KL-710

Biomedical Measurement Data Acquisition System


KL-74093: 16 Channels Case


KL-74091: 4 Channels Case

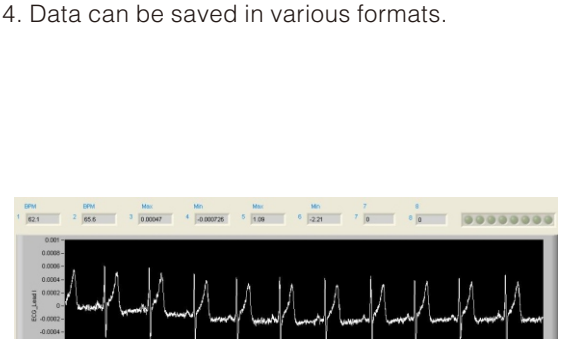

KL-74092: 8 Channels Case

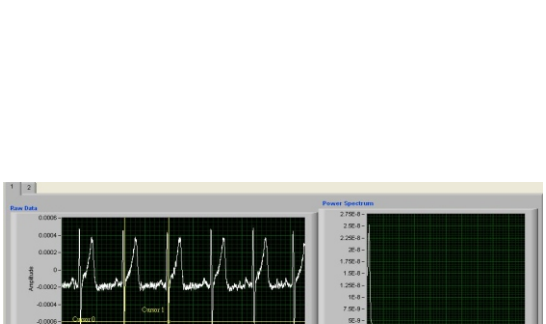
KL-710 is a complete data acquisition system that includes both hardware and software for acquisition and analysis of life-science data. The hardware uses the DAQ interface cards from National Instrument. KL-710 system uses PC to acquire, analyze and store data.

Features

The software allows you to edit data and control the experiment process appearing on the screen. It performs four general functions:

1. Control the data acquisition process including the analog input, analog output, digital input, digital output and trigger start.
2. Perform real-time calculation including the math functions, digital filter, wave analysis, rate detection and power spectrum.
3. Perform off-line analysis including the statistics, math functions, wave analysis, rate detection and power spectrum.
4. Data can be saved in various formats.


ECG_PPG


ECG_PPG

Specifications

Module Units (KL-74001~KL-74011 & KL-74041~KL-74042)

KL-74001 General Physiological Signal (GPS) Amplifier Module

KL-74001 has one instrumentation amplifier with adjustable offset and gain. It is used to amplify low-level physiological signals. With a wide range of filters, it is available to measure the different physiological signals. KL-74001 is intended for use in the following applications:

1. Electrocardiogram (ECG)
2. Electromyogram (EMG)
3. Electroencephalogram (EEG)
4. Electrooculogram (EOG)

Specifications:

Maximum input voltage	: ±10V
Upper frequency response	: DC or 0.05Hz or 0.1Hz or 1Hz or 100Hz
Lower frequency response	: 40Hz or 100Hz or 200Hz or 1KHz or 2KHz
Notch frequency response	: 50/60Hz
Gain	: x 100, x 1000, x 5000


3-Conductor electrode cable


Connecting wire, 2mm plug/10cm 3pcs


EEG electrode (3pcs/set)


Electrode lead (3pcs/set)

Body surface electrodes


Electrical conductivity jelly


Position cap for EEG

Option: For EEG

KL-74002 / KL-74002A Electrocardiogram Wilson Network

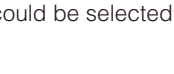
KL-74002 is a multiple electrocardiogram (ECG) Wilson network, it has to be connected with KL-74001 GPS amplifier module to measure ECG waveform. There are seven ECG leads outputs including: Lead I, Lead II, Lead III, aVR, aVL, aVF, and one chest lead. The quantities of ECG leads used should be identical to the quantities of KL-74001 GPS amplifier modules. Besides KL-74002 also has a single lead output for signal comparison. The ECG lead could be selected by the lead switch, and its output must be connected to KL-74001 GPS amplifier module.

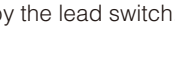
KL-74002A is a single electrocardiogram (ECG) Wilson network, it must be connected with KL-74001 GPS amplifier module to measure ECG waveform. KL-74002A only has a single lead output for 7 ECG signals, including: Lead I, Lead II, Lead III, aVR, aVL, aVF, and one chest lead. The ECG lead could be selected by the lead switch.


