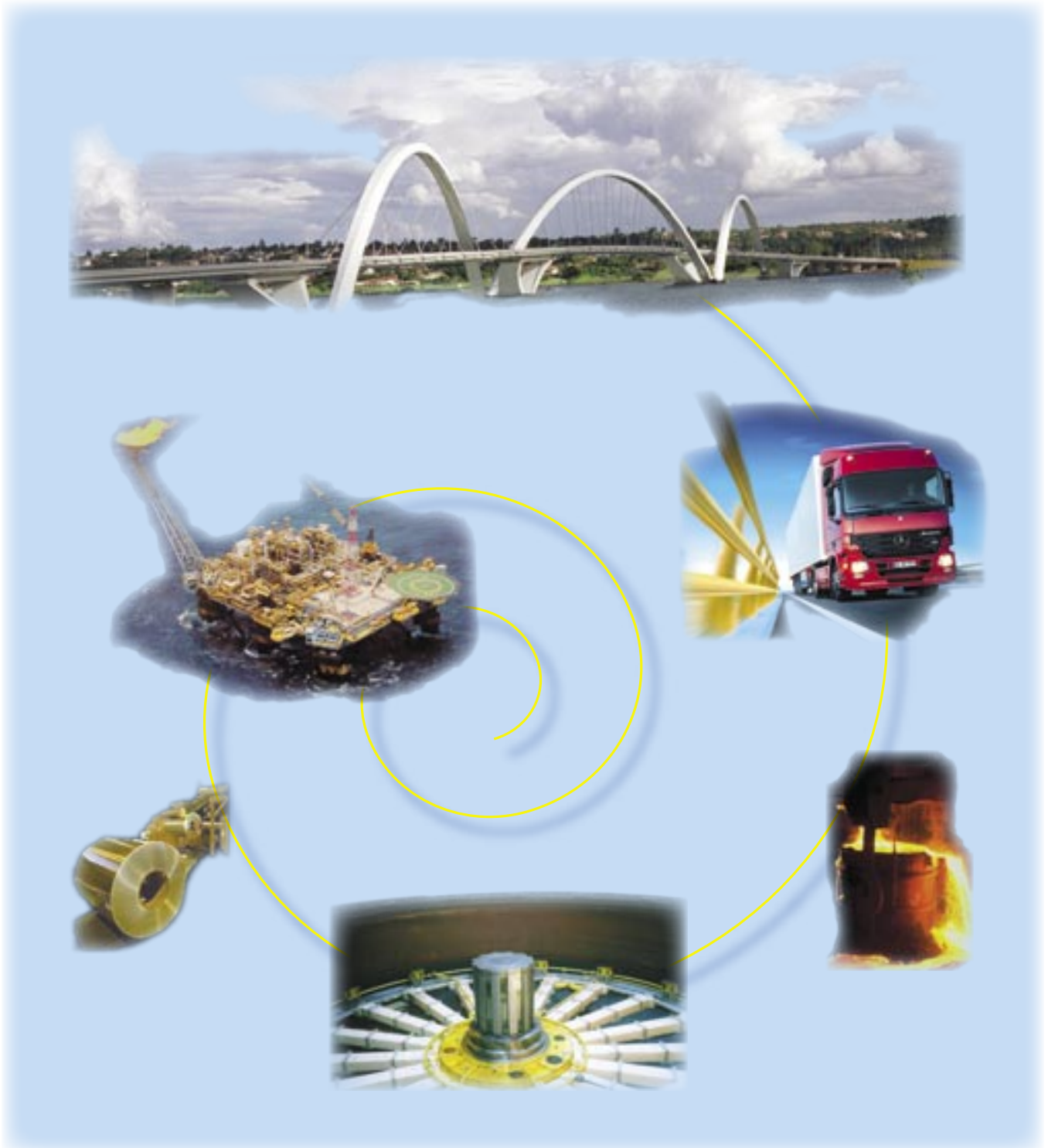# Lynx Data Acquisition

Simplicity and versatility in
experimental data acquisition

Researchers, engineers and technicians needs to measure and test in their daily work. As computer data acquisition is an essential tool for them, Lynx designed products for those who want to have a complete and versatile system, yet affordable and easy to use.

AqDados

AqDados is a versatile and simple to use general purpose data acquisition program. It has many resources to configure and calibrate the inputs and a fast and reliable streaming to disk capability. Even at high data acquisition rates AqDados can record for long periods.

