

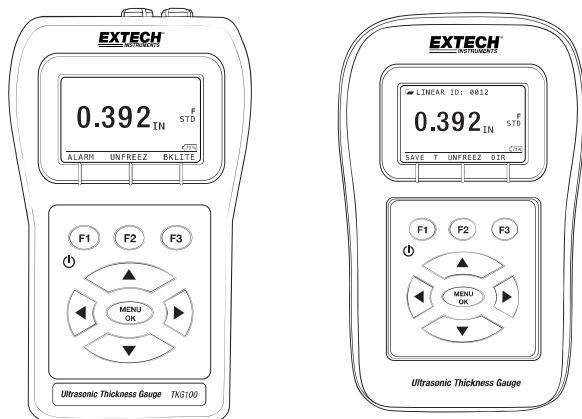
USER GUIDE

TKG100

Digital Ultrasonic Thickness Gauge

TKG150

Digital Ultrasonic Thickness Gauge with Datalogger



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1 Getting Started

About the TKG Series

The TKG100 and TKG150 are portable, digital, handheld thickness gauges. The TKG series of ultrasonic thickness gauges are specifically designed to measure the remaining wall thickness of primarily steel structures.

- Vibralarm (vibrates gauge below/above minimum/maximum thickness value)
- Illuminating keypad for easy to view go-no go thickness values (patent pending)
- Automatic transducer replacement intelligence built in (patent pending)
- Unique, programmable left-hand/right-hand operation (patent pending)
- Up to 200 hour battery life with 2 AA batteries
- Small, easy to hold, ergonomic, custom molded, durable case with rubber keypad
- Automatic zero capability
- Gain boost

The TKG100 is a base gauge offering a simple user interface packaged in the same custom molded high-density plastic case with rubber keypad as the other more sophisticated models. This gauge offers reliable, accurate thickness readings on mostly steel structures with access to only one side.

The TKG150 contains all the same features of the TKG100 plus:

- 50,000 (expandable to 100,000) reading datalogger capacity with complete setup tracking
- Three pre-set files for linear, grid (row advance) and grid (column advance)
- Echo-to-Echo
- B-scan

Probe Zero

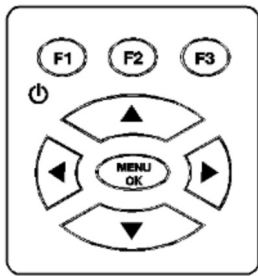
When turning on the TKG100 or TKG150 (for the sake of this manual, with the exception of the datalogger, B-scan, and Echo-to-Echo features, the two model numbers are interchangeable for the basic operation and calibration), the gauge does an automatic zeroing of the transducer (after the user selects the transducer from the list) thus eliminating the need for an on-block zero. The TKG100 and TKG150 will electronically zero the transducer upon power up and at a particular time during normal operation. This feature ensures the transducer is






working in accordance with electronic zeroing procedures. This feature is particularly important on high temperature materials and when the transducer becomes worn.





Important Notice: Please make sure the transducer is not coupled to the test piece when the gauge is first turned on and that there is no couplant on the end of the transducer. The transducer should also be at room temperature, clean without any noticeable wear.

Keypad Functions

The figure below shows the full keypad of the TKG Series thickness gauges. Refer to the following table that lists the function of each key on the keypad.



Key	Function
	Up arrow key
	Down arrow key
	Left arrow key
	Right arrow key
	On/Off symbol (under the F1 key)

	MENU/OK key
	F1 key
	F2 key
	F3 key

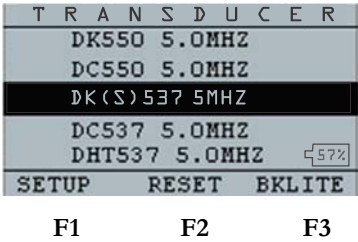
Function Keys

Function keys, or F keys, such as F1, F2, and F3 have various gauge functions and may change depending on the display screen. View the bottom of the display screen for the function that corresponds with the appropriate F key. For example, F1 may correspond with the Save function, F2 with the Freeze function, or F3 with the Directory function (Dir).

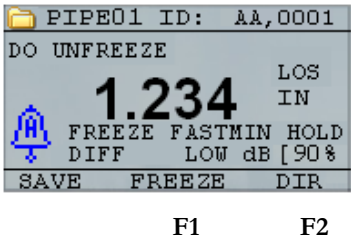
Display Screen

The gauge has a graphic style Liquid Crystal Display (LCD). Viewing the screen is best from straight above or slightly below the surface rather than from side to side. If external temperatures are below 32°F (0°C), the display may be slow to update information.

The TKG series is designed to show the parameters selected in the center of the display screen.



The top part of the display screen for TKG150 model shows the File name, ID number, AA, and 0001 for grid column and row. The lower part of the display acts as an interactive tool that allows you to decide how you want to proceed with the information that is displayed on the screen. The middle part of the screen shows the thickness value, In, mm or usec, Echo-to-Echo symbol, LOS for loss of signal, Freeze, Fast, Min or Max, Alarm indicator, Differential mode, Low, Med or High gain and percent remaining battery life.



Battery Power

Monitoring the Battery from the Display

The TKG series constantly displays the percent battery life on the bottom right hand corner of the display screen. When the gauge gets below 20 %, the indicator will flash.

