



# **OEM Data Acquisition System Business Partners Guide**

This document provides information on the PowerLab® data acquisition system and a broad outline of the steps to be taken for the development of a mutually beneficial OEM partnership.





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## Overview: ADInstruments and PowerLab

In 1988 ADInstruments was founded to develop and manufacture a proprietary range of advanced data acquisition systems designed to emulate the function and performance of conventional chart recorders, XY plotters and oscilloscopes. Today, ADInstruments is a world leader in the supply of computer-based data acquisition and analysis systems to the Life Science market. There are now over 25000 systems in use worldwide in hospitals, company laboratories, research institutes, universities, colleges, Polytechnics and high schools.

ADInstruments offices are located in the USA, UK, Germany, Japan, China, New Zealand and Australia in support of this installed base. We also have representative offices in India and Chile. The ADInstruments group employs over 110 people.

To ensure continued technological leadership, a large component of our work force is engaged in research and development with a strong emphasis on software development. ADInstruments' growth and market success has been based on its expertise in providing scientists with the functionality they need, offered within the framework of a high quality user-interface that is both intuitive and easy to use.

PowerLab is available to OEM customers in specially adapted versions. We offer two, four, eight and sixteen channel models that operate on Windows XP as well as Mac OSX.

Our PowerLab data acquisition systems (including hardware units and software) are available as a component to be attached to, or incorporated with, your instrument or transducer system. If you choose ADInstruments as your OEM partner you will be able to provide your customers with a quality, universal, proven and easy-to-use data acquisition and analysis system, while enhancing the power and appeal of your own system.





## PowerLab: A System Description

The PowerLab system is a processor-based data acquisition system (comprising hardware and software) used with a PC to provide the functionality of a chart recorder, XY plotter, storage oscilloscope or data acquisition board. It is used to display, record and analyze data (in real time) from an instrumentation or transducer system. PowerLab has the following broad specifications:

- Bus independent, multi-platform compatible, self powered enclosure. Switching power supply with 90-250 V AC input range (self selecting).
- Self contained instrument operating on both PC and Mac platforms
- Simple installation and unmatched ease of use
- Fast USB 2.0 interface on all models
- From 2 to 16 channels (depending on model)
- System Accuracy to 0.1% with 16 bit resolution
- Sampling from 1 sample/second to 200,000 samples/second continuously to disk with simultaneous display to the computer screen.
- Standard input voltage range 20 mV FS to 10 V FS (built-in amplifiers) which gives full A/D 16 bit resolution on the range selected. Gains are independent for each channel.
- 4 channels have software selectable single ended or differential inputs. The remainder have pseudo differential inputs.
- Built in low pass and high pass hardware filters with independent controls on each channel.
- Auto mains filter. Auto detects 50 Hz or 60 Hz.
- Dual DAC outputs (software selectable ranges from  $\pm 2$  mV to  $\pm 10$  V). Biphasic or independent.
- Trigger input (level or contact closure)
- Digital I/O (8 bits)
- Internal power for transducer power and signal conditioning
- ISO9001/IEC601-1/CE compliance

The PowerLab system is not a “dumb data acquisition card” with software running on the computer. Our Chart software does not require programming. Special features can be added to Chart (by ADInstruments) using our extensions interface.

Many card based systems has some serious flaws:

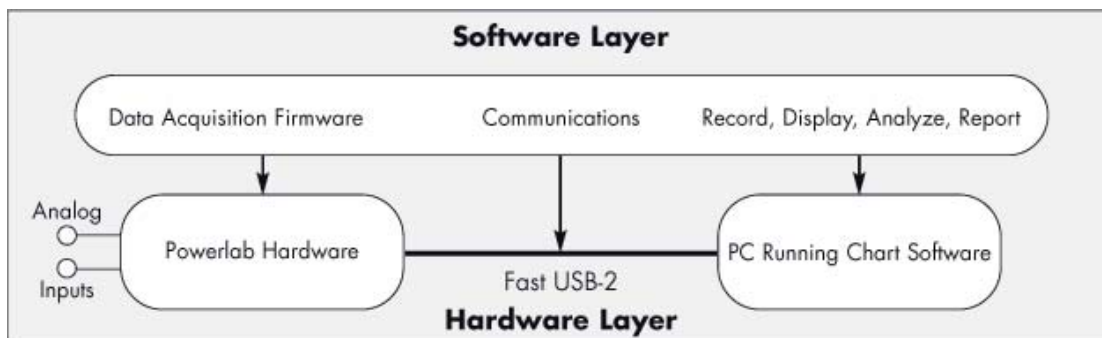
- Bus dependent: how often have PC busses changed?
- Need to install cards inside the PC
- Driver dependent: you need special drivers to operate these systems
- No on-card data processing capability
- Noisy signal environment
- Time consuming to program
- Long term software and hardware support issues



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PowerLab is designed to isolate the real time data acquisition, control and data processing tasks within its own environment and to provide a “standard” Operating System supported communications protocol to the PC. This is shown diagrammatically below. This means that the PC is not responsible for the time critical tasks that need to be performed. Operations are therefore predictable and the system is not subject to alterations in requirements imposed by the Operating System.



