



KL-600

Advanced Sensor Experimental System



*Notebook is excluded.

The KL-600 Advanced Sensor Experimental System is a comprehensive sensor / transducer control training system that incorporates industrial-grade components with various control circuits and load units. Its modular and closed-loop control circuits allow implementation of open-ended, individual control loops used in industrial applications.

KL-600 provides quantitative experiments, also with different sensors and transducers, but it's possible to measure more precisely the relationship between analog signals and voltage. The analog signals (like temperature or pressure) can be set and represented by a value.

The KL-600 uses only industrial-standard sensors / transducers (0~10V, 4~20mA) with USB interface.

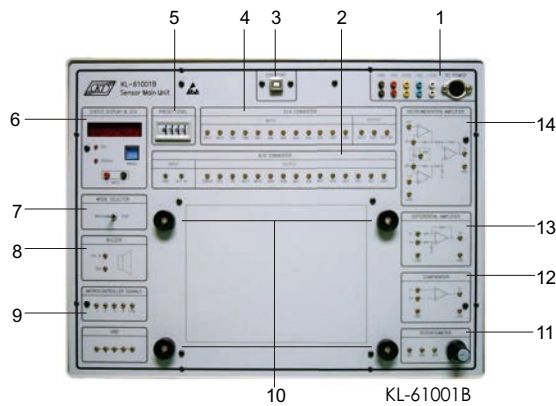
● Features

1. Industrial-standard sensors and transducers
2. With USB interface
3. Open-ended design, ideal for expansion
4. Offer a sensing data acquisition software

● Specification

Sensor Main Unit (KL-61001B)

1. Power Supply Unit
 - Fixed DC power supply
 - (1) Output voltage : +5V, -5V, +12V, -12V
 - (2) Max. output current : +5V/3A, -5V/0.3A, +12V/1A, -12V/0.5A
 - (3) With output overload protection
2. A/D Converter : 1x12-bit ADC
 - (1) Input voltage range : 0 ~ +5V
 - (2) Time pulse frequency : 3.58MHz
 - (3) Control signals : status, pole, over range indication
3. Interface Port
 - USB interface : type B
4. D/A Converter : 1 x 12-bit DAC
 - Analog output & control
 - OUT+ : +DC OFFSET 0 ~ +4.096V unipolar
 - OUT- : -DC OFFSET 0 ~ -4.096V unipolar
 - OUT BP : DC OFFSET -2.048V ~ +2.048V bipolar
5. Preset Level : 4-digit thumbwheel switch, Max. value : 4095
6. Status Display & DCV
 - Input voltage measurement
 - (1) Range : 2000mV, 20V
 - (2) Accuracy : $\pm 0.05\%$ of reading + 4 counts
 - (3) Input impedance: 10M Ω
 - (4) Display : 4 1/2 digits
7. Mode Selector
 - Manual/single-chip
8. Buzzer
 - Max. input signal voltage : +12V
9. Microcontroller Signals
 - 5 control line outputs
10. Model Holder : X4
11. Potentiometer : 100K Ω B-type
12. Comparator
 - V-,V+ input, Vo output
13. Differential Amplifier
 - V-,V+ input, Vo output
14. Instrumentation Amplifier
 - V-,V+ input, Vo output, adjustable gain



- KL-63011 Linear Scale Module
- KL-63012 Infrared Transducer Module
- KL-63013 Multi-Channel Remote Controlled Module
- KL-63014 Ultrasonic Transducer Module
- KL-63015A Pressure Transducer Module
- KL-63016 VFC Module
- KL-63017 FVC Module



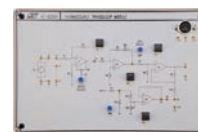
KL-63001A



KL-63002A



KL-63003



KL-63004



KL-63005



KL-63006A



KL-63007



KL-63008



KL-63009



KL-63010



KL-63011



KL-63012



KL-63013



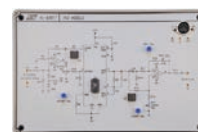
KL-63014



KL-63015A



KL-63016



KL-63017

Experiment Modules

1. 2mm plugs and sockets used throughout
2. Comprehensive experiment manual
3. Modules secured in plastic housings
4. Connected by 2mm-2mm test leads
5. Dimension : 255 x 165 x 30mm
6. Circuit symbols, blocks and components printed on the surface of each module
7. Power supplied from either power module or through KL-61001B main unit