Replacing the Batteries

To replace the batteries, unscrew the battery door on the bottom of the gauge and slide out the two “AA” batteries. Replace with two new “AA” batteries paying attention that both positive ends are facing towards the top of the gauge.

2 Basic Gauge Operations

Power on the Gauge

To power on any of the TKG series thickness gauges follow these steps:

1. Press and hold the **F1** key for more than 3 seconds. The power symbol is under the **F1** key printed on the keypad as shown below.



Power symbol
under the F1 key

2. The following (or similar) will appear on the display screen of the thickness gauge:



3. The next screen that appears automatically is the transducer selection screen also referred to as **Home** screen in the manual.

T R A N S D U C E R		
DK550	5.0MHZ	
DC550	5.0MHZ	
DK(S)537	5MHZ	
DC537	5.0MHZ	
DHT537	5.0MHZ	57%
SETUP	RESET	BKLITE

4. Use the up and down arrow keys to select a transducer and press **OK** key. (Please note that the transducer selection will automatically display the transducer last used prior to shut off.
5. Press **F1** to select the **Setup** option.
6. Press **F2** to select the **Reset** option.
7. Press **F3** to select the **Bklite** option.

Performing a Reset (TKG100)

You can reset the TKG100 gauge settings back to the default settings by performing a gauge reset.

Note: Performing a reset permanently deletes all of the saved parameters from the gauge and replaces the settings with default values.

To perform a reset, follow these steps:

1. From the **Home** screen (transducer select screen), press the **F2 Reset** key. The following Reset screen appears:



2. Press the OK button and the ARE YOU SURE? Prompt will appear. Press YES, NO, or BACK using the F1 F2 F3 function buttons as desired.

Performing a Reset (TKG150)

You can reset both the TKG150 DATABASE and PARAMETER settings back to their default settings in one gauge reset or you can reset the PARAMETER and DATABASE data individually.

Note: Performing a reset permanently deletes all of the saved parameters from the gauge and replaces the settings with default values.

To perform a reset, follow these steps:

1. From the **Home** screen (transducer select screen), press the **F2 Reset** key. The following Reset screen appears:



2. Use the up and down arrow keys to select DATABASE, PARAMETERS, or ALL and then press MENU/OK.
3. The ARE YOU SURE? Prompt will appear. Press YES, NO, or BACK using the F1 F2 F3 function buttons as desired.

4. Note that performing a Database Reset clears all the files in the database and keeps the first three: Linear, Row increment and Col increment database files with cleared readings. All the user created files in the database will be cleared and deleted.
5. After performing a Reset, the **Home** screen appears automatically.

Backlight

The backlight can be turned On or Off by pressing **F3 – Bklite**. Backlight can also be turned On, Off or set on Auto using the **Bklight** option in the Setup Menu.

Note: Leaving the backlight on will reduce battery life.

If you set the backlight to Auto, the backlight will turn on during active readings and hold for 15 seconds or unless otherwise specified.

Note: If the backlight is set to Auto and you have the gauge in Hold mode, the backlight will shut off after 15 seconds. If you would like the hold to remain lit, then you must enable the backlight on instead of using Auto.

About Screen

You can find information about any of the TKG series thickness gauges such as the model number, version number and contact information from the gauge's **About** screen. To go to the **About** Screen, follow these steps:

1. From the **Home** screen (transducer select screen), press the F2 – Reset key. The **Reset** screen will appear.
2. Press the F3 – About key. The following **About** screen appears.







3. Press the **F1 – Exit** key to return to the **Reset** selection screen.

3 Calibrating the Gauge

Calibrating is the process of adjusting the gauge for a specific material and transducer before testing material to make sure that all measurements are accurate. You must always calibrate before measuring material for standard accuracy.

To measure a thickness of unknown material you need to know the velocity of the sound in the unknown material. To find the velocity of the sound you can use one of the following methods:

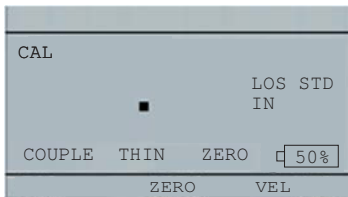
-  Velocity calibration only
-  Velocity and zero calibration
-  Zero calibration only
-  Delay line calibration

Velocity Calibration Only

If you are working with a test piece of known thickness but unknown material, then you can calibrate the velocity of the sound in the unknown material by measuring the time of flight from main-bang to the first back echo. By using the known thickness you can calculate velocity of the sound for the unknown material.

To perform any calibration, first go to the measure mode and press Menu/OK. Then select the Calibration option from the Menu screen and press OK. The following Calibration mode screen (or similar) should appear. To

exit the calibration screen without performing any calibration, press OK. To proceed to the Velocity calibration, follow the following instructions.



Cal screen for TKG100 non-datalogger version

While measuring the thicker step, select VEL by pressing F3. After selecting VEL, you can take the transducer off the test block. If the displayed measurement is different than the known value of the step, use the up or down arrow key to adjust the displayed value to the known value of the step. Press OK to perform the calibration. The unit will briefly display the calibrated velocity value in the top of the screen and then return to measure mode.

