MARPOSS

EDC
AST5 TEST SYSTEM

**Automatic test system
for stators
and coils**

THE DEFECT YOU CANNOT SEE IS THE ONE THAT BREAKS THE MOTOR

Stator quality is measured on two levels.

WHAT STANDARD TESTS DETECT

- Permanent short circuits, open circuits, incorrect number of turns (winding resistance).
- Windings in contact between phases or with the core (dielectric strength).
- Turn-to-turn short circuits within the same winding (surge).
- Connection errors, rotation direction reversal (functional tests).

WHAT STANDARD TESTS MISS

- A wire outside the slot brushing against the core, without damaging the enamel.
- A thin or scratched enamel coating at a single point of the winding.
- A hairpin geometry just outside tolerance, with critical bend angles or irregular settling.
- Impregnation defects invisible on a static part but yielding under voltage stress.

These are latent defects. On the test bench they pass inspection. In service, especially under PWM inverter drive, where terminal voltage peaks exceed 1500–2000 V on every pulse, they degrade the insulation and lead to failure within hours or weeks. This is the level addressed by Partial Discharge measurements. Since 1998, Marposs E.D.C. has been the first European company to bring them from the laboratory to production quality control.

ONE PLATFORM, TWO CONFIGURATIONS

AST5 covers electrical and functional test requirements on wound and hairpin stators, coils and wound rotors. Two versions, same electronics, same EDCWin.NET software.

AST5/WI - INTEGRATED

Test equipment, operator station, controls and safety interfaces combined in a single turnkey machine.

- **When to choose it:** lines where loading and handling are already engineered; only the measurement intelligence is required.
- **Flexibility:** feeds a manual station or an automated cell.

AST5/WS - STAND-ALONE

Test equipment in a separate rack, to be integrated into the existing production line.

- **When to choose it:** dedicated test cells, laboratories, lines where testing is an engineered island.
- **Workstation:** single or dual.
- **Loading:** manual, by operator.

A SINGLE PLATFORM FOR ALL ELECTRICAL TESTING

CONFIGURABILITY SHARED BY BOTH VERSIONS

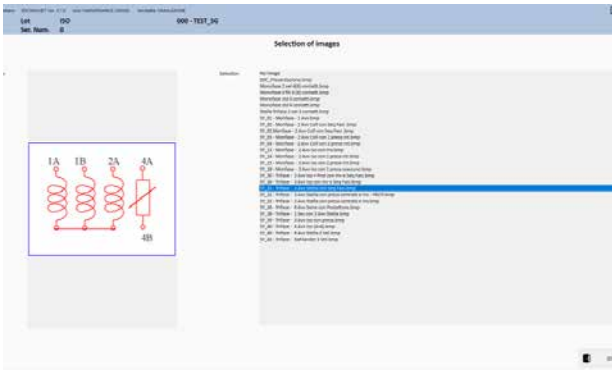
- **Number of terminals:** from 2 to 24 in standard configuration; higher configurations available per customer specification.
- **Customizable test programs:** test type, sequence, parameters and acceptance thresholds set by the customer.
- **Built-in functions:** result archiving, multilingual certificate and self-adhesive label printing, production statistics, self-diagnostics, software calibration, preventive maintenance, remote assistance.

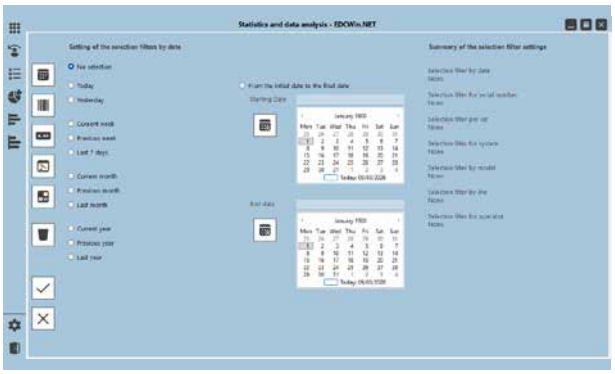
WOUND ROTOR APPLICATIONS

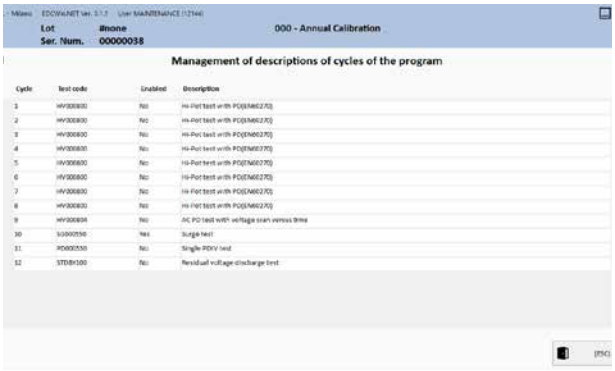
The same AST5 platform runs the standard electrical and functional tests on wound rotors for separately excited synchronous motors and DC motors. Winding resistance, dielectric strength, surge and the full Partial Discharge suite apply without hardware changes to the test bench, using test programs specific to the rotor geometry.

EDCWIN.NET SOFTWARE

A single interface for every version of the family. It manages test programs, parameters, sequences and acceptance thresholds; archives results and statistics; produces multilingual certificates and labels; and connects to the rest of the shop floor via LAN and OPC/UA. Parameters identified in the laboratory migrate to the production line without rework: the same software runs on Marposs E.D.C. laboratory systems and on production AST5 units.







