OLYMPUS®

Your Vision, Our Future

ULTRASONIC THICKNESS GAGE

45MG

Shown with optional waveform

- Color Transflective QVGA Display
- Dual Element Corrosion Gaging
- Precision Thickness Measurements
- Rugged, Designed for IP67

45MG Ultrasonic Thickness Gage: Simple Operation, Rugged, and Reliable

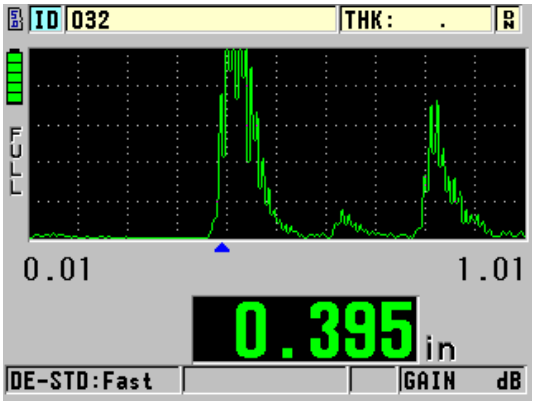
The 45MG is an advanced ultrasonic thickness gage packed with standard measurement features and software options. This unique instrument is compatible with the complete range of Olympus dual element and single element thickness gage transducers, making this innovative instrument an all-in-one solution for virtually every thickness gage application.

Built for Tough Environments

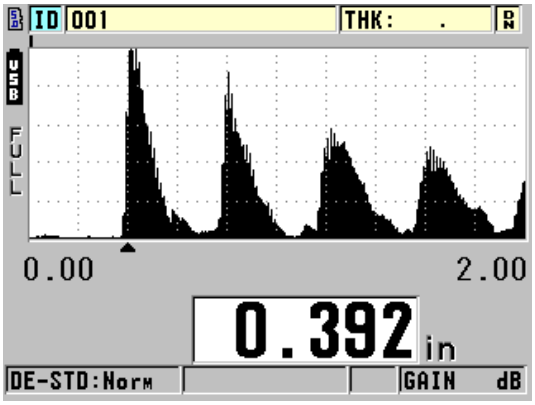
- Rugged, designed for IP67
- Explosive Atmosphere: Safe operation as defined by Class I, Division 2, Group D, as found in the National Fire Protection Association Code (NFPA 70), Article 500, and tested using MIL-STD-810G, Method 511.4, Procedure I.
- Shock tested using MIL-STD-810G, Method 516.5, Procedure I, 6 cycles each axis, 15 g, 11 msec Half sine.
- Vibration tested using MIL-STD-810G, Method 514.5, Procedure I, Annex C, Fig. 6, general exposure: 1 hour each axis.
- Wide operating temperature range
- Optional protective rubber boot with gage stand

Designed for Easy Operation

- Simple keypad for right hand/left hand operation
- Easy operator interface with direct access to most functions
- Internal and removable MicroSD memory card storage
- USB communication port
- Optional alphanumeric data logger with 475,000 thickness readings or 20,000 waveforms
- Default/Custom single element transducer setups (optional)
- Password protected instrument lock
- Color transflective QVGA display with indoor and outdoor color settings for superior clarity



Indoor display setting, optional A-scan mode



Outdoor display setting, optional A-scan mode

Standard Features

In its basic configuration the 45MG is a simple and straightforward gage that requires minimal operator training to tackle most common thickness gaging applications. With additional optional software options and transducers however, the 45MG can become significantly more advanced and take on applications well beyond that of a typical entry-level gage. Furthermore, most options are available individually at the time of purchase or can be added in the future as your needs change.

- Compatible with full line of Olympus dual element transducers for thickness measurements on internally corroded metals
- Min./Max. mode
- Two Alarm modes
- Differential mode
- Time-based B-scan
- Reduction Rate
- Gain Adjust (standard, high, and low)
- Password instrument lock

45MG with optional protective rubber boot and stand

Optional Features

From a simple corrosion gage to a multi-purpose precision thickness gage with only a few key strokes

The 45MG offers five code-activated software options that makes it one of the most versatile thickness gages in the industry.

Echo-to-Echo / THRU-COAT®

Using Echo-to-Echo, the true metal thickness is displayed and the thickness of the coating layer will be ignored. THRU-COAT measures metal and nonmetallic coating thicknesses, each adjusted for their correct sound velocities. There is no need to remove paint or coatings from surfaces.

Single Element

For very precise thickness measurements on many materials, including metals, plastics, composites, glass, and ceramics. Compatible with single element Microscan transducers ranging from 2.25 MHz to 30 MHz.

Single Element High Penetration

For thickness measurement on thick or highly attenuating materials such as fiberglass or cast metals. Compatible with single element Microscan transducers ranging from 0.5 MHz to 30 MHz. Included is the Single Element option.

Data Logger

The 45MG has a full-featured internal bidirectional alphanumeric data logger that is designed to easily store and transfer thickness readings and waveform data. Includes GageView™ interface program, a Windows-based application.