Velocity and Zero Calibration

If you have a test step block of known thicknesses but unknown material, then you can calibrate the zero and velocity of the sound in the unknown material by measuring the time of flight from the main-bang to the first back echo for thinner step and thicker step.

To calibrate both: velocity and zero at the same time first go to the Calibration mode as shown in Velocity Calibration Only section. While measuring the thicker step, select VEL by pressing F3. After selecting VEL you can take the transducer off the test block. If the displayed value is different than the known value of the step, adjust the value by pressing up or down arrow keys and press F1/CAL. Then while measuring the thinner step select ZERO by pressing F2. After selecting ZERO you can take the transducer off the test block. If measured value is different than the known value of the step, adjust the measured value by pressing up or down arrow key and then press OK. The unit will briefly display the calibrated zero value and then return to Measure mode. Note that the order of Velocity and Zero calibration could be reversed. If Velocity calibration is performed after Zero calibration, the calibrated velocity value will be displayed at the end of the calibration process.

Zero Calibration Only

If you have a test step block of known thickness and known velocity of sound in the material, then you can calibrate the zero by measuring the time of flight from main-bang to the first back echo for the thinner step. The calibrated zero is the calculated zero minus the measured zero.

To accurately measure a thickness of unknown material you need to know the velocity of the sound in the unknown material and the errors introduced by the cable

and electronics. This is called delay line and zero calibrated value for the transducer.

To perform a zero calibration, go to the Cal mode as shown in Velocity Calibration Only section. Then while measuring the thinner step, select ZERO by pressing F2. After selecting ZERO, you can take the transducer off the test block. If the displayed measurement is different than the known value of the step, use the up or down arrow key to adjust the displayed value to the known value of the step. Press OK to perform the calibration. The unit will briefly display the calibrated zero value in the top of the screen and then return to measure mode.

Delay Line Calibration

Delay line calibration is done every time the thickness gauge is powered on and a transducer is selected, or when a different transducer is selected during normal operation.

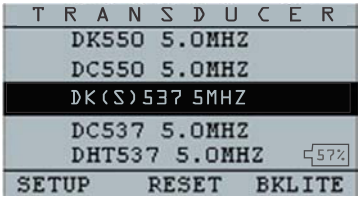
Delay line calibration is performed by measuring the echo of the transducer itself when it is not placed on any material and there is no couplant on the transducer surface.

Under normal usage, the surface of the transducer wears over time, which reduces sensitivity of the transducer. When you power on any of the TKG series thickness gauges and select a transducer, the gauge performs automatic calculations and warns you (patent pending) if

the sensitivity of the transducer is too low and whether the transducer should be replaced.

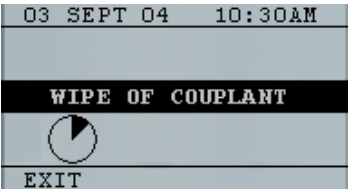
Automatic Zero

To perform an Automatic Zero or Auto Zero, you must first select a transducer option from the Transducer selection screen and press the **Menu/OK** key.



To continue the Auto Zero, follow these steps:

- 1. Follow the instructions given on each display screen; the first of which will prompt you to wipe off any couplant from the transducer and wait three seconds. The waiting time is shown in the changing pie-clock graphic on the display screen.



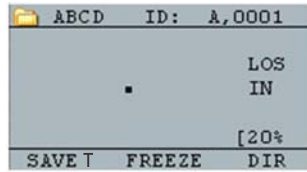
2. After three seconds the gauge automatically begins to zero the transducer. During the delay line calibration a screen appears displaying the message “Performing Auto Zero”.
3. A warning message will appear on the display screen if the delay line is below the acceptable limit for accurate thickness measurements. You will need to replace the transducer or select the **F1** key to acknowledge the warning message and continue using the same transducer, which may have a worn surface.
4. After three seconds or after acknowledging the warning message, the display shows the instrument parameters for 3 seconds before going to **Measurement** mode.

XDUCER DK537 5.0MHz	
DELAY	--- 4856
VEL	0.2360 IN/US

4 Measurement Mode

Measurement Mode with a Datalogger (TKG150)

For the TKG150 series datalogger the display screen in **Measurement** mode will look similar to the screen below:

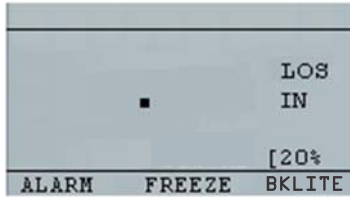


To continue in **Measurement** mode, follow these steps:

1. Press the **F1** key to select the **Save T** option. (See: Save section.)
2. Press the **F2** key to select the **Freeze** option. (See: Freeze section.)
3. Press the **F3** key to select the **Dir** (Directory) option. (See: Directory section.)
4. Press the **Menu / OK** key to select the **Menu** option. (See: Menu section.)

Measurement Mode without a Datalogger (TKG100)

The TKG100 display screen in *Measurement* mode will look like the screen below:



To continue in *Measurement* mode, follow these steps:

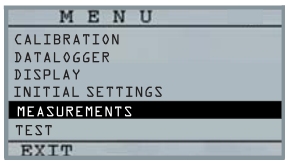
1. Press the **F1** key to select the **Alarm** option.
(See: Alarm section.)
2. Press the **F2** key to select the **Freeze** option.
(See: Freeze section.)
3. Press the **F3** key to control the **display backlight**. (See: Display Backlight)
4. Press the **Menu / OK** key to select the Menu option. (See: Menu section.)