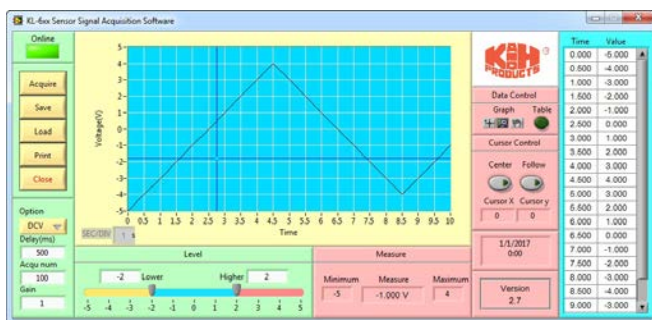
Graphic User Interface Software

System Requirement

1. PC : 1GHz or faster 32-bit (x86) or 64-bit (x64) processor, 1GB RAM, 1GB more free disk space
2. OS : Windows XP / Vista / 7 / 8 / 10

Specification & Feature

1. Real time acquire signal
2. Adjustable acquire frequency
3. Current, Min and Max value displayed
4. Data save, load and print function
5. X-axis : TIME / DIV
Y-axis : VOLT / DIV
6. Storage format : Excel format



List of Modules

- KL-63001A General Sensor Module
- KL-63002A General Transducer Module
- KL-63003 AD590 Transducer Module
- KL-63004 Thermocouple Transducer Module
- KL-63005 PT100 Temperature Transducer Module
- KL-63006A Humidity Transducer Module
- KL-63007 Load-Cell Transducer Module
- KL-63008 LVDT Transducer Module
- KL-63009 Photovoltaic Transducer Module
- KL-63010 Counter Module

List of Experiments

1. D/A and A/D Converters
2. Characteristics of Sensors
 - (1) Photo transistor
 - (2) Photo interruptor
 - (3) Magnetic sensor
 - (4) Pyroelectric detector
 - (5) Thermistor
 - (6) Reed switch
 - (7) Inclination sensor
 - (8) Limit switch
 - (9) Mercury switch
 - (10) Vibration switch
 - (11) Condenser microphone
 - (12) Dynamic microphone



3. General-Purpose Transducers
 - (1) Gas / smoke detector
 - (2) Ethanol detector
 - (3) Digital magnetic detector
 - (4) Analog magnetic detector
4. AD590 Temperature Transducer
 - (1) Characteristics and transduction circuit of AD590
 - (2) The application of AD590 - Temperature controller
 - (3) The application of AD590 - Digital thermometer
5. Thermocouple
 - (1) Thermocouple characteristics
 - (2) Transduction circuit of thermocouple
 - (3) The application of thermocouple - Digital thermometer
6. PT100 Temperature Transducer
 - (1) R vs. T characteristic of PT100
 - (2) Transduction circuit of PT100
 - (3) The application of PT100 - Fire alarm
 - (4) The application of PT100 - Digital thermometer
7. Humidity Transducer
 - (1) Impedance characteristic of humidity sensor
 - (2) Transduction circuit of humidity sensor
 - (3) The application of humidity sensor - Digital hygrometer
8. Load-Cell
 - (1) Characteristics and transduction circuit of Load-Cell
 - (2) The application of Load-Cell - Overweight alarm
 - (3) The application of Load-Cell - Digital scale
9. Linear Variable Differential Transformer (LVDT)
 - (1) Characteristics of LVDT
 - (2) The application of LVDT - Digital position indicator
10. Photovoltaic Cell
 - (1) Photovoltaic characteristics
 - (2) Photovoltaic transducer circuit
 - (3) The application of photovoltaic - Auto-Streetlamp controller
 - (4) The application of photovoltaic - Digital illuminometer
11. Linear Scale
 - (1) Linear scale characteristics and transducer circuit
 - (2) Distance measurement of linear scale
12. Infrared Transducer
 - (1) Infrared transducer DC characteristic test
 - (2) Infrared transducer AC characteristic test
 - (3) The application of infrared transducer - Event counter
 - (4) The application of infrared transducer - Remote controller
13. Ultrasonic Transducer
 - (1) Ultrasonic transducer characteristic test
 - (2) The application of ultrasonic transducer - Space disturbance detector
14. Pressure Transducer
 - (1) Transduction circuit of pressure sensor
 - (2) The application of pressure transducer
15. V/F and F/V Converters
 - (1) VFC converter
 - (2) FVC converter
 - (3) The application of V/F converter - FSK modulation
 - (4) The application of F/V converter - Encoder