KL-74002


KL-74002A

- Lead I
- Lead II
- Lead III
- aVR
- aVL
- aVF
- V


Electrode lead (5pcs/set)


Connecting cable between 74002 and 74001

Lead clamp

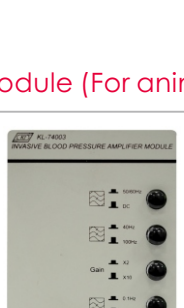

5-Conductor electrode cable


Body surface electrodes


Electrical conductivity jelly

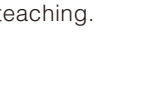
KL-74003 Invasive Blood Pressure Amplifier Module (For animals only)

KL-74003 IBP is used to measure direct arterial or venous blood pressure in animals for research or teaching.



Specifications:

Maximum input pressure	: 300mm Hg
Upper frequency response	: 0.1Hz or 1Hz
Lower frequency response	: 40Hz or 100Hz
Notch frequency response	: 50/ 60Hz
Gain	: x 2, x 10


Blood pressure transducer

T-Valve

KL-74004 Blood Pressure Cuff Amplifier Module

KL-74004 can measure the indirect arterial blood pressure with the Korotkoff method or oscillometric method. In the Korotkoff method, the Korotkoff sounds are detected by KL-74005.

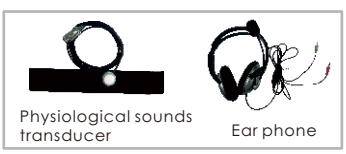
Specifications:

Maximum input pressure	: 300mm Hg
Upper frequency response	: 0.3Hz
Lower frequency response	: 10Hz
Gain	: x 100, x 500

Cuff bladder with rubber bulb

KL-74005 Physiological Sound Amplifier Module

KL-74005 is designed to measure a variety of acoustical signals, including heartbeat, Korotkoff sound, voice and grinding sounds from rib or bone.



Physiological sounds transducer

Ear phone

Specifications:

Excitation voltage	: 5V
Sensor	: Bridge piezo-electric
Dimensions	: 22mm(diameter)
Upper frequency response	: DC and 20Hz
Lower frequency response	: 200Hz or 1KHz

KL-74006A Photoplethysmogram Amplifier Module

KL-74006A photoplethysmogram amplifier module is a single channel amplifier with red photo and infrared photo couple sensor. KL-74006A is designed to detect the density of the finger for following applications:

1. Pulse rate determination
2. Blood pressure waveform analysis
3. Exercise physiology studies
4. Psychophysiological studies

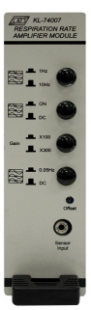
Specifications:

Excitation voltage	: 5V
LEDs	: Red : 660nm Infrared : 940nm
Lower frequency response	: 10Hz and 40Hz
Gain	: x200

Finger clip photo sensor

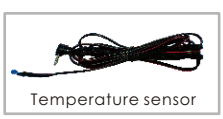
KL-74007 Respiration Rate Amplifier Module

KL-74007 is specifically designed for recording respiration rate with a thermistor.



Specifications:

Excitation voltage	: 5V
Upper frequency response	: DC and 0.05Hz
Lower frequency response	: 1Hz or 10Hz
Gain	: x100, x300



Temperature sensor

KL-74008 Respiration Pneumogram Amplifier Module

KL-74008 is specifically designed for recording respiratory efforts that are abdominal or thoracic expansion and contraction. KL-74008 can be used for following applications:

1. Determination of respiration rate
2. Sleep studies
3. Mental workload studies
4. Exercise physiology studies
5. Allergic responses analysis
6. Psychophysiological studies

Specifications:

Excitation voltage	: 5V
Sensor	: Bridge piezo-electric
Upper frequency response	: DC and 0.05Hz
Lower frequency response	: 1Hz or 10Hz
Gain	: x100, x500

Respiration transducer

KL-74009 Pneumotachogram Amplifier Module

KL-74009 is a high linear, wide range, airflow transducer amplifier. You can perform a variety of tests related to airflow and lung volume. KL-74009 is designed for following applications:

1. Exercise physiology studies
2. Lung function analysis

Specifications:

Excitation voltage	: 6V
Flow range	: 2-35L/min
Resolution	: 700P/L
Maximum operation pressure	: 25Bar

Pneumotach transducer

KL-74010 Electrodermal Activity Amplifier Module (People with cardiac pacemaker must avoid using this module)

KL-74010 is a signal channel, high gain, differential amplifier especially designed for measuring skin conductance via the constant current technique.