Note: The available choices for F1, F2, F3 are different for the TKG100 series thickness gauge.

Also, the file symbol, filename, ID: xx,xxxx are not displayed in the TKG100 series thickness gauge.

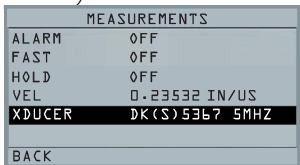
Measurement Mode Setup Options

The following modes are available (please note that in the TKG100 model the **Datalogger** mode is not available):



To select the **Measurements** setup mode, first access the main MENU (using the MENU/OK button from the Home screen), and then follow these steps:

- 1. Use the arrow buttons to highlight MEASUREMENTS and then press **Menu OK**. A screen similar to the one below will appear (a full list of setup options is shown later in this section):



- 2. Use the up and down arrow keys to select any of the setup parameters available and press the **OK** key to change the setting. You can also change the setting using the “Quick Access

mode”. To do this, simply use the left and right key (indicated in the top right hand of the display screen) to change the setting of the highlighted parameter.

3. The entire list of available MEAUREMENT MODE parameters for the TKG100 and TKG150 (red items TKG150 only) are as follows:

FAST	OFF
GAIN	LOW dB
HOLD	OFF
MEAS, TYPE	THICKNESS
VEL	0.23596 IN/US
XDUCER	DKS537 5.0MHz
ALARM	OFF
BSCAN	OFF
DIFF	OFF
E-TO-E	OFF

Setting the Clock

The TKG series thickness gauges have an internal real-time clock that includes the year, month, day and time.

This option appears under the Initial Settings option.

The entire list of available clock setup options are as follows:

TIME FORMAT	12 HR
DATE FORMAT	MM/DD
MINUTE	21
HOUR	01 PM
DAY	01
MONTH	01
YEAR	2013

To set the time and date, follow these steps:

- 1. Select CLOCK from the INITIAL SETTINGS list in the main MENU.

The following is an example of what the clock setup screen might look like depending on the

previous setup.

CLOCK SETUP	
TIME FORMAT	12 HR
DATE FORMAT	MM/DD
MINUTE	4
HOURL	12
DAY	8
MONTH	10
BACK	

2. To change the **Time Format**, select TIME FORMAT using up/down arrow keys. Use the left/right arrow keys to select between 12 HR and 24 HR options.
3. To change the **Date Format**, select DATE FORMAT using up/down arrow keys. Use the left/right arrow keys to select between MM/DD and DD/MM options.
4. To set **Minute**, select the MINUTE option using up/down arrow keys. Use left/right arrow keys to decrease/increase the minute value. You can set the minute value from 00 to 59.
5. To set the **Hour**, select the HOURL option using up/down arrow keys. Use left/right arrow keys to decrease/increase the hour value. If time is set in 12 HR format, the available hour values are from 00 AM to 11 PM. If time is set in 24 HR format, the available hour values are 00 to 23.

6. To set **Day**, select the DAY option using up/down arrow keys. Use left/right arrow keys to decrease/increase the day value. You can set the day value from 01 to 31.
7. To set **Month**, select the MONTH option using up/down arrow keys. Use left/right arrow keys to select a Month from JAN to DEC.
8. To set **Year**, select the YEAR option using the up/down arrow keys. Use left/right arrow keys to select the year value from 2005 to 2025.






Press Menu to store the changes and to return to the INITIAL SETTINGS screen. The real-time clock will automatically update the date and time once the clock parameters are selected and stored.

Setting LCD Contrast

To change the display contrast, select **Contrast** from the **Display** option under the main MENU. Use left and right arrow keys to select contrast value from 1-64. Press **BACK** to save the selection and return to the previous screen.

Understanding a LOS Reading

LOS (Loss of Signal) occurs when the gauge is not making a valid reading. This can happen for a variety of reasons, including the ones in the list below:

-  Not enough couplant
-  Surface is too rough or rusty
-  Low Transducer sensitivity
-  Temperature is too high
-  Dis-bond exists between the coating and the steel

In the event you try to save a reading in LOS with the TKG150, the **Notes** screen will automatically appear so that a reason is given for saving an LOS. You can scroll to the appropriate note and press the soft Save key.

Using the Hold Option

If a LOS occurs, the gauge can continue to display the last measured thickness by “holding” or freezing the measurement.

Using the Fast Option

The **Fast** option is available by accessing the main MENU, selecting **MEASUREMENTS**, and then selecting **FAST** from the list.

To select the **Fast** option, follow these steps:

1. Use the up and down arrow keys to highlight the **Fast** option and press the **OK** key.

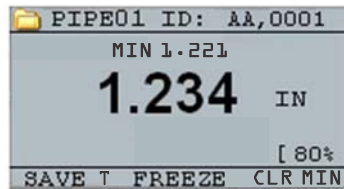
MEASUREMENTS	
ALARM	OFF
FAST	OFF
HOLD	OFF
VEL	0.23532 IN/US
XDUCER	DK(S)5367 5MHZ
BACK	

2. The following parameters are available:

F A S T
OFF
ON
MIN
MAX
EXIT

3. Use the up and down arrow keys to select the desired parameter and press the **OK** key.
4. Press **F1 Back** key to return to the **Measurement** mode.

