

LIGHT INTENSITY CONTROL

KS/EIE/LIC

1. Built-in 3 ½ digit DVM
2. Built-in IC regulated power supplies required.
3. 220V $\pm 10\%$, 50Hz Mains operation
4. Detailed literature and patch cords will be supplied with the kit

Range of experiments:

- Characterization of light panel and light sensor blocks
- Study of a practical single loop feedback control system which includes:
Disturbance study & Error monitoring
- Performance improvement through P-I control
- Evaluation of dynamic behavior
- Seven lamps 6V/300mA
- 5Hz square wave and triangular wave
- Switch selectable PI-Controller



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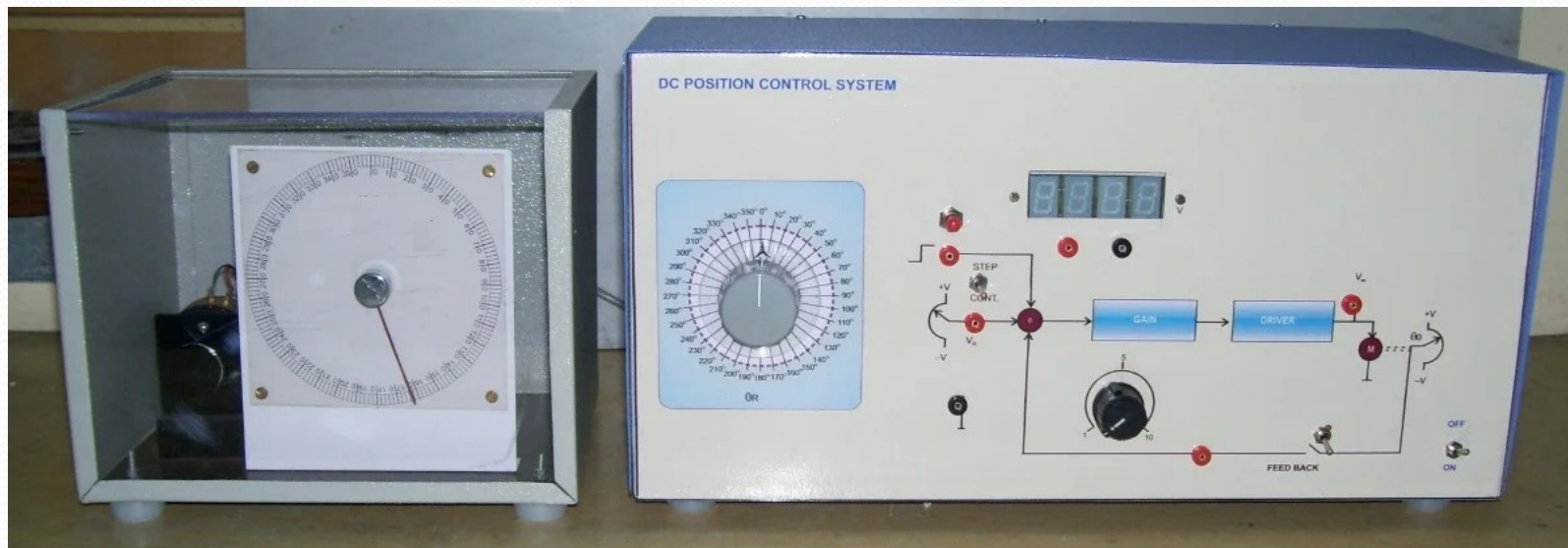
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D.C. POSITION CONTROL

KS/EIE/DCPC

1. Position control of 12V, 1A dc gear motor (30 rpm)
2. Provision shall be given for positive and negative tachogenerator feedback
3. Tacho constant 2V/1000 rpm
4. Calibrated dials for reference and output position resolution 1°
5. Servo- potentiometers with full 360° rotation.
6. microprocessor based waveform capture/display card shall be provided.
7. MATLAB Interface will be provided
8. Built-in 3 ½ digit DVM for signal measurements will be provided.
9. Built-in step signal and IC regulated power supplies for electronic circuits
10. Separates unit for motor in a sec-through cabinet will be provided
11. 220V $\pm 10\%$, 50Hz mains operation
12. Detailed literature and patch cords will be supplied with the kit.