Live A-scan with Waveform Adjust

This optional Live A-scan mode allows users to view the ultrasound waveform (or A-scan) directly on the gage's display, verify the thickness measurement, and make manual adjustments to gain and blanking settings to maximize measurement performance in challenging applications. This helpful option features Manual Gain Adjust, Extended Blanking, First Echo Blank, Range, and Delay.

Thickness Measurements on Internally Corroded Metals

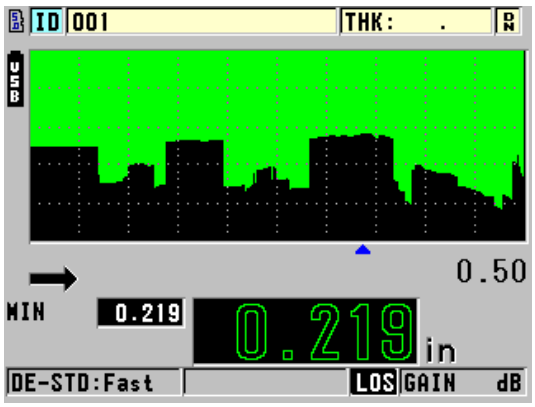
Using Dual Element Transducers

One of the major applications of the 45MG is measuring the remaining thickness of pipes, tubes, tanks, pressure vessels, ship hulls, and other structures affected by corrosion or erosion. Dual element transducers are most commonly used for these applications.

- Automatic Probe Recognition for standard D79X series dual element transducers
- Calibration Doubling warning when echo doubling may occur during calibration
- The Echo-to-Echo / THRU-COAT® option allows for measurements on painted and coated surfaces
- High temperature measurements; up to 500 °C (932 °F)

B-scan Mapping (Time-based)

The 45MG gage B-scan feature converts live thickness readings into cross-sectional images drawn on the display. This standard feature is very helpful in viewing the changes in thickness measurements over a distance. The B-scan is activated as soon as the transducer makes contact with the surface of the material. The Freeze Minimum function is used to display the minimum thickness of the scanned area. The optional 45MG datalogger can store up to 10,000 thickness readings in a single B-scan.



Indoor display setting, B-scan mode

High-Temperature Surfaces

The 45MG is ideally suited for making stable thickness measurements on hot material surfaces (up to 500 ºC or 932 ºF) with the D790 series transducers (D790, D790-SM, D790-RL, and D790-SL). The Zero Compensation feature of the 45MG enhances the accuracy of measurements on hot surfaces by compensating for temperature changes in the transducer delay line due to thermal drift.

D790-SM Transducer on high-temperature pipe

Echo-to-Echo / THRU-COAT® Option

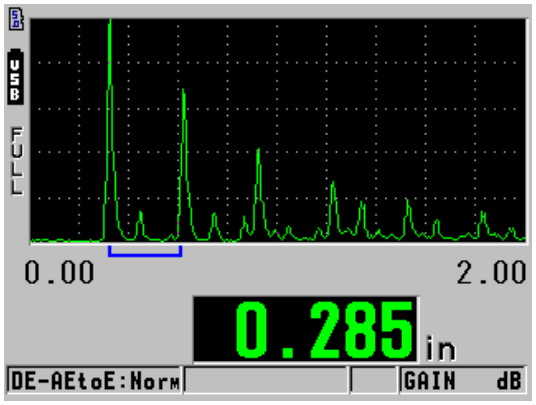
Echo-to-Echo

The gage displays the true metal thickness and ignores the thickness of the coating layer, using multiple back-wall echoes:

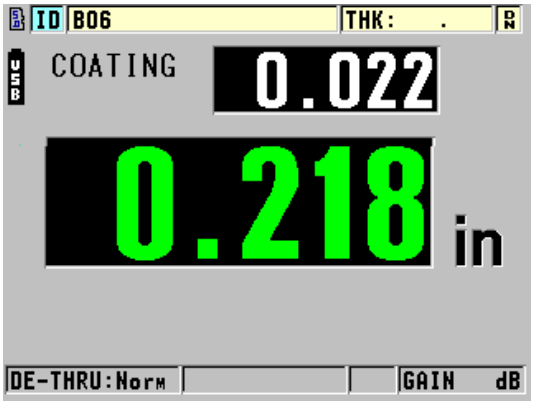
- Auto Echo-to-Echo
- Manual Echo-to-Echo (with A-scan option only) that allows:
  - Gain Adjust
  - Extended Blanking
  - Echo Blanking

THRU-COAT Technology

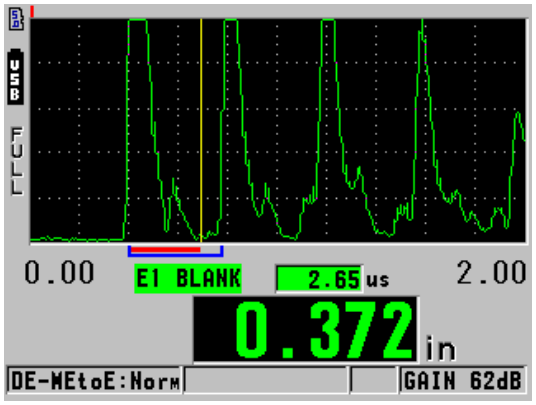
Uses a single back-wall echo to measure true metal thickness. You can display the metal and coating thicknesses, each adjusted for their correct material sound velocities. There is no need to remove paint and coatings from surfaces. THRU-COAT measurements use the D7906-SM, D7906-RM, and D7908 dual element transducers.



