



M2 SERIES

M2/ETS LIFE TESTING EV MOTOR STATORS

OPERATION

At regular intervals all parts are electrically tested, individually, with:

- Phase resistance test: this test, performed at high current, up to 100 A, is able to detect very small resistance variations and mismatches between phases.
- Insulation test: it's a test on insulating materials, it can be performed at different voltages and can evolve into PI/DAR and DD checks.
- Dielectric Strength Test: Tests AC up to double the rated supply voltage.
- SURGE TEST and, optionally, PD detection.



Any faults are detected and recorded. If possible, the defective object is not removed from the system and the test continues until final failure. When not in the electrical test phase, the stators are powered by a three-phase high-performance inverter; PWM frequency up to 50 kHz, rise time of the order of 100 ns and equivalent voltage of 1200 Vp are standard values. In the stators under test, being connected to open phases, will flow only pulsed current; therefore, due to the discrete parasitic components typical of stators, the current will be in the form of pulses that can reach tens or even hundreds of Amps. These currents generate heat and can contribute to the degradation of insulating materials: **it is commonly experienced that this technique effectively simulates the real condition**, due to the deterioration of a stator powered by an inverter.

OTHER MACHINES (read specific documentation)

H5/NCP-EV

Tests:

- Electrical resistance
- High current electrical resistance
- Dielectric strength
- SURGE
- Direction of rotation
- Inductance
- RLC bridge (high current option)

Options:

- Work station on production line with manual stator positioning and automatic contacting
- Laser marking to identify the piece being tested

P8/NCP

Complete motor testing (EV):

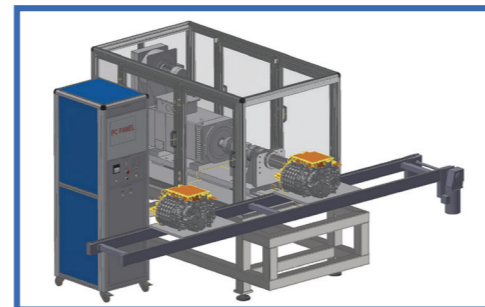
- Motor only
- Motor with reduction gear
- Motor with reduction gear and differential

Options:

- EMF (Electromotive Force)
- THD (Total Harmonic Distortion)

Standard safety tests:

- Electrical resistance
- Earth efficiency
- insulation resistance
- Dielectric strength



EV stators life testing control unit for automatic system.

M2/ETS FUNCTIONS

The "EV" industry is continuously developing new requirements in terms of design, production and testing of electric motors. The purpose of this system is to verify the duration or life of a series of stators under examination.

The test consists in carrying out the normal tests of: ELECTRICAL RESISTANCE, DIELECTRIC STRENGTH, SURGE with possible detection of PARTIAL DISCHARGE, alternating with periods of power supply via a three-phase PWM generator; this process will contribute to inducing impulsive currents on the stator under test, thus stressing the insulating materials and thus verifying their validity and longevity.

The test is performed in dedicated, temperature-controlled ovens to speed up the test cycle.

Field of application

Electrical and life testing via **M2/ETS** is useful for:

- Design: verification of the efficiency of the entire EV stator construction and manufacturing project, with ample research space for in-depth analysis for already introduced or new stators.
- Quality: validation of the quality of the stators and consequent improvement of the efficiency and duration. Verification of the suitability of the materials used with better standardization of the same.
- Process monitoring: verification of the technical solutions adopted in the production cycle, especially in the field of safety and reliability.

Life testing system M2/ETS

The **Risatti M2/ETS System** incorporates the traditional electrical test benches and a duration test on several stators in a single solution; it is a scalar solution where the number of parts being tested at the same time can vary from a few units to tens.

Composition of the system.

The system consists of the following parts:

CONTROL UNIT (see frontispiece) made up of:

- POWER SUPPLY UNITS whose number varies according to the foreseen testing stations. High-performance three-phase inverters; the standard provides for a PWM frequency up to 50 KHz with a rise time of 100 msec
- AUTOMATIC DIGITAL OHMMETER with adjustable current up to 100 A.
- DIELECTRIC STRENGTH TEST INSTRUMENT in AC and DC 3.000V with maximum current of 50mA.
- 3,000 V maximum voltage SURGE TEST. (Standard technical characteristics as "H" series)
- PARTIAL DISCHARGE DETECTOR PD. Characteristics as specific documentation.
- POWER SUPPLY MANAGEMENT
- PC PANEL, specifications: Intel Celeron 3765U 1.9GHz dual-core, RAM 8 Gbyte 128 Gb Sata 3 MLC (Double division, WINDOWS 10 IoT Entry Embedded, N° 2 USB 2.0 (+1 frontal), No. 3 LAN 10/100/1000, No. 2 USB 3.0, No. 3 RS-232 serials, No. 1 DVI-I, No. 1 WI-FI (OPTION), No. KEYBOARD (OPTION).



The M2/ETS system also includes:

- CONNECTION UNIT
← Remote unit according to the foreseen workstations
- THERMOSTATIC OVEN (possibly provided by the Customer)

BLOCK DIAGRAM