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D.C. POSITION CONTROL

KS/EIE/DCPC

Range of experiments:

- Operation of the position control system for different values of the forward gain to angular position commands.
- Step response studies for various values of forward gain.
- Study of the effect of velocity feedback on the transient and steady state performance of the system as well as its stability.
- Design and implement a PID controller, in hardware or MATLAB and study its performance



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DC MOTOR TORQUE SPEED CHARACTERISTICS

KS/EIE/DCMTS&C

1. Study of a 12V, 0.5A permanent magnet dc motor.
2. Friction grip type (Prony Brake) adjustable loading arrangement.
3. Load cell based force measurement with 3-digit display.
4. 4-digit speed display in rpm.
5. Volt/Ampere motor power readout on DPM.
- 6 Supporting user manual with all details of the experiment will be provided.
7. Compact unit with no additional accessories required.
- 8 Separate unit for motor in a see-through cabinet with single perspex cover for view from all four sides is required.

Range of experiments:

- Torque-speed characteristics by mechanical loading
- Electrical power input at various loads

Torque constant, speed regulation and efficiency determination



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LINEAR SYSTEM SIMULATOR

KS/EIE/LSS

1. Simulated first, second and third order system of type-0 and type-1 (4 combination).
2. Calibrated variable gain amplifier (Resolution 1 : 1000)
3. Built-in signal sources: Square wave and Triangular. Frequency 45-90 Amp 0- 2.5V approximately
4. Trigger output for perfectly steady display on CRO.
5. Uncommitted amplifier for phase adjustment.
6. Provision for distributed inputs.
7. 220V $\pm 10\%$, 50Hz mains operation.



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Range of experiments:

- Open loop step response of First Order type-0 system for various values of gain.
- Closed loop step response of First Order type-0 system for various values of gain.
- Open loop step response of Second Order type-0 and type-1 systems.
- Closed loop step response of Second Order type-0 and type-1 systems
- Steady-State errors for closed loop configuration through triangular wave input.
- Response of third order system.
- Suitable for Frequency Response studies with external function generator (function generator not included with the system)



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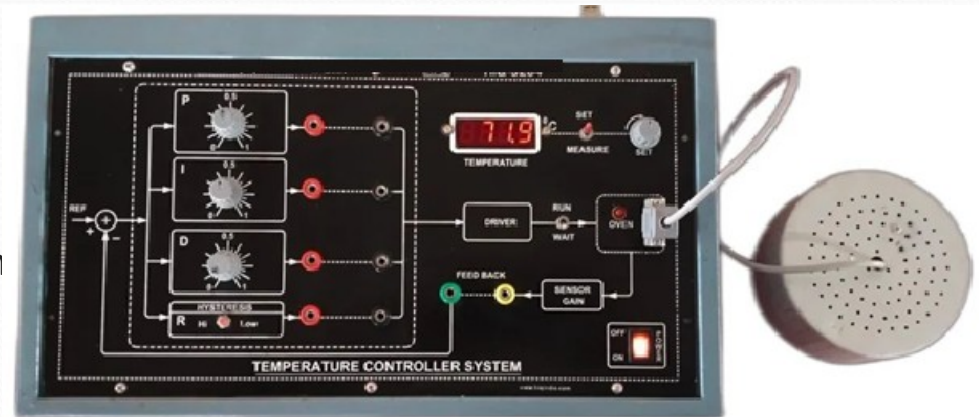
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PID CONTROLLER

KS/EIE/PIDC

1. Temperature controller with facilities for P, I, D and relay control blocks.
2. Operating temperature Ambient to 90°C.
3. Separate controls for P, I, D channel gains required.
4. Two settings for relay hysteresis will be provided.
5. Fast 25W oven fitted with IC temperature sensor.
6. Forced cooling option to ready oven for next experiment.
7. Digital display of set and measured temperature on a 3 ½ digit built-in DVM.
8. 0-9999 sec timer on panel for a convenient temperature response experiment.
9. IC regulation in controller circuit power supplies will be provided.
10. 220V $\pm$ 10% 50Hz mains operation.
11. Supporting literature and patch cords required



Range of experiments:

- Identification of the oven parameters
- Study of ON-OFF temperature control (with adjustable relay characteristics)
- Study of P, PI, PD and PID controls having adjustable coefficients.

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