Sensor Trainers

Sensor Trainers are designed to teach student interfacing of industrial sensors using an embedded circuit. A high-level overview of analog and digital interfaces, followed by deep learning of thermistors, RTDs, thermocouples, flow sensors, pressure sensors, speed sensors, etc. are explored. Microcontroller based interfacing circuit is studied in detail.

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Developed By:

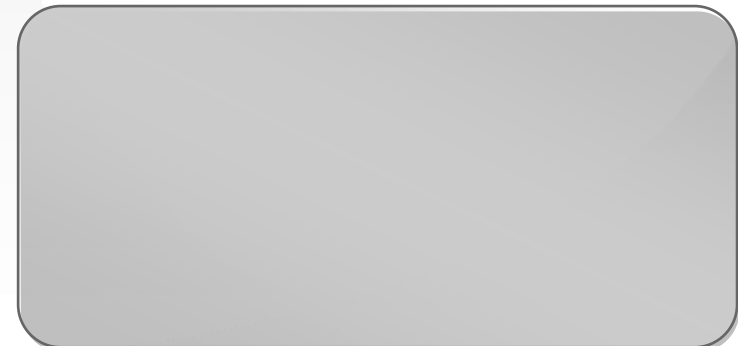### National Infotech

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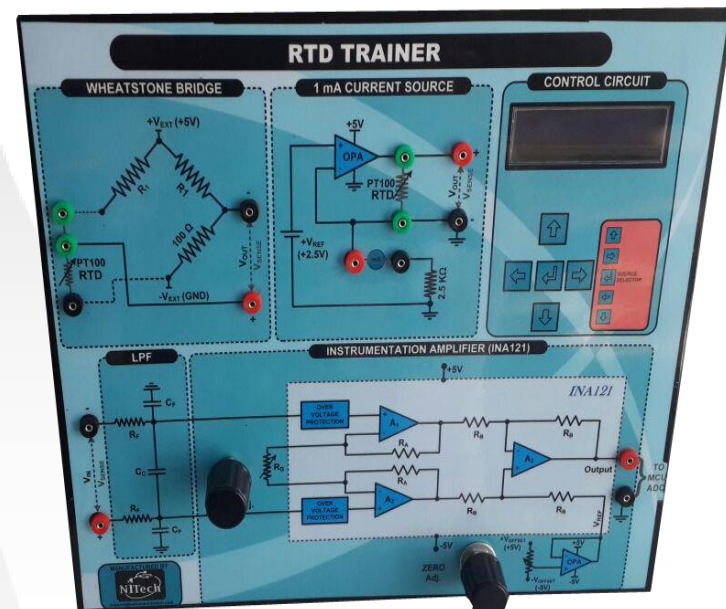**Web:**http://www.national-infotech.com

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NISE01: RTD Trainer

❖ Trainer kit is for study of 2 wire and 3 wire RTD temperature sensor.
❖ The Trainer kit includes two modes of RTD experimentation.
  • RTD is used as a member of Wheastone Bridge with constant voltage excitation.
  • A constant current source of 1 mA is used to excite RTD.
❖ 32 Bit microcontroller based card is used for sensing, processing and display of temperature.
❖ RTD is calibrated by using standard calibrator.
❖ MATLAB based utility is provided for calibration, which requires curve fitting and deciding coefficient of polynomial.
❖ The kit is capable of serial communication with MATLAB.

List of components:

❖ RTD Sensor 2- wire and 3- wire (Model: PT 100)
❖ 32 Bit Microcontroller Card with 12 Bit ADC,Display and Keypad, Instrumentation Amplifier(INA121)
❖ RTD Calibrator
❖ Process Plant [Water Bath]
❖ Thermometer

