

**Model PG70
Model PG70DL**

Precision Gauge

Operating Instructions



This product meets the Electromagnetic Compatibility Directive.

The product is Class A, Group 1 ISM equipment according to CISPR 11. Group ISM product: A product in which there is intentionally generated and/or used conductively coupled radio-frequency energy which is necessary for the internal functioning of the equipment itself.

Class A product is suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

Note: In the close presence of some radio transmitters, erroneous readings may be given. If this occurs tests should be repeated at another location.

These operating instructions are available for download on our website www.elcometerndt.com.

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elcometer[®]_{NDT}

Material Safety Data Sheet for the ultrasonic couplant supplied with the PG70DL & PG70 and available as an accessory, is available to download via our website:

Elcometer NDT Ultrasonic Couplant Material Safety Data Sheet :

www.elcometerndt.com/images/MSDS/elcometer_ultrasonic_couplant.pdf

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Thank you for purchasing this Model PG70/PG70DL Precision Gauge. Welcome to Elcometer.

Elcometer are world leaders in the design, manufacture and supply of coatings inspection equipment. Our products cover all aspects of coating inspection, from development through application to post application inspection.

The Model PG70/PG70DL Precision Gauge are world beating products. With the purchase of this gauge you now have access to the worldwide service and support network of Elcometer NDT. For more information visit our website at www.elcometerndt.com.

1 ABOUT YOUR GAUGE

The Model PG70/PG70DL Precision Gauge are hand-held gauges for fast and accurate measurement of the thickness of thin materials.

Your gauge is capable of measuring the thickness of various materials with great precision. The principal advantage of ultrasonic measurement over traditional methods is that ultrasonic measurements can be performed with access to only one side of the material being measured.

Your gauge is also capable of measuring the thickness of plastics.

There are two versions of the gauge:

- The Model PG70 is the basic model.
- The Model PG70DL model includes all the features of the Model PG70 model plus a data-logging (memory) facility which allows readings to be stored in batches before being downloaded to a computer.

This manual describes the operation of both models - Model PG70 and PG70DL.

1.1 STANDARDS

Your gauge can be used in accordance with the following Standards and test methods; ASTM E 797 and EN 15317.

1.2 WHAT THIS BOX CONTAINS

Model PG70 or PG70DL Gauge, Bottle of couplant, Battery (2 x), Carrying case, Test certificate, Operating instructions, CD with data transfer and data collection software (DL version only), RS232 cable and USB to Serial converter.

Note : *The box does **not** include a transducer; these must be ordered separately. To order a transducer, contact Elcometer NDT or your local Elcometer NDT supplier.*

To maximise the benefits of your new Elcometer NDT Ultrasonic Thickness Gauge, please take some time to read these Operating Instructions. Do not hesitate to contact Elcometer NDT or your Elcometer NDT supplier if you have any questions

1.3 FEATURES OF THE GAUGE

ECHO-TO-ECHO MODE: Allows measurement of coated materials without having to remove the coating.

INTERFACE-TO-ECHO MODE: The gauge switches to this mode automatically when measuring thicker materials and plastic.

PLAS MODE: For measuring the thickness of plastics.

SCAN MODE: Identifies the minimum thickness over a large area while moving the transducer over the surface. While the transducer is in contact with the material being measured the smallest value is held in memory and displayed when scanning is complete.

ALARM: Allows the user to set a target so that an audible and visual alarm operates when taking measurements. If the measurement falls below a pre-set nominal (target) value a red LED will light and the beeper sounds. A green LED will light to indicate an acceptable thickness.

DATA OUTPUT: Allows the user to send data direct to a printer or PC.

DATA-LOGGING (PG70DL VERSION ONLY): Memory capacity of up to 1000 readings. Readings are stored in up to 10 batches each containing up to 100 readings. Batches may be transferred to a PC using supplied software.

1.4 PACKAGING

Your gauge is packed in a cardboard and foam package. Please ensure that this packaging is disposed of in an environmentally sensitive manner. Please consult your Local Environmental Authority for further guidance.