Easy to use

With AqDados, data acquisition is very easy. You don't need to be a specialist in electronics or programming. You unpack and start to use:

- ◇ configure the channels;
- ◇ calibrate;
- ◇ select a file name;
- ◇ define the acquisition rate;
- ◇ start recording;
- ◇ your data are ready to be displayed, analyzed and processed.

Channel calibration and adjust:
- ¤ hardware control (if the feature is available in the signal conditioner used): input type selection, gain, balance, offset and filter settings;
- ¤ linear regression for scale calculation;
- ¤ signal linearization (thermocouples);
- ¤ cold junction compensation (thermocouples);
- ¤ full scale adjust using gain information .

Pulse input support:
- ¤ counter;
- ¤ period measurement;
- ¤ frequency measurement.

Programmable acquisition rate:
- ¤ from mili-Hertz to dozens of kHz (depends on computer and data acquisition equipment used).

Programmable acquisition time :
- ¤ from seconds to hours and days.

Programmable recording:
- ¤ one touch recording;
- ¤ interval timer;
- ¤ trigger based (level crossing).

Real time visualization:
- ¤ variable × time (x×t) and variable × variable (x×y);
- ¤ signals are distributed in folders (up to 16 folders with up to 8 signals each), allowing a fast access to grouped signals;
- ¤ selectable sweep time (visualization);
- ¤ vertical zoom;
- ¤ visual offset adjust (trace centering) ;
- ¤ real time spectral analyzer: window and average selection (linear, exponential, instantaneous) .

Event recorder :
- ¤ pre-definable comments ;
- ¤ manual comments;
- ¤ up to 32 events in a file.

Help online:
- ¤ signal connection diagrams;
- ¤ jumper and switches configuration (for manually configured models);
- ¤ commands and functions.

folders (up to 16)

