

Specifications:

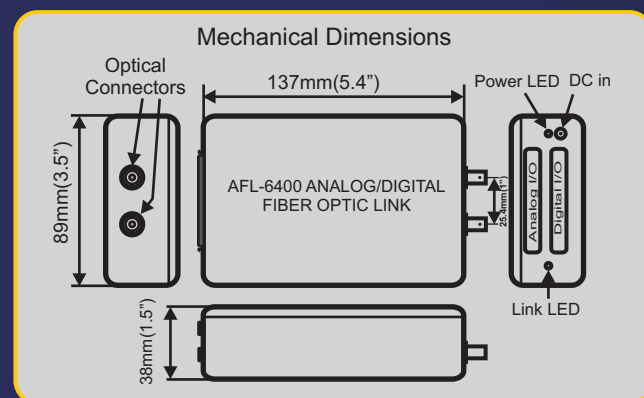
Analog Inputs:
Input Voltage Range: -10 Volts to + 10 Volts.
Sampling resolution: 16 Bit.
Noise and hum induced in input: <0.5mV ptp
Sampling method: True Simultaneous sampling.
Analog Outputs:
Output Voltage Range: -10 Volts to + 10 Volts.
Resolution: 16 Bit.
Noise and hum induced in Output: Less than 1 millivolts.

Digital Inputs and outputs:
Number of I/O signals: 32 Inputs + 32 Outputs.
Sampling Rate: up to 740 KHz. per I/O.
Sampling method: True Simultaneous sampling.
Delay from Input to Output: 9 micro Seconds constant delay.

Digital I/O signals can be combined with RS-232 or RS-485 drivers for bi-directional signals.

Optical Fiber:
Up to 20 Km. of Single Mode Fiber with ST connectors.
100 Km. Transmitters and receivers are available as Option 01.
Link Rate: 155 Mb/Sec., 1.2 Mb/Sec optional.
Fiber Type: Single Mode, 9/125 micron with ST connectors
Supply: 10 - 14V @2.5A max.

Mechanical Dimensions:



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WebSite: www.lab-systems.com

Ordering Information:

AFL-6400 Modules:

AFL-6404 - 4 bi-directional analog channels + 32 bi-directional digital channels.
Sampling rate: 740 KHz. simultaneous.

AFL-6408 - 8 bi-directional analog channels + 32 bi-directional digital channels.
Sampling rate: 425 KHz. simultaneous.

AFL-6416 - 16 bi-directional analog channels + 32 bi-directional digital channels. Sampling Rate: 240 KHz. simultaneous.
Bi-Directional units are available per request.

Option 01 - High Range fiber Optic Transmitter + Receiver - up to 100 Km.
Option 02 - Wavelength Multiplexer/Demultiplexer (WDM) for combining optical signals from 2 units on the same fiber (including Bi-Directional).
Option 03 - Optical Coupler for using a single fiber as a Bi-Directional link (instead of 2 fibers).
Option 04 - A USB-2 Interface to the AFL-6400 for acquiring data and sending data to the AFL-6400.

Power Supplies:

AFL-6400-PS3 - 10 Volts, 3A low noise, linear Regulated power supply (for one AFL- 6400 unit)

USB2 Interface Card:

AFL-6400-USB2 - High speed USB2 interface +driver for WIN XP/2K.

Software:

AFL-6400-SW - Windows data acquisition and control Software.

AFL-6400-LV - Lab View data acquisition and control VI drivers (open VI)

Optical Fiber:

AFL-6400-FO-20m. (for 20 m)
Optical Fiber - Single mode, ST connector.

I/O boards:

- * General purpose I/O board - with 16 Analog I/O and 32 Digital I/O terminals + 1m cable set
- * Relay/RS232 board - with up to 16 Relays and 16 RS-232 ports
- * Filter board - with up to 16 anti-aliasing and 16 reconstruction filters.

AFL-6400

Analog & Digital Fiber Optic Link Data Acquisition System

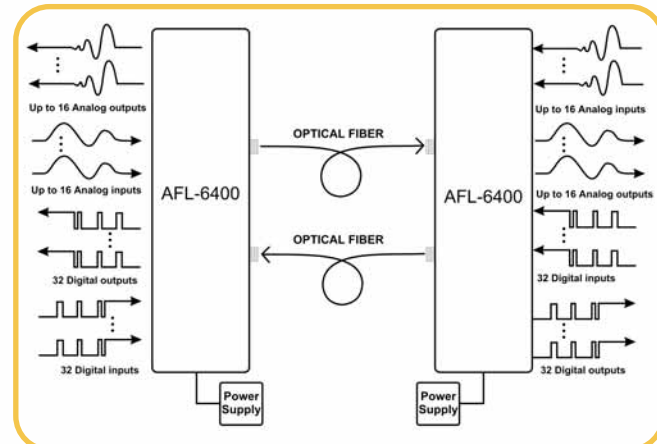


AFL-6400 Analog / Digital Fiber Optic Link

The AFL-6400 is an enhanced Fiber Optic Transmission product family, used for transferring up to 16 analog channels + 32 digital channels in each direction.

