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Part I: SPIM Single-Phase Motor Demo – No Load Operation

Part II: SPIM Single-Phase Motor Demo – Connecting a Friction Brake as Load

Part I: SPIM Single-Phase Motor Demo – No Load Operation

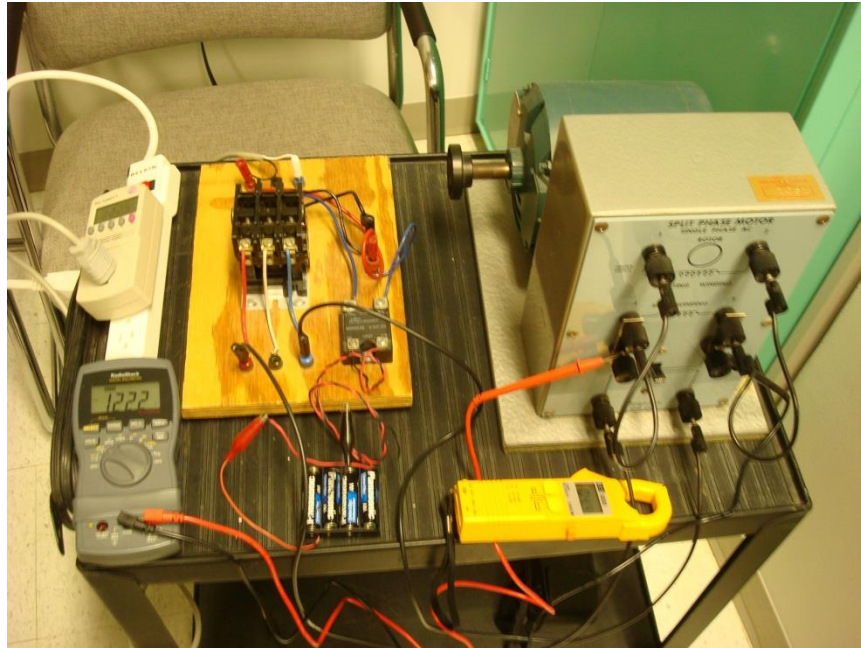


Figure I-1. AC Single-Phase Motor Demo – No Load Operation

- Motor: 1/3 Hp, 115V, 60Hz, 5.2A, 1725 RPM (Split-phase with centrifugal switch)
Magnetic switch (On/Off) Online Starter, Computer Interface ready (through Solid State Relay - SSR: Input DC 3-32V)