In the **Measurement** the selected **Fast** option setting is displayed similar to the screen below:



Helpful Hint: When using the FASTMIN mode, if you press the **F2** key "Freeze" prior to LOS, the gauge will display the last minimum prior to the LOS so that the actual couplant on the end of the transducer is not registered as a legitimate minimum reading.

The parameters that you select in the **Fast** option are shown as follows in **Measure** mode:

FAST	when On is selected
FASTMIN	when Min is selected
FASTMAX	when Max is selected
<BLANK>	when Off is selected

The **Fast** option allows you to select fast updates of measurements at 20 Hz compared to 4 Hz. If you select the **FastMax** option, the LOS will display the LAST MAX measured value, or if you select the **FastMin** parameter the LOS will display the LAST MIN measured

value. If you select the **On** parameter from the **Fast** option, the LOS will work normally and not show the measured reading.

The screens below reflect different parameters selected from the Fast option. For example, the top screen shows the FASTMAX with LAST MAX measurement on LOS, and the bottom screen shows the FASTMIN with LAST MIN measurement on LOS.

MAX 1.344		
		LOS
		IN
	FASTMAX	[80%
SAVE	FREEZE	MAXCR

MIN 1.221		
		LOS
		IN
	FASTMIN	[80%
ALARM	FREEZE	MINCR

Note: The LOS flag indicates the LAST MAX or the LAST MIN value and is shown based on the FastMax or FastMin setting.

To reset the tracking of LAST MAX and LAST MIN measured value press the **OK** (Menu) key.

Using the Gain Option (TKG150 only)

Gain refers to an increase in signal power (echo height) and is typically measured in decibels (dBs). The Gain function is useful for setting a reference level where by making it easier to add or subtract gain. There are three Gain options, which include: LOW dB, STD dB & HI dB. The Gain selection is available from the **Measurements** mode screen in the Main MENU.


MEASUREMENTS	
ALARM	OFF
BSCAN	OFF
DIFF	OFF
E-to-E	OFF
FAST	OFF
GAIN	STD
BACK	


1. Use the up and down arrow keys in the **Measurements** screen to highlight the **Gain** option.
The following Gain parameters are available:
STD (standard), LO, and HIGH
2. Use the left/right arrow keys to select the desired **Gain** option.
3. Press the **F1** key to accept the parameter and return to **Measure** mode.

In the **Measure** mode screen the **Gain** option that you select is displayed on the center/right side of the display.

Using the Diff Option

There are 3 Diff options:

 **ABSOLUTE:** Absolute, where the gauge will display a thickness value as an absolute number. For example, diff abs = 0.500" and the real thickness is 1.000 inch, the display will show diff abs 0.500. If the real value is 0.300, the gauge will display, -0.200"

 **PERCENT:** When this mode is on, the displayed value will be listed as a percentage of the value entered into as the diff. For Example, if the operator set the diff to percentage at 0.500", a reading of 0.250" will result in 50%







 **OFF:** Diff Option off.

In the **Measure** mode screen, highlight the **DIFF** option and select the desired option using the right/left arrow keys. Press F1 to exit Measurement mode and save settings.


5 Alarm Options

Using the Alarm Option

The TKG series thickness gauges offers various alarm settings to alert you of low or high thresholds via audible sounds, display flashes, vibrations (if on) and illuminating keypad. There are several alarms options, which include:

-  Alarm On/Off: Sets the audible alarm either on or off.
-  Low Alarm: Audible alarm will occur and display will flash when the displayed reading is less than the low alarm reference value.
-  High Alarm: Audible alarm will occur when the displayed reading is higher than the high alarm reference value.
-  High_Low Alarm: Audible alarm will occur and display will flash when the displayed reading is less than the low alarm or greater than the High alarm reference value.
-  Low Alarm/Vibra (TKG150 only): Vibration alarm will occur and display will flash when the displayed reading is less than the low alarm reference value.
-  High Alarm/Vibra (TKG150 only): Vibration alarm will occur and display will flash when the

displayed reading is higher than the high alarm reference value.

-  High_Low Alarm/Vibra (TKG150 only): Audible alarm will occur and display will flash as well as vibrate when the displayed reading is less than the low alarm or greater than the High alarm reference value.

The **Alarm** option is available from the **Measurements** screen list.

MEASUREMENTS	
ALARM	OFF
BSCAN	OFF
DIFF	OFF
E-to-E	OFF
FAST	OFF
GAIN	STD
BACK	

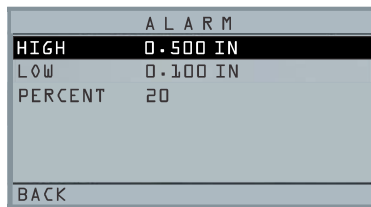
1. Use the up and down arrow keys to highlight the **Alarm** option and press the **OK** key (or you can use Quick Access mode by using the right or left keys once **Alarm** is highlighted). For the TKG100 model you can also press the **F1** (Alarm) key to go directly to the **Alarm** option without having to go through the **Main MENU/Measurement** Mode list.

The ALARM selections available are listed on

the previous page.

