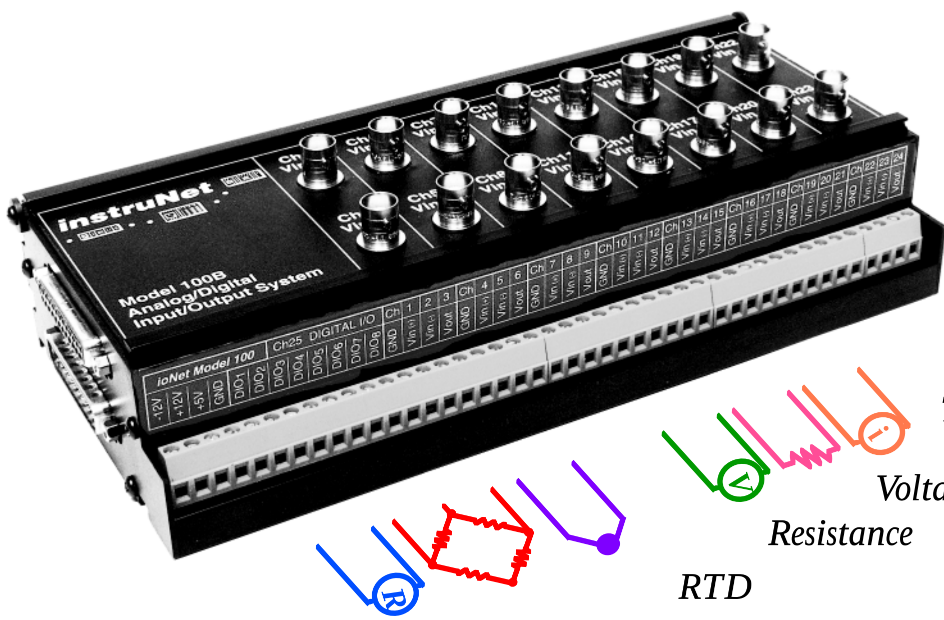
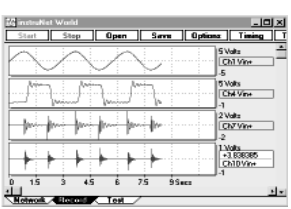
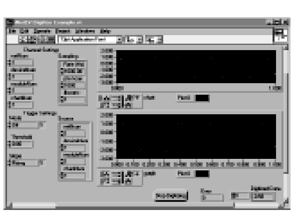
Precision Direct To Sensor Data Acquisition

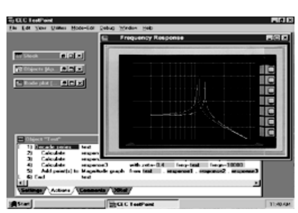




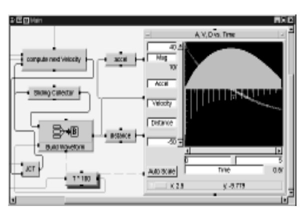
Strip Chart Software



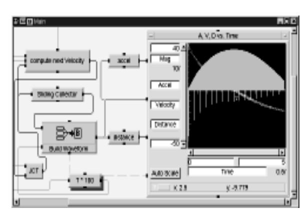
Labview



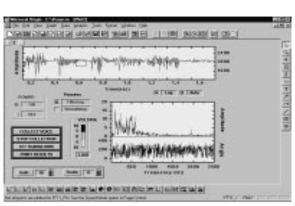
Test Point



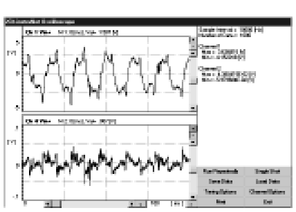
HP VEE



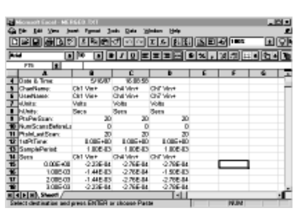
MicroLab



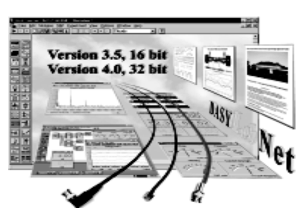
Origin



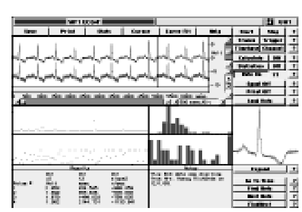
Visual Basic, C, C++



Direct To Excel



DASYLab



SuperScope II

instruNet

Direct To Sensor Accuracies

VOLTAGE Measurement[1,2]

Range	Absolute Accuracy No Integration	Absolute Accuracy 1ms Integration
±5V	±1.5mV	±.7mV
±.6V	±150uV	±75uV
±80mV	±45µV	±15µV
±10mV	±30uV	±10µV

THERMOCOUPLE Measurement[1,2]

instruNet supports a direct connection to thermocouples with the following measurement accuracies. The table excludes thermocouple device errors; yet includes cold junction compensation, voltage measurement, & linearization errors.