PG70









PG70DL

2 THE KEYPAD

MODEL PG70

Key	Functions	For more information see	Mode
	Press to switch the gauge on or off. When switching off, the gauge retains all of its settings. If the gauge is idle for 5 minutes, it will switch itself off.		PG70 PG70DL
	Press to adjust the features and settings of the gauge (alarm, scan, mode, units, backlight, and beeper).		PG70DL
	Press to switch SCAN mode on or off.	page 15.	PG70
	Press to adjust calibration.	page 12.	PG70 PG70DL
	Press to change units (metric/imperial)		PG70 PG70DL
	a) Increases values on the display (press and hold to change values quickly).		PG70
	b) Switches between measurement modes (echo-echo, interface-echo or auto).		PG70
	c) Scrolls up through menu system		PG70DL

Key	Functions	For more information see	Mode
	a) Decreases values on the display (press and hold to change values quickly).		PG70
	b) Switches the display backlight between three settings; on, off and auto.	page 19.	PG70
	c) Press and hold during gauge switch on to toggle LOC mode on/off	page 20.	PG70
	d) Scrolls down through menu system		PG70 PG70DL
	a) Press and hold during gauge switch on to toggle the audible beeper on or off.		PG70
	b) Press to toggle the alarm on or off, and to adjust the nominal thickness value.	page 17.	PG70
	Press to toggle the DIFFERENTIAL mode on or off, and to adjust the nominal thickness value.	page 16.	PG70 PG70DL
	Press to switch data logging (memory) on/off.	Measurement - Recording your readings - see page 22.	PG70DL
	Press when data logger is switched on to clear the contents of an entire batch, or an individual memory location. The CLR key is also used to send an obstruct message (ObSt) to an individual memory location. The ObSt symbol would indicate that the user was unable to take a reading at a particular location.	Measurement - Recording your readings - see page 22.	PG70DL

Key	Functions	For more information see	Mode
	a) Press to send the displayed thickness measurement to an external storage device via the RS232 port.	page 26.	PG70
	b) Press to select functions in the menu and save readings		PG70
	c) Press to send the displayed thickness measurement to an internal memory location or an external storage device via the RS232 port.	page 26.	PG70DL
	c) Press to select data logging functions.	Measurement - Recording your readings - see page 22.	PG70DL

3 GETTING STARTED

3.1 FITTING BATTERIES

Your gauge may be used with dry cell batteries or rechargeable batteries. 2 x LR6 (AA) alkaline batteries are supplied in the kit.

When the battery voltage is low the entire display will start to flash. When this occurs the batteries should be replaced.

To fit or replace batteries:

1. Unscrew battery compartment cover.
2. Referring to battery polarity instructions on rear of gauge, insert batteries into gauge ensuring correct polarity.
3. Replace battery compartment cover.

Remove the batteries from the gauge if it is to remain unused for a long period of time. This will prevent damage to the gauge in the event of malfunction of the batteries.

Note: Alkaline batteries must be disposed of carefully to avoid environmental contamination. Please consult your local environmental authority for information on disposal in your region.

Do not dispose of any batteries in fire.

3.2 CHOOSING THE TRANSDUCER

Information can be found on the Elcometer NDT Knowledge Centre on www.elcometerndt.com.



3.3 FITTING THE TRANSDUCER

The transducer transmits and receives ultrasonic sound waves that the gauge uses to calculate the thickness of the material being measured.


The transducer connects to the gauge via the attached cable, and single coaxial connectors.

Transducers are supplied with two replaceable delay lines, 6.35 mm (1/4") and 12.7 mm (1/2"). The 12.7 mm (1/2") is suitable for most applications and measures steel up to 25 mm. Generally, it should be used to measure thicker materials. It will also dampen the signal of noisy materials, providing better accuracy.

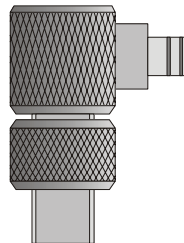
The 6.35 mm (1/4") delay line provides more signal strength and may allow you to measure tough-to-penetrate materials.

To change the delay line, unscrew the end of the transducer and apply couplant to the connecting end of the delay line before screwing together.

3.4 SWITCHING ON/OFF

To switch on or off, press **ON/OFF**  .

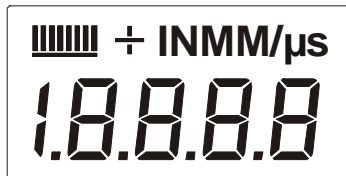
The gauge will switch off automatically after 5 minutes of inactivity.



