

METRAHIT COIL

interturn short circuit detection and *insulation test*:

The new METRAHIT | COIL unites all important measuring and test instruments for electric drives into a single handheld device. The special multimeter includes a universal digital multimeter, as well as an insulation measuring instrument and a motor coil tester . an entirely unique combination. Consequently, the METRAHIT | COIL is well equipped for universal electro-technical use in the fields of service, diagnostics and electrical safety, in particular with regard to electric motors.

Application description

Diagnostics, maintenance and service for electrical drives require the measurement of versatile electrical parameters as well as functional and safety tests. This generally requires several test and measurement instruments, which provide frequently only limited mobility and thus are not suited for services at sites. The new METRAHIT COIL from Gossen Metrawatt unites all important test and measurement instruments for electrical drives in a hand held device. The special multimeter is a universal digital multimeter as well as an insulation measurement instrument and motor winding tester. **This combination in a hand-held device is unique in the world.**

The function Inter-turn Short Circuit Detection celebrates its world premiere in a multimeter with METRAHIT COIL. By usage of the COIL TEST ADAPTER the comparison of the measured values for the motor coils of a multi-phase drive provides detection of an unbalance originating from an inter-turn short circuit. The measurement is performed with a charging voltage of **1000V**, thus **failure occurring only under operating conditions will be detected too**. The comparison of the coils and the evaluation are processed automated in the device.

Even **single phase motors** can be checked for inter-turn short circuits. Therefore comparison with a known reference value is necessary, as comparing measurement is not possible.

Description of measurement method

The check is performed by measurement of the time constant for a LC parallel resonance circuit configured with the motor coil and the capacitor in the test adapter. The test adapter is optimized for motor coils with inductivities in the range from approx. 10 μ H to 10mH. For motors with other inductivity simply another test adapter with adapted capacity becomes necessary, which can be offered specific to a project. Check is possible for motors with delta-connection as well as with star-connection.

After charging the resonance circuit with the test voltage of 1kV the discharge follows, at the same time the decay time is measured between the first two zero crossings. The result is displayed at the LCD with the unit μ s%. This time constant is direct proportional to the inductivity of the coil. The measurement is repeated for all coils. The progress of the check is displayed with bars for 1, 2 or 3 measurements. For motors with more than three coils the display changes with the fourth measurement into a running bar. The deviation of the measured time constants to each other is shown in the analogue display in percentage. For good motors the deviation is in the range of a few percent. For a deviation of 10% or more it is assumed that an inter-turn short circuit exists. An exact value cannot be given, because the quality of the motor influences the measurement result. The display is reset for a new measurement with the menu button or the rotary knob.

The motor has to be voltage free for the measurement, of course. It is highly recommended to establish a secure connection for the measurements, e.g. by means of crocodile clips. This ensures mainly the safety of the operator. The measurement is repeated as long as the functional key U_{COIL} is pressed. The test voltage 1000V is flashing in the display and the measured time constant is displayed. After release of key U_{COIL} the decaying residual voltage is displayed. Disconnection of the crocodile clips shall not be done before the discharge is completed and the display of residual voltage is equal zero.

Practical Benefit

The first customer for the METRAHIT COIL is STILL, an internationally leading manufacturer for fork lifters. STILL relies in service and maintenance for electric fork lifters already since many years on measurement instruments from Gossen Metrawatt. So far they used the digital multimeter sMETRAHIT ISO PRODUCED FOR STILL%STILL was triggering the development of the METRAHIT COIL, because they expressed their wish for the detection of inter-turn short circuits in their electric drives by means of a multimeter. More than 90% of the motor failures are originating from the inverter, which is thus replaced in case of a motor failure at first. Originated the problem from the motor coils the detection on site was not possible right away, only after an unnecessary replacement of the inverter and several expensive work hours. **Thus the investment in a METRAHIT COIL amortizes very rapidly, already by the avoidance of one unnecessary replacement of an inverter!**

Isolation Resistance Measurement

Additionally the METRAHIT COIL measures **insulation resistance up to 3.1 G¹**, with an adjustable test voltage of 50 to 1,000V and automatic detection of interference voltage. **The insulation resistance has to be checked for electric drives by routine.**

18 multimeter functions and true RMS measurement up to 10 kHz make the METRAHIT COIL an all-purpose tool. It measures voltage, current, resistance, duty cycle, diode/continuity, frequency, capacity and temperature. For the measurement functions V_{DC} and \hat{o} a high resolution mode provides a display with 30,000 digits and an increased accuracy. The illuminated high contrast LCD has an analog and digital display. Measuring unit, current type and various special functions are displayed together with the measured value.

The **data memory** sufficient for 15,000 readings enables recording of measured values with date and time. The function DATA HOLD automates the capture of a steady state measured value. A patented method ensures that for rapidly changing values the actual one is stored and not a random value. Via the infrared interface momentary and stored values can be read, analyzed and recorded. Therefore the comfortable windows software METRAWIN 10 is available.

For this reasons the METRAHIT COIL well equipped for ubiquitous electro-technical **applications in the areas service, diagnostics and electrical safety, especially for electric drives**. The delivery content comprises a DAkkS calibration certificate. Quality and reliability made in Germany, just Gossen Metrawatt.