

Ultrasonic Measuring Technical documentation

The USM II Ultrasonic Bolt Meter is an electronic device which is used to measure extremely accurately, the extension of a bolt of virtually any material from 25mm to 15 meters in length. The physics governing the process are clearly understood and have been employed for many years in the fields of active sonar or radar. Send a pulse of energy toward an object (in this case the opposite end of the bolt) and measure the time between the initial pulse and the returning echo.

While the concept is comparatively simple and the ultrasonic measurement can produce extremely accurate results, the correct selection of the optimum bolt and transducer and their coupling can be difficult.

The objective when taking a measurement is to transmit as much sonic energy as possible from the transducer in to the bolt and to send that energy to the greatest extent possible down and back the centre of the bolt as shown below.

Things which may cause interference with the reading can be the bolt ends not being square, dirt, corrosion or paint on the bolt ends. Also, if the bolt is not straight or has a defect in it such as a crack, it will cause a distortion in the reading.

Further information on this equipment can be provided on request along with references from users in other fields.



ULTRASONIC TRANSDUCERS

Magnetic Transducers

This standard style is used with ferrous materials, and consists of a rare earth magnet surrounding the piezo electric transducer. The diameter refers to the nominal diameter of the piezo electric crystal. The annular magnet increases the overall diameter to the value of 'A' shown. Temperature range: -20°C to + 80°C (0°F to 180°F)

Integrated Solutions to Piping Problems | www.patriot-int.com

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Other sizes and frequencies are available on request

Glue-on Transducers

Allows positive location on non- magnetic fasteners. Also ideal for temporary or permanent monitoring of all joints. Higher repeatability than magnetic transducers because of the position of the transducer on the fastener is constant. The cyanoacrylate adhesive acts as a couplant with good sound transmission properties. Operating temperature range is: -20°C to +80°C (0°F to 180°F). Transducers are built to order. Please contact Patriot International with your requirements.

SMART Glue -on Transducers

These glue-on units have in-built memory and allow both fast and simple monitoring of joints. Simply attach the transducer to a special version of the USM-II and the change in elongation or load since the last inspection can be displayed and recorded. Transducers are built to order. Please contact Patriot International.

Diameter	Frequency	A (mm)	B (mm)
1/8"	5MHz	9.7	12.7
1/4"	5MHz	19.1	19.1
1/2"	5MHz	25.4	19.1
3/4"	2.25Mhz	30.7	19.1

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