Load Units

1. KL-68001 Humidity & Temperature Load
 - (1) Temperature load
 - a. Provides heat source for AD590, PT-100 and thermocouples
 - b. Temperature range : ambient~170°C
 - c. Manual / automatic selection
 - d. Insulated for safety reasons
 - e. Digital temperature control : SSR driven voltage output
 - f. ON/OFF LED indicator
 - (2) Humidity Load
 - a. Provides humidity source for Humidity Transducer
 - b. Humidity Range : ambient~99% RH
 - c. Stainless steel tray for water storage
 - d. With a humidity / temperature switch
 - e. With humidify / dehumidify functions
2. KL-68002 Pressure Gauge
 - (1) Pressure gauge : full scale 5000mm Ag
 - (2) Flow rate control valve
 - (3) Power source : 110V / 220V AC
3. KL-68003 Load Cell
 - (1) Construct strain gauge and bridge circuit
 - (2) Max. load : <5Kg
 - (3) Electronic scale
4. KL-68004 Linear Variable-Differential Transformer (LVDT)
 - (1) Range : $\pm 5\text{mm}$
 - (2) Scale : 0.01mm
 - (3) Linear accuracy : 0.1%
 - (4) Excitation frequency : 350Hz
5. KL-68005 LUX Load
 - (1) Selectable light sources
 - (2) Light bulb luminous intensity adjustable
 - (3) Photovoltaic transducer open voltage : $\approx 2\text{V}$
 - (4) Photovoltaic transducer close current : $\approx 0.08\mu\text{A/lx}$
6. KL-68006 Angle / Distance Load
 - (1) Platform moving range : 300mm
 - (2) Adjustable transmitting / receiving angle : 30°/step, 0~360°
 - (3) Infrared receiver : Max. input wavelength = 940nm
 - (4) Ultrasonic transmitter / receiver : nominal frequency=40KHz
7. KL-68007 Linear Scale
 - (1) Resolution : 0.005mm
 - (2) Max. range : 200mm
 - (3) Stepping motor with speed adjustment
 - (4) Voltage requirement : +5V DC
 - (5) Left / right directional switch
 - (6) Left / right limit switch



8. KL-68008 Standard Weight Set
2 x 50g; 2 x 100g; 1 x 200g; 1 x 500g; 2 x 1Kg; 1 x 2Kg
9. KL-68009 Encoder Sensor Module
(1) DC power supply : +5V DC
(2) Output signal : A, B, Z
(3) Max. pulse frequency : 30KHz (300P/R)
(4) Max. speed : 6000rpm (300P/R)

Experiments / Equipment Required

1. Sensor & General Transducer Characteristics Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63001A; KL-63002A
2. Temperature Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63003; KL-63004; KL-63005
LOAD UNIT : KL-68001 Humidity & Temperature load
3. Humidity Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63006A
LOAD UNIT : KL-68001 Humidity & temperature load
4. Load-Cell Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63007
LOAD UNIT : KL-68003 Load-cell; KL-68008 Standard weight set
5. LVDT Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63008
LOAD UNIT : KL-68004 LVDT load
6. Photovoltaic Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63009
LOAD UNIT : KL-68005 LUX load
7. Linear Scale Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63010; KL-63011
LOAD UNIT : KL-68007 Linear scale
8. Infrared Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63012; KL-63013
LOAD UNIT : KL-68006 Angle / displacement load
9. Ultrasonic Transducer Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63010; KL-63014
LOAD UNIT : KL-68006 Angle / displacement load
10. Pressure Sensor Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63015A
LOAD UNIT : KL-68002 Pressure gauge
11. V/F, F/V Converter Experiments Kit
MAIN UNIT : KL-61001B
MODULE : KL-63016; KL-63017
LOAD UNIT : KL-68009



1. Sensor & General Transducer Characteristics Experiments Kit



2. Temperature Transducer Experiments Kit



3. Humidity Transducer Experiments Kit



4. Load-Cell Transducer Experiments Kit



5. LVDT Transducer Experiments Kit



6. Photovoltaic Transducer Experiments Kit



7. Linear Scale Experiments Kit



8. Infrared Transducer Experiments Kit



9. Ultrasonic Transducer Experiments Kit



10. Pressure Sensor Experiments Kit



11. V/F, F/V Converter Experiments Kit

● Accessories (KL-68011)

1. Experimental Manual
2. Connection Leads and Plugs x 1 set
3. Magnet x 1 pce