4 THE DISPLAY




Stability indicator (see below)

Units (IN, MM, IN/ μ s, MM/s)



Thickness value/Menu items

Stability indicator

	One bar - no readings are being taken
	Less than 5 bars - reading is unstable and may be inaccurate
	More than 5 bars - reading is stable

Refer to page 21 and page 33 for information on how to achieve a stable measurement.

4.1 FRONT PANEL LIGHTS

Green light illuminates when:

- The alarm mode is active, and
- the measured thickness is greater than the alarm value.

Red light illuminates when:

- The alarm mode is active, and
- the measured thickness is less than the alarm value.

5 SETTING UP GAUGE

As a delay line transducer should be used with these gauges, zeroing of the gauges is not necessary.

5.1 CALIBRATION

In order for the gauge to make accurate measurements, it must be set to the correct sound-velocity for the material being measured.

Different types of material have different sound-velocities. For example, the velocity of sound through steel is 5918 m/s (about 0.233 in/ μ s) and the velocity of sound through aluminium is 6350 m/s (about 0.248 in/ μ s). Setting the calibration is crucial for the gauge to function and the procedure should be carried out after every probe zero and when the material type is changed.

There are two methods of calibrating your gauge:

KNOWN THICKNESS CALIBRATION: This is the simplest and most commonly used calibration procedure.

KNOWN VELOCITY CALIBRATION: The sound-velocity of the material being measured is entered directly into the gauge.

Note: Known thickness calibration must be performed on material with the paint or coating removed. Failure to remove the paint or coating prior to calibration will result in a multi-material velocity calculation that may be different from the actual material velocity intended to be measured.

5.1.1 Known thickness calibration

This procedure requires a sample piece of the material to be measured, the exact thickness of which is known, having been measured by some other means e.g with a caliper or micrometer.

1. Apply couplant to the sample piece.

2. Press the transducer against the sample piece, making sure that the transducer is flat against the surface of the sample. The display should show some (probably incorrect) thickness value, and nearly all the bars of the stability indicator should be illuminated.
3. Press **CAL**. The **MM** (or **IN**) symbol should begin flashing. You may remove the transducer at this point if you wish.
4. Use **UP** and **DOWN** to adjust the displayed thickness, until it matches the known thickness of the sample piece.
5. Press **CAL**. The **M/s** (or **IN/μs**) symbols should begin flashing. The gauge is now displaying the sound-velocity value it has calculated.
6. Press **CAL** to exit the calibration mode.

The gauge is now ready to perform measurements.

5.1.2 Known velocity calibration

This procedure requires that the operator knows the sound-velocity of the material to be measured. A table of common materials and their sound-velocities can be found in page 34.

1. Press **ON/OFF** to switch on the gauge.
2. Press **CAL** to enter calibration mode then press **CAL** again, so that the **M/s** (or **IN/μs**) symbols are flashing.
3. Use **UP** and **DOWN** to adjust to the desired value, until it matches the sound-velocity of the material to be measured.
4. Press **CAL** to exit the calibration mode.

The gauge is now ready to perform measurements.

Note: At any time during the gauge calibration procedure (IN, MM, IN/ μ s, or M/s flashing in the display), pressing the SCAN (PG70) or CLR (PG70DL) will restore the gauge to the factory default sound-velocity for steel, 5918 m/s (0.233 in/ μ s).

Material composition (and thus, its sound-velocity) sometimes varies from batch to batch and from manufacturer to manufacturer. Calibration to a sample of known thickness will ensure that the gauge is set as closely as possible to the sound-velocity of the material to be measured.

6 MEASUREMENT MODES

The gauge has three measurement modes; echo-echo, interface-echo and automatic.

ECHO-ECHO: The gauge has the ability to read thin metals from 0.15 mm to 10.14 mm (0.006" to 0.399"). The echo-echo mode also allows the user to measure the thickness of metals that have been previously coated or painted on the surface. This enables the user to determine the thickness of the metal without having to remove the paint.

INTERFACE-ECHO: The gauge has the ability to read thicker metals from 1.65 mm to 25.4 mm (0.065" to 1.0"), plastics and other difficult materials.

