

INVERTER HOT LINE COIL RESISTANCE METER DAC-HRI-3



The Inverter Hot Line Coil Resistance Meter is a testing instrument for measuring hot-line coil resistance of a motor stator coil. Traditionally, the motor under test is temporarily de-energized to measure its coil resistance, which is then converted to the corresponding temperature. Hot-line resistance measurement using this instrument enables high-precision and highly-efficient measurement of coil resistance while the coil is being energized.

Test Materials

- EV Motor
- Brushless Motor
- Compressor Motor for Air-Conditioner

Rated Standard

JIS C4203 Single Phase induction motors
 JEC 60034-1 Rotating electrical machines
 – Part 1: Rating and performance

Specifications

- Measuring range : 0.2Ω Range : 0-0.2000Ω (Superimposed Current DC100mA)
 2Ω Range : 0-2.000Ω (Superimposed Current DC100mA)
 20Ω Range : 0-20.00Ω (Superimposed Current DC10mA)
 200Ω Range : 0-200.0Ω (Superimposed Current DC1mA)
 2000Ω Range : 0-2000Ω (Superimposed Current DC0.1mA)
- Testing Voltage : AC400V max (50/60Hz), Average Rectifier RMS
- Frequency : 10 - 400Hz
- Resolution : Voltage Meter : 0.1V
 Resistance Meter : 0.1mΩ (0.2Ω Range)
- Display : Voltage Meter : 4 digit
 Resistance Meter : 4 digit 2000FS
- Accuracy : 2Ω/20Ω/200Ω : ±0.3% FS
 0.2Ω Range : ±0.5% FS
- Input impedance : 0.2Ω/2Ω Range : Approx. 1.5kΩ
 20Ω Range : Approx. 15kΩ
 200Ω Range : Approx. 150kΩ
 2000Ω Range : Approx. 1500kΩ
- Interface : RS232C
- Analog output : DC0-2V
- Power Source : AC100V-240V±10% 50/60Hz
- Dimensions : W430×H200×D385mm Approx. 20kg
- Accessories : 1) 4-terminal probe (6m for HR)
 2) AC Power cable (3P inlet cord with a ground terminal)
 3) Instruction manual
 4) Inspection certificate (Test Report)
- Option : DC Blocking Capacitors Box (C-BOX, 7A, 23A, 45A)

Conversion to temperature

Usually, $1/\alpha_0 = 235$, where α_0 is the temperature coefficient at 0°C, is used for the conversion to temperature as described in the following formula

$$tc = \frac{R_t - R_{t_0}}{R_{t_0}} (235 + t_0) + t_0$$

$$\Delta t = t_0 - tc$$

t_c = Converted temperature (T_c)

Δt = Temperature rise (ΔT)

R_t = Measured electrical resistance (R)

R_{t_0} = Initial resistance (R_0)

t_0 = Initial temperature (T_0)



DC Blocking Capacitors Box

DC Blocking Capacitor must be required for measurement under energized. An appropriate capacitor must be selected in accordance with the rated current of specimen.

- Capacitor : Electrolytic Capacitor
- Maximum-allowed-current value
 - : 470 μ F ... 2A
 - : 4,700 μ F ... 7A
 - : 47,000 μ F ... 23A
 - : 330,000 μ F ... 45A



Terminal type
For 3 phase 23A/7A



Switch type
For 3 phase 23A/7A

Necessity of Hot-Line resistance measurement

During the temperature rise test of a coil, in particular, a coil of small-size equipment cools rapidly once de-energized, and so its resistance changes considerably. In other words, it is very difficult to accurately measure the coil resistance of a running motor. In the case of the coil of a motor that is equipped with a fan, the motor exterior is cooled by the fan, but the temperature of the coil inside the motor can be much higher. In this case, the motor temperature that is measured externally with, for example, a thermistor, can be much different from the temperature of the coil. The traditional “measurement of coil resistance after shutdown” is based on the assumption that the temperature rises and falls in accordance with natural logarithm, but the assumption often fails for products of complicated structure, and differences or errors are inevitable in inferring the coil resistance under the energized state from that under the de-energized state. Therefore, hot-line resistance measurement is an ideal method for correct measurement of coil resistances.