To achieve this design goal PowerLab hardware units include a powerful 32 bit RISC processor with sufficient memory to buffer the incoming data stream and standard hardware to communicate with the PC. More importantly firmware resident within the PowerLab unit performs all the time critical tasks such as:

- Gain control
- Multiplexing
- Data buffering & time stamping
- Real time computations such as digital filtering, frequency, period calculations and many more
- High level communications with the PC over USB 2.0





## Available Software

Software listed below is available on both PC and Macintosh platforms. More information on our software products is available on our Web site [www.adinstruments.com](http://www.adinstruments.com) and in product literature.

### Chart

Chart combines the familiar simplicity of a traditional chart recorder with the advantages of computer-based data handling and display. Together with a PowerLab hardware unit Chart software 'transforms' your computer into a scientific instrument that records and displays data in real time. You benefit from seamless data acquisition, professional display and numerous online and offline analysis features.

### Chart Extensions

Chart Extensions provide a mechanism for adding functionality to Chart without modifying the core program. We can develop customer-specific extensions and in some circumstances provide the means for you to develop your own. Below is a select list of extensions to provide an indication of the potential of this methodology:

- Arithmetic: allows arithmetic operations on or between channels in real time
- Event Manager: detects and announces alarms, executes macros, places comments
- Cyclic Measurement: computes parameters in cyclic data (in real time)
- DVM: displays channel data in a digital voltmeter format
- Differential: Computes the differential of a signal
- Integral: Computes the integral of a signal
- XY Plot: produces on-line (or offline) XY plots.
- Events: detects signal events such as max, min etc.
- Spectrum: computes and displays power spectrum of selected data
- Digital Filters: User selectable digital filters
- pH Measurement: allows direct reading from pH meters
- .....many more!!

Extensions are currently available for both the Windows and Macintosh operating systems. There are some difference in these product offerings.

### Scope

An Oscilloscope and XY plotting data acquisition and analysis program with a powerful programmable stimulator. Ideal for high-frequency signals, such as action potentials and evoked responses that are time locked to a stimulus.





## Available Hardware

The system available for OEM applications has been designed specifically to allow both software and hardware changes to be implemented (NRE charges may be applicable). A universal input-switching, medically rated power supply powers the PowerLab 25 series and provides up to 25 watts of power for external user supplied equipment or conditioning circuits.

### PowerLab 25/OEM Series

The 25/OEM series consists of 4 major components:

- Main PCB with 2, 4, 8 or 16 channels, optional DAC outputs and Digital I/O.
- 30 VA and 60 VA universal mains switching supplies
- Optional expansion Board used for special conditioning circuits or an extra 8 channels.
- Two Enclosure types : type I (200 x 250 x 65 mm) and Type II (300 x 300 x 60 mm)

PowerLab 25/OEM series hardware supports the USB 2.0 (up to 200 kHz) and will operate at slower speeds on USB 1.1 (up to 100 kHz).

## Computer Requirements for PowerLab Systems

### PC Computers:

Any new PC computer with 512M RAM and Windows XP, Service pack 2. USB port required.

### Macintosh Computers:

PowerPC based system with minimum 512 MB RAM and USB port.

Mac OSX or later with USB port.





## Why Consider PowerLab 25/OEM Series?

### Faster Time to Market

Reach the market faster with a tested and proven data acquisition product. Each month lost in bringing a new product or feature represents a “real” loss of money, opportunity and most importantly market share. Software development cycles are becoming increasingly longer and unpredictable, customer expectations higher. Customers expect ease of use, full colour graphics, overlay facilities, flexible calibration options, special analysis features, ‘cut and paste’, etc. PowerLab offers all of this and will let you focus on your key products, saving you time and improving profit margins.

### Enhance and Add Value to your product

Add value to your products and increase customer satisfaction by incorporating PowerLab into your product range. The years spent on developing, testing, debugging and continually improving the PowerLab system can be put at your disposal. Provide your market with a turnkey solution by adding a data acquisition system to your own specialist product range.

### Save on Development costs

What development costs? Most of our OEM projects are performed with minor NRE (non recurring expenditure) costs. The reason for this is central to our offer: we do not offer to develop a new system for you, we are offering our existing and proven system adapted to your needs. We are not a “for hire” development organization but rather a product developer that is looking for partners to share its technology.