Each unit has Analog and Digital I/O pins. Units can be connected back-to-back (i.e. 2 units of the same type, where the signals input to one unit will come out through the outputs of the other unit) or as a Data Acquisition System (i.e. One AFL6400 unit and the PCI Acquisition card).

AFL-6400 Block Diagram



The product is based on A/D and D/A technique, combined with a powerful transceiver, for ranges of up to 100 Km, at analog bandwidth of up to 250 KHz. per channel, at 16 bit resolution (96 dB S/N ratio).

Each unit can work back to back using the same type of units as receiver / transmitter modules (i.e. for sending and receiving analog and digital signals to/from other units) or as a powerful data acquisition module, used for acquiring analog or digital signals over long distances, with high accuracy and noise immunity. It is also possible to combine both configurations (Back-To-Back and Data Acquisition) by using Optical Splitters or Couplers. All channels are sampled simultaneously to provide correct phase information for analysis, control and data acquisition purpose.

Advantages:

* Low noise transfer of analog or digital data (such as RS-232 interface) particularly beneficial in electrically noisy environments and for transmission over long distance.

* For medical tests: the patient is isolated from data acquisition system and from any other high voltage source

* Optional instrumentation amplifier input stage provides a differential input, with an adjustable gain of 10-2,000, for direct connection of any sensor such as: Strain Gage, Piezo, EEG & ECG, temperature, Humidity, Pressure, etc.

* Isolates delicate test equipment from computer-generated noise and spikes: noises from computer do not return into your system

* Eliminates the formation of "ground loops" (when two instruments are connected to separate power lines or have a difference between their ground voltage potentials)

* Total protection of signal processor's input stage from accidental sensor malfunction (e.g. short to mains voltage or a lightning shock)

* Replaces bulky coaxial cables with compact fiber-optic cables - especially important when rewiring existing ducts.

* Cheaper wiring (for long distances) than standard copper cable. 16 Analog channels + 32 digital channels on a single fiber!

* Transfers analog and digital signals to distances of up to 100 km - with very high accuracy.

New Features:

* **USB2 Interface**

* **Full Duplex communication using a single optical fiber**

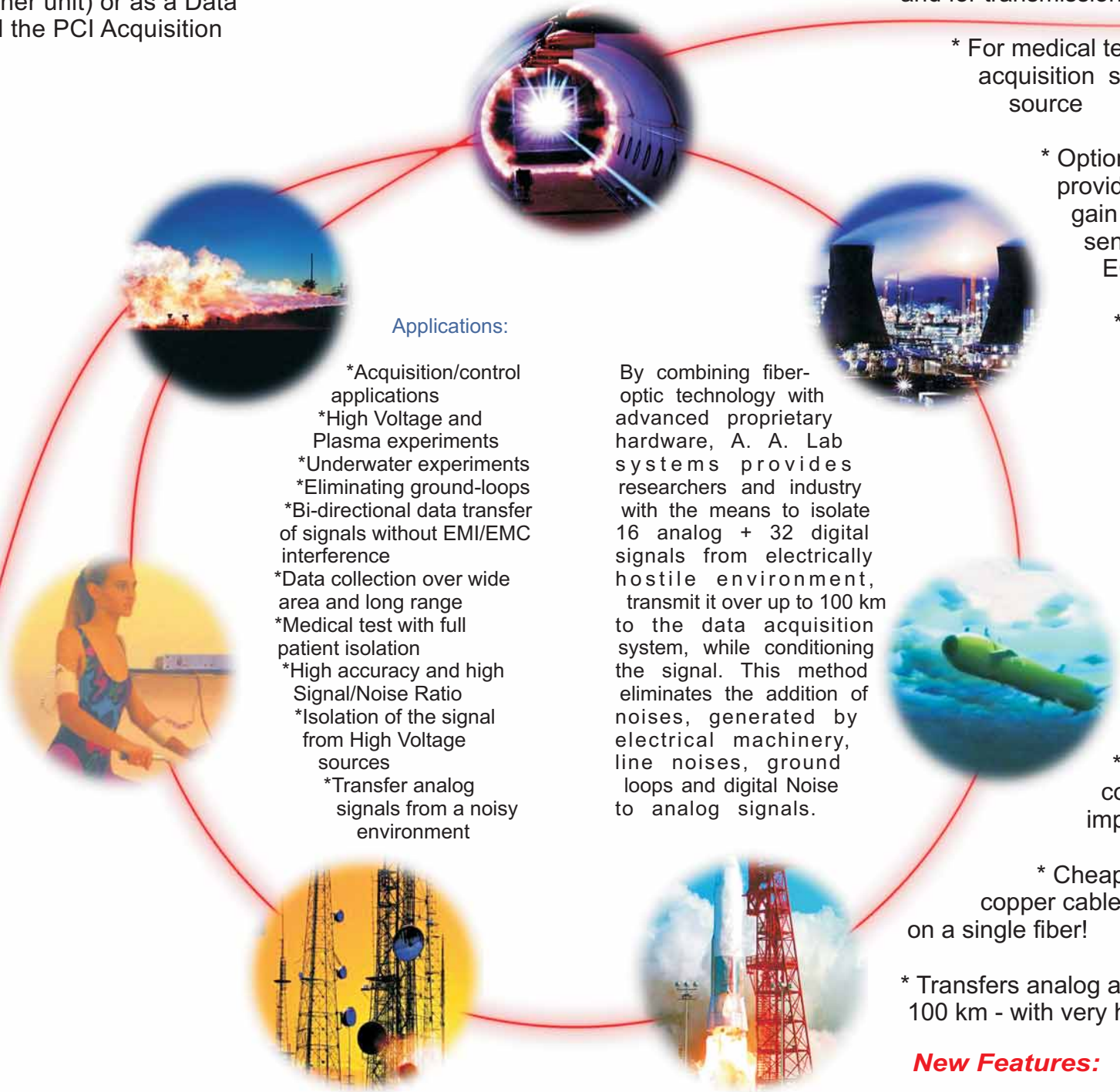
* **Wavelength Multiplexing modules**

* **Analog units with 20MHz. @14 bit sampling rate.**

Applications:

- *Acquisition/control applications
- *High Voltage and Plasma experiments
- *Underwater experiments
- *Eliminating ground-loops
- *Bi-directional data transfer of signals without EMI/EMC interference
- *Data collection over wide area and long range
- *Medical test with full patient isolation
- *High accuracy and high Signal/Noise Ratio
- *Isolation of the signal from High Voltage sources
- *Transfer analog signals from a noisy environment

By combining fiber-optic technology with advanced proprietary hardware, A. A. Lab systems provides researchers and industry with the means to isolate 16 analog + 32 digital signals from electrically hostile environment, transmit it over up to 100 km to the data acquisition system, while conditioning the signal. This method eliminates the addition of noises, generated by electrical machinery, line noises, ground loops and digital Noise to analog signals.



Data Acquisition system and software

The AFL-6400 system components can be used in conjunction with the USB2 optical interface. This interface captures the digital optical signals from the optical fiber and converts them into digital words which are transmitted to the host computer through a high speed USB-2 link (at up to 480 Mb/Sec speed). A user friendly acquisition software help you acquiring Analog and Digital data and view them in real-time on the computer's monitor. The software can also save the data to the hard drive. The USB-2 interface, connected to the AFL-6400 system can function as a arbitrary signal generator, capable of transmitting arbitrary digital and analog signals through the AFL-6400 digital or analog outputs. The host computer may be located up to 60 miles away from the signal inputs/outputs without using any optical repeaters.