AUTOMATIC: In Automatic, the gauge will automatically switch between modes according to the different materials being measured.

PLAS: Plas mode can be used to measure thin plastics using a special graphite tip - see "Spares & Accessories" on page 30.

The automatic (Auto) mode will generally be the mode of choice for the majority of common applications with the following exceptions:

- The gauge should be set to echo-echo mode when through-coating measurements are required.
- The gauge should be set to interface-echo when plastics above 1.52 mm (0.060") are being measured.

6.1.1 To select measurement mode

Model PG70

1. Press **UP** to switch between **GAtE I-E**, **GAtE E-E**, **GAtE Auto** or **GAtE PLAS**.
2. Repeat until correct mode is displayed.

Model PG70DL

1. Select **MODE/GAtE**.
2. Press **SEND** to switch between **GAtE I-E**, **GAtE E-E**, **GAtE Auto** or **GAtE PLAS**.
3. Press **MODE** to return to the measurement screen.

6.2 SCAN MODE

Scan mode is used to search a large region for the thinnest point.

Scan mode doubles the reading rate to 8 per second. As the transducer is scrubbed across the surface the gauge searches for the lowest thickness value. When the transducer is removed, the gauge displays the lowest thickness that was detected.

To switch scan mode on/off:

Model PG70

1. Press **SCAN** to toggle **SCAN OFF** or **SCAN On**.
2. The gauge will display **SCAN OFF** or **SCAN On**.

Model PG70DL

1. Select **MODE/SCAN**
2. Press **SEND** to toggle scan mode on or off.
3. Press **MODE** to return to the measurement screen.

6.3 DIFFERENTIAL MODE

Your gauge includes **Differential Mode** which allows it to display the positive or negative difference from an entered nominal value.

To switch differential mode on/off and enter the value:

Model PG70

1. Press the **dIFF**.
2. The gauge will display **dIFF OFF** or **DIFF** followed by a thickness value.
3. When toggled on, use **UP** and **DOWN** to scroll to the desired nominal thickness value.
4. Press the **SEND** to select the nominal value entered.

Model PG70DL

1. Press **MODE/dIFF**
2. The gauge will display **dIFF OFF** or **dIFF ON** followed by a thickness value.
3. Press **SEND** to toggle **dIFF ON** or **OFF**.
4. When toggled on use **UP** and **DOWN** to adjust to the desired thickness value.
5. Press **SEND** to set value.
6. Press **MODE** to return to the measurement screen.

6.4 ALARM

The **Alarm** feature of your gauge allows you to set an audible and visual alarm when taking measurements. If the alarm is switched on, the green light on the front panel of the gauge is illuminated. If the measurement falls below the value set by the user, a red light shows on the front panel of the gauge and the beeper is sounded (if it is switched on).

Use of the red light and beeper improves the speed and efficiency of the inspection process by eliminating constant viewing of the reading displayed.

To switch beeper on/off

Model PG70

1. While the gauge is off, press and hold down **ALRM**.
2. Switch on the gauge.
3. Release **ALRM**.
The gauge will display **bEEP OFF** or **bEEP On**.
4. Repeat steps 1 to 3 to toggle between **bEEP ON** and **bEEP OFF**.

Model PG70DL

1. Select **MODE/bEEP**.
2. Press **SEND** to toggle the status of the beeper on/off.
3. Press **MODE** to return to measurement screen

To set alarm value and switch alarm on

Model PG70

1. Press **ALRM** to toggle the status of the alarm.
When toggled on the gauge displays **ALAr** followed by a thickness value.
2. Use **UP** and **DOWN** to adjust Lo alarm thickness value.
3. Press **SEND** when correct value is displayed.
The Hi value will now be displayed.
4. Repeat steps 3 and 4 to adjust and set the Hi alarm thickness value.

Model PG70DL

1. Select **MENU/ALAr**.
2. Press **SEND** to toggle the alarm on/off.
3. When toggled on use **UP** and **DOWN** to adjust the Lo alarm.
4. Press **SEND** and adjust the Hi alarm.
5. Press **SEND** to confirm.
6. Press **MODE** to return to the measurement screen.

To switch alarm off

Repeat the steps above, but select **ALAr OFF**.