signals (up to 8 p
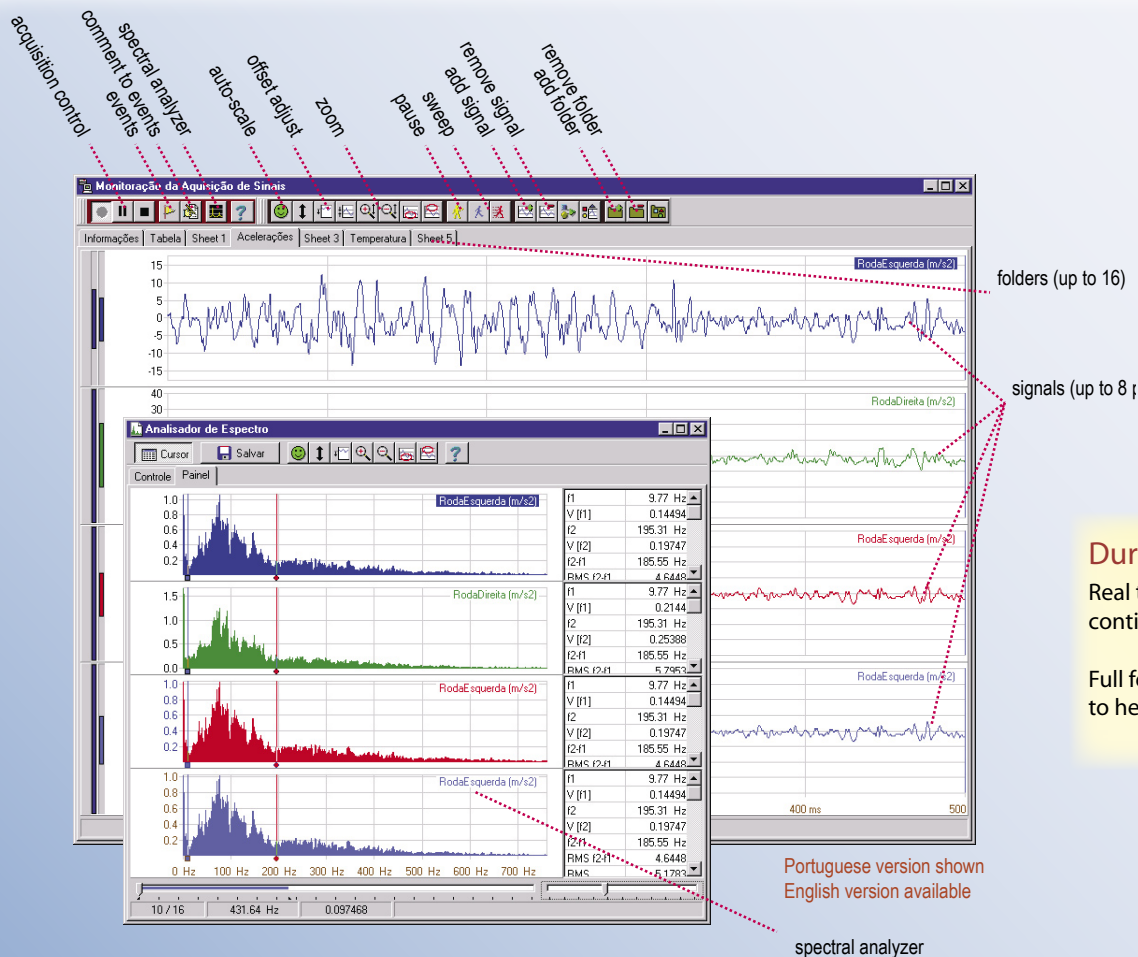
During acquisition

Real time display , allows continuous test monitoring.

Full featured with functions to help in displaying.

Portuguese version shown
English version available

spectral analyzer

AqDAnalysis

AqDAnalysis is the companion analysis and processing module for AqDados.

Folder organization:
- ¤ each folder shows a set of graphics of the same type ;
- ¤ up to 16 folders with up o 16 graphics each;
- ¤ folders are grouped in views and there are 4 of them allowing to display up to 1024 graphics;
- ¤ you can select the signals by dragging from the tree to display area.

Signal types:
- ¤ time domain;
- ¤ frequency domain;
- ¤ statistics (standard, Markov and Rainflow).

Graph modes:
- ¤ time domain: time and x×y, overlapped or tiled, polygraph mode ;
- ¤ spectra (power, power density, real and imaginary parts) line or bar mode; Nichols diagram and Nyquist diagram;
- ¤ Markov and Rainflow statistics.

A full set of tools do easy graphic displaying (see figure).

Signal Analysis:
- ¤ spectra: window (Rectangular, Hanning, Hamming, Bartlett, Blackman), from 256 to 8192 lines. Cross spectra, transfer function and coherence calculation;
- ¤ Rainflow and Markov (for material analysis);
- ¤ signal statistics by segment (maximum and minimum, mean, RMS, standard deviation);
- ¤ material fatigue analysis using Rainflow;
- ¤ comfort analysis.

Signal Filtering:
- ¤ integration;
- ¤ derivation;
- ¤ high pass;
- ¤ low pass;
- ¤ band pass.

Signal edition:
- ¤ point to point;
- ¤ splines.

File export and import:
- ¤ ASCII files (text);
- ¤ RPC (MTS) file import.

Reports:
- ¤ you can copy graphics for Windows clipboard area and paste them in your document or
- ¤ you can use the pre-defined reports.

Color can be adjusted to fit user preferences.

Arithmetic operations:

|	
+, -, *, /	sum/ subtraction/ multiplication/ division
k, Pi	numeric constants, π
t	time variable
Abs (x)	absolute value of x
Exp (x)	exponential value of x
Ln (x)	natural logarithm of x
Sqrt (x)	square root of x
Sqr (x)	x^2
Tan (x)	tangent of x
ATan (x)	arc tangent of x
Tanh (x)	hyperbolic tangent of x
Sin (x)	sine of x
ASin (x)	arc sine of x
Sinh (x)	hyperbolic sine of x
Cos (x)	cosine of x
ACos (x)	arc cosine of x
Cosh (x)	hyperbolic cosine of x
Sign (x)	sign of x
Rand (x)	random number

High technology

Our products are a result from years of investment in research and development.

The products use the best components and the most advanced hardware and software technologies.

Up to date with the latest trends Ethernet networks and DSPs (Digital Signal Processors).