Real-Time Display

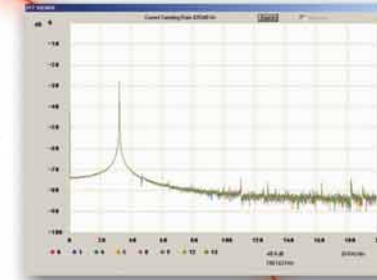
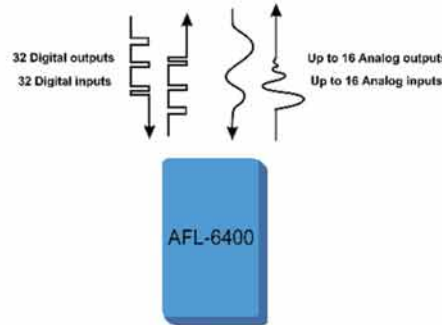
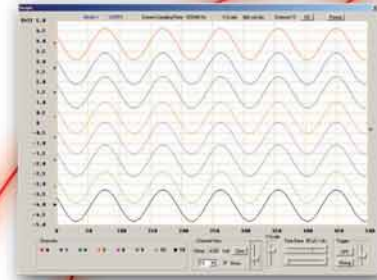
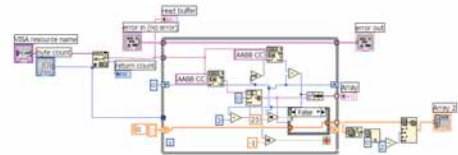
The acquired signals can be displayed in real time on an "Oscilloscope like" screen. Up to 16 signals may be viewed simultaneously on the same screen with a fast refresh rate. The signals may be displayed at different horizontal and vertical scales.

Calibration and Monitoring

This screen can control all Analog inputs and outputs. It allows you to send any voltage levels to all Analog outputs, for calibration purpose, while displaying all input levels on compact readouts.

LabView Driver

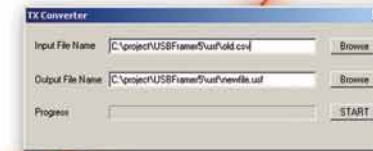
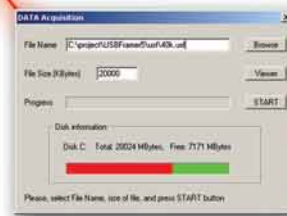
The AFL-6400 software package comes with open VI driver files for all basic acquisition operations. These files can be combined with your existing VI files.



CHANNEL #1	CHANNEL #2	CHANNEL #3	CHANNEL #4	CHANNEL #5	CHANNEL #6	CHANNEL #7	CHANNEL #8
INPUT	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT	INPUT
OUTPUT	OUTPUT	OUTPUT	OUTPUT	OUTPUT	OUTPUT	OUTPUT	OUTPUT
Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive
Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative



Input	Output
1 1 1 1 1 0 1 0 1 1 1 1 1 1 0 0 1 1 1 1 0 1 1 1 1 1	0 1 0 0 1 0 0 0 0 1 0 0 1 0 1 0 0 0 0 0 0 0 0 1 0 1 0
2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31



Data Acquisition

The system can acquire all Analog and Digital data directly to your hard disk. The system can save the data file in Binary format, which may be converted to ASCII Comma Delimited format, for easy exportation to spreadsheet and mathematical programs.

Synthetic Signals

Standard ASCII data files, created by the user in CSV format (Comma Space) with synthetic signals, are converted into Binary format and sent to the remote AFL-6400 Analog and Digital outputs, at high rate.



High Speed USB-2 interface

The USB-2 interface enable the user to acquire data at very high speeds. The AFL-6400 generates data from up to 16 A/D's running at speeds of up to 1 Mhz. each. A proprietary technology is used for transferring these huge amounts of data thru the USB-2 port directly to your Pc's memory. Another AFL-6400 unit can be used to reconstruct the analog and digital signals for monitoring purpose while your computer acquires the data.

Real-Time Spectral Analysis

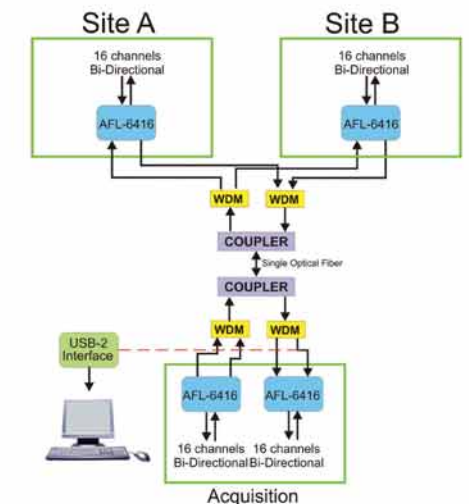
The power spectrum of all inputs is displayed at a high refresh rate, on a Logarithmic scale. The Signal to Noise Ratio (SNR) and spectral densities of the input signals are measured using thid high-resolution screen.

Digital I/O monitoring and control

Each one of the 32 digital input signals is monitored on this screen. Simple control of outputs is possible by toggling them with a single mouse click.