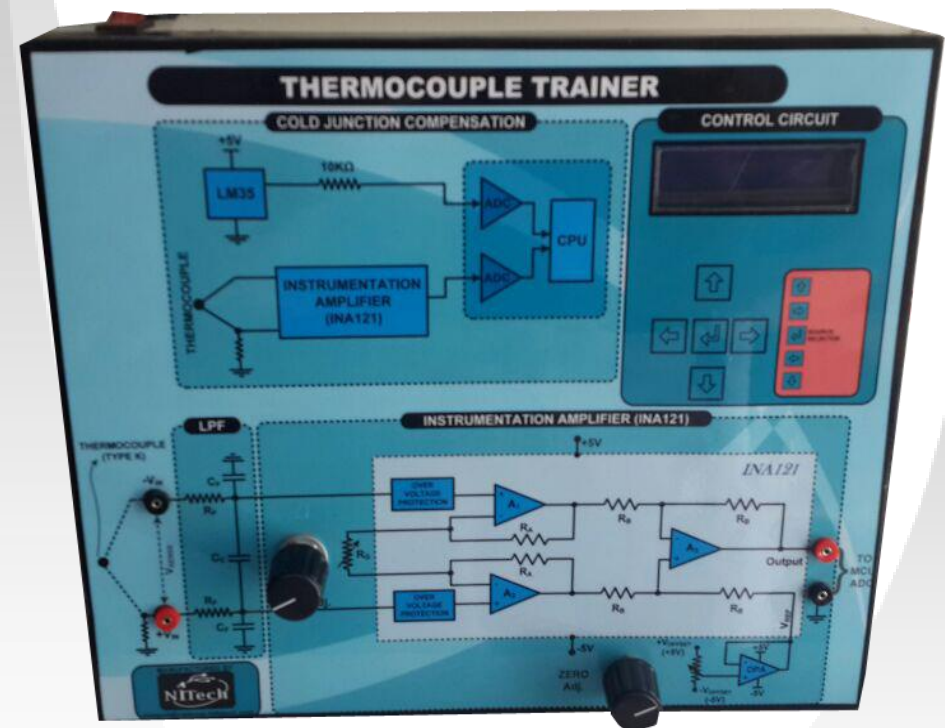# NISE02: Thermocouple Trainer

❖ Trainer kit is for study of Thermocouple as temperature sensor.
❖ The Trainer kit includes two modes of Thermocouple experimentation.
❖ Sensing temperature with thermocouple using cold junction compensation.
❖ Sensing temperature of thermocouple without cold junction compensation.
❖ Instrumentation amplifier (INA121) is used for signal conditioning and amplifying. LM35 IC is used to measure the temperature of cold junction.
❖ 32 Bit microcontroller based card is used for sensing, processing and display of temperature.
❖ Thermocouple is calibrated by using standard calibrator.
❖ MATLAB based utility is developed for curve fitting and deciding coefficient of polynomial.
❖ The kit is capable of serial communication with MATLAB.

List of components:

❖ Thermocouples-Type: K
❖ LM 35
❖ 32 Bit Microcontroller Card with 12 Bit ADC ,Display and Keypad, Instrumentation Amplifier(INA121)
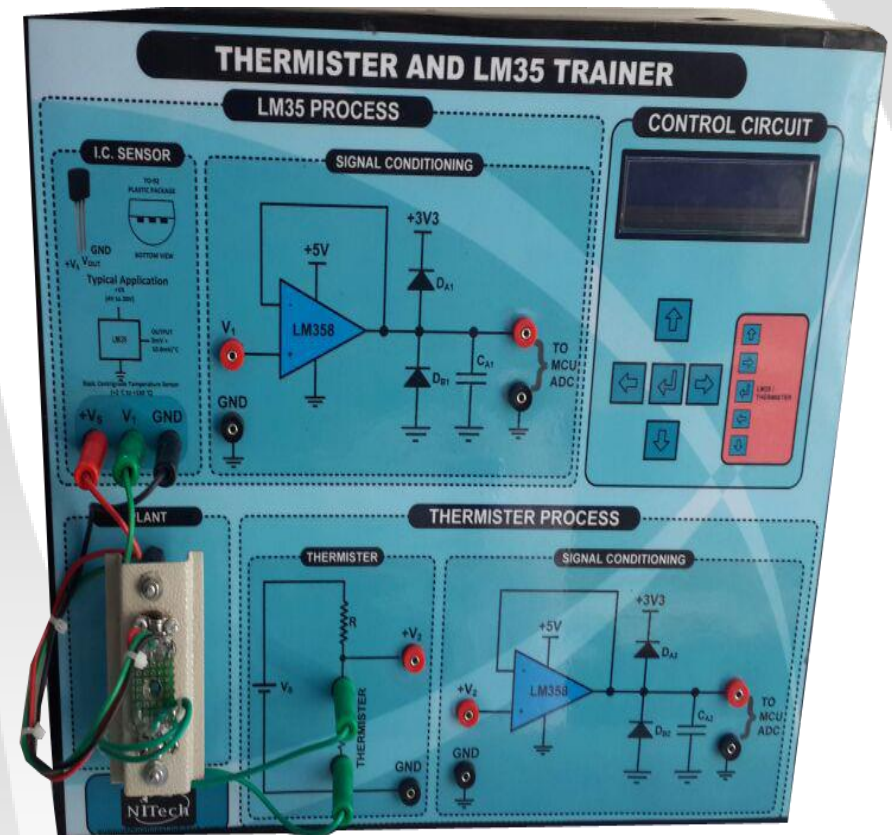❖ Thermocouple Calibrator
❖ Process Plant [Water Bath]
❖ Thermometer