High quality graphic interface.
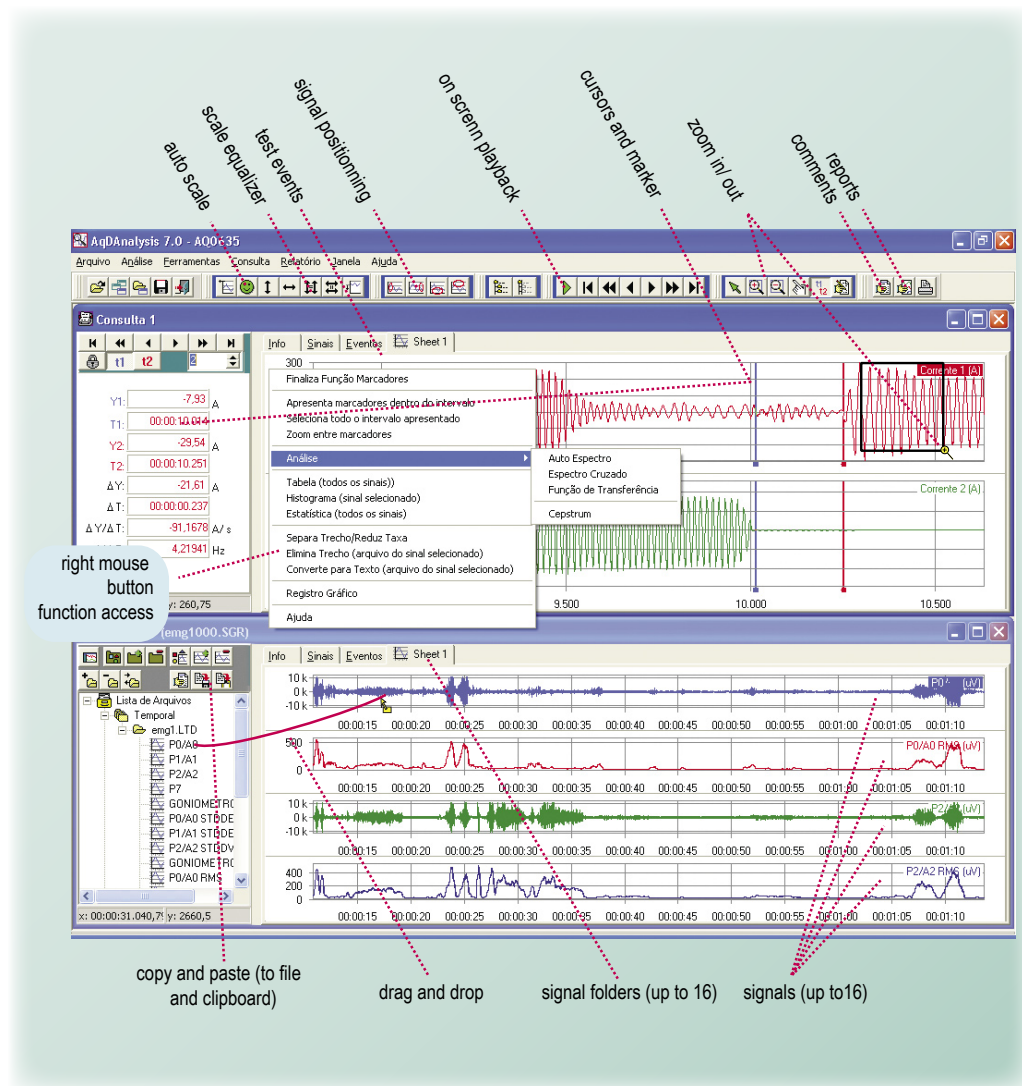
Applications

Lynx data acquisition product can be used in a wide range of cientific and technical applications: from basic research to industrial applications. The following list shows some real applications using our systems:

|		
Railroad engineering	structural test laboratory brake testing	train dynamics commissioning
Automotive engineering	component characteristic curve dynamic performance brake testing	road simulator fatigue analysis
Aerospace engineering	components and structures	
Electrical engineering	high voltage circuit brake tester: open close timing	power generation equipment commissioning and test: turbines generators and auxiliary equipments
Thermal engineering	PID loop adjust	heat mapping
Agriculture engineering	machine development and testing	process research
Naval engineering	scale modelling	real scale test in ships and offshore platforms
Industrial processes	machine monitoring (failure analysis) vibration analysis PID loop adjust	quality control recording
Structures	vibration and stress	finite elements model adjust
Soil	mechanics	
Physiology	hemodynamics	drug effects