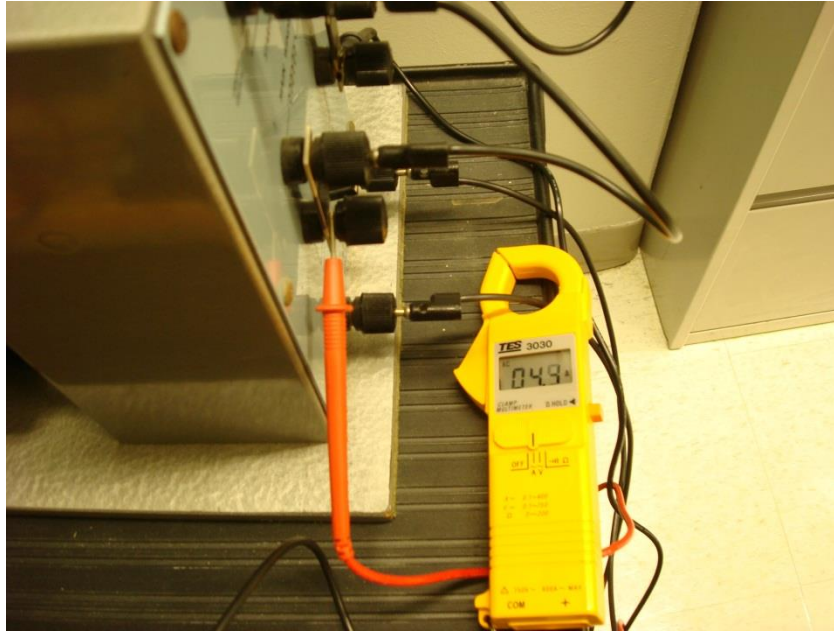
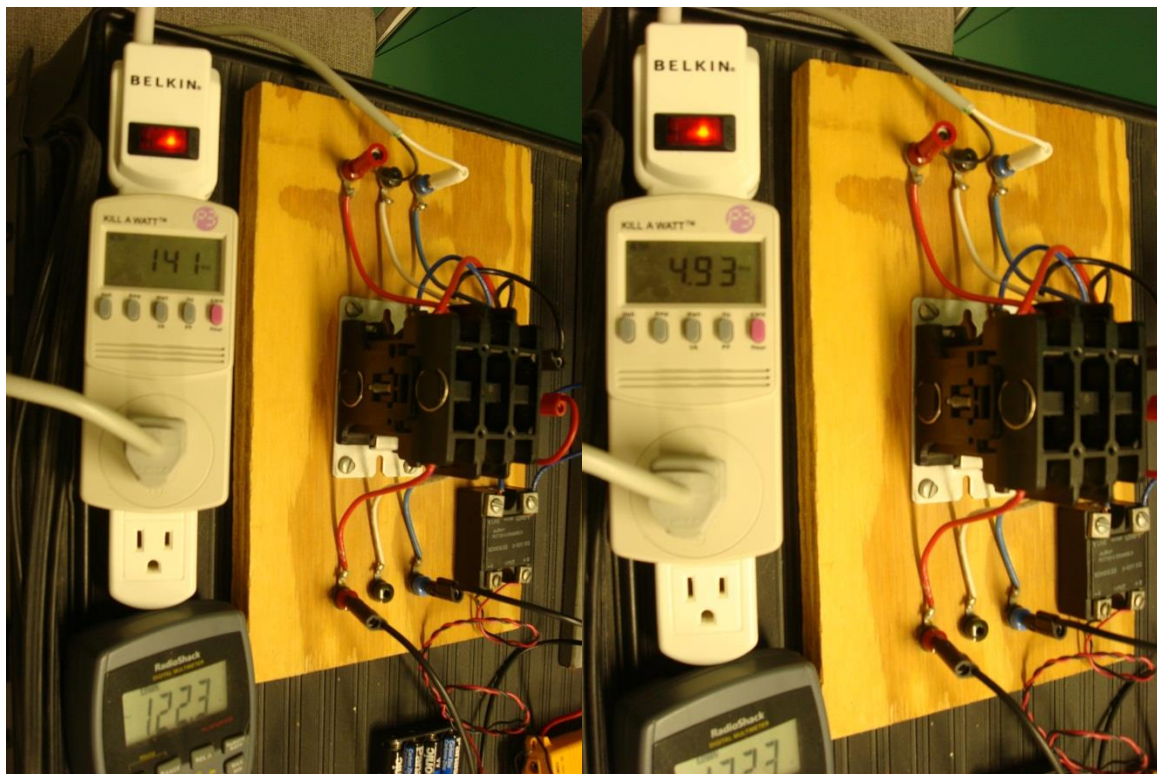


Figure I-2. Measurement of motor current using digital clamp ammeter. Clamp ammeter: Starting current 5.2A, and the no-load current is 4.3 A



(a)

(b)

Figure I-3 Measurement of VL, IL, Hz, Watt, kWh with a Kill A Watts power monitoring instrument, Line Voltage measurement - DMM, Line current measurement through a digital Camp meter (Starting and running current) (a) DMM line voltage measurement 122.3V, Power = 141 Watts, other measurement from Kill A Watt include VL = 122.5V, Frequency 59.9 Hz, PF = 0.22, P = 141 Watt, S = 546VA (b) Measured IL = 4.93A