### Acquire a Proven and Tested Product

The PowerLab product has gone through continuous hardware and software evolution over the last 15 years. We have a track record of delivering reliable and well-supported products. The company currently qualifies its products to IEC601-1 and UL5601 as well as meeting the European EMC directives 89/336/EEC, 73/23/EEC, 92/31/EEC and 93/42/EEC (CE Mark). Modifications can affect such approvals and may require re-testing. The company has implemented the ISO9001 standard and was registered in 1998.

The above reasons for choosing PowerLab are commercially compelling provided the necessary alterations are limited in scope to those the system can tolerate without changing its basic design parameters.



## Is PowerLab 25/OEM Suitable for Your Application?

This system is designed for specific sets of applications related to the recording, display and analysis of data using the Chart recorder idiom. In order to achieve maximum benefit for your company, your application should strive for minimum change in the basic system. This is not to say that the system is not adaptable, it is just that some things are relatively easy to change while other changes can pose significant challenges. To adapt our software to “other” hardware is a difficult task requiring the development of a new firmware and communication layer. There is therefore considerable reluctance on our part to follow OEM applications that require the re-implementation of PowerLab compatible firmware into a new hardware environment or the development of a new communications protocol.

An implication of developing new firmware/hardware alliances is that it brings with it the need to duplicate ongoing support effort. For example it is more efficient and effective for you to license our hardware/firmware for manufacture in your own packaging format, than to re-implement the firmware on new hardware. Modifying the existing system is significantly more acceptable particularly if the changes are minor or simply require the addition of special/application specific analysis tools.

An important concept in the PowerLab 25/OEM system is the “Extensions” interface – a software system which allows new computation/analysis features to be readily added to Chart software. The extension system is used internally to add new features and is potentially available to OEMs. This capability allows new OEM-designed software features to be added. Producing extensions is more predictable and can be undertaken at any stage of product marketing. They could be added to enable entry into new markets or as a response to customer demand.

### Summary

The best approach to using the PowerLab system in your application is to limit changes to cosmetic and necessary physical adaptations coupled with software enhancements required by your market or applications. If major alterations or new software elements need to be written the advantages of being an OEM may be limited. Our priority is the supply of fully-supported, quality products that can achieve maximum success for our business partners.

### Typical PowerLab OEM examples

Company A manufactures a range of ultrasonic blood flow/blood pressure transducers that provide an analog output proportional to blood flow. A PowerLab system can provide not only the means of recording data but also the ability to extract data such as  $dP/dt$  and other sophisticated analysis routines.

Company B manufactures a mass spectrometer system and requires the capability to record internal operating parameters. PowerLab provides this capability as well as long-term trend recording and analysis and the ability to sound alarms.

Company C manufactures specialized transducers for the pharmaceutical industry. It adds a PowerLab system to replace previously offered chart recorders. PowerLab is adapted to specifically recognize the company’s transducer range as well as provide special analysis tools.





## OEM Options and Pricing

We offer two broad OEM arrangements ranging from the Standard Option to a Custom Option that redevelops the product to fit into your product environment. ADInstruments believes that the maximum benefit can be gained from an OEM arrangement if it minimizes changes to existing technology. If it becomes necessary to fundamentally redesign the system then many benefits can be quickly lost.

### Standard Option

The easiest choice for small volume requirements is to choose the Standard Option (or minimum change). PowerLab will work with most instruments providing an analog or even digital (frequency) outputs. Some minor customization options could be provided. This option allows an immediate start with minimum setup costs and no significant volume commitments. It could include:

- Your company's name or logo on the front panel of the hardware interface
- Modifications to "splash screen" and "about" that reflect your details
- Modification of gain and channel configuration and labels to suit your application
- Provision of high quality documentation sources (in FrameMaker format) that allow your staff to edit the documentation to reflect your needs and those of your customers
- The "hiding" or removal of unnecessary menus and control items

### Custom Option

This enables customization of the PowerLab system to reflect your product and operational requirements without introducing significant hardware and software changes. The following range of modifications could be implemented in this option:

- Redesigned PCB to fit a particular form factor (provided no major software/hardware revision was necessary)
- Provision of modified firmware
- Provision of new software Extensions that add specific functionality to the system
- Modifications to front panel design in terms of non-standard configurations and connector types
- Provision of specialized conditioning circuitry through the "expansion board"
- The options above will incur non-recurring expense (NRE) charges. Payment for NRE charges can be negotiated in a number of ways including:
  - customer meets all charges up front
  - ADInstruments meets charges up front and recoups costs from unit sales
  - a combination of the above



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## Configuration Table

The following table summarizes system choices into the “Standard” and “Custom” options.