Strain measurement

Strain measurement is a technique to measure material deformation using sensors called *strain gages*. With Lynx signal conditioners and software *gage* measurements becomes an easy job. The conditioners includes bridge completion resistors and 3 wire configuration to allow the connection of *gages* in ½ and ¼ bridge using 120 or 350Ω gages. In some models the balance and *shunt* calibration can be performed with a click in the mouse button.
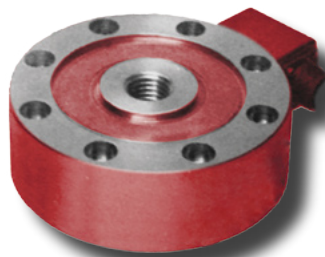
Sensors

Thermocouples, Pt100
Load Cells, torque and pressure transducers
Potentiometers, encoders
Current and voltage signals
Piezo-resistive accelerometers
Current driven piezo-electric accelerometers
Servo-accelerometers
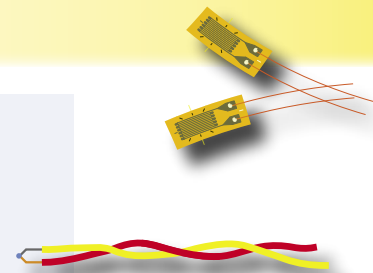
Pulse input

This type of input is very useful in applications that needs to measure the behavior of a rotating element. A pulse input can be used to: :

¤ counting;
¤ average speed measurement;
¤ instantaneous speed (measured when each pulse occurs, or, as we call period to period measurement).

The period to period measurement is the most interesting for dynamic analysis, e.g., in rolling mills, ABS break test, motors and rotative couplings. The figure shows an accelerating indented wheel. In this example the wheel suffers an oscillations in it's angular speed.
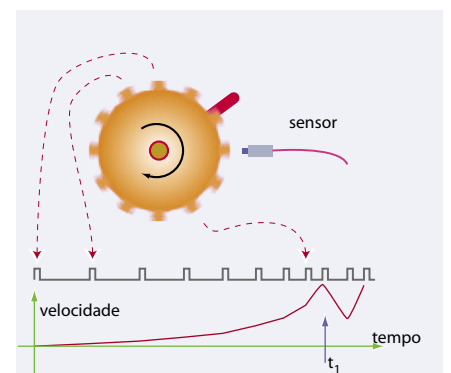
Flexibility

Lynx always has a solution to meet your technical and financial requirements.

Experience

Lynx team has a large experience and specialization in data acquisition design and application .

ADS500 IP

Compact low cost integrated system

Composition:

¤ includes acquisition controller with A/D converter, PC communication and versatile integrated signal conditioners;
¤ compact enclosure;
¤ 12 V supply (external AC power adapter included);

Main features:

¤ Ethernet/IP network communication;
¤ 16 jumper configured signal conditioners;
¤ 12 bits A/D converter, up to 500 samples/sec/channel

Versatility and cost saving

From product conception, to manufacture, Lynx efforts are directed to supply world class products that can meet current and future customers' needs, by incorporating features that maximizes the return for the investment done.

With high versatility, the same product can be used in different applications, avoiding the need for additional accessories or equipments.

ADS1000 IP

A/D and D/A converters for special applications

Composition:

¤ compact enclosure;
¤ 12 V supply (external AC power supply included);
¤ acquisition controller with A/D converter and PC communication;
¤ D/A converter expandable up to 16 channels;

Main features:

¤ Ethernet/IP network communication;
¤ 16 analog inputs;
¤ 12 bits A/D converter (20k samples/sec/channel) or 16 bits (4k samples/ sec/ channel);
¤ pulse type input;
¤ internal DSP can be used for special applications

ADS1000 (models AC1120/AC1160)

Servicing

Servicing customers well is a great concern for Lynx. Free technical support and reasonable maintenance cost guarantees the availability and usage of our systems.

