

EMAT-VG System

General Description



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The EMAT-VG System is a multi-channel electronic adapter system to operate EMAT transducers for couplant-free transmitting and receiving of oblique incident bulk ultrasonic waves and guided waves in ferromagnetic materials.

The system serves as signal-generating and processing component in combination with conventional (or Phased Array) ultrasonic instruments. It provides time-delayed RF signals for transmitter stages, amplification, filtering and summation of the received signals and the power supply for the transducer electromagnets.

The control of the system, such as frequency, beam angle, pulse length (number of cycles), pulse repetition rate, transducer selection, etc., is performed by the system setup program using a PC or laptop computer connected via USB.

1. Technical Data

The system consists of the following components:

- Synthesizer board
- Burst generator board; burst length (number of Cycles) and frequency are adjustable in the system settings via PC
- Single board with a maximum of eight transmitter power stages
- Maximum of eight parallel transmitter/receiver channels with Phased Array capability
- Receiver board with four selectable band filters and four output stages
- Control PC for system control and parameter settings via USB; parameter settings are saved to the EMAT-VG system and the control PC can be disconnected during data acquisition

The signals received from the receiver coils are pre-amplified in the transducer by built-in preamplifiers and are transmitted to the system. In the EMAT-VG system, the signals are further amplified and filtered by the filter stages.

Technical Data:

Frequency Range:	50kHz – 10MHz
Burst duration:	1 – 15 cycles, adjustable in steps of 1
Pulse repetition rate:	400Hz, dependable on the transducer in use
Amplification:	0dB, 13dB, 26dB and 40dB

2. Computer Controlled Functions and Parameters

- Trigger-Mode: internal, external, software triggered
- Ultrasonic frequency
- Number of cycles/bursts
- Filter selection: 100kHz – 635kHz, 420kHz – 1,070kHz
750kHz – 1.92MHz, 1.5MHz – 5.15MHz, customizable
- Receiver amplifier adjustments

3. Technical Data – Transmitter Output

- Transmitter output impedance: $8\Omega - 9\Omega$
- Transmitter output, short-circuit protected for burst signals
- Transmitter current: 20App (real impedance of 50Ω)
- Transmitter output voltage (open circuit): $\cong 1KV_{pp}$

4. Technical Data – Receiver Signal Processing

- Amplification 0dB, 13dB, 26dB and 40dB
- Bandwidth(-3dB): 50kHz – 10MHz, depending on filter settings
- Two switchable band-pass-filters with 3dB cutoff-frequencies: 100kHz – 635kHz, 420kHz – 1,070kHz, 750kHz – 1.92MHz, 1.5MHz – 5.15MHz, customizable
- Input/output impedance: 50Ω
- Visual saturation indicator for each receiver channel

5. Time Delays (Transmitter/Receiver Side)

- Technical performance: digital at the transmitter side
- Maximum time of delay: $20\mu s$ Transmitter

6. Trigger Signal Input/Output

- Trigger IN: LVTTTL, 0V...0.8V/2.0V...5V trigger levels
- Trigger OUT: LVTTTL, 0V/3.3V
- BNC connectors

Input and Output types and connectors are customizable upon request