



Transmission Dynamics[®]

Figure 1: Pulser receiver unit and EMAT

Transmission Dynamics has developed SonicEcho®, a state-of-the-art Ultrasonics Guided Wave Pulser Receiver System that is capable of providing long-term, non-intrusive structural surveying of wind turbine jacket structures and monopiles.

The system consists of a pulser-receiver unit connected via a cable to an electromagnetic acoustic transducer coil (EMAT). The system periodically sends an ultrasonic signal through the test material – for example a wind turbine structure or a pipeline – and records the response. The signal travels along the test material and reflects off the structure's features enabling long-range scanning of the structure from a single position.

The transducer can emit directional signals and can be configured to scan either forward and backward – isolating the sections upstream and downstream of the transducer. The pulse settings are remotely configurable so to optimise the received signal from the test piece and the frequency of testing can be configured to optimise battery life if a battery supply is used.

The robust and flexible 70 kHz EMATs can be attached to painted or unpainted surfaces using an adhesive. The modular transducers can be tiled together to cover larger diameter structures allowing for longer range scanning and better data quality.



Figure 2: EMATs

An optional piezoelectric transducer with easy-toinstall magnetic clamp and pre-load can be used alongside the EMAT coil. This is a secondary receiver channel and can be used to compliment data received from the EMAT and further enhance understanding of the ultrasonic wave within the test piece.

The unit is designed to be operational for decades without the need to undergo any maintenance. It can be permanently mounted and left to upload data for the entire lifetime of the wind asset.

OPERATION

The default version of the product sends the collected data wirelessly via low energy 2.4 GHz ISM to a local transceiver and is then uploaded to the Transmission Dynamics Global Data Network (GDN®) either using Wi-Fi or GSM. The transceiver should be positioned appropriately within 20 m of the pulser receiver.

Upon request, if a wired communication is required, an RS485-enabled variant of the product can be designed to interface with the customer's data logging device on a wired connection.

The device requires an external power supply of 24V-32V. The system can be supplied with a battery supply bespoke to the application upon request.



SonicEcho® – Ultrasonic Non-Destructive Testing

SIGNAL CONDITIONING

Nominal Supply Voltage	24 V
Maximum Supply Voltage	32 V
Maximum Current Consumption	1 A
EMAT channel gain	X8-x1400
PZT channel gain	X16-x1800
Pulse frequency	70 kHz
Communication	2.4 GHz ISM (license-free) communication (or RS485 upon request).
ADC	14-bit high speed SAR ADC , 2.5 MSPS

	PHISICAL			
Approximate				
Dimensions (w/o	141 mm x 129 mm x			
magnet clamps):				
Approximate Dimensions (w/ magnet clamps):	233 mm x 129 mm x			
Weight (without magnet clamps):	0.525 g			

Weight (with magnet 1.26 kg clamps):

*Battery

capacity, Ah

Magnet pull strength

Ingress protection

Pulser

Class

xx45

xx25

xx12

Receiver

68 kg/ magnet IP68

Maximum range of scanner, m

FPGA VARIANTS

70 m

37 m

21 m

33 mm

65 mm

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Figure 3: SonicEcho® and EMAT coil installed on Transmission Dynamics' test structure.



Figure 4: SonicEcho® recorded response on our Global Data network (GDN®)

*Approximate battery capacity required /year (pulse parameters: 1 test /week @ 32 averages w/ a PRF of 3Hz) (Ah)

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