Part II: Single-Phase Motor Demo – With Mechanical Friction Brake

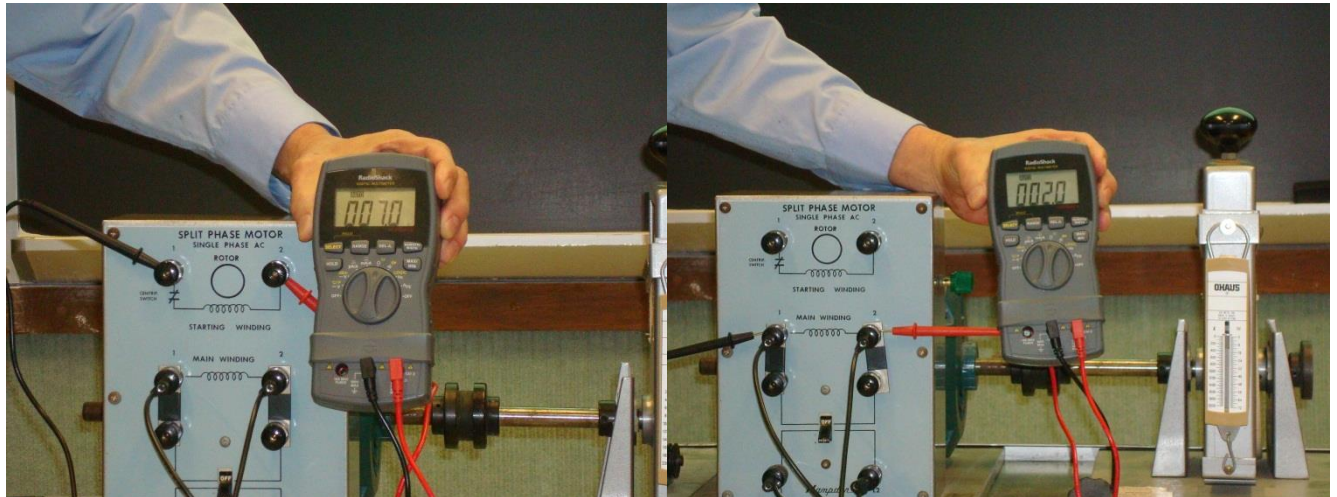
Dynamometers, <http://en.wikipedia.org/wiki/Dynamometer>

Name Plate:

TYPE SP, FR 56

1/3 HP 60Hz 120V 4-Pole 5.2A 1725 RPM

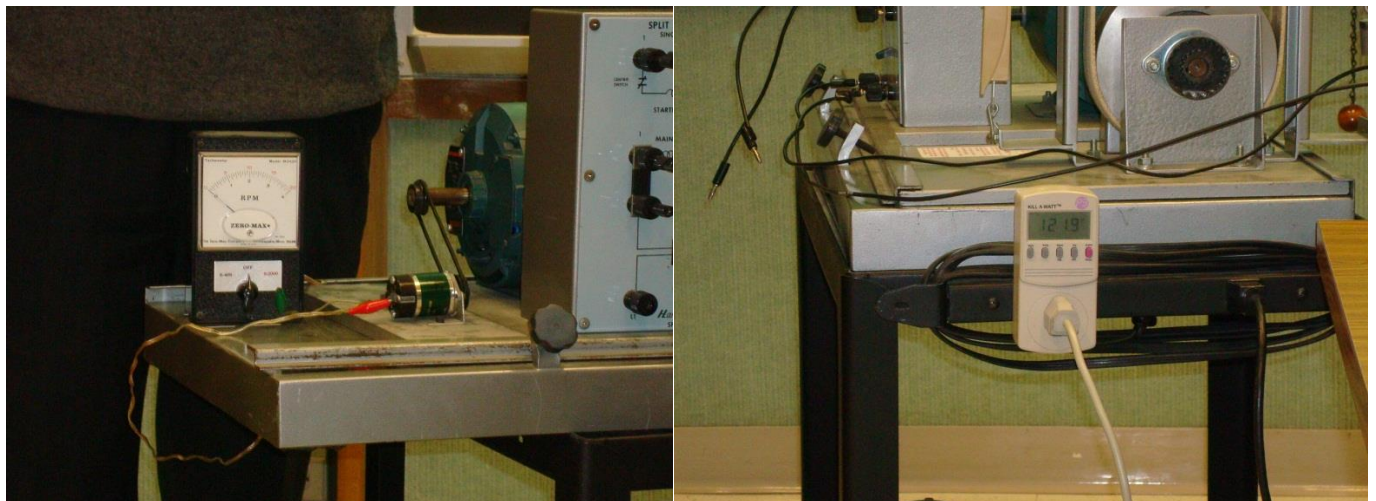
Maximum Ambient 40C° Service Factor 1.35



