ophinstr.llb
This library can be configured to work with the Nova II, Vega, USBI or Single-Channel LaserStar devices. It can also work with the Juno or Juno+ with a Thermopile or Photodiode sensors. It can be set to RS232, USB or GPIB. It is based on NI-VISA for all 3 communication protocols.

LabVIEW COM Demo.llb
Library supplied for use with all of our USB speaking devices (Centauri, StarBright, StarLite, Juno, Juno+, Nova II, Pulsar, USBI, Vega). Makes use of our COM object. Included with our StarLab application.