

INVERTER HOT LINE COIL RESISTANCE METER

- **DAC-HRI-3N**
- **DAC-HRI-3N TYPE 700**

Importance of winding temperature measurement

A motor is a device that converts electrical energy into mechanical energy. The losses generated during the energy conversion process become heat, which increases the winding temperature of the motor. Rising winding temperatures can cause insulation deterioration and affect motor function. Therefore, knowing the winding temperature during motor operation is very important to ensure safety and quality of the electrical devices.



DAC-HRI-3N TYPE 700



DAC-HRI-3N

DAC-HRI-3N / HRI-3N TYPE 700 can measure resistances of the coil winding of a motor driven inverter power supply (PWM) during applying voltage.

Test Specimens

- EV, HEV Motor
- DC Brushless Motor
- Heat Pump, Compressor Motor for Home appliances

Applicable Standards

- JIS C4203 Single Phase induction motors
- JEC 2137 Induction motor
- IEC 60034-1 Rotating electrical machines - Part 1

Features of Hot Line Measurement

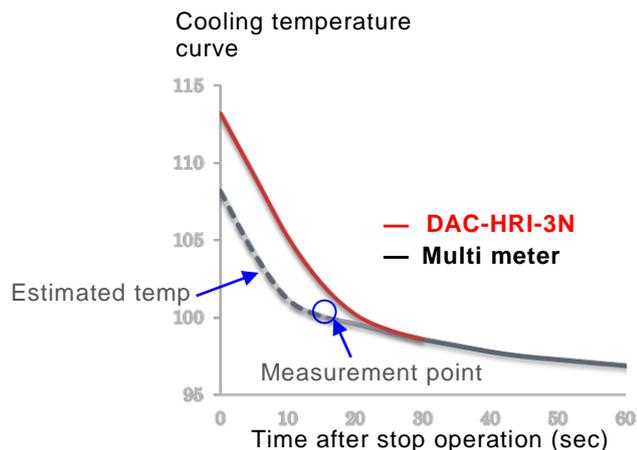
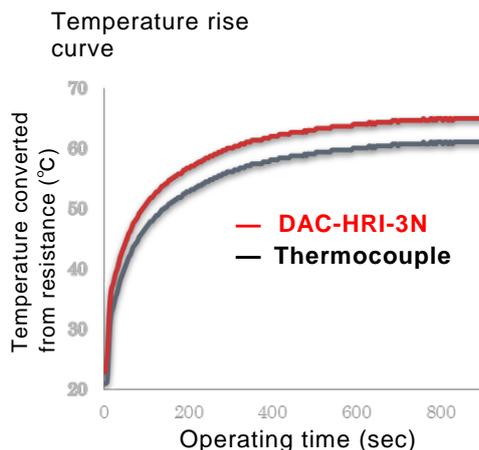
Until recently, the coil winding resistance is confirmed while the motor is stopped. This method assumes a natural logarithmic change in resistance after stop of operation, but complex products do not always follow this principal. In particular, the coils of motors with fans cool rapidly, and there can be a large different between the off-line value and the actual value. To verify and ensure the safety of the product, it is ideal to measure the coil temperature while it is in operation state. Accurate measurement is possible with DAC-HRI-3N.

Specifications

Model	DAC-HRI-3N		DAC-HRI-3N TYPE 700
Test Voltage	Max AC 450Vrms		Max AC 700Vrms
Measuring Range	0.4ΩRange	0-0.4000Ω	(Superimposed current: DC 100mA)
	4ΩRange	0-4.000Ω	(Superimposed current: DC 100mA)
	40ΩRange	0-40.00Ω	(Superimposed current: DC 10mA)
	400ΩRange	0-400.0Ω	(Superimposed current: DC 1mA)
	4000ΩRange	0-4000Ω	(Superimposed current: DC 0.1mA)
Test Frequency	10 – 400Hz		
Resolution	Voltmeter	0.1V	
	Resistance Meter	0.1mΩ (0.4ΩRange)	
Display	Voltmeter	4 digits	
	Resistance Meter	4 digits 4000 F.S.	
Accuracy	4Ω/40Ω/400Ω/4000 Ω	±0.15% F.S.	
	0.4ΩRange	±0.25% F.S.	
Input impedance	0.4Ω/4ΩRange	Approx. 1500Ω	
	40ΩRange	Approx. 15kΩ	
	400ΩRange	Approx. 150kΩ	
	4000ΩRange	Approx. 1500kΩ	
Interface	RS232C		
Power Source	AC100-240V ±10% 50/60Hz		
Dimensions	W430×H200×D385mm		Unit A: W430×H200×D385mm
			Unit B: W430×H200×D385mm
Weight	About 20kg		Unit A: About 20kg
			Unit B: About 10kg
Accessories	4-terminal measurement cable AC cord		4-terminal measurement cable
			Connecting cable for Unit A and B AC cord
Option items	DC Blocking capacitor box Auto 3-phase switching box Model DAC-SCB-3 with software		

True resistance under motor operating conditions

The temperature of a motor rises due to heat generated by internal losses and becomes constant after a period of time. The temperature rise value becomes higher if the motor is started and stopped frequently. If this value becomes too high, thermal degradation of the insulation will progress, which may lead to burnout. To verify and ensure product safety, it is ideal to measure winding temperatures while the motor is in operation.



