

# Mini-Motors Laboratory

Educational Training Equipment for the 21st Century

Bulletin 259J

## Description

All of the rotating electrical machines and accessories required for a basic Electrical Power course are contained in the Hampden Mini-Motors Laboratory. The equipment illustrated is the basic package, to which compatible Hampden motors, controllers, and accessories may be added.

### MODEL MGB-100-DG Bedplate

Holds motors and generators securely during tests. Includes quick-connect coupling and shaft guards.

### MODEL DM-100A DC Motor/Generator

May be used as either motor or generator; series, shunt, or compound.

### MODEL SFR-100 Series Field Rheostat

Changes the degree of compounding of a DC generator

### MODEL DYN-100A-DM Dynamometer

Measures torque in ounce-force inches in either direction. May also be used as DC motor or generator.

### MODEL SM-100-3 Synchronous Motor/Alternator

Runs as a synchronous motor or operates as a three-phase alternator when driven by AC or DC motor.

### MODEL MFM-100 Multi-Function Machine

Runs as a split-phase; a capacitor start; a permanent-capacitor; or a two-capacitor motor.

### MODEL RL-100A Resistance Load

Applies resistive load to generators and alternators.

### MODEL RLC-100 Resistance/Reactance Load

Applies unity, lagging, or leading power factor load.

### MODEL SLA-100M Strobe-Tachometer

Measures speeds between 100 and 12,000 RPM

### MODEL HT-100-L Digital Optical Tachometer

Measures speeds between 0.5 and 20,000 RPM with accuracy of 0.05% of actual speed.



## Power and Metering

To satisfactorily perform the required experiments, the following power should be available:

- Fixed 120V AC 1 $\phi$ , 2-wire 10A
- Fixed 208/120V AC 3 $\phi$ , 4-wire, 10A
- Variable 0-240/140V AC 3 $\phi$ , 4-wire, 9A
- Variable 0-150V DC, 1.0A, isolated, 1% RMS
- Variable 0-125V DC, 5.0A, isolated, 1% RMS

The following meters should also be available:

- DC Voltmeter; 0-75/150V (2)
- DC Ammeter; 0-0.5/1.0/2.5/5.0A (2)
- AC Voltmeter; 0-150/300V
- AC Ammeter; 0-0.5/2/4/8A (2)
- AC Wattmeter; 0-150/300/600/1200W (2)

All of the above power and metering facilities are included in the Hampden **MODEL HMD-100-CM** Deluxe Console.

## Three-Phase Add-On

The study of three-phase motors and alternators may be enhanced by the addition of the following equipment (shown below) to the Hampden Mini-Motors Laboratory:

### MODEL IM-100 Induction Motor

Runs as a 3 $\phi$ , 4-pole, squirrel-cage motor.

### MODEL WRM-100-3A Wound-Rotor Motor

Runs as a 3 $\phi$ , 4-pole, wound rotor motor.

### MODEL WRSC-100 Wound-Rotor Speed Controller

Used to vary the speed of the WRM-100-3A.

### MODEL SYN-100 Synchronizing Phasing Lamps

Used to synchronize two alternators.

All Hampden units are available for operation at any voltage or frequency

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## Model H-CAI-100 Computer-Aided Instruction for Series 100 Motor Systems

### Purpose

To provide a single-station computer-assisted approach to single and three-phase AC motor and machine theory AND practice. Through the use of multi-color menus, text, and graphics, the **Model H-CAI-100** system works in partnership with the student to develop an expanded understanding of motors.

### Description

The **Model H-CAI-100** Computer-Aided Instruction for Series 100 Motor Systems

provides an interactive platform whereby the student works through the background and theory of AC and DC motors. Experiments are included for the student to set up, perform, and then provide test results to the CAI system. Testing is also accomplished with all results keyed by student name and class.

The **MODEL H-CAI-100** Computer-Aided Instruction Series 100 Motor System is available for operation on a PC-compatible system with at least 386-level performance.



## Model H-MGI Motor-Generator Interface Module —Hampden's Four Step Solution for Motor Signal Acquisition

### Purpose

The **MODEL H-MGI** Motor-Generator Interface package provides an all-in-one solution for interfacing motors and machines with computers.

Providing ease-of-connection for real-world signal levels, the **MODEL H-MGI** connects to any standard IBM-compatible computer via an RS-232 serial cable.

It's four steps and you're up and running:

1. Unpack the **MODEL H-MGI** Motor Interface
2. Plug in the inputs from your machines into the clearly labeled inputs on the **MODEL H-MGI** front panel.
3. Plug the supplied RS-232 cable from the **MODEL H-MGI** into your computer.
4. Install the Hampden Acquisition software on your computer.

That's it! Your motor experiments can now be recorded and analyzed by the software included with the **MODEL H-MGI**.

Hampden includes typical templates for many standard fractional and integral motor setups.

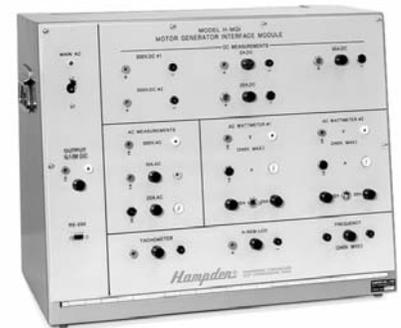
### Typical Experiments

- DC:** Torque vs Alternate Current  
Speed vs Alternate Current  
Speed vs Applied Armature Voltage
- AC:** Power Factor vs Load  
Torque vs Current  
H.P vs Load  
Efficiency of a Single Phase Motor vs Current "V"-curves

### Description

The Hampden **MODEL H-MGI** Motor-Generator Interface Module is directly compatible with:

- Hampden Series 100 Motors
- Hampden H-REM-120
- Hampden H-REM-1A
- Hampden Series 2 Hp Motors
- Hampden Series 3 Hp Motors



The **MODEL H-MGI** also provides inputs for the Hampden **MODEL H-REM-LC-D** Digital Load Cell and **MODEL HPT-100A** Digital Photo Tachometer.

### Supplies Required

120V AC - 1 $\phi$  - 50/60Hz

All Hampden units are available for operation at any voltage or frequency

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