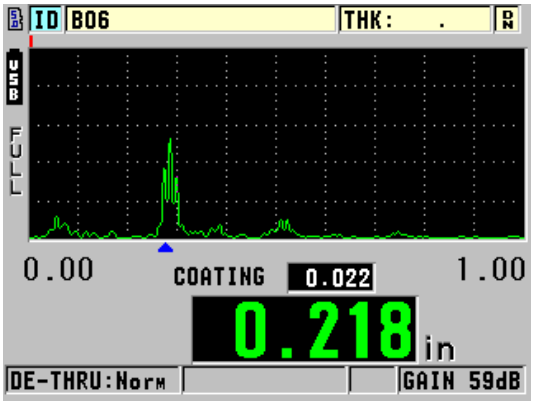
Auto Echo-to-Echo mode with A-scan



THRU-COAT mode showing thickness of coating and steel (waveform not activated)



Manual Echo-to-Echo adjusting the First Echo blank



THRU-COAT mode with optional waveform

Dual Element Transducers for Corrosion Gaging

All standard dual element transducers feature Automatic Probe Recognition, which automatically recalls a default V-path correction for each specific transducer.

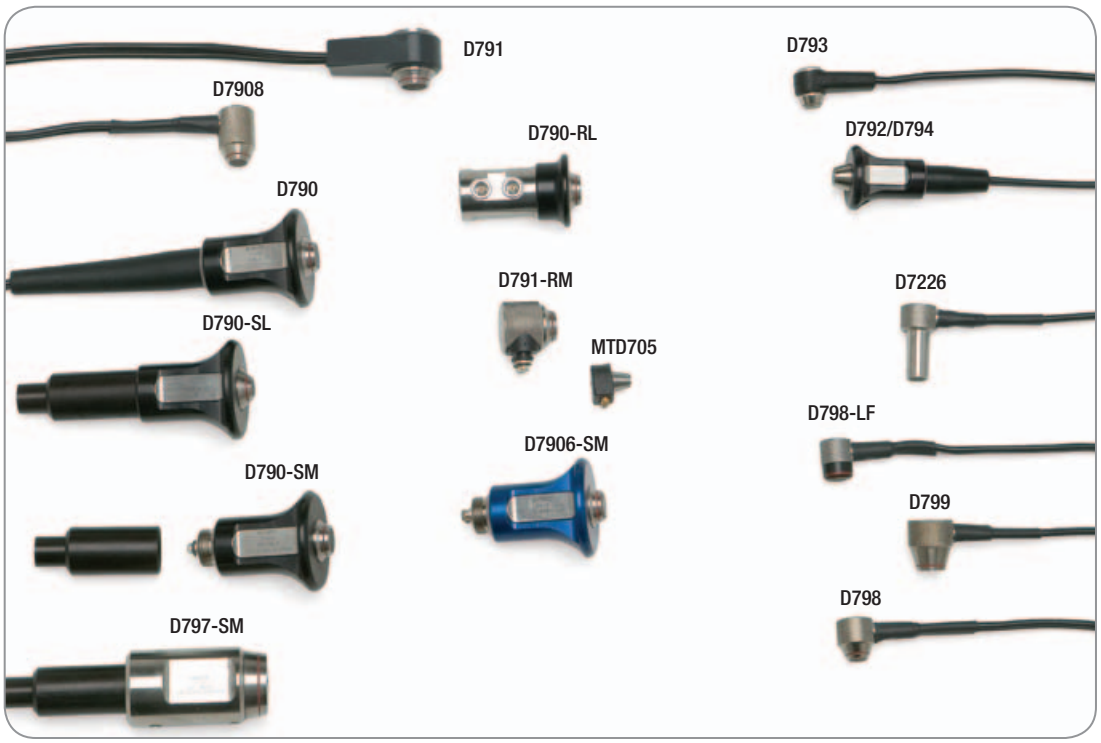
Transducer	Item Number	Freq. (MHz)	Connector	Tip Dia. mm (in.)	Range (Steel)* mm (in.)	Temp. Range** °C (°F)	Cable	Item Number
D790	U8450002	5.0	Straight	11.00 (0.434)	1.00 to 500.00 (0.040 to 20.000)	–20 to 500 (–5 to 932)	Potted	—
D790-SM	U8450009		Straight				LCMD-316-5B†	U8800353
D790-RL	U8450007		90°				LCLD-316-5G†	U8800330
D790-SL	U8450008		Straight				LCLD-316-5H	U8800331
D791	U8450010	5.0	90°	11.00 (0.434)	1.00 to 500.00 (0.040 to 20.000)	–20 to 500 (–5 to 932)	Potted	—
D791-RM	U8450011	5.0	90°	11.00 (0.434)	1.00 to 500.00 (0.040 to 20.000)	–20 to 400 (–5 to 752)	LCMD-316-5C	U8800354
D792	U8450012	10	Straight	7.20 (0.283)	0.50 to 25.00 (0.020 to 1.000)	0 to 50 (32 to 122)	Potted	—
D793	U8450013		90°				Potted	—
D794	U8450014	5.0	Straight	7.20 (0.283)	0.75 to 50.00 (0.030 to 2.000)	0 to 50 (32 to 122)	Potted	—
D797	U8450016	2.0	90°	22.90 (0.900)	3.80 to 635.00 (0.150 to 25.000)	–20 to 400 (–5 to 752)	Potted	—
D797-SM	U8450017		Straight				LCMD-316-5D	U8800355
D7226	U8454013	7.5	90°	8.90 (0.350)	0.71 to 100.00 (0.028 to 4.000)	–20 to 150 (–5 to 300)	Potted	—
D798-LF	U8450019							
D798	U8450018	7.5	90°	7.20 (0.283)	0.71 to 100.00 (0.028 to 4.000)	–20 to 150 (–5 to 300)	Potted	—
D798-SM	U8450020		Straight				LCMD-316-5J	U8800357
D799	U8450021	5.0	90°	11.00 (0.434)	1.00 to 500.00 (0.040 to 20.000)	–20 to 150 (–5 to 300)	Potted	—
MTD705	U8620225	5.0	90°	5.10 (0.200)	1.00 to 19.00 (0.040 to 0.750)	0 to 50 (32 to 122)	LCLPD-78-5	U8800332
D7906-SM††	U8450005	5.0	Straight	11.00 (0.434)	1.00 to 50.00 (0.040 to 2.000)	0 to 50 (32 to 122)	LCMD-316-5L	U8800358
D7906-RM††	U8450025		90°				LCMD-316-5N	U8800647
D7908††	U8450006	7.5	90°	7.20 (0.283)	1.00 to 37.00 (0.040 to 1.500)	0 to 50 (32 to 122)	Potted	—