Measurement principle

DAC-HRI-3N series conduct measurement by superimposing a DC component on the AC line, which is based on general copper wire resistance measuring method with DC current. The imposed DC component does not affect the measurement since it is as small as negligible to the AC current. The devices can handle measurements from small to large capacitance specimens, and both single-phase and three-phase specimens depending on optional DC blocking capacitors used with HRI-3N.

DC Blocking Capacitor Box

Hot-Line measurements require that appropriate capacitors be inserted between the AC power source and the device under test to prevent the test DC current from flowing into the power line. For 3-phase specimen, DC cut capacitor unit for 3-phase type is recommended.

Model DAC-C23AXC7A-SC (For Single-Phase/3-Phase Max 23A/7A)



Front

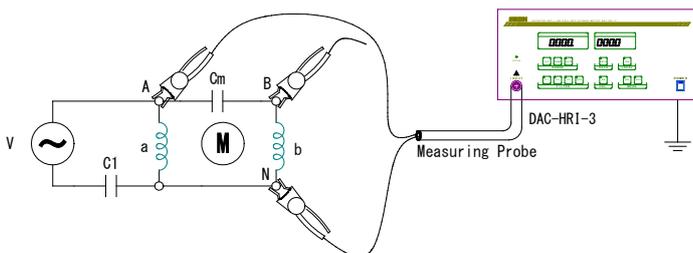


Rear

Optional Capacitors for single phase, 3-phase, and larger current are available upon request.

Connecting Examples

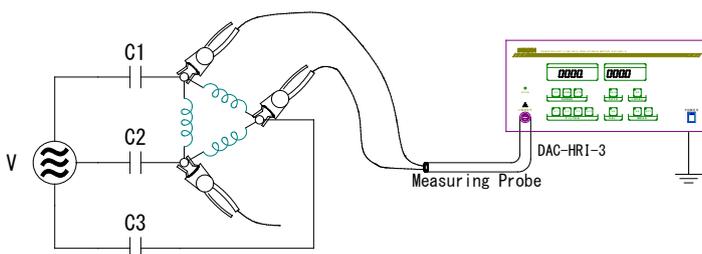
e.g.1 Coil Resistance measurement of Capacitance Motor



C1: DC Cut capacitor, a: Main winding, b: auxiliary winding

The resistance value of the main winding can be measured by connecting the 4-wire (Kelvin) measurement lead to point A and N of the main winding. The auxiliary winding b can be measured by connecting the clips to point B and N.

e.g.2 Coil Resistance measurement of 3-phase Transformer / 3-phase Motor

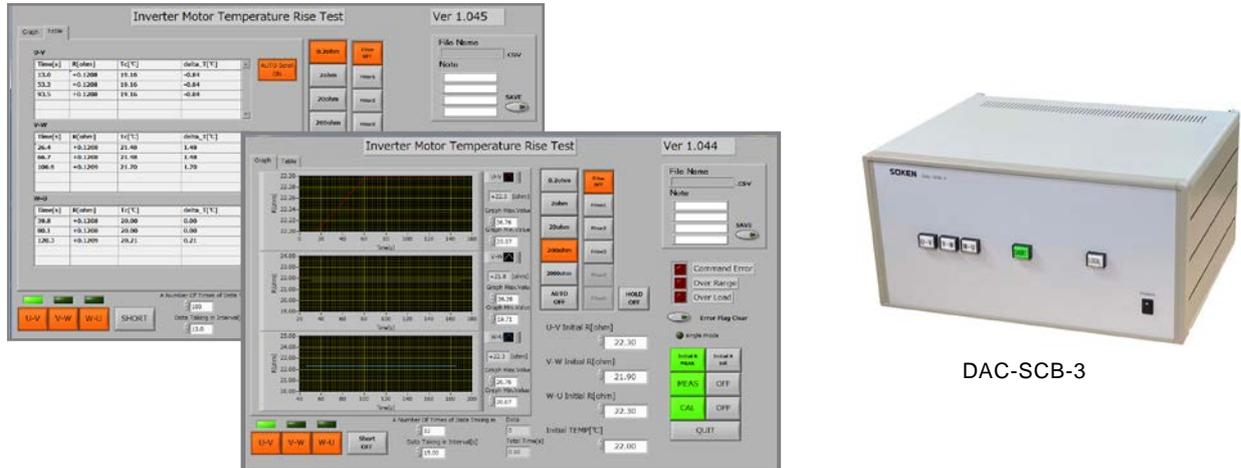


Insert DC Cut capacitor to every phase (C1, C2 and C3), and perform measurement by exchanging the measuring points. DC Cut capacitors for each phase must have the same capacity.

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Auto-3-phase switching box DAC-SCB-3

Automatic 3-phase measurement is possible with the option DAC-SCB-3.



Auto Measuring Software

- Continuous Measurement to obtain Temperature Rise – Cooling Curve.
- Automatic switchover of 3-phase test point (U-V, V-W, U-W).
- Data acquisition of 1 selected phase at minimum sampling time.
- Time Interval and a number of times of import data are configurable.
- Temperature value converted from the resistance value are displayed.

Connection example

When using DAC-SCB-3 and 3-phase capacitor box.

