



## TRAINING MODULES FOR LEARNING AND EXPERIMENTING OF THE MAIN DRIVE AND CONTROL CIRCUITS FOR INDUSTRIAL ELECTRIC MOTORS.

**URM-00** teaching and experimental series modules have been especially designed to provide a comprehensive, hands-on and complete instruction in the principles and operations of control circuits of the main types of electrical motors (open and closed loop) most widely used in industry today, such as:

### STEPPER MOTORS - DC MOTORS - AC MOTORS - BRUSHLESS MOTORS

All the modules are completely self-sufficient and do not require any external devices or special equipment other than a common DC power supply and the standard laboratory measuring instruments in order to work. The system modularity allows to programme investments through the complete or partial purchasing of the seven modules currently available:

- **URM-01/PP** Stepper motor control
- **URM-02/CC** DC motor (2-quadrant) control
- **URM-03/CA** AC three-phase motor control
- **URM-04/BL** Brushless motor control
- **URM-05/4Q** DC motor (4-quadrant) control
- **URM-06/PS** Speed and position DC motor control (CNC Linear axe)
- **URM-07/PLC** Manage of the above module by means PLC (software included)

A special computerized device known as **“URM-SMC”** enables automatic measurements, data acquisition and graphic monitoring of the signals using any PC. Full technical bibliography complete of the theory of the control circuits and many hands-on experiments are provided with each module ensuring a fast and effective learning of the subject. Each module can be used as easily either resting on a flat surface or fitted to a special vertical anodized aluminium frame.

**MECHANICAL FEATURES COMMON TO ALL MODULES**

- Anodized aluminium and silk screened panel reproducing the various internal electronic circuits
- Easy mechanical mounting/removal system from the vertical frame
- Shaft lexan protection for any motor
- Plastic protection under the electronic circuits
- Highly reliable bushes for safe connections
- Side ventilation
- Rubber feet
- Dimensions: mm 375 x 303 x 110h

**ELECTRONIC AND FUNCTIONAL FEATURES COMMON TO ALL MODULES**

- Industrial electronic drives (low power) with built-in latest technology
- Main test points and controls available on panel
- LEDs to indicate operating modes
- Short circuit electrical and electronic protection
- Test points on safety bushes
- Supplied complete of motor and speed detectors (see individual module)
- External speed regulation either via PC or PLC (separate inputs)
- Supplied complete with teaching manual containing theory and practical experiences

**URM-01/PP  
TRAINING MODULE FOR STUDY STEPPER MOTORS AND RELATED ELECTRONIC DRIVE CIRCUITS**

- 20 KHz PWM control
- Step angle degree: 1,8°
- 1/1,1/2,1/4 and 1/8 step angle selectable
- Power supply: 24 Vdc
- Peak output current: 2.5 A
- Mean output current: 1.5 A
- Motor power: 5W
- Max revs.:1500
- Max torque: 24.5 mNm
- Step accuracy: 0.08mm
- Max output current: 5 A

**URM-02/CC  
TRAINING MODULE FOR STUDY DC MOTOR DRIVES**

- Connection to external DC motors
- Protected thyristor bridge
- Dual speed and current loop
- Speed feedback selectable from D.T. or I x R mode
- 24V/4W DC motor fitted with tachometer dynamo
- Adjustable electromechanical load with DC dynamo
- Stall torque: 31 mNm
- Efficiency: 81%

**URM-03/AC  
TRAINING MODULE FOR STUDY THREE PHASE AC MOTOR DRIVES (INVERTER)**

- Power supply: 220/240 Vac single-phase
- Acceleration/deceleration to/from 0 to rated speed in 5 seconds (adjustable)
- Output voltage: 220V three-phase on safety bushes
- Max power: 0.187KW
- Sinusoidal wave form

- Mosfet power stage
- Frequency generated from 2.5Hz to 100 Hz
- Frequency stability better than 1.5%
- Electronic short-circuit protection
- 220V/170W asynchronous three-phase motor on base
- Power supply safety insulator transformer

**URM-04/BL  
TRAINING MODULE FOR BRUSHLESS MOTOR DRIVES**

- Power supply: 24Vdc
- Max current: 3A
- Digital speed and analog current feedback
- Electronic braking
- PWM frequency: 10KHz
- Digital rotation sense detector
- Brushless 4-phase Dc motor on panel
- Built-in polyphase encoder
- Torque rate: 8 Ncm
- Max speed: 3000 rpm

**URM-05/4Q  
TRAINING MODULE FOR STUDY DC 4 QUADRANT MOTOR DRIVES**

- Power supply: 42 -48 Vac
- Output voltage: 48V on safety bushes (4 mm)
- Max current: 6,8A
- Power of DC motor : 250W (0,8 N/m)
- Adjustable acceleration and deceleration ramps
- Automatic sense of rotation reversing
- Dual thyristor bridge fully controlled
- Dual feed back (speed and current)
- Permanent-magnet DC motor with T.D ( fitted on metal base)

**URM-06/PS  
DC MOTOR SPEED AND POSITION CONTROL**

- Microprocessor position control
- Settings and regulations either via PC or manually
- 5 coded switches (contraves) for manual settings
- RS-232 interface
- PC managing software Windows environment
- Independent PID loops separately adjustable
- Tracking error indicator and automatic zero point
- 4Q drive with DC. Motor, encoder and load
- 60 cm. linear axis with mechanical indicator
- External PLCs & PC control

**URM-SMC  
COMPUTERIZED MEASURING SYSTEM FOR DATA ACQUISITION AND GRAPHIC MONITORING**

- PC printer port connection
- Resolution: 12 bits 0.025%, Linearity: 10 bits
- Sampling frequency: 100KHz
- Software running in Windows 95/98/NT environment
- Conversion time: 10 µS
- Input impedance : 1Mohm/20pF
- Two separate input channels complete with 1:1 and 10:1 probes
- Accuracy: 0.25% ± 1 LSB
- Measuring Instruments: oscilloscope, storage oscilloscope, true RMS voltmeter, spectrum analyzer and recorder