NISE03: Thermistor & LM 35 Trainer

❖ Trainer kit for study thermistor and LM 35 temperature sensors.

❖ Trainer kit includes analog buffer circuit for Thermister and LM 35 output signals.

❖ 32 Bit Microcontroller based Card is used for sensing, processing and display of temperature.

List of components:

❖ Thermistor (Type : NTC)

❖ LM35

❖ 32 Bit Microcontroller Card with 12 Bit ADC ,Display and Keypad, Analog buffer
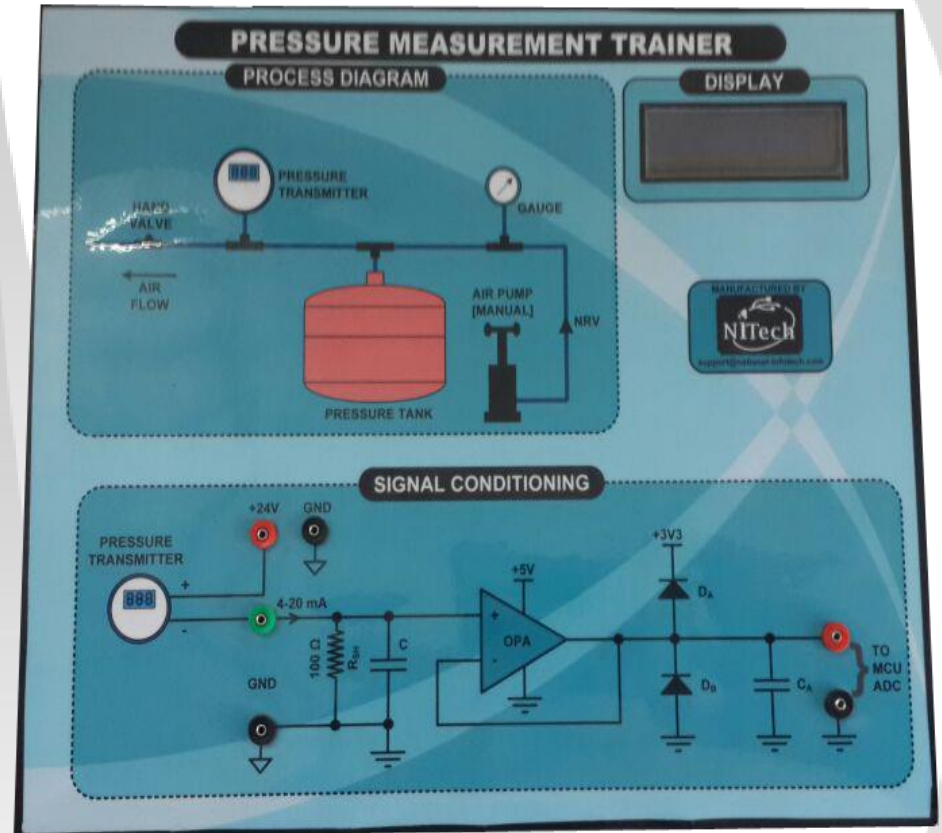
❖ Process Plant [Hot Plate]

NISE04: Pressure measurement / Capacitance Transducer Trainer

❖ Pressure control trainer is designed for experimentation on pressure measurement.