Thermocouple	Range	Accuracy
J	-210C to -100C	±.8C
	-100C to 1200C	±.5C
K	-200C to -50C	±.8C
	-50C to 1360C	±.6C
T	-200C to -100C	±.8C
	-100C to 400C	±.5C
E	-200C to -60C	±.7C
	-60C to 1000C	±.5C
R	-50C to 70C	±3.5C
	70C to 1768C	±2.0C
S	-50C to 150C	±2.8C
	150C to 1768C	±1.8C
B	250C to 600C	±3.8C
	600C to 1300C	±2.0C
N	-200C to -110C	±1.3C
	-110C to 1260C	±.8C

THERMISTOR Measurement[1,2]

instruNet supports a direct connection to YSI/Omega 4xx and 4xxxx series thermistors, requiring one external shunt resistor. The table excludes thermistor device errors; yet includes thermistor and shunt self-heating, shunt initial accuracy, voltage measurement, and linearization errors.

Therm.	Range	Shunt	Vexc.	.025% shunt[3] Accuracy	.1% shunt[4] Accuracy
2252	-80 to 40C	47K	4.9V	±.2C	±.24C
2252	0 to 70C	4.7K	.55V	±.1C	±.12C
2252	0 to 200C	200	.55V	±.4C	±.4C
10K	-80 to 40C	100K	4.9V	±.3C	±.32C
10K	0 to 70C	10K	.55V	±.1C	±.12C
10K	0 to 250C	2K	.55V	±.16C	±.18C

RESISTANCE Measurement[1,2]

instruNet measures resistances directly, requiring one external shunt resistor. The table includes DUT & shunt self-heating, shunt initial accuracy, and voltage measurement errors.

Range	Shunt	Vexc.	.025% shunt[3] Accuracy	.1% shunt[4] Accuracy
0-100Ω	10K	4.9V	±.14Ω	±.22Ω
0-1KΩ	10K	4.9V	±.8Ω	±1.6Ω
0-10KΩ	100K	4.9V	±6Ω	±14Ω
0-100KΩ	100K	4.9V	±120Ω	±195Ω
0-1MΩ	1M	4.9V	±2.4KΩ	±3KΩ

CURRENT Measurement[1,2]

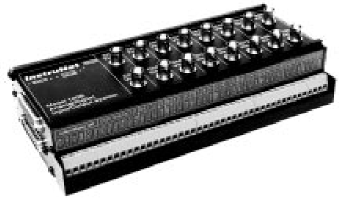
instruNet measures current directly, requiring one external shunt resistor. The table includes shunt self-heating, shunt initial accuracy, and voltage measurement errors.

Range	Shunt	.025% shunt[3] Accuracy	.1% shunt[4] Accuracy
0 to 10uA	4.7K	±6nA	±15nA
0 to 100uA	4.7K	±40nA	±120nA
0 to 1mA	4.7K	±.4uA	±1.2uA
0 to 20mA	10	±12uA	±30uA
0 to 100mA	1	±.1mA	±.18mA
0 to 1A	0.1	±1.2mA	±2mA

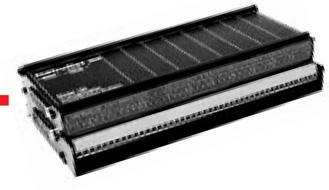
RTD Measurement[1,2]

instruNet supports a direct connection to .00385 and .00392 RTD's between 100 and 1Kohms, requiring one external shunt resistor. The table excludes RTD device errors; yet includes RTD & shunt self-heating, shunt initial accuracy, voltage measurement, & linearization errors.

