

Power Meter

rev 1.0

July 5, 2010

1 Introduction

Monitoring every laser shot is the optimum approach to detect laser pulse energy fluctuations, SHG and THG efficiency changes and flashlamp degradation of your laser . A laser spot reflection can be measured using a photodiode or a laser power meter head.

2 Components

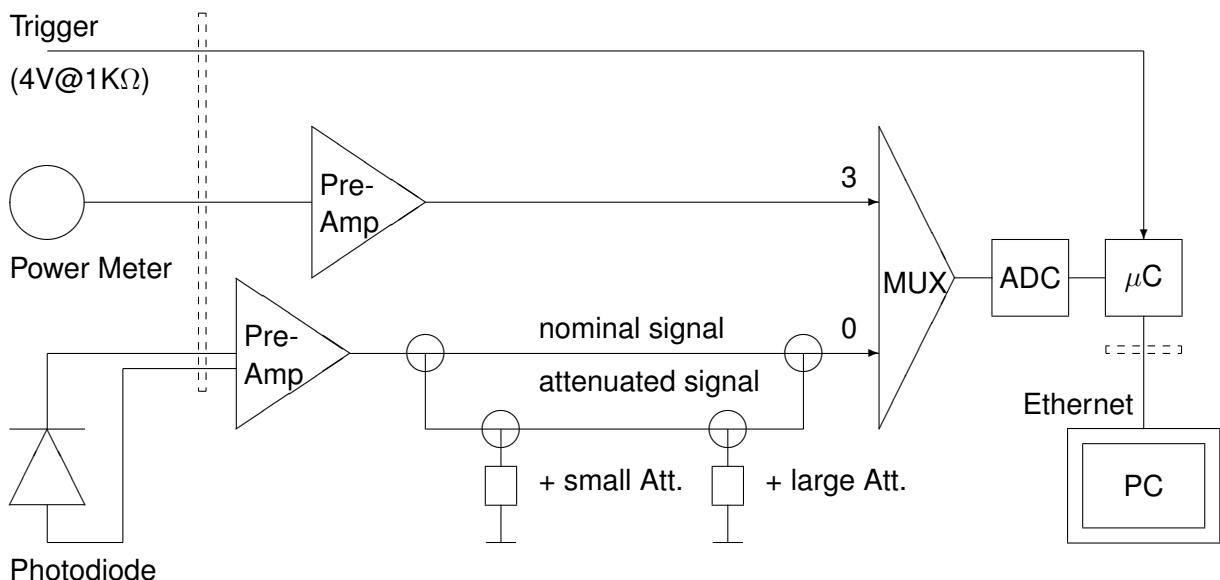
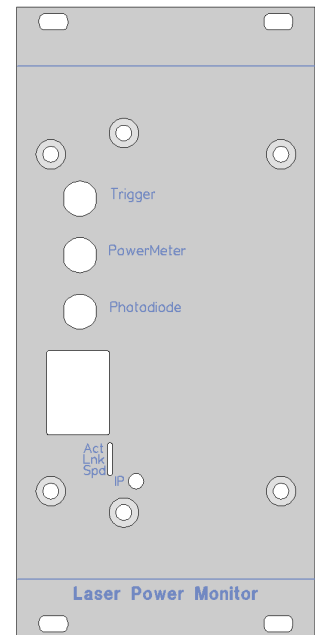
The power meter module has an Ethernet controller for communication with the PC. After the external trigger is received a short trace from either the photodiode or the power meter head will be analyzed.

The trigger pulse should be 4V @1k Ω for more than 100ns.

The signal inputs have Lemo CAMAC connectors (mating connector: Lemo FFA.00.250.NTAC29). The photodiode signal connects to the ADC channel 0 and the power meter head to ADC channel 3.

The photodiode should not have a additional ground connection outside the power meter controller as this will certainly create unwanted ground loops.

For every trigger the light pulse is measured and the result together with a timestamp is sent to the PC over a Ethernet connection.



