

# MPM1015

## Variable Frequency Inverter

**Part of TecQuipment's Electrical Machines Teaching System – shows how to use a three-phase inverter with pulse width modulation (PWM) to drive an induction motor**



- Part of TecQuipment's Electrical Machines Teaching System to drive one of the optional fractional horsepower (FH) machines
- Three-phase variable frequency output from a single-phase fixed-frequency supply input
- Includes current and voltage measurement connections for full range of experiments
- Works with the Test Bed (FH2) to show speed, slip and frequency
- Internal or external control
- Controls frequency, speed, acceleration and motor direction

### Description

A self-contained pulse width modulated (PWM) variable-frequency inverter. The bench-mounting unit works with other parts of the Electrical Machines Teaching System. It converts a single-phase constant voltage and constant frequency mains input into a variable-frequency, three-phase output. This output is suitable to work with the Cage Rotor Induction Motor (FH90) of the optional fractional horsepower (FH) machines range.

When used with the other parts of the teaching system, this drive shows the principles of pulse width modulation. It also allows students to compare how a motor works from a standard three-phase supply with how it works when powered by the inverter. This includes the torque and speed characteristics of the motor at different frequencies and loads.

Students use controls on the front panel of the unit to set how they need to drive the motor. One control sets the output frequency (speed of the motor). Other controls set the rate of acceleration or deceleration, forward or reverse direction, and whether the motor has four or eight poles.

A three-range analogue meter shows output frequency, speed and slip. The inverter includes a socket and a lead to connect to the FH2 test bed to input an accurate motor shaft speed signal.

Fully buffered and isolated outputs allow students to connect an oscilloscope (not included) to monitor current and voltage waveforms at power levels. Students use an internal/ external switch to select whether control of speed is via the panel-mounted controls or by an external signal input.

### Standard Features

- Supplied with comprehensive user guide
- Two-year warranty
- Made in accordance with the latest European Union directives

### Recommended Ancillaries

- Other products in the Electrical Machines Teaching System (see overview datasheet).
- Oscilloscope (OS2)

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- An ISO 9001 certified company

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### Experiments

- Investigation of conventional operation of induction motor
- Investigation of PWM current and voltage waveforms at different frequencies and motor loads
- Torque and speed characteristics of cage rotor induction motor at different frequencies/speeds
- Speed and acceleration/deceleration characteristics of an induction motor at different motor loads

### Essential Services

#### *Electrical supply:*

Single-phase with earth  
220/240 VAC, 50/60 Hz, 13 A

Other voltages available to special request.

#### *Bench space needed:*

750 mm x 750 mm

### Operating Conditions

#### *Operating environment:*

Laboratory environment

#### *Storage temperature range:*

-25°C to +55°C (packed)

#### *Operating temperature range:*

+5°C to +40°C

#### *Operating relative humidity range:*

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

### Sound Levels

Less than 70 dB(A)

### Specification

#### *Nett dimensions and weight:*

540 x 450 x 200 mm and 11 kg

#### *Packed dimensions and weight:*

Approximately 0.2 m<sup>3</sup> and 15 kg

#### *Output power:*

Up to 1 kW

#### *Output voltage:*

240 V line-to-line, PWM three-phase only

#### *Output frequency:*

0 to 100 Hz

#### *Controls:*

- Adjustable frequency/speed control.
- Adjustable acceleration and deceleration control.
- Internal/external switch – selects whether speed and acceleration control is from the local controls or by an external analogue signal input at a 7-pin DIN socket.
- 4-pole/8-pole switch – selects the stator winding of the motor to correctly calculate slip.

#### *Frequency/speed/slip meter:*

Displays current values as selected by range switch. Takes speed signal from tachogenerator of Test Bed (FH2).

#### *Voltage/current monitor points:*

Two sockets give output signals of phase voltage and current waveforms.