2. Use the up and down arrow keys to select the desired alarm type and then press the **OK** key.

The following screen below appears (screens will differ slightly based on alarm type selection). Use the up and down arrow keys to select the high, low, or percent parameters and then use the left/right arrow keys to change the Alarm limits. Press the **OK** key to continue.



Note: The Low Alarm limit will not go beyond the High Alarm limit.

3. When you are finished adjusting the setting, press the F1 key to return to Measure mode.

Visual and Audible Alarm

The Visual Alarm conditions can be viewed from either a red, yellow or green LED that light up under the **F1**, **F2**, or **F3** keys on the keypad.

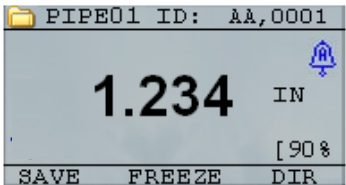
As an example, when using the 5 step English test block with thicknesses of 0.100, 0.200, 0.300, 0.400 and 0.500 inches, if you enter alarm high-low you will first need to enter the high value. Enter 0.500 and press enter. Next you will need to enter the low value of 0.100 in. The display will ask you to enter the percent reading of the high low. The gauge will default to 20% (this can be changed with the up or down keys), so any reading within 20% of the high value (approaching high, between 0.400 and 0.499 as 0.400 is within the 20% range of 0.500.) will result in the yellow keypad lighting up. Also, any reading above the low value of 0.101 and 0.120 will result in the yellow F2 keypad lighting up as you are approaching the minimum

So, in **Alarm** mode, choosing a non-zero percent value provides the user with warning for readings approaching the selected percent value of the high or low limits. For example, if the alarm value is 0.100" and 20% is entered as the "percent value", reading from 0.101" to 0.120" will result in the **F2** "yellow" key being illuminated. Also, reading less than 0.100" will result in the F1 key "Red" being illuminated and greater than 0.120" will result in the **F3** "Green" key being illuminated.

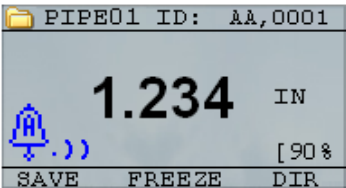
The Audible Alarm turns the beeper on the gauge either on or off based on the same alarm conditions used for visual alarm stated above.

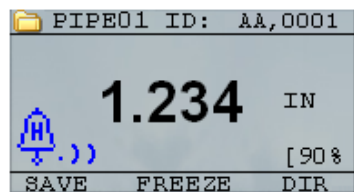
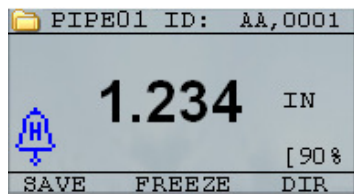
‘Vibra’ Alarm (TKG150 only)

The gauge will physically vibrate when the Vibrating Alarm is active based on the same alarm condition used for visual alarm. The Vibrating Alarm, noted as ((.)) on the gauge display, can be enabled with varying alarms and alarm conditions as shown on the screens below:



Visual and Audible Alarm is enabled.
The letter **A** (Alarm) appears in the alarm icon

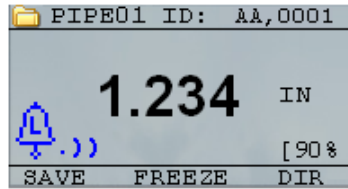
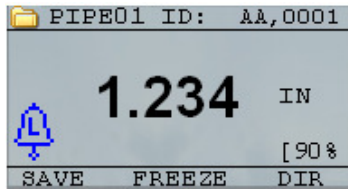




Visual, Audible, and Vibrating alarm enabled

)) symbol appears next to the alarm icon. The letter **H** (High) appears in the alarm icon

Alarm condition has occurred meaning the measured reading is greater than the High Alarm limit. The letter **H** (High) appears in the alarm icon. The screen above has the Vibrating alarm enabled as the)) symbol appears next to the alarm icon.





Visual, Audible, and Vibrating alarm enabled
)) symbol appears next to the alarm icon. The letter **L**
 (Low) appears in the alarm icon

Alarm condition has occurred meaning the
 measurement reading is less than the Low
 Alarm limit. The letter **L** (Low) appears in the
 alarm icon. The screen above has the Vibrating
 alarm enabled as the)) symbol appears next to
 the alarm icon.

Note: For the TKG100, the **F1**, **F2**, and **F3** choices are different and the file symbol or the filename along with ID# are not shown.

6 Using the Echo-to-Echo Option (TKG150 only)

The **Echo-to-Echo** option allows you to make measurements between two consecutive back-wall echoes. Therefore, a good usage of the **Echo-to-Echo** option is for measuring through coatings to measure only the true metal thickness. There are two Echo-to-Echo options you can select, which are as follows:

-  Echo-to-Echo On: Enables the Echo-to-Echo function
-  Echo-to-Echo Off: Disables the Echo-to-Echo function

In the **Measurements** mode screen in the Main menu, highlight the **E-TO-E** option and select the desired option using the right/left arrow keys. Press F1 to exit Measurement mode and save settings and F1 again to get back to the measurement mode.