6.5 BACKLIGHT

The gauge display includes a backlight which can be set to one of three modes - on/off/auto.

In AUTO mode the backlight automatically illuminates while the gauge is making a measurement and switches off after several seconds (to conserve battery life).

6.5.1 To set backlight mode

Model PG70

1. Press **DOWN** to toggle the status of the backlight.

Model PG70DL

1. Select **MODE/LitE**.
2. Press **SEND** to toggle the status of the backlight
3. Press **MODE** to return to the measurement screen.

6.6 LOC MODE

LOC mode is used to present identical modification of the measurement mode or any other gauge features by disabling the options to Press and hold **DOWN** while switching the gauge on to toggle **LOC** mode on/off.

7 TAKING READINGS

Disclaimer: Inherent in ultrasonic thickness measurement is the possibility that the instrument will use the second echo rather than the first echo from the back surface of the material being measured while in standard pulse-echo mode. This may result in a thickness reading which is TWICE what it should be.

The responsibility for proper use of the instrument and recognition of these types of phenomenon rests solely with the user of the instrument.

7.1 BEFORE YOU START

- *Calibrate the gauge.*

See page 20.

- *Prepare the surface.*

See Condition and Preparation of Surfaces on the Elcometer NDT Knowledge Centre at www.elcometerndt.com .

7.2 PROCEDURE

1. Apply couplant

For the gauge to work correctly there must be no air gaps between the transducer and the surface of the material to be measured. This is achieved using a material called a couplant.

Before the transducer is placed on the surface, put a small amount of the couplant supplied with the gauge on the surface of the material. Typically a single drop is sufficient.

2. Place transducer onto surface of material to be measured

Press the transducer wearface into the couplant. Moderate pressure on the top of the transducer using the thumb or index finger is sufficient; it is only necessary to keep the transducer stationary and the wearface seated flat against the surface of the material.

3. Read display

If six or seven bars of the stability indicator are showing, the display will be reading the correct thickness of the material directly beneath the transducer.

If the stability indicator has fewer than five bars showing, or the numbers on the display seem erratic, check to make sure that there is an adequate film of couplant beneath the transducer, and that the transducer is seated flat against the material. If the condition persists, it may be necessary to select a different transducer (size or frequency) for the material being measured.

The gauge will perform four measurements every second when the transducer is in contact with the surface of the material. The display is updated as each reading is taken.

4. Remove transducer from surface

The display will show the last measurement made.

Note: Occasionally, a small film of couplant that is left on the transducer surface will be measured by the gauge, changing the displayed thickness reading. Using less couplant can reduce this effect.

8 MEASUREMENT - RECORDING YOUR READINGS (PG70DL ONLY)

The Model PG70DL is equipped with a data logger a useful feature for reporting your inspections. It increases efficiency by reducing the time it takes to manually record the measurements during the inspection process. The gauge can then be connected to a computer or serial printer to save and print the results of the inspection.

The gauge has a memory capacity of 1000 readings. Measurements are stored in up to 10 batches (files), each consisting of up to 100 readings (memory locations).

8.1 SETTING-UP THE DATA LOGGER

1. Switch on the gauge.
2. Press **MEM** to activate the data logger.
The display will flash **FILE F-01** (or the last batch used).
3. Press **SEND** to enter batch setup. The current batch will be displayed (F-01, F-03, etc.)
4. Use **UP** and **DOWN** to scroll to the batch (1-10) that will be used.
5. Press **SEND** to select the batch.
6. Press **MEM** to access the memory locations in the batch selected.

The current memory location (L007, L039, etc.) and the status of the memory location will be displayed. The memory location can contain one of three possible things:

- a measurement that was previously stored
- **CLr** in the display, indicating that the memory location is empty
- **ObSt** (obstruct) in the display, indicating that a measurement could not be obtained

7. Press **UP** and **DOWN** to advance to the desired memory location.

8.2 STORING A MEASUREMENT

1. Press **SEND** to store a reading in the memory location.

The data logger will then **automatically advance** to the next memory location.

8.3 DELETING CONTENTS OF A MEMORY LOCATION

The user may require a memory location that is currently full to be over written. The procedure for deleting (clearing) the contents of the memory location is outlined in the following steps:

Note: This procedure assumes the steps in 8.1 and 8.2 have been completed, and 8.2 is being repeated.