THE TEST THAT SEES WHAT OTHERS MISS

A Partial Discharge is a localized electrical discharge that only partially bridges the insulation between two conductors. It is not a short circuit, it is its precursor. Every discharge leaves a micro-erosion in the dielectric; repeated over time under voltage stress, it leads to failure. Measuring Partial Discharges at end-of-line means intercepting quality defects before they become field failures.

CONCRETE PROOF: THREE DEFECTS, THREE TESTS THAT MISS THEM, ONE MEASUREMENT THAT CATCHES THEM ALL

Marposs E.D.C. laboratory tests on a sample stator and rotor simulate three realistic defects. Each defect leaves the results of standard tests unchanged (Resistance, Hi-Pot, insulation, surge): the part would pass inspection. Only the PDIV measurement, the Partial Discharge inception voltage, records a sharp drop.

Type of simulated defect	PDIV without defect	PDIV with defect
Insulated wire in contact with the core	1108 V	693 V
Insulation loss on the rotor	1212 V	668 V
Defect between turns of the same winding	2221 V	1199 V

Three defects that, if allowed through, drastically reduce motor service life under PWM drive. Three measurements that, in less than a second each, catch them at end-of-line.

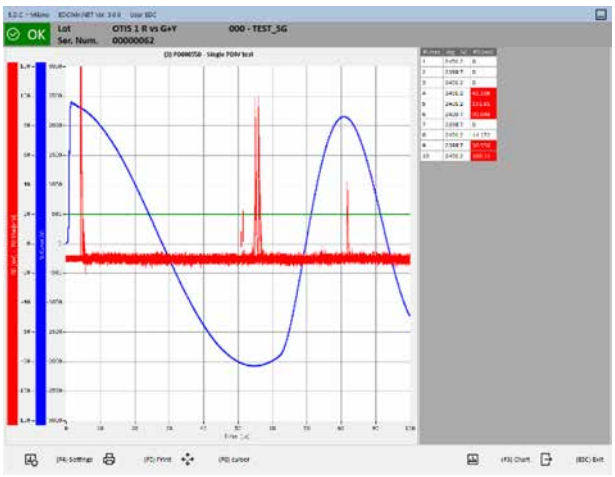
THE MARPOSS E.D.C. METHOD: CAPACITIVE COUPLING

Two ways to detect Partial Discharges in a winding: Pick them up via antenna near the part, or read them directly from the supply circuit through a coupling capacitor. Marposs E.D.C. chose the second approach from the start. On the production line, the difference is clear-cut:

- **Antenna:** also picks up shop-floor electromagnetic noise (inverters, welders, variable-speed drives) and requires a shielded chamber to be reliable.
- **Capacitive coupling:** electrically connected to the part under test, natively filters out ambient noise. More sensitive, more repeatable, reliable even on the shop-floor.

FOUR PRODUCT-LIFE PHASES, ONE PLATFORM

- **In development**
  objective comparison between copper/aluminum suppliers, insulating materials and impregnation resins.
- **In industrialization**
  optimization of process parameters: winding machine speed, hairpin bending angles, effectiveness of phase separator.
- **In production**
  100% part verification, cycle times compatible with the line, absence of PD below the qualification voltage.
- **In quality control and life testing**
  early assessment of insulation degradation before failure.



AST5 AT A GLANCE

Main functional and technical features, shared by both AST5/WI and AST5/WS versions.

TESTABLE PRODUCTS	Wound stators · hairpin stators · coils · wound rotors · motorettes · wound wires · insulation samples.
APPLICATION RANGE	From low-power appliances and 48 V automotive up to large industrial sizes.
NUMBER OF TERMINALS	From 2 to 24 in standard configuration · higher configurations available per customer specification.
BASIC ELECTRICAL TESTS	Winding resistance · temperature sensor resistance (NTC, PTC, PT100, PT1000) · insulation resistance · AC dielectric strength (Hi-Pot) · surge · inductance · parasitic capacitance.
FUNCTIONAL TESTS	Rotation test · reverse rotation test.
PARTIAL DISCHARGE TESTS	PD during Hi-Pot (/PDH option) · PD during surge (/PDS option) · PDIV at fixed voltage (/PDIV option) · RPDIV at voltage sweep for laboratory (/PDW and /PDIV-Q options).
AC HI-POT TEST VOLTAGE	Up to 5 kV, with manual regulation or AVR (automatic voltage regulation).
SURGE TEST VOLTAGE	Up to 7 kV · impulse generator with 12-bit sampling · selectable sampling frequency up to 250 MHz.
SOFTWARE	EDCWin.NET · management of test programs, parameters, sequences and acceptance thresholds.
ARCHIVING AND REPORTING	Program archive · result archive · production statistics · multilingual certificate printing · self-adhesive label printing.
CONNECTIVITY	LAN · OPC/UA.
SYSTEM FUNCTIONS	Self-test · software calibration · preventive maintenance · remote assistance.
WORKSTATION CONFIGURATION	Single or dual loading station · AST5/WI: manual loading by operator · AST5/WS: manual or automated loading (robot, shuttle) depending on production line integration.
STANDARDS COMPLIANCE	IEC 60034-18-41 (inverter-fed machines) · IEC 60034-27 (off-line PD measurements) · IEC 60270 (general PD measurements).
POWER SUPPLY	230 V ~ 50/60 Hz.

For a full list of address locations, please consult the Marposs official website

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