ADS2000 IP

General purpose modular and compact integrated system

Composition:

¤ module enclosure;
¤ AC and DC embedded power supply (90~240 Vac) and (10 a 18 Vdc);
¤ signal conditioner boards;
¤ acquisition controller with A/D converter and PC communication;

Main features:

¤ Ethernet/ IP network communication;
¤ up to 2 (4 depending on enclosure) signal conditioners;
¤ 16 bits A/D converter with conversion time of 12,5 μs/channel;
¤ up to 4 synchronized units allowing up to 128 channels (256 with 4 conditioners enclosure);
¤ up to 6 pulse input signals (optional);
¤ conditioner options: AI2080, AI2161 and AI2164.

signal conditioners

AI2161

AI2164

enclosure

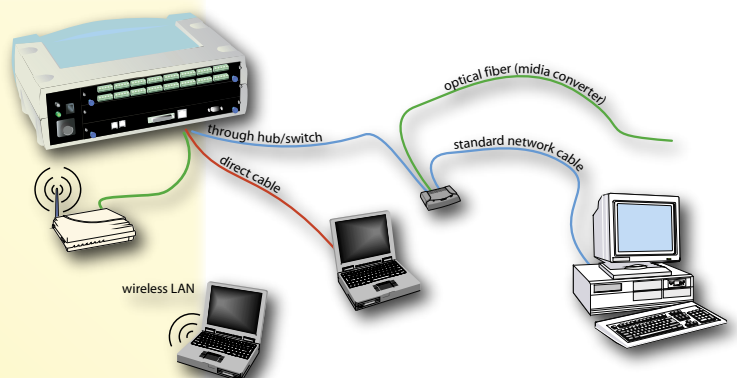Controller with A/D converter (AC2122)

DC and AC power supply
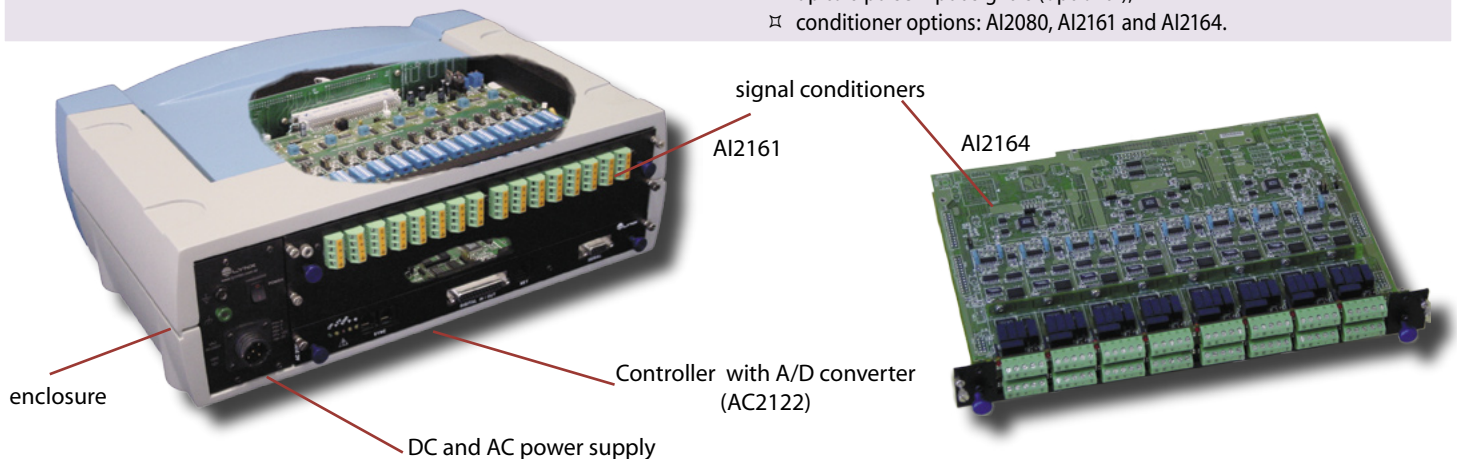
Ethernet/IP

Ethernet/ IP protocol technology opens new possibilities for data acquisition.
Many of Lynx products incorporates this technology that has the following advantages:

¤ operating system portability and compatibility;
¤ distance between equipment and computer: 100 m for direct connection, expandable using hubs/ switches;
¤ use in any cabled local area network (LAN);
¤ possibility of using wireless LAN.