1. Press **UP** and **DOWN** to move to the memory location.

If the memory location is currently full, the display will flash the **FuLL** symbol.

2. Press **CLR** to delete the contents of the memory location. The display will flash the memory location (L011, L099, etc.) and the **CLr** symbol.

8.4 DELETING CONTENTS OF AN ENTIRE BATCH

The user may require the contents of an entire batch to be cleared of all measurements. This would allow the user to start a new list of measurements starting at memory location L001, for example. The procedure is outlined in the following steps:

1. Press **MEM** to activate the data logging functions and settings.
2. Press **SEND** to enter batch setup.
3. Use **UP** and **DOWN** to scroll to the batch.

4. Press **SEND** to select the batch.
5. Use **UP** and **DOWN** to scroll to the flashing **CLr F-05** (or the batch selected).
6. Press **SEND**. The display will show **CLr?**
7. Press **CLR** to confirm and clear the contents of the entire batch.
8. Press **MEM** to return to the measurement screen.

8.5 DELETING CONTENTS OF ALL BATCHES

1. Immediately press the **CLR**. The display will show **CLr?**
2. Press **CLR** to clear all batches.

9 TRANSFERRING READINGS TO A COMPUTER

Readings can be transferred from your gauge to a computer. The Model PG70 will transfer readings as they are taken. The Model PG70DL will transfer readings as they are taken and also transfer the contents of its memory.

A data transfer cable is used to connect the gauge to the computer. This cable is supplied with the Model PG70DL, but must be ordered separately for the Model PG70 - see “vices available, and to arrange for non-warranty service.” on page 29.

Elcometer NDT recommends the use of ElcoMaster™ 2.0 software to transfer the data. Other types of software may also be used.

ElcoMaster™ 2.0 is supplied with the Model PG70 & PG70DL.

9.1 CONNECTING THE DATA TRANSFER CABLE

1. Plug the 9-pin female D-type connector on one end of the data transfer cable into the COM port on the PC.
2. Plug the jack connector on the other end of the data transfer cable into the RS232 data connection socket on the bottom of the gauge.



RS232 data
connection
socket

9.2 SETTING-UP THE SOFTWARE

- **ElcoMaster™ 2.0 Software for Measurement Data.** This software allows the user to transfer data from the memory of the gauge to a PC for archiving, analysis and reporting. Data can be transferred using the PC connection cable. ElcoMaster™ 2.0 includes all the charts that you may need together with a report designer to let you design your reports the way you wish to see them.

All of this software can also be downloaded from the Elcometer NDT website www.elcometerndt.com.

9.3 TRANSFER SET UP

1. Connect your gauge to your PC using the optional cable.
2. Switch on your gauge.
3. Start the software and connect the gauge using the wizard. Then follow the on screen instructions.

9.4 TRANSFERRING DATA

Model PG70

After taking a measurement, press **SEND** to send the measurement to the computer.

Model PG70 DL

TRANSFERRING ONE BATCH

1. Press **MEM** to activate the data logging functions and settings.
2. Press **SEND** to enter batch setup.
3. Use **UP** and **DOWN** to scroll to the required batch.
4. Press **SEND** to select the batch. The display will flash **FILE F-05** (or the batch selected).
5. Use **UP** and **DOWN** to scroll to to the required batch.
6. Press **SEND** to send readings to the computer.
The display will show **buSY** during data transfer.
Wait until all the data has been transferred.
7. Press **MEM** to exit the data logging functions.

TRANSFERRING ALL BATCHES

1. Press **MEM** to activate the data logging functions and settings.
2. Use **UP** and **DOWN** to scroll to **SEnd ALL** flashing on the display.
3. Press **SEND** to send readings to the computer.
The display will show **buSY** during data transfer.
Wait until all the data has been transferred.