* *Thickness range dependent on material, transducer type, surface conditions, and temperature. Full range may require Gain Adjust.*

** *Maximum temperature with intermittent contact only*

† *Stainless steel cable available; consult Olympus NDT for details.*

†† *Transducers used with THRU-COAT® technology*

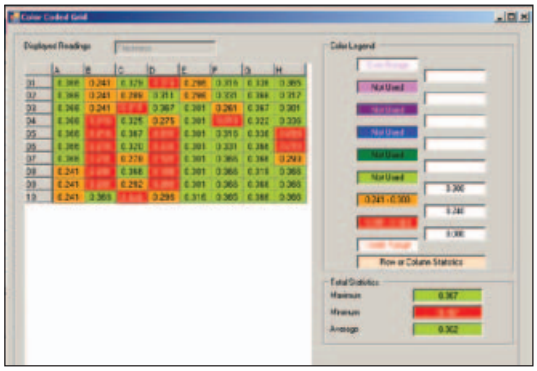


Optional Data Logger and PC Interface

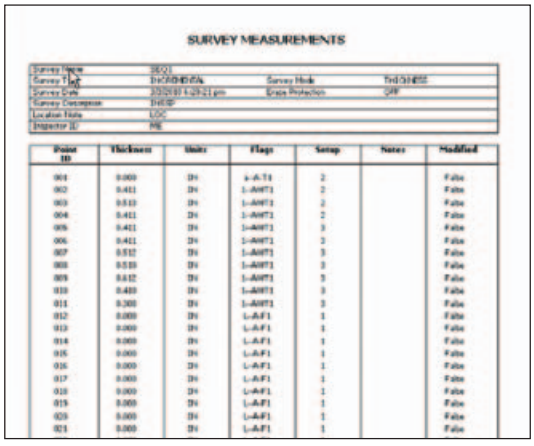
The 45MG has a full-featured internal bidirectional alphanumeric data logger that is designed to easily store and transfer thickness readings and waveform data. The data logger option includes the GageView™ Interface program.

Data Logger Option

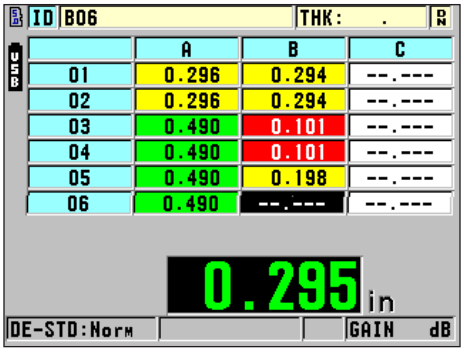
- Internal memory of 475,000 thickness readings or 20,000 waveforms with thickness readings
- 32 Character File name
- 20 Character ID# (TML#)
- 6 file formats: Incremental, Sequential, Sequential with custom point, 2-D Grid, Boiler, and Manual (from PC) GageView
- Internal and removeable MicroSD memory cards
- File copy with the ability to copy files between internal/removable MicroSD memory cards
- Standard USB communication
- Two-way transfer of single element transducer setups
- Onboard statistical report
- Onboard DB Grid View with three programmable colors
- GageView™ interface program communicates with the 45MG
  - using the USB port
  - or read and write to a MicroSD memory card
- Direct export of internal files to MicroSD memory card in Excel compatible CSV (comma-separated values) and .txt format.



