

KL-600

Microcomputer Sensing Control System



The KL-600 Microcomputer Sensing Control 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.

The KL-600 uses only industrial-standard sensors/transducers (0~10V, 4~20mA) and is equipped with USB interfaces for computer interface control experiments. Control programs can be written and downloaded to the single-chip microprocessor on KL-61001A main unit from computers through USB interface.

► Features

- Industrial-standard sensors and transducers
- With USB interface ports
- Open-ended design, ideal for expansion
- Offer a sensing data acquisition software

► Specification

► Main Unit (KL-61001A)

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/1.5A, -12V/0.3A
- (3) With output overload protection

2. Interface Port

USB interface : Type B

3. Status Display & DCV

- (1) Input voltage measurement
 - a. Range : 2000mV, 20V
 - b. Accuracy : $\pm 0.05\%$ of reading + 4 counts
 - c. Input impedance : 10M Ω
 - d. Display : 4-1/2 digits
- (2) Sensor input measurement
 - a. Sensor types : TEMP, %RH, LUX, WEIGHT, AUX
 - b. Accuracy : $\pm 0.05\%$ of reading + 4 counts
 - c. Display : 4-1/2 digits

4. Preset Level : 4-digit thumbwheel switch,
Max. value : 4095

5. Single-Chip & EPROM

- (1) Single-chip processor : 89C51
- (2) 8 Control line outputs

6. D/A Converter : 1x12-bit DAC

- (1) Resolution : 1.22mV/bit
- (2) Analog output & control
 - OUT+ : +DC OFFSET 0V ~ +4.096V unipolar
 - OUT- : -DC OFFSET 0V ~ -4.096V unipolar
 - OUT BP : DC OFFSET -2.048V ~ +2.048V bipolar

7. A/D Converter : 1x12-bit ADC

- (1) Resolution : 1.22mV/bit
- (2) Input voltage range : 0 ~ +5V
- (3) Time pulse frequency : 3.58 MHz
- (4) Control signals : State, pole, over voltage indication

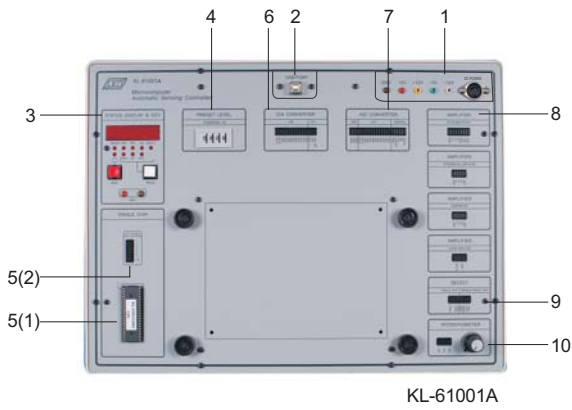
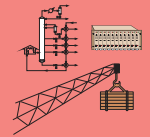
8. Amplifiers

- (1) Instrumentation amplifier : $\pm V_i$ input, V_o output, adjustable gain
- (2) Differential amplifier : $\pm V_i$ input, V_o output
- (3) Comparator : $\pm V_i$ input, V_o output
- (4) Alarm amplifier : buzzer with driver circuit

9. Selectors

- (1) Single-chip selector
- (2) Manual/single-chip selector

10. Potentiometer : 100K Ω B-type



● Accessories

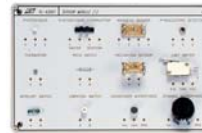
- (1) Connector leads : a. 0.5mm-0.5mm, 150mmL, 10pcs
 b. 0.5mm-0.5mm, 300mmL, 15pcs
 c. 2mm-0.5mm, 300mmL, 10pcs
- (2) Cable : USB (A-B), 1pce
- (3) User's manual
- (4) AC cord
- (5) Anti-dust cover
- (6) Software CD : Software for data acquisition

► Experiment Modules

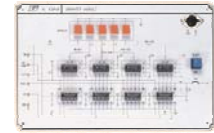
1. 2mm plugs and sockets used throughout
2. Comprehensive experiment manual
3. Modules secured in plastic housings
4. Connected by 2mm-0.5mm test leads
5. Dimension : 255 x 165 x 30mm
6. Circuit symbols, blocks and components printed on the surface of each module
7. Power supplied from either power module or through KL-61001A main unit

► List of Modules

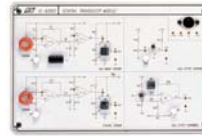
- KL-63001 Sensor Module
- KL-63002 General Transducer Module
- KL-63003 AD590 Transducer Module
- KL-63004 Thermocouple Transducer Module
- KL-63005 PT-100 Temperature Transducer Module
- KL-63006 Humidity Transducer Module
- KL-63007 Load-Cell Transducer Module
- KL-63008 LVDT Transducer Module
- KL-63009 Photovoltaic Transducer Module
- KL-63010 Counter Module
- KL-63011 Linear Scale Module
- KL-63012 Infrared Transducer Module
- KL-63013 Multi-Channel Remote Controlled Module
- KL-63014 Ultrasonic Transducer Module
- KL-63015 Pressure Sensor Module
- KL-63016 VFC Module
- KL-63017 FVC Module