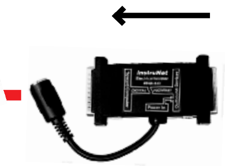
RTD	Range	Shunt	Vexc.	.025% shunt[3] Accuracy	.1% shunt[4] Accuracy
100	0-200C	1K	.5V	±.4C	±.7C
100	0-850C	2K	.45V	±1C	±2C
500	0-200C	4.7K	.45V	±.4C	±.7C
500	0-850C	10K	4.5V	±.9C	±2C
1000	0-200C	10K	.5V	±.4C	±.7C
1000	0-850C	20K	4.5V	±.9C	±1.9C



instruNet 100 w/BNC's
#iNet-100B



instruNet 100
#iNet-100



Optional Optical Isolation
#iNet-330

Welcome T

www.inst

- High Accuracy Data Acquisition Boxes attach to Windows 95/NT & Macintosh Computers.
- Each Box: 16se/8di 14bit analog inputs, 8 analog outputs, and 8 digital I/O lines.
- Each PCI/Nubus Controllers: 10 Counter/Timer Channels.
- Reduce noise by placing boxes near sensors and 0-1000 feet from noisy computer.
- Signal Conditioning Amplifiers on each input.
- Direct Connect to RTD, Thermocouple, Voltage, Thermistor, Bridge & Strain Gage Sensors.
- 166Ks/sec throughput to Ram or to Disk.

Specifications[1]

16se/8di Analog Inputs

Channels	16se/8di; 14bit 4µs a/d
Ranges	+-5V, +-.6V, +-78mV, +-8mV
Throughput	166Ks/sec max aggregate
SNR	78dB
Linearity	Diff. +- 1.5 LSB; Integral +- 2 LSB
OverVoltage	+- 15 V (power on or off)
Impedance	>10MΩ 1%, 3pf
CM Voltage	+- 5V min (CMR +- 80dB)
Temp. Drift	Gain:+- 5ppm/˚C of FSR Offset: Self-cal'ed to 0
Time Stability	Gain: 27ppm/1yr typ Offset: Self-cal'ed to 0

8 Analog Outputs

Channels	8Channels, 8bit D/A
Range	#iNet-100/100B: +- 5V @ 4mA #iNet-100HC: +- 5V @ 15mA
Protection	Short-to-ground continuous
Settling Time	4µs (to +-1/2 LSB,+-5V step)
Accuracy	+-0.4%
Coupling	+-20mV Digital Coupling
Drift	+- 10ppm/˚C of 5V FSR; +- 5µV/˚C offset drift
Readback	See Voltage Input Accuracy

8 Digital I/O

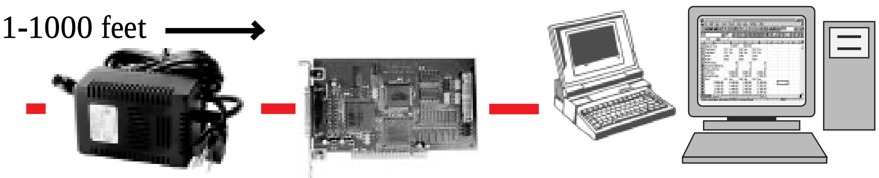
I/O Lines	8 non-latching inputs and 8 latching outputs at 8 bidirectional terminals.
Inputs	V_{IH} = 3.2Vmin to 12Vmax; V_{IL} = 1.0Vmax to -12Vmin I_{IH} = -200µA, V_i = 3.2V I_{IL} = -.5mA max.
Outputs	V_{OH} = 2Vmin to 5Vmax; I_{OH} = -.5mA max. I_{OL}=.5A max, V_O=1.7V; I_{OL}=50mA max, V_O=.7V

[1] Maximum specifications, 0-70°C, no condensation, #iNet-100xx Rev 3.

[2] 0.001sec Integration, accuracies are typical within 2 std dev, temperature has not changed since self-calibration.

[3] #TN130-resistance-0.025%-20 (.025% initial accuracy, 20ppm/C, 116C/Watt) shunt resistor.

[4] #RN60E xxxx B (.1% initial accuracy, 25ppm/C, 116C/Watt) shunt resistor.