❖ Signal from pressure transmitter (capacitive type) is transmitted as 4-20 mA signal.

❖ The signal is converted to equivalent voltage signal for measurement and display with the help of 32 Bit microcontroller based card.

❖ Pressure gauge is used as standard instrument for comparison with pressure transmitter output.

❖ The process set up consists of pressure vessel fitted with Pressure Gauge, Pressure transmitter, Hand valve, Non return valve, Foot pump.

❖ On LCD screen, measured pressure is displayed.

List of components:

❖ Pressure sensor – Capacitive Type

❖ Pressure Transmitter – Industrial Standard

❖ 32 Bit Microcontroller Card with 12 Bit ADC ,Display and Keypad, I to V converter
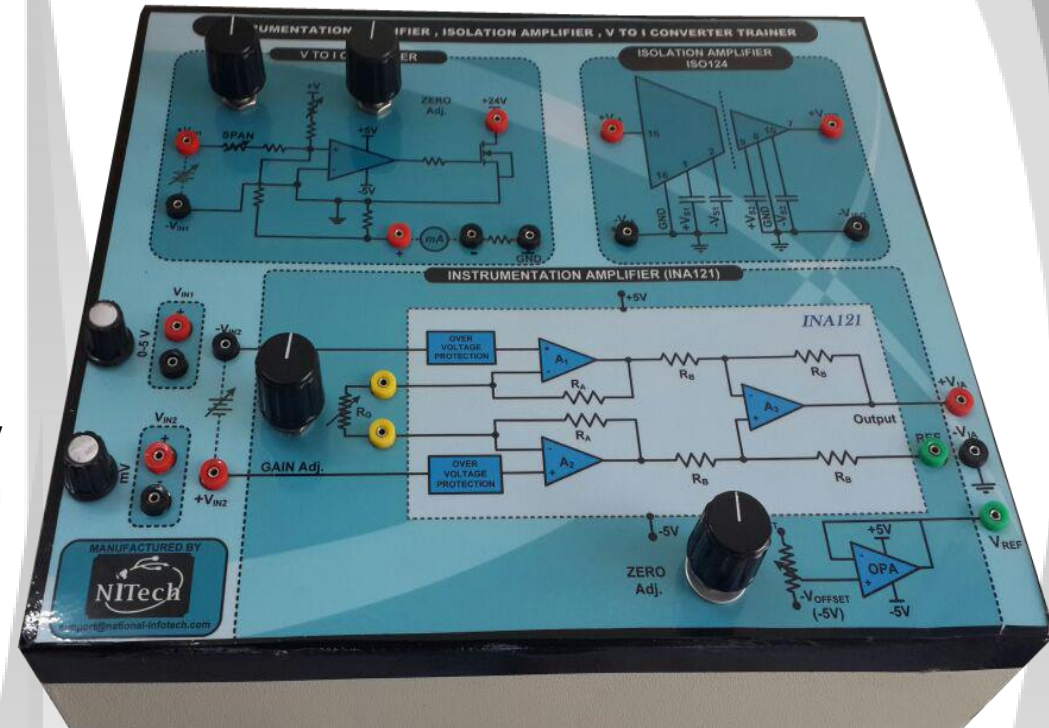
❖ Foot Pump assembly

NISE05: Instrumentation Amplifier, Isolation Amplifier, V to I converter Trainer

❖ Trainer kit is for study of
- Instrumentation Amplifier (INA121)
- Isolation Amplifier (ISO124)
- V to I converter.

❖ Trainer kit includes internal 0-20 mV and 0-5 V power supply. There is a provision for zero-span adjustment for V to I converter using multi turn POT.