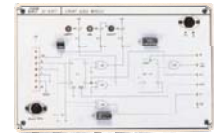
KL-63001



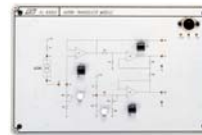
KL-63010



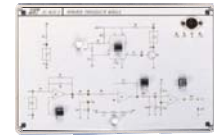
KL-63002



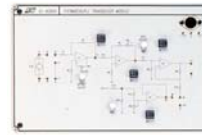
KL-63011



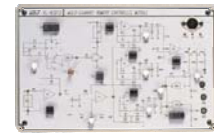
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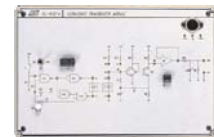
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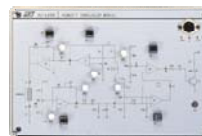
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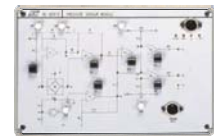
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KL-63014



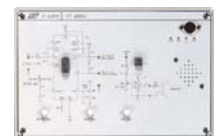
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KL-63015



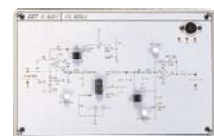
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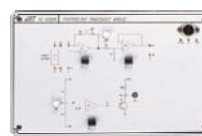
KL-63016



KL-63008

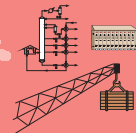


KL-63017



KL-63009





► List of Experiments

1. Characteristics of Various Sensors

- (1) Photodiode
- (2) Photo-interrupter
- (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

2. General Sensor Characteristics Experiments

- (1) Gas/smoke detector
- (2) Ethanol sensor
- (3) Hall-effect (analog)
- (4) Hall-effect (digital)

3. AD590 Temperature Transducer Experiments

- (1) AD590 characteristics & converter circuit
- (2) Boiler with temperature control
- (3) Digital thermometer
- (4) Computer I/O interface control
- (5) Single-chip microprocessor control

4. Thermocouple Temperature Transducer Experiments

- (1) Thermocouple characteristics curve & converter circuit
- (2) Fire alarm
- (3) Digital thermometer
- (4) Computer I/O interface control
- (5) Single chip microprocessor control

5. PT-100 Temperature Transducer Experiments

- (1) PT-100 resistor-temperature characteristics measurement
- (2) Fire alarm
- (3) Digital thermometer
- (4) Computer I/O interface control
- (5) Single-chip microprocessor control

6. Humidity Transducer Experiments

- (1) Humidity transducer characteristics & converter circuit
- (2) Greenhouse humidity control
- (3) Digital humidity-meter
- (4) Computer I/O interface control
- (5) Single-chip microprocessor control

7. Load-Cell Weight Measurement Experiments

- (1) Load cell characteristics & converter circuit
- (2) Weight measurement
- (3) Digital scale
- (4) Computer I/O interface control
- (5) Single-chip microprocessor control

8. LVDT Transducer Experiments

- (1) LVDT characteristics & converter circuit
- (2) Position measurement
- (3) Distance measurement
- (4) Computer I/O interface control
- (5) Single-chip microprocessor control

9. Photovoltaic Transducer Experiments

- (1) Photovoltaic transducer characteristics & converter circuit
- (2) Characteristics of various light sources
- (3) Automatic lighting
- (4) Digital luxmeter
- (5) Computer I/O interface control
- (6) Single-chip microprocessor control

10. Linear Scale Experiments

- (1) Characteristics of linear scale
- (2) Measurement of movements
- (3) Computer I/O interface control

11. Infrared Transducer Experiments

- (1) AC/DC characteristics
- (2) Counter
- (3) Infrared remote control

12. Ultrasonic Transducer Experiments

- (1) Ultrasonic characteristics measurement
- (2) Motion detector

13. Pressure Sensor Experiments

- (1) Zero-pressure input characteristics
- (2) Full-scale pressure measurement
- (3) Over-pressure alarm

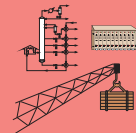
14. V/F, F/V Converter Experiments

- (1) VFC/FVC characteristics
- (2) Computer I/O interface control
- (3) Programmable time pulse generation