When viewed on your PC a color coded grid easily flags out-of-tolerance thickness conditions.



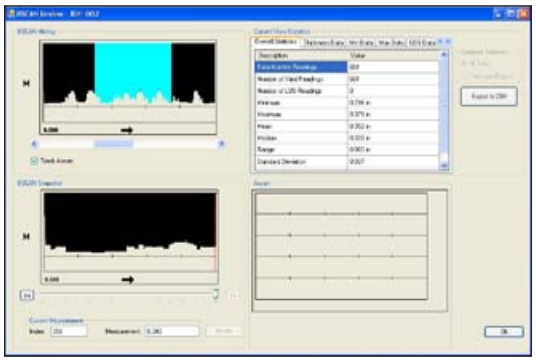
Measurement reports can easily be generated and printed containing measurements, ID, and other parameters.



Onboard DB Grid View with three programmable colors

GageView Interface Program

- Included with the Data Logger option
- This Windows-based application collects, creates, prints, and manages data from the 45MG.
- Creates datasets and surveys
- Stored data editing
- View dataset and survey files; including thickness readings, gage setup values, and transducer setup values
- Download and upload thickness surveys to and from the gages
- Export surveys to spreadsheets and other programs
- Collecting snapshot screens
- Printing reports such as Thickness, Setup Table, Statistics, and Color Grid
- Upgrading operating software
- Download and upload single element transducer setup files



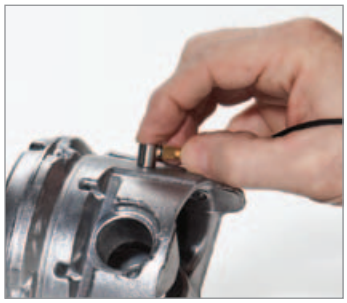
B-scan review screen in the GageView interface program

Thickness Measurements on Plastics, Metals, Composites, Glass, Rubber, Ceramics

Using Single Element Transducers

Single element transducers enable you to make accurate thickness measurements on metals, plastics, composites, glass, ceramics, and other materials. These transducers are available in a wide range of frequencies, diameters, and connector styles. In order to use a single element transducer with the 45MG, you must purchase either the Single Element software or the High Penetration software option.

- Single Element software option can display measurements up to 0.001 mm (0.0001 in.) for single element transducers from 2.25 MHz to 30 MHz
- High Penetration software option for measurements on attenuating materials such as fiberglass, rubber, and thick castings
- Thickness, Velocity, or time-of-flight measurements
- Application Auto-Recall with default and custom setups to simplify thickness measurements



Ultrasonic thickness measurements are accurate, reliable, and repeatable. Instant readings can be achieved from one side of a material, making it unnecessary to cut up or destroy the part.

Single Element Software Option

The Single Element software option enables you to make very precise thickness measurements at a resolution of up to 0.0001 in. or 0.001 mm. Compatible with single element Microscan transducers ranging from 2.25 MHz to 30 MHz.

- Most materials, from thin to thick
- Plastic bottles, tubes, pipes, sheets as thin as 0.08 mm (0.003 in.)
- Metal containers, steel coils, machined parts as thin as 0.10 mm (0.004 in.)
- Cylinder bores, turbine blades
- Glass bulbs, bottles
- Thin fiberglass, rubber, ceramics, and composite materials
- Curved areas or containers with small radii

Single Element High Penetration Software Option

This option allows you to use low frequency single element transducers (as low as 0.5 MHz) to measure thick or highly attenuating materials such as rubber, fiberglass, castings, and composites. Included is the Single Element option.

- Most thick or sound-attenuating materials
- Thick cast metal parts
- Thick rubber tires, belts
- Fiberglass boat hulls, storage tanks
- Composite panels
- Resolution of 0.01 mm (0.001 in.) for transducer frequencies of 0.5 MHz and 1.0 MHz

Measure depth to steel ply / cords in rubber conveyor belts or tires.

Many cast metal parts or highly attenuating materials can be measured with the High Penetration software option.

Application Setup Recall

Application Setup Recall simplifies making thickness measurements. Select any of the stored transducers and the 45MG gage recalls all relevant internal transducer parameters.

Stored Standard Setups

The 45MG includes 21 standard single element transducer setups for the most common applications. These default transducer setup can be used on wide variety of thickness applications.

Stored Custom Setups

The 45MG can store up to 35 custom single element transducer setups including calibration information. You can connect the appropriate transducer and recall the setup file and the instrument is ready to make thickness measurements on even the most difficult applications.