4. Press **MEM** to exit the data logging functions.

9.5 PRINTING A BATCH

A batch can, very simply, be sent to a communications program on a PC and then printed. The procedure for printing a batch is outlined below:

1. Press **MEM** to activate the data logging functions and settings.
2. Press **SEND** to enter batch setup.
3. Use **UP** and **DOWN** to scroll to the batch to be printed (F-01, F-05, etc.).
4. Press **SEND** to select the batch to be printed. The display will flash the batch selected.
5. Use **UP** and **DOWN** to scroll to the flashing **Prnt**.
6. Press **SEND** to print the contents of the batch.
7. Press **MEM** at any time to exit the data logging functions.

10 STORAGE



Your gauge has a Liquid Crystal Display. If the display is heated above 50°C (120°F) it may be damaged. This can happen if the gauge is left in a car parked in strong sunlight.

Always store the gauge in its case when it is not being used.

If the gauge is to remain unused for long periods of time, remove the batteries and store them separately. This will prevent damage to the gauge in the event of malfunction of the batteries.

11 MAINTENANCE

Your gauge is designed to give many years reliable service under normal operating and storage conditions. The transducer will wear with repeated use. Transducer life depends on the number of measurements taken and the manner in which readings are taken. To extend transducer life, always set the transducer down so that it is perpendicular to the panel surface. Dragging the transducer along the surface will reduce the life of the transducer.

Replacement transducers are available from your local Elcometer NDT supplier or directly from Elcometer NDT.

The gauge does not contain any user-serviceable components. In the unlikely event of a fault, the gauge should be returned to your local Elcometer NDT supplier or direct to Elcometer NDT. The warranty will be invalidated if the instrument has been opened.

12 TECHNICAL SPECIFICATION

Range:	0.15 mm to 25.4 mm (0.006" to 1.000")
Resolution:	0.002 mm (0.0001")
Accuracy:	±0.02 mm (±0.0008"), depends on material and conditions
Sound-velocity range:	1250 m/s to 10 000 m/s (0.0492 in/μs to 0.3937 in/μs)
Weight:	295 g (10 oz) including batteries
Size:	63.5 mm x 120.6 mm x 31.5 mm (2.5" x 4.5" x 1.24")
Operating temperature:	-30°C to 50°C (-20°F to 120°F) - depending upon climatic conditions
Case:	Extruded aluminium body, Nickel plated aluminium end caps
Battery type:	2 x LR6 (AA), alkaline dry batteries or rechargeable ^a equivalents
Battery life:	200 ^b hours continuous (alkaline dry batteries)

vices available, and to arrange for non-warranty service.

-
- a. Rechargeable batteries can be used if they are charged outside the gauge.
b. Battery life is reduced to approximately 120 hours when using rechargeable batteries. Follow the instructions provided by the battery manufacturer when charging and disposing of rechargeable batteries.

13 SPARES & ACCESSORIES

13.1 TRANSDUCERS

Elcometer NDT gauges are **not** supplied with a transducer as standard - this must be ordered separately. The transducers listed below are the most commonly used however, Elcometer NDT offer a wide range of other transducers to suit various applications.

Further information on the transducers available and their applications can be found on the Elcometer NDT Knowledge Centre on www.elcometerndt.com.

Description	Sales Part No.
15 MHz Single Element Delay Line Transducer	TX15 MOCM
20 MHz Single Element Delay Line Transducer	TX20 MOCM
Delay Line Tip, Acrylic, ¼" Diameter x ½" Length	TD-24033-6
Delay Line Tip, Graphite, ¼"	TD-24033-8

13.2 CALIBRATION BLOCKS

Elcometer NDT offer a comprehensive range of calibration blocks to suit a wide range of applications and standards.

Selecting the correct calibration block for the application is essential to ensure accurate evaluation. The form, shape and material of the calibration block should be appropriate for the material being inspected. Any artificially induced flaw should closely resemble that of the actual flaw being tested for.

The calibration blocks listed below are a selection of those available - details of the full range can be found on www.elcometerndt.com.

Description

Calibration Block: 8 Step; 1 - 8mm

Calibration Block: 10 Step; 2 - 20mm

Calibration Block: 10 Step; 2.5 - 25mm

Replace * with S1018 = 1018 Steel Block; A = Aluminium Block; SS = Stainless Steel Block;
T = Titanium Block.

Sales Part No.

TW-24005-*

TW-24006-*

TW-24007-*

13.3 ULTRASONIC COUPLANT

Each gauge is supplied with a 120ml (4oz) bottle of standard ultrasonic couplant. Replacement bottles and couplant for high temperature applications are available from your local Elcometer NDT supplier or directly from Elcometer NDT.