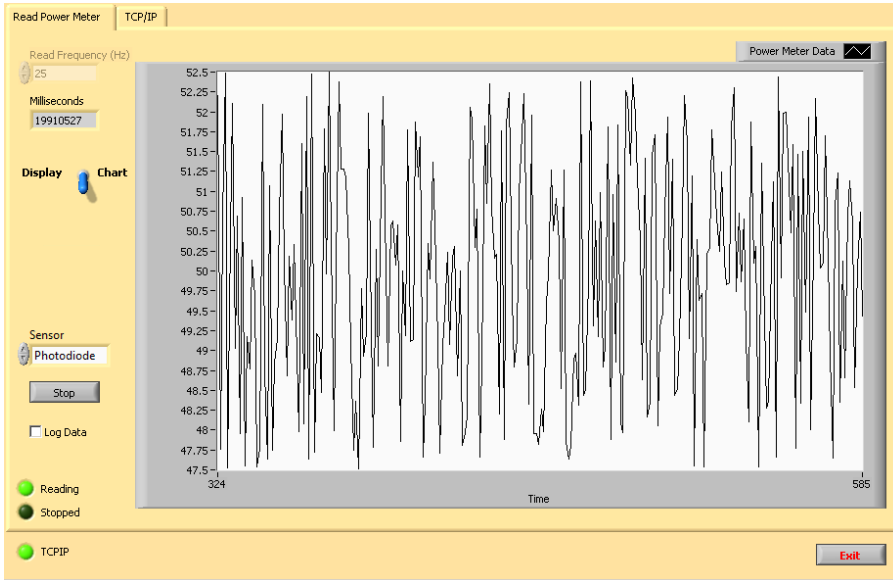
Principal scheme

3 Software usage

After setting up the IP address (see [Licel Ethernet Controller Installation and Reference Manual](#)) the `Power Meter Control.vi` can be started with the previously selected IP address.

IP Address	Port	Timeout
192.168.69.150	2055	5000

Once the TCP/IP connection is established the **Sensor** needs to be selected so that it corresponds to the external detector (*Photodiode* or *Power Meter*).



The display of the data can be in two modes, either a power scale or history chart that shows the last 1024 readings. After pressing the *Start* button the recording of the data begins. The button text will change to *Stop*. The acquisition stops after pressing the button again.

Check **Log Data** to write the acquired data to a file. Two tab-separated ASCII columns are written, the first column contains the millisecond timer value returned by the controller, and the second contains the sensor value. The files are written to the sub directory `log`. The file name is `YYYYmmdd_HH-MM-SS.uu.log` where `YYYYmmdd` is the date, and `HH-MM-SS` the 24 hour time. `uu` stands for the first decimal places of the seconds.

4 Low Level TCPIP access

The general syntax of the commands is described in the [Licel Ethernet Controller Installation and Reference Manual](#).

The power meter controller implements the general commands:

- *IDN?
- CAP ?
- TCPIP
- LOGON
- WHITELIST
- MILLISEC?

The following command is unique for the controller:

- POW

It has several subcommands.

- `POW CHANNEL`
- `POW CONFIG`
- `POW START`
- `POW STOP`

To run the system one needs to open to 2 sockets, one for the commands and another socket to get the data pushed from the controller to the PC.

4.1 Commands

4.1.1 `POW CHANNEL <ADC >`

`POW CHANNEL 0`

Selects the ADC channel 0 for the data acquisition. The ADC channel can be between 0 and 3. The useful values are 0 the photodiode and 3 the power meter head.

The controller response is:

```
POW CHANNEL executed
```

4.1.2 `POW CONFIG <Attenuation >`

`POW CONFIG 0`

Deselects the attenuation. `Attenuation` is a bit field where

- 0x01 activates the attenuation
- 0x02 adds a small additional attenuation
- 0x04 adds a large additional attenuation

The bit field is sent as a normal decimal value. For instance to attenuate the signal and add a small additional attenuation one would sent (0x01 + 0x02 = 3) three as the attenuation parameter.

The controller response is:

```
POW CONFIG executed
```

4.1.3 `POW START`

`POW START`

activates the data acquisition and data transmission over the previously opened push socket.

The controller response is:

```
POW START executed
```

For every received trigger one ASCII line will be sent over the push socket with the following format

```
<Milliseconds since controller start> <Pulse amplitude ><CRLF>
```

4.1.4 `POW STOP`

`POW STOP`

deactivates the data acquisition and stop the data transmission over the previously opened push socket.

The controller response is:

```
POW STOP executed
```

4.2 LabVIEW TCPIP Power Meter VIs

Licel TCPIP POW Parse Trace.vi

Parses the string reply of the **POW TRACE** command and returns the data as an array.



Licel TCPIP PowerMeter.vi

The vi sends the POW command with the **Parameter** (0: START, 1: STOP, 2: RESET) to the controller.

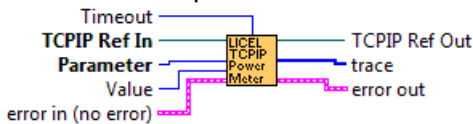
START causes the controller to send power meter data whenever receiving a trigger

STOP stops transferring data.

CHANNEL sets the ADC channel

CONFIG mode sets the powermeter mode (bit 0: preamp, bit1: damping, bit2: damping2)

An error is generated if the vi does not receive the appropriate reply (POW <Parameter>executed or for TRACE a sequence of decimal string numbers).



5 Appendix – Ini File

```
[TCPIP]
UseValues=TRUE
Port=2055
IPAddress=10.49.234.234
[Data]
CalibrationFactor=1
UnitLabel=mW
Offset=0
```

UseValues	Use TCPIP values from ini file (Only for Windows applications)
Port	TCPIP Port
IPAddress	TCPIP address
CalibrationFactor	Conversion from binary controller data to physical unit
UnitLabel	physical unit
Offset	Offset in physical units