Material Sound Velocity Measurements

The 45MG has the capability to make material sound velocity measurements. This standard feature is useful in applications where the speed of sound within the material can be correlated to other properties. Typical applications include cast metals to monitor the degree of nodularity, and composites/fiberglass to monitor variations in density.

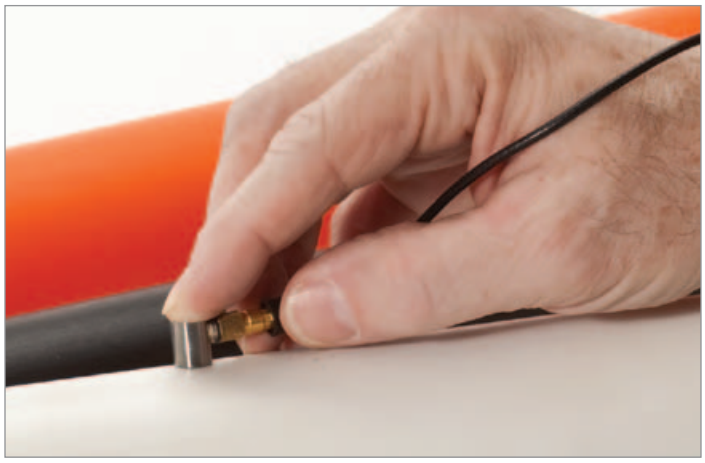
Reduction Rate Measurements

Differential Mode and Reduction Rate Mode are standard features on the 45MG. Differential Mode shows the thickness variation from a pre-set thickness value. Reduction Rate calculates and displays the percent of thickness reduction after a material thinning process. A typical application is automotive sheet steel that is bent and formed to make car body panels.

Measure thin plastic material using a 20 MHz delay line transducer.

Measure metal thinning caused by bending or forming.

Measure thin glass with a V260-SM Sonopen® transducer.



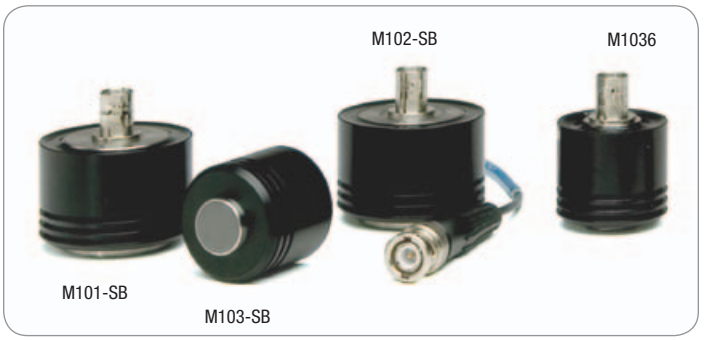
Measure the thickness of many materials including plastic, metal, rubber, glass, ceramic, and composites.

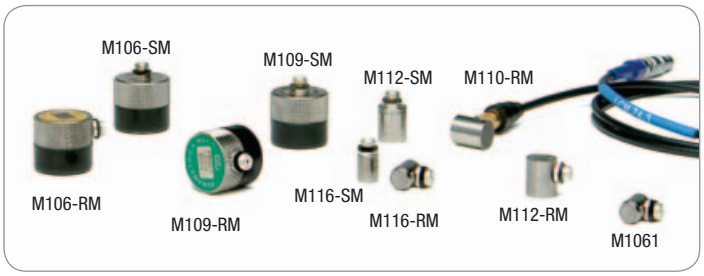
Single Element Transducers for Precision Thickness Measurements

Contact Transducers

Frequency (MHz)	Element Diameter		Transducer	Item Number
	mm	inches		
0.5	25	1.00	M101-SB*	U8400017
1.0	25	1.00	M102-SB*	U8400018
1.0	13	0.50	M103-SB*	U8400020
2.25	13	0.50	M106-RM M106-SM	U8400023 U8400025
2.25	13	0.50	M1036	U8400019
5.0	13	0.50	M109-RM M109-SM	U8400027 U8400028
5.0	6	0.25	M110-RM M110-SM M110H-RM**	U8400030 U8400031 U8400029
10	6	0.25	M112-RM M112-SM M112H-RM**	U8400034 U8400035 U8400033
10	3	0.125	M1016	U8400015
20	3	0.125	M116-RM M116-SM	U8400038 U8400039
20	3	0.125	M116H-RM**	U8400037

* These transducers can only be used with the High Penetration software option.
** Use with spring loaded holder





Sonopen® Transducers

The Sonopen transducer has a replaceable delay line that is tapered to a small contact area. This transducer makes reliable thickness measurements in applications such as turbine blades and tight radii on plastic containers.