Description

Ultrasonic Couplant, 120 ml (4 oz)

Ultrasonic Couplant, 360 ml (12 oz)

Sales Part No.

TC-24034-1

TC-24034-2

Note: A wide range of other transducers and accessories is available - see www.elcometerndt.com for details.

13.4 MISCELLANEOUS**Description**

RS232 Cable USB to Serial Converter

Sales Part No.

TL-24031

14 WARRANTY

Elcometer NDT warrants the Model PG70 and PG70DL ultrasonic gauges against defects in materials and workmanship for a period of two years from receipt by the end user.

Additionally, Elcometer NDT warrants transducers and accessories against such defects for a period of 90 days from receipt by the end user. If Elcometer NDT. receives notice of such defects during the warranty period, Elcometer NDT. will either, at its option, repair or replace products that prove to be defective.

Should Elcometer NDT. be unable to repair or replace the product within a reasonable amount of time, the customer's alternative exclusive remedy shall be refund of the purchase price upon return of the product.

14.1 EXCLUSIONS

The above warranty shall not apply to defects resulting from: improper or inadequate maintenance by the customer; unauthorised modification or misuse; or operation outside the environmental specifications for the product.

Elcometer NDT makes no other warranty, either express or implied, with respect to this product. Elcometer NDT. specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. Some states or provinces do not allow limitations on the duration of an implied warranty, so the above limitation or exclusion may not apply to you. However, any implied warranty of merchantability or fitness is limited to the two-year duration of this written warranty.

This warranty gives you specific legal rights, and you may also have other rights, which may vary from country to country, state to state or province to province.

14.2 OBTAINING SERVICE DURING WARRANTY PERIOD

If your hardware should fail during the warranty period, contact Elcometer NDT. and arrange for servicing of the product. Retain proof of purchase in order to obtain warranty service.

For products that require servicing, Elcometer NDT. may use one of the following methods:

- Repair the product
- Replace the product with a re-manufactured unit
- Replace the product with a product of equal or greater performance
- Refund the purchase price.

14.3 AFTER THE WARRANTY PERIOD

If your hardware should fail after the warranty period, contact Elcometer NDT. for details of the services available, and to arrange for non-warranty service.

15 TRANSDUCERS

Further information can be found on the Elcometer NDT Knowledge Centre on www.elcometerndt.com.

16 CONDITION AND PREPARATION OF SURFACES

Further information can be found on the Elcometer NDT Knowledge Centre on www.elcometerndt.com.

17 APPLICATION NOTES

Further information can be found on the Elcometer NDT Knowledge Centre on www.elcometerndt.com.

18 SOUND VELOCITIES OF COMMON MATERIALS

Material	Sound-velocity (m/s)	Sound-velocity (in/ μ s)	Material	Sound-velocity (m/s)	Sound-velocity (in/ μ s)
Aluminium	6350	0.250	Paraffin	2210	0.087
Bismuth	2184	0.086	Platinum	3962	0.156
Brass	4394	0.173	Plexiglas	2692	0.106
Cadmium	2769	0.109	Polystyrene	2337	0.092
Cast Iron	4572	0.180 (Approx)	Porcelain	5842	0.230 (Approx)
Constantan	5232	0.206	PVC	2388	0.094
Copper	4674	0.184	Quartz Glass	5639	0.222
Epoxy Resin	2540	0.100 (Approx)	Rubber, Vulcanised	2311	0.091
German Silver	4750	0.187	Silver	3607	0.142
Glass, Crown	5664	0.223	Steel	5918	0.233
Glass, Flint	4267	0.168	Steel, Stainless	5664	0.223
Gold	3251	0.128	Stellite	6985	0.275 (Approx)
Ice	3988	0.157	Teflon	1422	0.056
Iron	5893	0.232	Tin	3327	0.131
Lead	2159	0.085	Titanium	6096	0.240
Magnesium	5791	0.228	Tungsten	5334	0.210
Mercury	1448	0.057	Water	1473	0.058
Nickel	5639	0.222	Zinc	4216	0.166
Nylon	2591	0.102 (Approx)			