Configuring your system

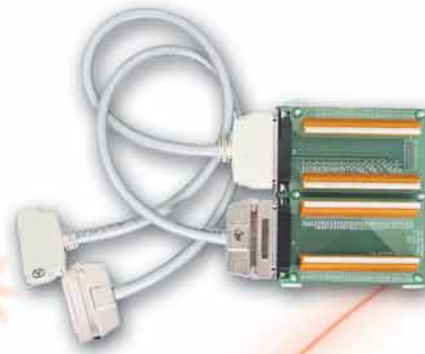
The optical signals may be multiplexed or split using optical component to perform complex setups with many channels and USB2 interface. All signals may be acquired while they are reconstructed.



Options and Accessories

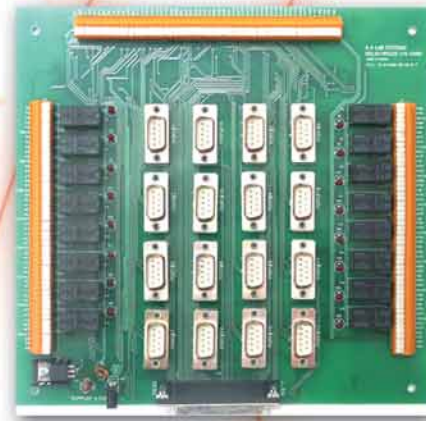
Analog and Digital I/O Board

The I/O board was designed for connecting all external input and output signals to the AFL-6400 system. All connections are made with fast terminals (No Screws!) for easy and reliable wiring.



Relay and RS-232 Digital I/O board

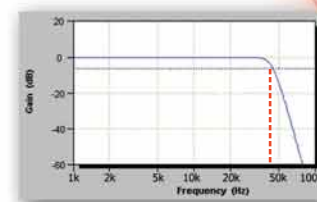
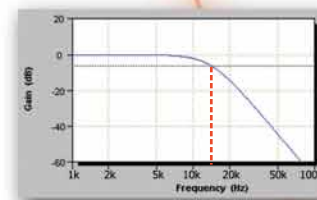
This board converts the digital I/O lines from simple TTL level lines to 16 Full-Duplex RS-232 lines and 16 control relays with 2 dry contacts on each control input. Mixed versions of signals may be made per request. This board simplifies the interface to existing control hardware and instrumentation.



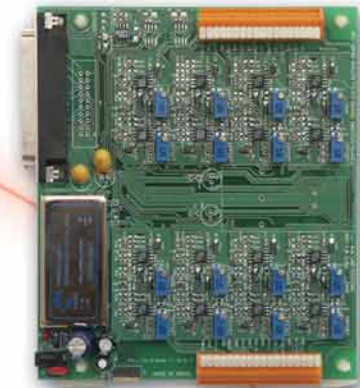
Enhanced Filter Board

Each AFL-6400 Analog input and Output contains an Anti-Aliasing and Reconstruction Filter. This filter is inside the AFL-6400 case and it has 2 poles. Such a filter has a typical attenuation curve like the one on the first curve.

Since all inputs must be attenuated at least -60dB at Nyquist's frequency (50% of the sampling rate) to prevent aliasing of the signals, the filter cutoff frequency (-3dB point) must be far lower than Nyquist's frequency. For example: at a sampling rate of 250 KHz, we must have a -3dB point at about 50 KHz., thus losing a large part of the potential input bandwidth. A solution to that problem is using a filter with 8 poles (second graph) with a sharper roll-off.



The Filter board in combination with the AFL-6400 system is using such a filter for each input and output, in order to provide a higher bandwidth (80 KHz. instead of 50 KHz. for our example) while reducing the input noise and providing a smoother output signal (with less noise and less "stairs" at an excellent Signal to Noise ratio.



EMI/RFI Protected 19" Rack + Charger

The AFL-6400 system is most often used in applications where no interference can be allowed to or from the system. The AFL-6400 system is housed in a Steel case, with double shielding made of Mu-Metal (an alloy with very high magnetic permeability), to prevent any electrical or magnetical interference. All Inputs and outputs to the system are filtered with "Feed-Thru" connectors. The system is powered from an internal battery which allows at least 5 hours of continuous operation. A powerfull charger is used to charge the internal battery.

External power supply

This power supply is used in AFL-6400 systems for systems with 16 channels or in heat sensitive applications.



Compact power supply

Low weight, Small volume Switch-Mode power supply for the AFL-6400 System components.



Linear power supply

Low-Noise Linear power supply is most recommended for Noise sensitive applications.



USB-2 power supply

A small size, low weight adaptor is used for powering the USB-2 interface.



All Power Supplies are for worldwide operation: 110/220V, 50/60 Hz.