

MAGNATEST[®] ECM 3.621



- * Low-cost eddy-current module for non-destructive testing using the magneto-inductive method
- * Genuine magneto-inductive testing by evaluation of harmonics
- * Test parameters variable over wide ranges
- * Simple operation
- * Test pieces sorted in two groups: o.k. / n.o.k.
- * One-dimensional display of measured value by LED bar graph
- * Key-operated switch for locking operating functions

ECM = Eddy Current Module

Features

- ✓ Fully compatible with MAGNATEST S (also suitable for frequencies below 64 Hz with the output amplifier MAGNATEST ECM/LV option)
- ✓ All MAGNATEST S test coils and probes can be used
- ✓ This permits test settings found with the MAGNATEST S to be used with the MAGNATEST ECM as well
- ✓ MAGNATEST I or VRH sensors can also be connected
- ✓ Can be combined with additional MAGNATEST[®] ECM, STATOGRAPH[®] ECM and/or DEFECTOMAT[®] ECM
- ✓ PC interface to evaluation program eddyWin running with MS WINDOWS[®]
- ✓ Simple integration into existing control cabinets
- ✓ Physically separated interface for the most important control signals to the testing line
- ✓ Mains failure protection by battery backup of the parameter memory

Application

Automatic piece testing for

- Hardness
- Strength, microstructure
- Identification, material differentiation or sorting
- Geometric characteristics such as
 - Shape accuracy
 - Completeness of assembled parts (bearings, etc.)
 - Machining state on all metallic series parts, e.g. hubs, door locks, steering system components, connecting rods, sintered carbide balls, chain links, profile shafts, shearing heads

Mode of operation

The exciter winding of the test coil magnetizes the test piece to determine its material characteristics. The voltage induced in the receiver winding depends on the shape and size of the hysteresis curve. The hysteresis curve is influenced by the hardness, the alloying constituents and the grain structure.

A non-sinusoidal signal consisting of ground wave and harmonics is produced at high exciter field strength values. By variation of the exciter **field strength**, it is possible to select the driving range of the hysteresis curve that possesses a magnetic characteristic upon which the sought material characteristic has an especially great influence.

An analysis of the proportions of **harmonics** supplies information about the material condition. Alloy composition and mechanical or thermal treatment of ferromagnetic test pieces that influence different ranges of the hysteresis curve can be evaluated with high test reliability. Selection of the appropriate exciter **frequency** permits selective observation of core and surface characteristics.

The test criterion relates to the changes in conductivity in the case of non-ferromagnetic materials.

Construction

In its standard configuration, the MAGNATEST ECM consists of the components:

- MAGNATEST ECM 3.621
- Mains cable, sensor cable, connecting cable
- Sensor system



The system can be adapted in steps to the respective test situation by adding further components:

- MAGNATEST ECM/LV
- Housing 6 HU
- Configuration adapter
- Combination with additional MAGNATEST ECM, STATOGRAPH ECM and/or DEFECTOMAT ECM
- Remote control and extended display and evaluation by PC program eddyWin

Please refer to separate leaflet „ECM-SYSTEM“, Order No. 107 593 4, for possible combination options.

MAGNATEST ECM 3.621

The MAGNATEST ECM contains the control elements, the test channel and power supply.

- Input keys for user inputs
- Key-operated switch for locking operating functions
- LC display for plain-text messages
- LED bar graph for measured value and threshold display
- Individual LEDs to display certain conditions
- Sensor connection socket
- Serial interface to additional ECMs or PC
- Parallel interface to the testing line (inputs via optocouplers; outputs via relays)
- Service socket
- Mains connection socket
- Standard plug-in unit for 19" cabinets
- Dimensions approx. 261 X 106 x 313 mm (H x W x D)
- Mass approx. 5 kg

Test coils

All coils designed for the MAGNATEST S system can be connected to the MAGNATEST ECM.

Refer to data sheet „MAGNATEST S sensor systems and accessories“ for a detailed description, Order No. 137 992 5.

Moreover, MAGNATEST I and MAGNATEST VRH coils and probes can also be connected via corresponding adapters.

Conversion kit 60 Hz

Used for connection to 230 V/60 Hz or 115 V/60 Hz mains.

Housing 7 HU

To accommodate one to four ECM modules. Dimensions approx. 310 x 559 x 318 mm (H x W x D).

Configuration adapter

Plug-on module for automatic configuration of the MAGNATEST ECM. Stores the configuration data for one application.