7 Special Gauge Functions

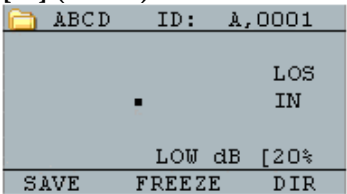
The TKG series thickness gauges have many special functions that go beyond the basics, mainly in the TKG150 model. This section will discuss these special gauge functions in detail.

Using the Save Option (TKG150 only)

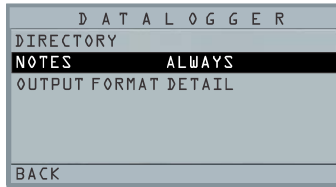
You are able to save your data via the **Save** option.

To use the **Save** option, follow these steps:

1. From the **Measurement** mode screen, press **[F1] (Save T)**.



The data saved will depend on your setup parameters. For example, if the **Notes** option is set to **Off** (Main MENU, DATALOGGER, NOTES) the saved thickness readings will be stored at the ID location [Linear], [Row], [Col] without notes. (See: Directory selection for file type details.)



2. If the **Notes** option is set to **Always** then the thickness reading is stored at the ID location [Linear], [Row], [Col] with notes. To change the Notes settings, select the Notes option from the **Datalogger** screen in the MAIN Menu.

Now when you press **Save T** (T for Thickness) to store a reading in measurement mode, the following **Notes** options will be presented:

No comments, not sand blasted, pitting too hot, broken insulation, couldn't read scaffold, needs painting, broken/ missed plug, obstruction, port, burner, metalized, overlay, already cut out, and pad weld

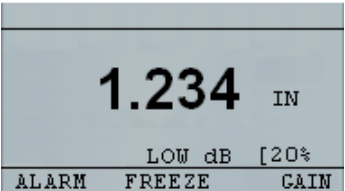
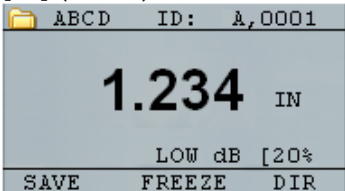
3. Use the up and down arrow keys to select a note for the reading and press the **OK** key. The selected note will be stored at the ID location, and based on the file type, [Linear], [Row], or [Col] is incremented. (See: Directory selection for file type details.)

Using the Freeze Option

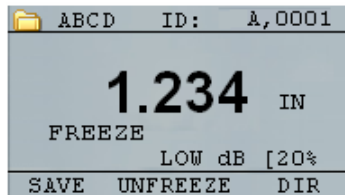
You can freeze your data via the **Freeze** option.

To use the **Freeze** option, follow these steps:

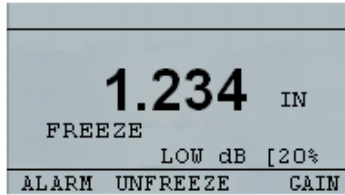
- 1. From the **Measurement** mode screen, press **[F2] (Freeze)**.



The following screen comes up after pressing **[F2] (Freeze)** whereby showing the flag “**Freeze**” under the thickness reading. You are now in **Freeze** mode. The **[F2]** selection also changes from **Freeze** to **Unfreeze**.

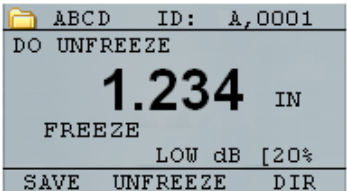


TKG150 Datalogger version

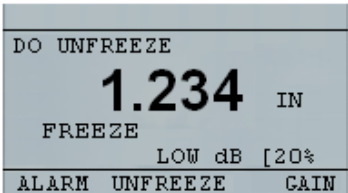


TKG100 Non-datalogger version

2. Press **[F1] (Save)** to save the reading. (See Using the Save Option for more information.)
3. Press **[F2] (Unfreeze)** to disable the **Freeze** mode
4. Press **[F3] (Dir)** to perform file operations. (See Using the Directory Option for more information.)
5. While in **Freeze** mode the menu options are disabled. The display will prompt you to unfreeze the gauge.



TKG150 Datalogger version



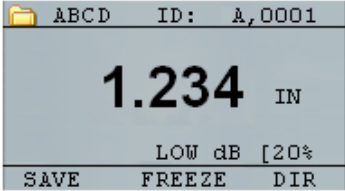
TKG100 Non-datalogger version

Using the Menu Option

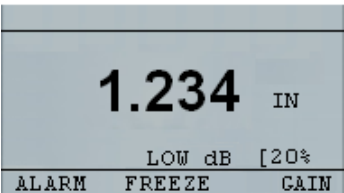
For the TKG100 and TKG150 models you can operate in **Measure** mode.

To use the **Measure** mode, follow these steps:

- 1. Press the **Menu (OK)** key to select the **Menu** options from **Measure** mode.



Measure mode of the TKG150 Datalogger version



Measure mode of the TKG100 Non-Datalogger version

The following **Menu** options are available:

TKG150 Datalogger version

M E N U
CALIBRATION
DATALOGGER
DISPLAY
INITIAL SETTINGS
MEASUREMENTS
TEST
EXIT

TKG100 Non-datalogger version

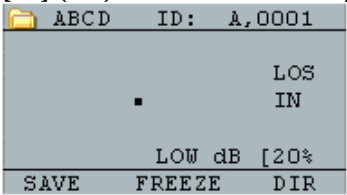
M E N U
CALIBRATION
DISPLAY
INITIAL SETTINGS
MEASUREMENTS
TEST
EXIT

8 Using Datalogger Directory Mode (TKG150 only)

Note: This section applies only to the TKG150 Thickness Gauge with a datalogger. If you do not have a datalogger, you may skip this section.