Why superimpose a DC component on the AC line

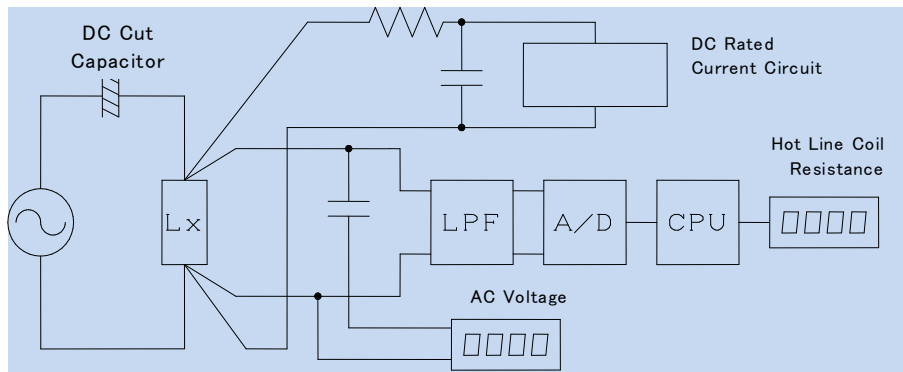
It is not impossible to derive effective resistance from AC components under the energized state, but the derivation is associated with difficulties related to load conditions or separation of iron loss. In addition, pertinent electrical regulations stipulate that copper wire resistance must be DC measured. For this reason, this Coil Resistance Meter adopts the approach of superimposing a DC component on the AC line. The magnitude of the DC current to be superimposed, however, is made negligible to the AC current.

Principle of operation

A DC-blocking capacitor is inserted to prevent flow of the DC measuring current into the AC power source, and the energizing AC voltage is applied to the coil, L_x , of the tested motor. A DC current from the DC constant current circuit of the Coil Resistance Meter is superimposed on the coil, L_x , and the voltage drop across the L_x is measured. The DC component of the measured voltage drop is extracted by using a low pass filter (LPF), and then the coil resistance is calculated and displayed. Because the LPF is composed of circuit elements, a CPU-based digital filter is used to eliminate inverter noises.

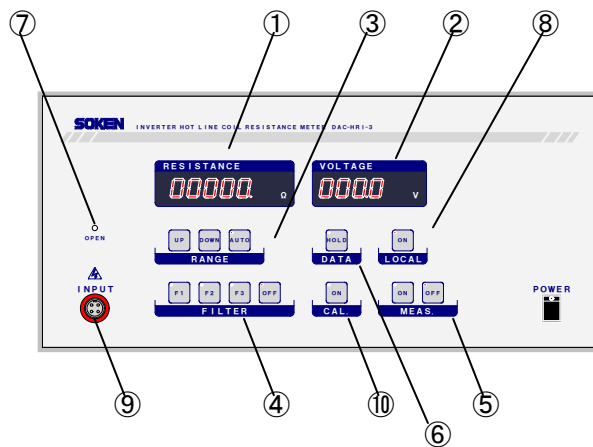
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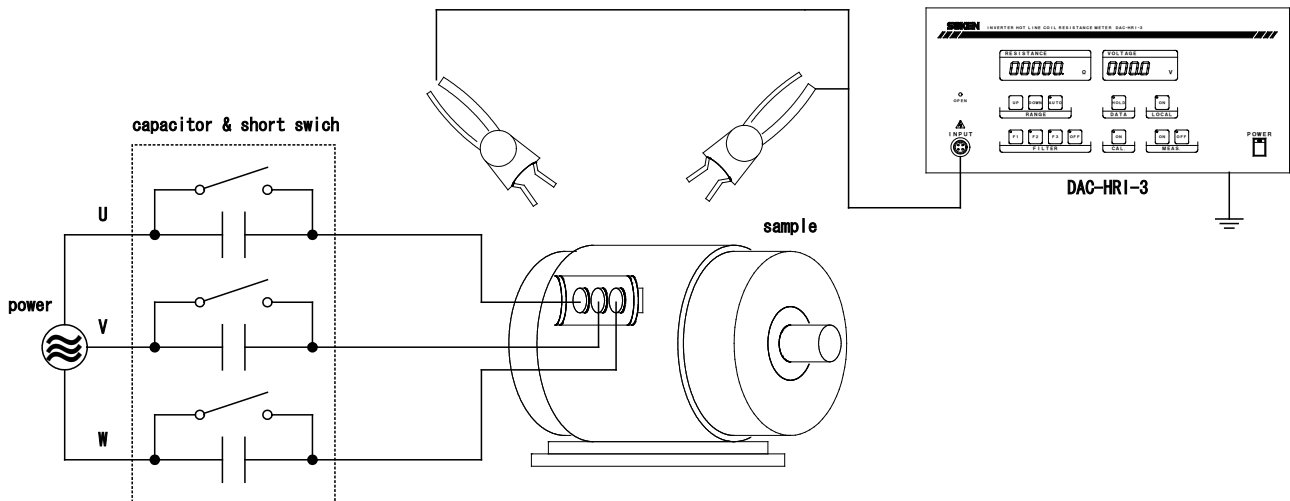


Front Panel

- ① RESISTANCE
- ② VOLTAGE
- ③ RANGE selection
- ④ FILTER
- ⑤ MEAS. Button
- ⑥ HOLD
- ⑦ OPEN alarm
- ⑧ Non-Hot Line Mode
- ⑨ INPUT Connector
- ⑩ CALIBRATION



Connection Diagram



Head Office & Plants
ISO 9001: 2008

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