► 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~200°C
 - c. Manual/automatic adjustment
 - d. Insulated for safety reasons
 - e. Digital temperature control : SSR driven voltage output
 - f. ON/OFF LED indicator
- (2) Humidity load
 - a. Humidity transducer rated voltage : Maximum 1V AC
 - b. Frequency range : 500Hz~1KHz
 - c. Impedance : 1MΩ (75±5% RH at 25°C)
 - d. Humidity range : 50%~99% RH
 - e. Output conversion rate : 100mV/1% RH
- (3) Accessories
 - a. Connector leads : 2mm-0.5mm, 600mmL, 2pcs
 - b. AC cord x 1
 - c. AD 590 sensor probe x 1
 - d. PT100 sensor probe x 1
 - e. Thermocouple sensor probe x 1
 - f. Humidity meter x 1
 - g. Humidity sensor x 1



2. KL-68002 Pressure Gauge

- Pressure gauge : full scale 5000mmHg
- Flow rate control valve
- Power source : 110VAC or 220VAC
- Accessory : plug cable x 1, 6P-6P, >600mmL

3. KL-68003 Load Cell

- Construct strain gauge and bridge circuit
- Maximum load : <5Kg
- Electronic scale
- Accessory : plug cable x 1, 6P-6P, >600mmL

4. KL-68004 Linear Variable-Differential Transformer (LVDT)

- Range : $\pm 5\text{mm}$
- Scale : 0.01mm
- Linear accuracy : 0.1%
- Excitation frequency : 350Hz
- Accessory : plug cable x 1, 6P-6P, >600mmL

5. KL-68005 LUX Load

- Selectable light sources
- Light bulb luminous intensity adjustable
- Photovoltaic transducer open voltage : $\approx 2\text{V}$
- Photovoltaic transducer close current : $\approx 0.08 \mu\text{A}/\text{lx}$
- Accessories :
 - AC cord x 1
 - Connector leads : $2\text{mm}-2\text{mm}$, 600mmL , 2pcs

6. KL-68006 Angle/Distance Load

- Platform moving range : 300mm
- Adjustable transmitting/receiving angle : $30^\circ/\text{step}$, $0-360^\circ$
- Infrared receiver : Max. input wavelength = 940nm
- Ultrasonic transmitter/receiver : nominal frequency= 40KHz
- Accessory : Connector leads : $2\text{mm}-2\text{mm}$, 600mmL , 4pcs

7. KL-68007 Linear Scale

- Resolution : 0.005mm
- Max. range : 200mm
- Stepping motor with speed adjustment
- Voltage requirement : $+5\text{V DC}$
- Left/right directional switch
- Left/right limit switch
- Accessories :
 - Plug cable : $6\text{P}-6\text{P}$, $>600\text{mmL}$, 1pce
 - Connector leads : $2\text{mm}-2\text{mm}$, 600mmL , 2pcs

8. KL-68008 Standard Weight Set

$2 \times 50\text{g}$; $2 \times 100\text{g}$; $1 \times 200\text{g}$; $1 \times 500\text{g}$; $2 \times 1\text{Kg}$; $1 \times 2\text{Kg}$

9. KL-68009 Encoder

- DC power supply : $+5\text{V DC}$
- Output signal : A, B, M
- Response frequency : 30KHz ($100-600\text{P/R}$)
- Impedance : $2\text{K}\Omega$
- Current consumption : 60mA
- Rise/fall time : $1\mu\text{s}$ or less

► Experiments / Equipment Required

1. Sensor & General Transducer Characteristics

Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63001; KL-63002

2. Temperature Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63003; KL-63004; KL-63005
LOAD UNIT : KL-68001 Humidity & Temperature load

3. Humidity Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63006
LOAD UNIT : KL-68001 Humidity & temperature load

4. Load-Cell Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63007
LOAD UNIT : KL-68003 Load-cell; KL-68008 Standard weight set

5. LVDT Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63008
LOAD UNIT : KL-68004 LVDT load

6. Photovoltaic Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63009
LOAD UNIT : KL-68005 LUX load

7. Linear Scale Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63010; KL-63011
LOAD UNIT : KL-68007 Linear scale

8. Infrared Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63012; KL-63013
LOAD UNIT : KL-68006 Angle/displacement load

9. Ultrasonic Transducer Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63010; KL-63014
LOAD UNIT : KL-68006 Angle/displacement load

10. Pressure Sensor Experiments Kit

MAIN UNIT : KL-61001A
MODULE : KL-63015
LOAD UNIT : KL-68002 Pressure gauge

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

MAIN UNIT : KL-61001A
MODULE : KL-63016; KL-63017
LOAD UNIT : KL-68009

► Accessories (KL-68011)

- Experimental manual
- Connector leads : (1) $2\text{mm}-0.5\text{mm}$, 300mmL , 15pcs
(2) $2\text{mm}-2\text{mm}$, 300mmL , 10pcs
- Connection plugs : 2mm , 10mm pitch, 10pcs
- Magnet : 1 pce