Phasic EDA includes the electrodermal response, which is very similar to the formerly common measure of Galvanic Skin Resistance (GSR). KL-74010 is designed for following applications:

1. General eccrine activity measurement
2. Mental workload studies
3. Vestibular function analysis
4. Vertigo and motion sickness studies
5. Psychophysiological studies

Specifications:

Maximum input voltage	: ±10V
Upper frequency response	: DC or 0.05Hz
Lower frequency response	: 1Hz or 10Hz
Gain	: ×5000

EEG Electrode (4pcs/set) | 5-Conductor electrode cable | Electrical conductivity jelly

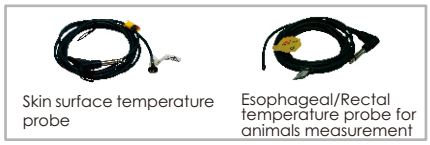
KL-74011 Skin Temperature Amplifier Module

KL-74011 is especially designed for skin and core temperature ranging from 32°C to 42°C. The applications of KL-74011 are shown below:

1. General temperature measurement
2. Sleep studies
3. Psychophysiological studies

Specifications:

Excitation current	: DC 100 μA
Sensor	: Thermistor 2252Ω (at 25°C)
Range	: 32°C~42°C
Sensitivity	: 0.1°C



Skin surface temperature probe | Esophageal/Rectal temperature probe for animals measurement

KL-74041 Sound Stimulation Module

The function of KL-74041 is sending an exciting signal with a fixed pulse to the acoustic nervous system so as to record the induced potential variation. If one channel is used by KL-74041, the induced response can be measured and recorded simultaneously with triggering signal.

Specifications:

Output frequency	: 2KHz, 5KHz, 10KHz
Output control	: Manual switch
Output power	: 300mW
Volume	: Manual adjustment

Ear phone

KL-74042 Photic Stimulation Module

KL-74042 is a photic stimulator which consists of 96 white-light LED for providing periodical lighting signal during EEG measurement. By using different pulse for lighting stimulation, the potential signal from optic nerve stimulation can be measured and recorded. If one channel is used by KL-74042, the induced response can be measured and recorded simultaneously with triggering signal.

Specifications:

Flash frequency(sec.)	: 0.5s,1s,6s,7s, 11s,12s,31s,32s
Light intensity	: 96 white light LEDs with 8 levels of adjustable illumination
Power	: DC 9V for light stimulator

Light Stimulator

Data Acquisition Module

KL-74022 Data Acquisition Module (NI USB-6211)

Specifications:

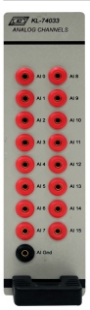
Interface	: USB
Analog input	
Number of channels	: 16 single-ended
Sample rate	: 250 kS/s (aggregate)
Resolution	: 16 bits
Max input range	: ±10V
Analog output	
Number of channels	: 2
Output resolution	: 16 bits
Update rate	: 250 kS/s
Digital I/O	
Number of channels	: 4 DI / 4 DO
Logic level	: TTL
Triggering	: Digital

KL-74023 Data Acquisition Module (NI USB-6009)

Specifications:

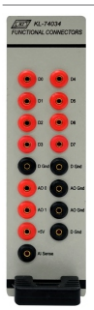
Interface	: USB
Analog input	
Number of channels	: 8 single-ended 4 differential
Sample rate	: 48 kS/s (aggregate)
Resolution	: 14 bits differential 13 bits single-ended
Max input range	: ±10V
Analog output	
Number of channels	: 2
Output resolution	: 12 bits
Update rate	: 150 Hz, software-timed
Digital I/O	
Number of channels	: 4 DI / 4 DO
Logic level	: TTL
Triggering	: Digital

KL-74033 Analog Channels (for KL-74022 use)



There are 16 analog inputs provided in this module. This module allows users to measure the signals from amplifiers directly using oscilloscope without DAQ card, or to enter signals to DAQ card via this module for any other specific applications.

KL-74034 Functional Connectors (for KL-74022 use)



There are 4 digital input terminals, 4 digital output terminals, 2 analog output terminals and a DC +5V output terminal provided in this module. Additionally, a NRSE grounding reference is provided for using DAQ card.

KL-74035 Functional Connectors (for KL-74023 use)

There are 4 digital input terminals, 4 digital output terminals, 2 analog output terminals and 4 analog input terminals plus a digital trigger provided for working with KL-74023 DAQ card. The 4 analog input terminals are fit for the channel 1 to 4. This module allows user to measure the signals of amplifiers directly using oscilloscope without DAQ card.