Optional 110V Power Supply #iNet-310

DSP Controllers: PCI Card, #iNet-200 PC-Card, #iNet-230 Nubus Card, #iNet-220

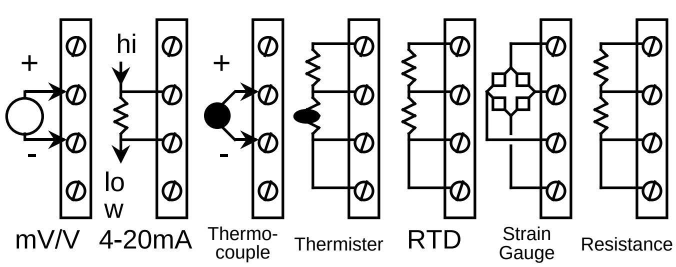
Windows 95/NT or Macintosh 68k/PPC Computer

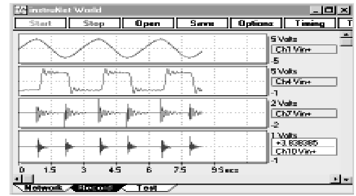
o instruNet

runet.com

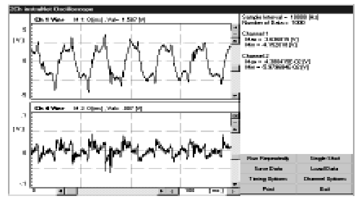
- Includes Strip Chart/Oscilloscope Software.
- Boxes powered by 32bit DSP PCI or PC-Card card in 95/NT/Macintosh computer.
- Optional Low Cost Optical Isolation.
- Programmable from C, Visual Basic, TestPoint, HP Vee, DASYLab, Orgin, MicroLab, Famous, & SuperScope II. LabVIEW drivers available.
- Each channel has independently programmable analog filters, integration time, voltage range, sample rate and digital filters (LP, HP, BP, BS).
- Returns Engineering Units
- Solid Aluminum Construction.

Wire Directly to Common Sensors via Universal Screw Terminals

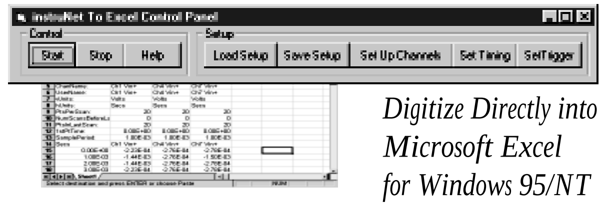




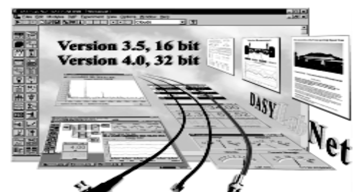
Free instruNet Strip Chart for Windows 95/NT and Macintosh



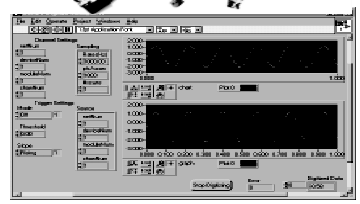
Free Visual Basic, C and C++ Interface



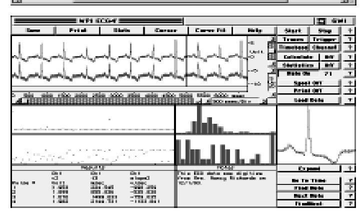
Digitize Directly into Microsoft Excel for Windows 95/NT



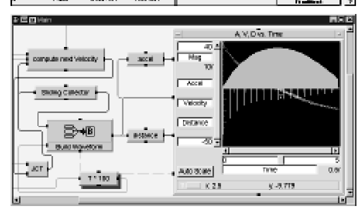
DASYLab for Windows 95/NT



LabVIEW for Macintosh and Windows 95/NT



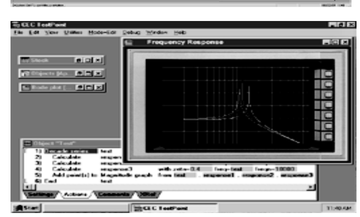
SuperScope II for Macintosh



HP VEE Graphical Programming for Windows 95/NT

Famous for Windows 95/NT

MicroLab for Windows 95/NT



TestPoint for Windows 95/NT

Overview

instruNet provides ten's of microVolts of absolute accuracy instead of ten's of milliVolts, at the same cost, and at the same throughput rates as typical general purpose data acquisition boards. It does this with a completely different topology where the analog electronics are close to the sensor in electrically-quiet boxes outside your PC, and the noisy digital electronics are left inside the computer. The external boxes contain signal conditioning amplifiers for each channel, and can therefore *directly* attach to sensors such as thermocouples, ysi thermistors, RTD's, strain gages, resistance sources, current sources, and voltage sources. The box then returns engineering units to your PC (e.g. "°C", "Volts", "Amps"). At the heart of the real-time system is a PCI or PC-Card (1/98) controller board that plugs into a Macintosh or Windows 95/NT x86 computer. Each controller contains a 32bit microprocessor with 256KB of RAM that manages the external "network" of devices. All real-time tasks are off-loaded to this processor, therefore the host computer is not burdened with real-time issues. Each *instruNet 100* Box provides:

- 16se/8di 14bit Analog Inputs (A/Ds) with ±5V, ±.6V, ±.08V & ±.01V range
- 8 ±5V 8bit Analog Outputs (D/As)
- 8 Digital I/O Lines

The *instruNet 100* includes 44 screw terminals. The *100B* version adds 16 BNC's for analog inputs. The *100HC* version provides 15mA/10KpF voltage output drive capability, instead of 4mA. The controller's themselves provide 10 counter/timer channels that each can function as a digital input bit, a digital output bit, a clock output channel, or a period measurement input channel.