List of Components:

❖ PCB with Instrumentation Amplifier(INA121)
❖ PCB with Isolation Amplifier(ISO124)
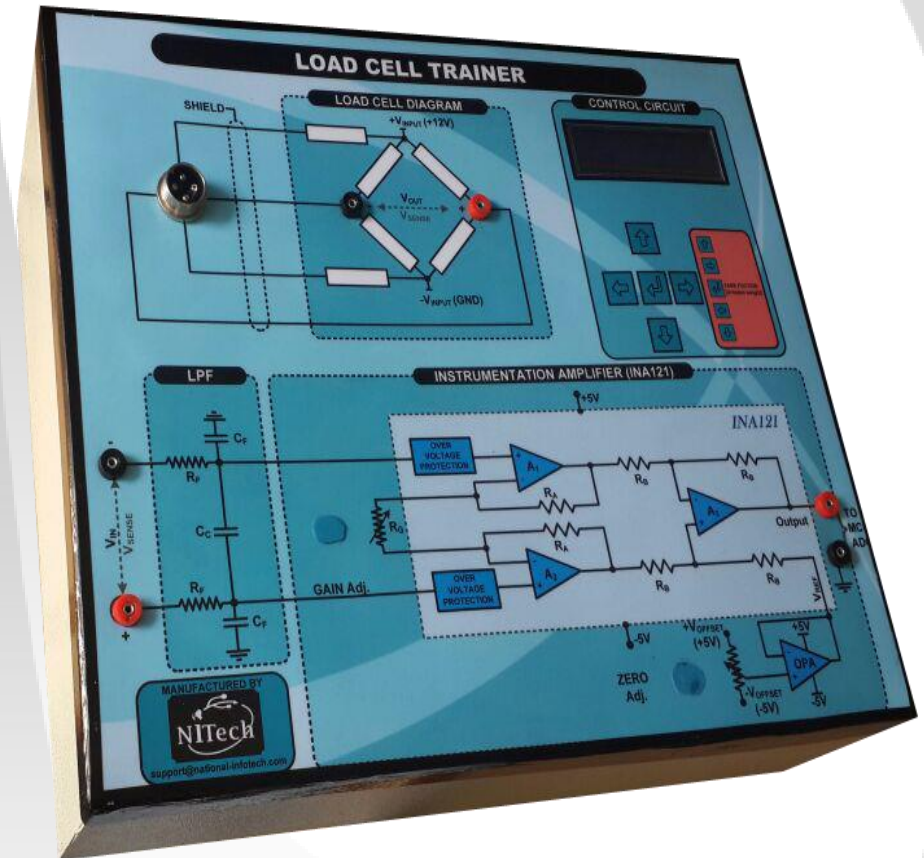❖ PCB with V to I Converter (I/P : 0 to 5 V , O/P: 4 to 20 mA, Zero Span Adjustment)

NISE06: Strain Gauge / Load Cell Trainer

❖ Trainer kit is for studyof strain measurement using load cell. A load cell of 10 kg range is provided.

❖ The load cell is excited with 12V dc. Unbalanced voltage of load cell Bridge is amplified with using instrumentation amplifier (INA121).

❖ There is provision for explaining the concept of tare weight.

❖ 32 Bit Microcontroller Card is used for sensing, processing and display. On LCD screen TARE weight and actual weight is displayed.

List of Components :

❖ Load cell with Loading assembly

❖ 32 Bit Microcontroller Card with 12 Bit ADC ,Display and Keypad, Instrumentation Amplifier(INA121)

❖ Standard Weights

NISE07:Proximity Sensors Trainer

❖ Trainer kit is for study of speed sensing using inductive, capacitive and magnetic proximity sensors.

❖ A 12 VDC PMDC geared motor is provided with variable speed.

❖ Internal 12 VDC power supply is provided for proximity excitation.

❖ A microcontroller card is used for sensing, processing and display of speed.

List of Components :

❖ Inductive Proximity sensor
❖ Capacitive Proximity sensor
❖ Magnetic Proximity sensor
❖ PMDC Motor with Gear assembly for Speed sensing.
❖ 8051 Microcontroller Card,Display and Keypad