optical fiber (midia converter)

through hub/switch

standard network cable

direct cable

wireless LAN

Acquisition controllers

	CAD12/32	CAD12/56	CAD12/32-IP	ADS500	AC1120	AC1160	AC2122
interface	ISA	ISA	IP(Ethernet)	IP(Ethernet)	IP(Ethernet)	IP(Ethernet)	IP(Ethernet)
A/D converter resolution channels conversion time	12 bits 8/16/32 simple 20 µs	12 bits 16 simple 8,5 µs	12 bits 16 simple 10 µs	12 bits 16 simple 10 µs	12 bits 16 simple 2 µs	16 bits 16 simple 10 µs	16 bits 16 simple 12,5 µs
D/A converter channels x resolution output voltage	N.D.	2 × 12 bits ± 10 V	2 × 16 bits OPT ± 10 V	2 ×16 bits OPT ± 10 V	2 × 16 bits OPT 16 × 16 bits OPT ± 10 V	2 × 16 bits OPT 16 × 16 bits OPT ± 10 V	N.O.
digital input/ output	16i/ 16o/ TTL	16i/ 16o/ TTL	16i/ 16o/ TTL	16i/ 16o/ TTL	16i/ 16o/ TTL	16i/ 16o/ TTL	8i/ 8o/ TTL
pulse input	1 (ct)	1 $(ct/f_{MD}/f_{PP})$	1 (ct)	1 (ct)	1 $(ct/f_{MD}/f_{PP})$	1 $(ct/f_{MD}/f_{PP})$	6 OPT $(ct/f_{MD}/f_{PP})$
interruptions	yes	yes	N.A.	N.A.	N.A.	N.A.	N.A..
DMA	no	yes	N.A.	N.A.	N.A.	N.A.	N.A.

Signal conditioners

	ADS500	MCS1000-V3	AI2080	AI2161	AI2164
applicable family	ADS500 (integrated)	ADS1000/ not integrated	ADS2000	ADS2000	ADS2000
channel	8/16	8/16	8	16	8/16
input type	V, I, R bridge, tc, pot	V, I, R bridge, tc, pot	V, I, R bridge, tc, pot, Pt100	V, I, R bridge, tc, pot, Pt100, IPz	V, I, R bridge, tc, pot
gains	1/100/200/300/600 (manual)	1/100/200/300/600 (manual)	1/2/5/10/100 (manual)	1 a 5000, seq 1/2/ 5 (semi-ssw)	1 a 5000, seq 1/2/5 (ssw)
filters	20 Hz (modifiable)	20 Hz (modifiable)	35 Hz (modifiable)	5/ 20/100/200/2kHz (ssw)	3/30 /100/1k/3kHz (ssw)
sensor power supply	2,5/5/10 V	2,5/5 /10 V	5/12 V	0,25/0,5/0,75/2,5/5 /7,5 V	0,125/2,5/5 7,5/10 V
balance	manual	manual	manual	ssw	ssw
shunt calibration	auto OPT	auto OPT	N.O.	1 to ground (ssw)	3 to ground /Vexc (ssw)
galvanic isolation	N.O.	N.O.	500 V_{AC}	N.O.	N.O.

Captions:

OPT: optional   N.A.: not applicable   N.O.: not offered   ssw: selectable by software
ct: count f_{MD}: mean frequency f_{PP}: period to period frequency

Input type:

V:	voltage up to ±10 V
I:	current
R bridge:	resistive bridge: full, ½, ¼
tc:	thermocouple
pot:	potentiometer
IPz:	current driven piezo-electric sensors
Pt100	platinum temperature sensor

Requirements:
AqDados /AqDAnalysis 7
- ¤ Operating systems: Win98, Me, XP, 2000, NT 4.0;
- ¤ 64 MBytes, (Win98) 256 MBytes(XP) or more RAM memory;
- ¤ CPU with 400 MHz or greater;
- ¤ ISA slots for ISA boards ;
- ¤ ethernet network adapter for IP systems;
- ¤ high capacity disk for data archiving (see below)

To calculate the space needed to data archiving use the following equation:
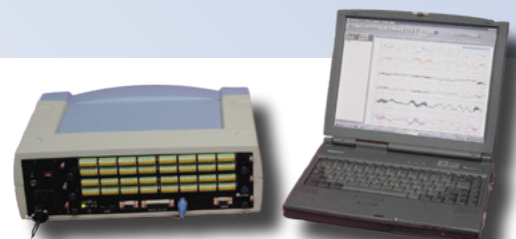
Size (approx)= 2*[frequency]*[channel quantity]*[duration]

Example
100 samples/sec
32 channels
1 hour= 3600 sec
Size= 2*100*32*3600 = 23 MBytes

Features presented herein may be altered at any time. Photos are just illustrative.