(a) Measurement of Starting Winding Raw 7.0Ω

(b) Measurement of Run Winding Rmw 2.0Ω

Figure 1 Split-Phase Induction Motor (SPIM) with a main winding and an auxiliary winding (connected in series with a centrifugal switch). The Friction Brake (on the right) is attached to the SPIM through a rubber coupler. The front side of the brake is attached to a scale and the other side is attached with metal wright. The torque can be calculated from $T = F \cdot r$ where r is distance from the center of the shaft to the center point of the scale, and the F is reading of the weight from the scale.



(a) DC Tachogenerator for RPM Measurement

(b) Measurement of Line Voltage 121.9V

Figure 2 Connect DC Tach-generator for RPM measurement and I-V-W meter for operational current, voltage and wattage consumption monitoring

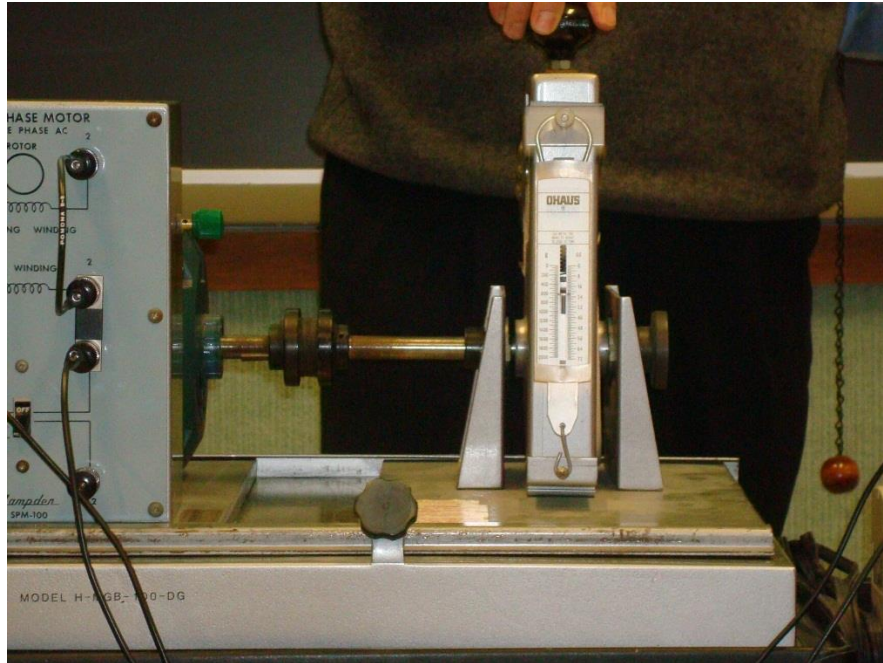


Figure 3. Add pressure on the top of the Friction Brake, and measure the currents: 4.78A, 4.88, 5.02, 5.03, 5.22, 5.38, 5.53, 6.08, 6.3 A. The motor stopped when $I = 6.3$ A (breakdown).



(a) A Strobe Tachometer



(b) Measure RPM

Figure 4. Using Strobe Tachometer as shown in (a) for RPM measurement. Turn on the Strobe Tacho, aim at coupler's key holes on the shaft. Adjust the reading dial on the Strobe Tacho and observe that the key hole is standstill (not moving forward or backward). Use the dial reading 1.72×100 RPM = 1720 RPM.