Sonopen – 15 MHz, 3 mm (0.125 in) transducer

Straight Handle		Right Angle Handle		45° Handle	
Part	Item Number	Part	Item Number	Part	Item Number
V260-SM	U8411019	V260-RM	U8411018	V260-45	U8411017

Sonopen – Replaceable Delay Lines

Tip Diameter		Part	Item Number
mm	inches		
0.080	2.0	DLP-3	U8770086
0.060	1.5	DLP-302	U8770088
0.080	2.0	DLP-301†	U8770087

† High temperature delay for use up to 175° C (350° F)

Immersion Transducers

Panametrics Microscan immersion transducers are designed to transmit and receive ultrasound in water. Thickness measurements by immersion technique are often preferred when the test piece has a complex geometry or in on-line applications. Typical off-line applications include wall thickness measurements on small diameter plastic or metal tubing, scanned or rotary measurements and thickness measurements on sharply curved parts. Transducer focusing may be necessary depending on the application.

Frequency (MHz)	Element Diameter		Transducer	Item Number
	mm	inches		
2.25	13	0.50	M306-SU	U8410027
5.0	13	0.50	M309-SU	U8420001
5.0	6	0.25	M310-SU	U8420004
10	6	0.25	M312-SU	U8420008
15	6	0.25	M313-SU	U8420009
20	3	0.125	M316-SU	U8420011

RBS-1 Immersion Tank

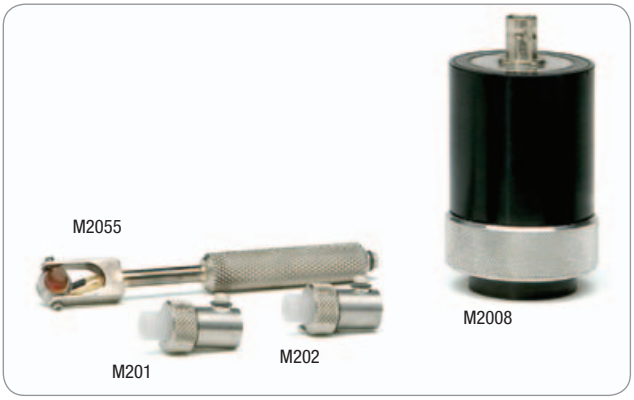
The RBS-1 immersion tank is designed to simplify ultrasonic thickness measurements using immersion techniques.

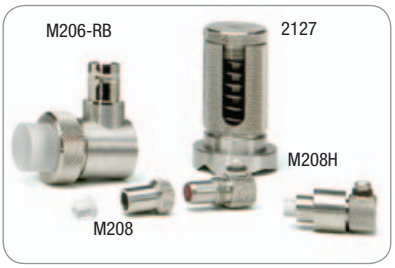
Delay Line Transducers

Microscan delay line transducers provide excellent performance on very thin materials, at elevated temperatures, or with applications that require a high degree of thickness resolution.

Freq. (MHz)	Element Diameter		Transducer	Item Number	Holder	Item Number
	mm	inches				
0.5	25	1.00	M2008*	U8415001	—	
2.25	13	0.50	M207-RB	U8410017	—	
5.0	13	0.50	M206-RB	U8410016	—	
5.0	6	0.25	M201-RM	U8410001	—	
5.0	6	0.25	M201H-RM	U8411030	2127	U8770408
10	6	0.25	M202-RM M202-SM	U8410003 U8410004	—	
10	6	0.25	M202H-RM	U8507023	2127	U8770408
10	3	0.125	M203-RM M203-SM	U8410006 U8410007	—	
20	3	0.125	M208-RM M208-SM	U8410019 U8410020	—	
20	3	0.125	M208H-RM	U8410018	2133	U8770412
20	3	0.125	M2055**	U8415013	—	
30	6	0.25	V213-BC-RM**	U8411022	—	

* These transducers can only be used with the High Penetration software option.
** Delay line is not replaceable on these transducers.





Replaceable Delay Lines

Delay lines function as a protective buffer between the surface of the test piece and the transducer element.

Element Diameter		Delay Line		Maximum Thickness Measurement Limit*					
		Part	Item Number	Steel - Mode 2		Steel - Mode 3		Plastic - Mode 2	
mm	inches			mm	inches	mm	inches	mm	inches
13	0.50	DLH-2	U8770062	25	1.0	13	0.5	13	0.5
6	0.25	DLH-1	U8770054	25	1.0	13	0.5	13	0.5
3	0.125	DLH-3	U8770069	13	0.5	5	0.2	5	0.2

* Exact range depends on material sound velocity, transducer frequency, part geometry, and surface condition.

Additional products available at www.olympus-ims.com

Couplants

Liquid couplant is almost always necessary to provide acoustic coupling between the transducer and the test piece. We offer various types of couplants to suit virtually all applications.

Calibration Test Blocks

Test blocks are necessary for the calibration of ultrasonic thickness gages and should be used to maintain and verify the accuracy, dependability, and reliability of ultrasonic measurements. Blocks are held to tighter tolerances than stated in ASTM E797 code. Metric test blocks are available.

Transducer Cables

A wide selection of transducer cables suitable for all ultrasonic thickness gaging instrumentation.