Determining the instrument setting

If required, FOERSTER can determine an application-specific instrument setting in its application laboratory and save it on the configuration adapter. Specimen test pieces must be submitted for this purpose.

Measuring cable 1 m

Connecting cable between ECM service socket and oscilloscope.

MAGNATEST ECM/LV

MAGNATEST ECM 3.621 output amplifier for certain LF applications with high power requirement (e.g. evaluation of harmonics at test frequencies below 64 Hz). Ensures full compatibility with the MAGNATEST S with regard to the electrical power data.

- Connection socket for MAGNATEST ECM 3.621
- Sensor connection socket
- Mains connection socket
- Standard plug-in module for 19" cabinets
- Dimensions approx. 261 x 106 x 313 mm (H x W x D)
- Weight approx. 5 kg

Connecting cable for output amplifier

Connecting cable between MAGNATEST ECM and MAGNATEST ECM/LV.

Further accessories

Accessories of the MAGNATEST S system which can be used:

- Power booster
- Sensor multiplexer
- Coil cable adapter, differential mode

Detailed description in the “MAGNATEST S Test System 3.625” Equipment Sheet, Order No.137 375 7.

Recommended sensors	Part-No.	Probe cable	Adapter
LF coils, HF coils (MAGNATEST ECM)	3.621.xx-3xxx	3.625.11-9911	-
LF coils, HF coils (MAGNATEST S)	3.625.xx-3xxx	3.625.11-9911	-
LF probes (MAGNATEST S)	3.625.xx-4xxx	3.625.01-9942	-
HF probes (MAGNATEST S)	3.625.xx-4xxx	3.625.01-9922	-
LF coils, LF probes (MAGNATEST I)	3.610-xxx	3.610-071	3.625.01-9931
HF coils, HF probes (MAGNATEST I)	3.610-xxx	3.610-071	3.625.01-9951
Coils (MAGNATEST VRH)	3.222-7xx-xxx	3.610-071	3.621.01-9961

Recommended accessories	Part-No.	Cable to ECM	Cable to sensor
Output amplifier MAGNATEST ECM/LV	3.621.01-2011	3.625.11-9911	3.625.11-9911
Power booster	3.625.01-1401	3.625.11-9911	3.625.11-9911
Sensor multiplexer	3.625.01-1501	3.625.11-9911	3.625.11-9911
Coil adapter, differential mode	3.625.01-9701	3.625.11-9911	-