System Requirement

1. Above INTEL P4 compatible PC
2. USB port
3. Above 1G bytes memory
4. Disk space more than 2G bytes
5. DVD-ROM driver for installing PC
6. OS : Windows 7 / 8 / 10

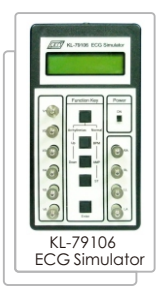
Accessories

1. AC power cord
2. Connection leads
3. Alcohol prep. pad
4. Captured and analysis software

Optional Accessories

1. KL-79106 ECG simulator
2. EEG simulator
3. Position cap for EEG
4. Medical tape
5. Electrical conductivity jelly
6. Body surface electrode
7. EEG electrode
8. T-Valve
9. Alcohol prep. pad

NOTE : Since item No. 4 to 9 are consumables, the extra order quantity depends on user's choice.



KL-79106
ECG Simulator

List of Experiments / List of Modules	KL-74091	KL-74001	KL-74002A	KL-74003	KL-74004	KL-74005	KL-74006A	KL-74007	KL-74008	KL-74009	KL-74010	KL-74011	KL-74041	KL-74042	KL-74023	KL-74035
Experiment 1 Measurement of Electroencephalogram																
Exp 1-1: Electroencephalogram while calm, with eye-open or closed	1	2													1	1
Exp 1-2: Measurement of evoked potential caused by quick deep breath	1	2													1	1
Exp 1-3: Measurement of evoked potential caused by flash stimulation	1	2												1	1	1
Exp 1-4: Measurement of auditory evoked potential	1	2											1		1	1
Experiment 2 Measurement of Electrooculogram																
Exp 2-1: Electrooculogram measurement for the rotation and blink of eyeballs	1	1													1	1
Experiment 3 Measurement of Electromyogram																
Exp 3-1: Electromyogram of biceps contraction	1	1													1	1
Exp 3-2: Electromyogram of antagonist contraction	1	2													1	1
Exp 3-3: Isometric & isotonic contraction of skeletal muscles	1	2													1	1
Exp 3-4: Tetanus contraction and fatigue of muscle	1	2													1	1
Experiment 4 Measurement of Heartbeat and Heart Sound																
Exp 4-1: Measurement of heartbeat in human	1						1								1	1
Exp 4-2: Measurement of heart sound in human	1					1	1								1	1
Experiment 5 Measurement of Electrocardiogram																
Exp 5-1: Electrocardiogram measurement under resting condition	1	1	1												1	1
Exp 5-2: Influence of temperature on electrocardiogram	1	1	1												1	1
Experiment 6 Measurement of Blood Pressure																
Exp 6-1: Measurement of blood pressure by mercury sphygmomanometer																
Exp 6-2: Measurement of blood pressure by oscillometric method	1				1										1	1
Exp 6-3: Measurement of blood pressure based on Korotkoff sound	1				1	1									1	1
Experiment 7 Measurement of Animal Blood Pressure and Temperature																
Exp 7-1: Invasive measurement of arterial blood pressure	1			1											1	1
Exp 7-2: Measurement of rectal temperature	1											1			1	1
Experiment 8 Measurement of Bowel Sounds																
Exp 8-1: Measurement of bowel sounds under normal condition	1					1									1	1
Exp 8-2: Measurement of bowel sounds under fasting condition	1					1									1	1
Exp 8-3: Measurement of bowel sounds under fed condition	1					1									1	1
Experiment 9 Measurement of Respiration																
Exp 9-1: Measurement of respiration and heart rate under resting condition	1						1	1	1						1	1
Exp 9-2: Measurement of respiration and heart rate in hyperventilation	1						1	1	1						1	1
Exp 9-3: Measurement of respiration and heart rate in hypoventilation	1						1	1	1						1	1
Exp 9-4: Influence of exercise on respiration and heart rate	1						1	1	1						1	1
Experiment 10 Measurement of Pulmonary Function																
Exp 10-1: Measurement of static lung volume	1									1					1	1
Exp 10-2: Measurement of dynamic lung volume	1									1					1	1
Exp 10-3: Influence of exercise on dynamic lung volume	1									1					1	1
Experiment 11 Psychophysiological Measurement under Various Emotion Conditions																
Exp 11-1: Influence of respiration on GSR	1										1				1	1
Exp 11-2: Influence of temperature on GSR and heart rate	1						1				1				1	1
Exp 11-3: Influence of emotion on GSR and heart rate	1						1				1				1	1