- Standard
- Waterproof
- Heavy Duty
  - Teflon
  - Armored PVS Jacket
  - Armored Silicone Jacket
  - Stainless Steel

45MG Specifications*

MEASUREMENTS

Dual element transducer measurement mode	Time interval from a precision delay after the excitation pulse to the first echo
Echo-to-Echo (optional)	Time interval between two successive back-wall echoes to eliminate paint or coating thickness
THRU-COAT® measurement (optional)	Measurement of true metal and coating thicknesses with a single back-wall echo (with D7906-SM and D7908 transducers)
Single element transducer measurement modes (optional)	Mode 1: Time interval between the excitation pulse and the first back-wall echo Mode 2: Time interval between the delay line echo and the first back-wall echo (with delay or immersion transducers) Mode 3: Time interval between successive back-wall echoes following the first interface echo after the excitation pulse (with delay line or immersion transducers)
Thickness range	0.080 mm to 635 mm (0.003 in. to 25.0 in.) depending on material, transducer, surface conditions temperature, and selected configuration (Full range requires single element option)
Material velocity range	0.508 mm/µs to 13.998 mm/µs (0.020 in./µs to 0.551 in./µs)
Resolution (selectable)	Low: 0.1 mm (0.01 in.) Standard: 0.01 mm (0.001 in.) Single Element option: 0.001 mm (0.0001 in.)
Transducer frequency range	Standard: 2.25 MHz to 30 MHz (–3 dB) High Penetration (Single Element option): 0.50 MHz to 30 MHz (–3 dB)

GENERAL

Operating temperature range	–10 °C to 50 °C (14 °F to 122 °F)
Keypad	Sealed, color-coded keypad with tactile and audible feedback
Case	Impact-resistant and water-resistant, gasketed case with sealed connectors. Designed for IP67.
Dimensions (W x H x D)	Overall: 125 mm x 211 mm x 46 mm (4.92 in. x 8.31 in. x 1.82 in.)
Weight	430.9 g (0.95 lb)
Power supply	3 AA batteries/USB power supply
Battery life operating time	3 AA alkaline: 20 to 21 hours 3 AA NiMH: 21 to 23 hours 3 AA Lithium-ion: 35 to 36 hours
Standards	Designed for EN15317

DISPLAY

Color transflective QVGA display	Liquid crystal display, display area 54.61 mm x 41.15 mm (2.15 in. x 1.62 in.)
Rectification	Full wave, RF, half-wave positive, or half-wave negative (Waveform option)

INPUTS/OUTPUTS

USB	2.0 client
Memory card	Maximum capacity: 2 GB removable MicroSD memory card

INTERNAL DATA LOGGER (Optional)

Data logger	The 45MG identifies, stores, recalls, clears, and transmits thickness readings, waveform images, and gage configuration information through USB or MicroSD.
Capacity	475,000 thickness measurements or 20,000 waveforms with thickness measurements
File names, IDs, and comments	32-character file names and 20-character alphanumeric location codes with four comments per location
File structures	Six standard or custom application-specific file structures
Reports	On-gage reporting of summary with statistics, Min./Max. with locations, Min. review, file comparison, and alarm report

Standard Package

- 45MG digital ultrasonic thickness gage
- AA alkaline batteries
- 2-step test block and couplant
- USB cable
- User's manual on CD
- **Measurement features:** Min./Max. mode, two alarm modes, Differential mode, B-scan, Reduction Rate, Programmable Lock

Software Options

- **45MG-SE (U8147022):** Single Element option to use single element transducers with frequency range of 2.25 MHz to 30 MHz.
- **45MG-HP (U8147023):** Single Element High Penetration option to use single element transducers with frequency range of 0.5 MHz to 30 MHZ.
- **45MG-EETC (U8147021):** Echo-to-Echo and THRU-COAT®
- **45MG-WF (U8147019):** Waveform option
- **45MG-DL (U8147020):** Internal data logger including GageView interface program

Optional Accessories

- **MICROSD-ADP-2GB (U8779307):** 2 GB External MicroSD memory card
- **45MG/RPC (U8779307):** Rubber protective boot with stand

www.olympus-ims.com

OLYMPUS NDT INC. is ISO 9001 and 14001 certified.

OLYMPUS®

For enquiries - contact
www.olympus-ims.com/contact-us

OLYMPUS NDT INC.
48 Woerd Avenue, Waltham, MA 02453, USA, Tel.: (1) 781-419-3900
12569 Gulf Freeway, Houston, TX 77034, USA, Tel.: (1) 281-922-9300
OLYMPUS NDT CANADA INC.
505, boul. du Parc-Technologique, Québec (Québec) G1P 4S9, Tel.: (1) 418-872-1155
1109 78 Ave, Edmonton (Alberta) T6P 1L8

FSC Mixed Sources
Product group from well-managed forests, controlled sources and recycled wood or fiber
Cert no. www.fsc.org © 1996 Forest Stewardship Council

CE

45MG_EN_201208 • Printed in the USA • Copyright © 2012 by Olympus NDT.

*All specifications are subject to change without notice.
All brands are trademarks or registered trademarks of their respective owners and third party entities.

P/N: 920-255-EN Rev. A