FREE Strip Chart/Scope Software

"*instruNet World*", is a FREE application program. It manages, monitors and operates the *instruNet* system. It digitizes long continuous waveforms, spools them to disk, views incoming waveforms in real-time and then allows post acquisition viewing — much like an oscilloscope or strip chart recorder. *instruNet World* provides a spreadsheet-like environment where one can set and view channel parameters such as sensor type, integration time, analog filter, and digital filter. Each channel has it's own row in the spreadsheet, with the various options in the columns.

12/1/97

Performance

The *instruNet* system supports the digitizing of multiple channels at a maximum aggregate sample rate of 166ks/sec, where each channel can be digitized at it's own rate. This maximum rate decreases when: the total cable length increases, optical isolation is used, digital filtering or plotting is enabled, more boxes are added, more channels are digitized, amplifier gain is increased, or spooling to disk is added. Each channel can be independently digitally filtered with low-pass, high-pass, band-stop and band-pass filters; where the filter specification for each channel is independently set in software.

Each channel provides a programmable analog low pass filter with programmable A/D measurement integration time. The network can be hundreds of feet long and can support multiple hardware devices connected together in a daisy-chain configuration. The start of digitizing can be triggered from any channel. *There are no jumpers or pots;* the system automatically self-calibrates on power-up. Since *instruNet* is modular, it can easily be expanded as needs evolve. One can easily move the system hardware from one computer family to another, since the various controllers are functionally identical.

Programming

instruNet includes drivers callable from any 32bit C compiler, and Visual Basic ≥ 4.0. This involves 1 main routine, called "iNet( )", that reads or writes any of the options or channels on the system.

Compatibility

instruNet is Compatible with SuperScope II Macintosh; Microsoft Excel ≥8 for Windows; TestPoint, HP VEE, Origin, MicroLab, DASY*Lab*, Famous, and drivers are available for LabVIEW (Mac & Windows). The system is easily controlled with any 32bit C compiler & Visual BASIC ≥ 4.0 (drivers included free). instruNet runs on a 68K or PPC Macintosh, Windows 95/NT computer with ≥8MB of RAM recommended.

Part #	Product
iNet-100	*instruNet* External A/D Box with 3m cable (requires iNet-2xx Controller Card). Provides 16se/8di Analog Inputs, 8 Analog Outputs, and 8 Digital I/O lines, w/screw terminals.
iNet-100B	*instruNet* External A/D Box (same as iNet-100, yet w/add'l 16 BNC Connectors)
iNet-100HC	*instruNet* External A/D Box (same as iNet-100, yet w/ 15mA/.01uF Vout)
iNet-200	PCI-Bus Controller Card for Windows 95/NT or Macintosh (controls up to 16 iNet-100's)
iNet-220	Nubus Controller Card for Macintosh (controls up to 16 iNet-100's)
iNet-230	PC-Card Controller (Type II, requires iNet-311/322 supply, Avail 1/98)
iNet-300	Power Adaptor, if using 4 or more iNet-100's, (no signal isolation, requires iNet-311/322 power supply)
iNet-330	Optical Isolator, isolates power and signal lines (replaces iNet-300; requires a power supply)
iNet-311	Power Supply, 110V to 5V/.8A & ±12V/.24A, used w/iNet-300/330/230 (use 1 per 3 add'l boxes)
iNet-322	Power Supply, 220V to 5V2A & ±12V/.5A, used w/iNet-300/330/230 (use 1 per 5 add'l boxes), CE, 2prong euro
iNet-340	DIN Rail Mounting Bracket for iNet-100xx.
iNet-34S	34Pin Screw Terminal Panel, breaks out Digital I/O on iNet-200/220 Controller (iNet-34W3F cable req'd).
iNet-34W3F	3ft 34wire Ribbon Cable, to connect iNet-34S to iNet-200/220 Controller Digital I/O.