System Component	Description	Standard Option	Custom Option	Comment
No. of channels	2, 4, 8 & 16 channels	yes		Preferred Channel Configurations
	1, 3, 5, 6, 7 channels		yes	
PCB version	Standard PCB	yes		
	Non standard		yes	Non standard PCB is a high cost option
Expansion Board	8 channels expansion	yes		8 channels expansion to 16 channels total
	Special circuit		yes	Cost depends on complexity and other factors
Case Size	Type I & Type II	yes		
	Mechanical mods		yes	
Front.Rear Panel	New silk screen	yes		To suit standard front panel configurations
	New Front Panel		yes	New front panel configuration can be developed
DAC	2	yes		Standard
	1 or 0		yes	Minor charge to remove - some cost reduction
Digital I/O	8 input /8output	yes		Standard
	None	yes		Minor charge to remove - some cost reduction
Pod Inputs	2 on Type I	yes		
	4 on Type II	yes		
	Other Configurations		yes	
Modify Config		yes		Mods internal configuration splash screens etc
New Extensions	New analysis software		yes	Cost depends on complexity and other factors
Firmware Modification	Modify internal operation of system		yes	
Power Supplies	30 VA or 60 VA	yes		60 VA can only be housed in Type II Case
	Other		yes	
Documentation	Edit existing	yes		
	New Documentation		yes	Major revision of documents can be expensive





## Options difficult to implement

- Interfacing our existing software applications to non ADInstruments hardware platforms
- Interfacing our existing hardware to other non ADInstruments software

These two options are difficult to implement for the reasons outlined previously. They are not impossible and in some circumstances could be implemented provided the financial and volume aspects can be satisfactorily negotiated and there are no insurmountable technical barriers.

## Unavailable option

The development of entirely new applications is not available.

## Typical OEM Pricing

OEM prices will obviously vary based on the configuration chosen and the nature of the NRE (non recurring expenditure) to be undertaken and how that NRE is funded.

To obtain an accurate specification will require a detailed analysis of the application, required configuration, lifetime volume and NRE charges.

## NRE Charges

Non recurring expenditure charges will apply for modifications to standard products. The following items typically attract NRE charges.

- Design and manufacture of decals or mechanical components
- Software splash screen design and implementation
- Modifications to documentation
- Modification or redesign of PCB's
- Design of new signal conditioning PCB's
- Software modifications





## ADInstruments, the Company

ADInstruments is a company dedicated to a single concept: “easiest to use, computer based data recorders, for the Life Sciences” using world best practice standards. We are offering our dedication to companies that require a superior digital recording system to enhance their high quality products.

Our OEM partners are not acquiring a one off product, they are entering a partnership committed to maintaining the product at the leading edge of available technology.

ADInstruments is an Australian corporation formed in July 1988 that has enjoyed profitable operations every year since its inception with an average annual growth approaching 25%. ADInstruments has featured frequently as one of Australia’s Top 100 fastest growing private companies and has been selected and promoted as one of the country’s most innovative technology companies by the Australian government ([www.techshowcase.nsw.gov.au](http://www.techshowcase.nsw.gov.au)). ADInstruments has the resources available to engage effectively in new developments.

The company has design resources available in both software and hardware with over 30 professionally qualified staff engaged in this area. Appropriate systems and tools are in place to support our design teams including application scientists with experience and qualifications in Life and Physical sciences and engineering. Our software development team is divided into two groups addressing the Windows and Macintosh markets. They are closely coordinated to ensure that the resulting products are essentially identical to the user without losing some of the unique advantages inherent in the two systems.

The company currently qualifies its products to IEC601.1 and UL5601 as well as meeting the European EMC directives 89/336/EEC, 73/23/EEC, 92/31/EEC and 93/42/EEC (CE Mark). Modifications can affect such approvals and may require re-testing. The company has implemented the ISO9001:2000 standard and was first registered in 1998.

Resources are available for hardware and software support through telephone, fax , email and internet for fast partner and customer support.





## Commercial and Legal Issues

Our approach to an OEM partnership is not complex. We like to keep agreements short, clear and well defined. Our representatives can assist you to review and define the following:

- Description of product to be delivered
- Description of agreed changes or modifications
- Quality terms and approvals
- Agreed price/quantity schedule. A fixed price is normally negotiated. Two price components are negotiated: The cost of the hardware/software deliverables and the NRE (non recurring expenditure) to cover the cost of changes and modifications necessary to meet OEMs needs. NRE is typically paid either when incurred or spread over delivered units.
- Agreed purchase quantities or forecasts are important to guarantee product availability this is particularly true when unusual quantities are involved
- Delivery terms
- Payment terms
- Hardware support terms - warranty service and out of warranty repairs
- Software support - customer support - bug fixes - access to new versions
- Software/design escrow agreements
- Nondisclosure agreements





## The Next Step

You are invited to contact one of our directors for more information, a demonstration, or an opportunity to discuss your potential application in strict confidence.

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