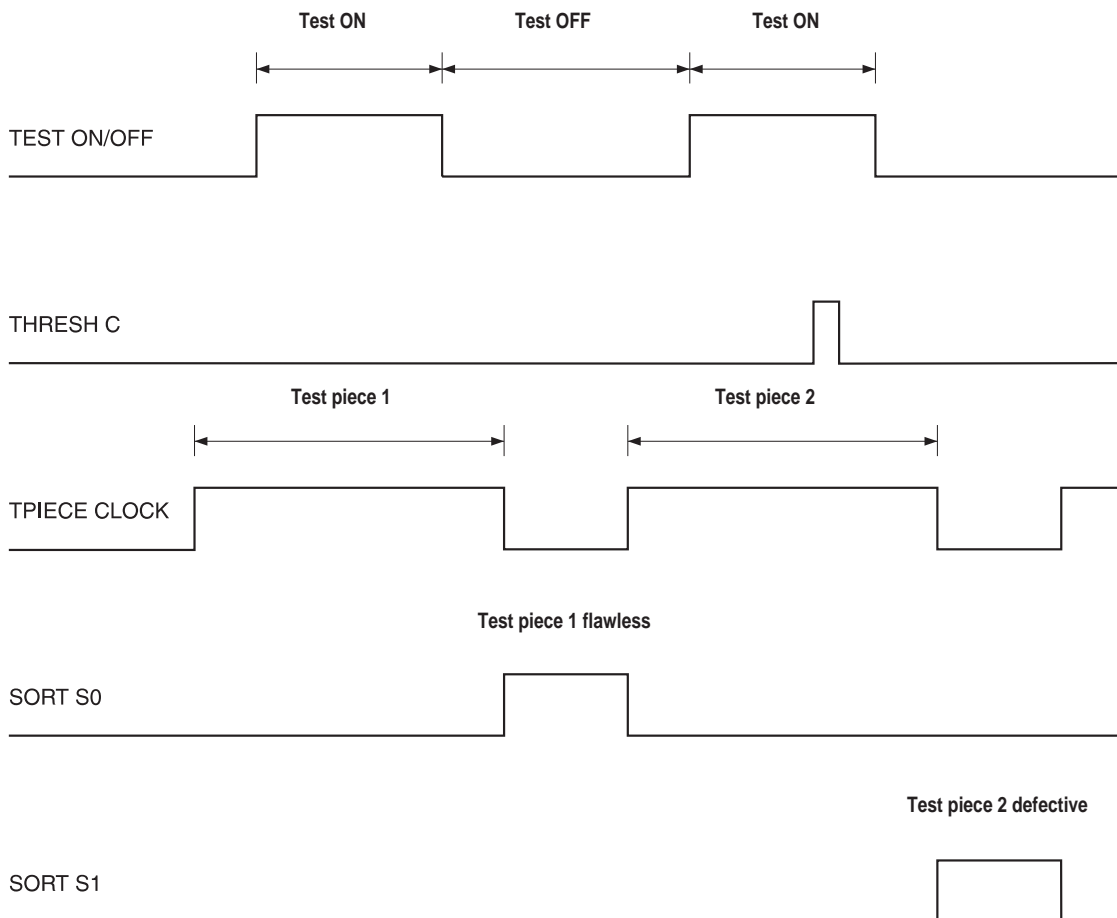
Test sequence

The ECM's test sequence is controlled by two external signals: TEST ON/OFF and TPIECE CLOCK. TEST ON/OFF controls test release. TPIECE CLOCK controls the evaluation sequence (assignment of flaw signals to test pieces).

The test result is signaled by the ECM to the control by instantaneous signals (threshold transgression THRESH A, THRESH B and THRESH C) on the one hand and by static signals (SORT S0 = flawless test piece, SORT S1 = defective test

piece) on the other. A test piece is evaluated as defective if flaw threshold C was exceeded at least once.

Threshold transgressions THRESH A, THRESH B and THRESH C are signaled immediately they occur and for the duration of the threshold transgression by LEDs and by output signals at socket IN/OUT. The sorting signals SORT S0 and SORT S1 are output at socket IN/OUT only when the tail of the test piece is reached. The criterion for this is the trailing edge of the input signal TPIECE CLOCK.



Technical data

Digital sine-wave generator (crystal-stabilized)	Frequencies from 2 Hz to 128 kHz in 17 steps
Sensor output	0.35 Arms, 20 Vpp, magnetic field strength variable in 1% steps
Digitization of the measured signal	16 bit A/D converter
Test mode	Single-coil absolute mode Two-coil differential mode by use of adapter
Input amplifier	Overvoltage protection (± 13 V)
Filter	Stop filter against mains interference 50/100/150 Hz or 60/120/180 Hz
Evaluation	up to the 7th harmonic for frequencies up to 256 Hz
Microprocessor	for sequence control, operator prompting self-test etc.
Signal processor	for measured-value acquisition and processing, fast Fourier transformations (FFT)
Permitted supply voltage	115/230 V +10% -15%, 50-60 Hz
Operating temperature	+5 °C to +40 °C
Enclosure (DIN 40 050)	IP 30 (ECM without housing) IP 54 (ECM in housing 6 HU)

Product information**Leaflets**

ECM - SYSTEM 2.010 and PC software eddyWin	107 593 4
STATOGRAPH ECM 6.421	107 521 7
DEFECTOMAT ECM 2.841	107 522 5
MAGNATEST S Test System 3.625	137 375 7
MAGNATEST S Sensor Systems 3.625	137 992 5
MAGNATEST D Test System	150 536 0

Application infos

Tensile Strength Testing	Beer Barrels	135 975 4
	Suspension Bolts of Highvoltage Insulator	144 662 2
Hardness Testing	Wheel Hub	139 289 1
	Top of Thrust Bolts	139 393 6
	Door Handle for Passenger Cars	141 990 0
	Chain Links	141 991 9
	Shaver Guards	145 994 5
	Bolt Testing Equipment	125 046 9
Grade Verification	Austenitic Pipes	141 993 5
	Tool Tips of Hard Metal	144 663 0
	Hard Metal Balls	144 664 9
	Raw Pieces of Drills	145 987 2
	Idler Arm	145 988 0
	Automotive Pistons	125 045 0
	Zinc Wires	149 577 1
Combined flaw and hardness testing	Tie Rod	125 052 3
	Ball Pin	125 053 1

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