To use the datalogger **Directory** mode, follow these steps:

- 1. From the **Measurement** mode screen press **[F3] (Dir)** to select the **Directory** mode.



By pressing **[F3] (Dir)** you will be able to review, create, delete, select, rename and clear stored thickness and copy.

- 2. Use the up and down arrow keys to view the list of files, and select whichever one is relevant.

Increment Row [R] or
Column [C] in grid file or
Linear [L] in linear file after
every save operation

Column, Row matrix for
grid file or linear type

List of filenames

File size

% of ID locations stored with
thickness readings in this file

NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TWO	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				


- 3. Press the **OK** key to select a file in the directory view.
- 4. To create a custom file see **Creating Custom Files** section.
- 5. To review thickness readings, see **Reviewing a File** section.
- 6. To rename custom file, see **Renaming a File** section.
- 7. To clear an entire file, see **Clearing a File** section.
- 8. To clear selected readings from a file, see **Reviewing a File** section.


9. To create copy of the existing file structures, see **Copying a File** section.
10. To delete a custom file, see **Deleting a File** section.

The first three files cannot be deleted or renamed. These files are factory default files available for you to start storing thickness reading or make a quick copy of the file structure (Linear or Grid [Col, Row]) in order to start saving data in the new file. (See File System for more information.)


Managing the Datalogger File System


The TKG150 supports the following two files types:

 **Linear file:** Consists of ID# from 0001 to 5000. The extended memory option consists of ID# from 1 to 500000.

 **Grid file:** Consists of ID# as COLUMN and ROW. The COLUMN is single or double digit capital alpha character from A to Z and AA to ZZ. The ROW is a four digit number based on the $5000 / \text{COLUMN}$.

For example, when you create a new GRID file with END COLUMN = C, then the maximum ROW you can slew up to is limited to 1666 calculated by the instrument as follows:

 The total storage space per file is 5000 readings.

 For Columns ending at C, this means 3 columns are required and the maximum Row allowed is limited to $5000 / 3 = 1666$.

If you create a new GRID file with END COLUMN = Z, then the maximum ROW you can slew up to is limited to $5000/26 = 192$.

If you create a new GRID file with END COLUMN = AF, then the maximum ROW you can slew up to is limited to $5000/(26 \text{ for A to Z} + 6 \text{ for AA to AF}) = 156$ the grids are created as shown below:

```

A,1 to A,156 then
B,1 to B,156 then
:
Z,1 to Z,156 then
AA,1 to AA,156 then
AB,1 to AB,156 then
:
AF,1 to AF,156

```

If a new GRID file with END COLUMN = ZZ, then the maximum ROW you can slew up to is limited to $5000 / (26 \text{ for A to Z} + 26 * 26 \text{ for AA to ZZ}) = 7$.

```

A,1 to A,7 then
B,1 to B,7 then
:
Z,1 to Z,7 then
AA,1 to AA,7 then
AB,1 to AB,7 then
:
AZ,1 to AZ,7 then
BA,1 to BA,7 then
BB,1 to BB,7 then
:
:
ZZ,1 to ZZ,7

```

Note that there are two different types of Grid files: ROWINC and COLINC. The above two examples show how the ID locations are incremented in ROWINC type file only. Here the Row value is incremented first, while updating ID location. Whereas, in a COLINC type file, Column value is incremented first.

So for a COLINC file with END COLUMN value AF, the ID locations will increment as follows:

A,1 to AF,1 then

A,2 to AF,2 then

.

.

A,156 to AF,156

A COLINC file with END COLUMN value ZZ will have ID increments as follows:

A,1 to ZZ,1 then

A,2 to ZZ,2 then

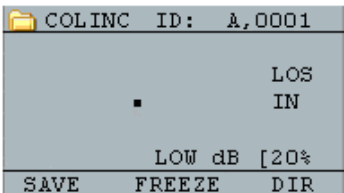
.

A,7 to ZZ,7

Creating Custom Files

To create a custom file in the datalogger, follow these steps:

- 1. Press **[F3] (Dir)** from the **Measurement** mode screen.

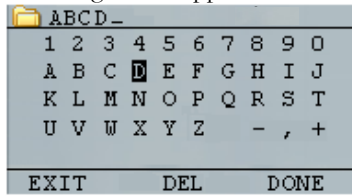


The following screen appears:

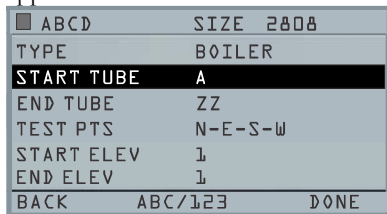
NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TW00	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

- 2. Use the up and down arrow keys to highlight the next **Empty** file in the list.

- Press the **OK** key and select **RENAME**, the following screen appears:



- Use the up, down, left, and right arrow keys to select the characters of the filename. Press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to delete the last character of the entered filename.
- Press **[F3] (Done)** when you are finished entering the filename. The following screen appears:

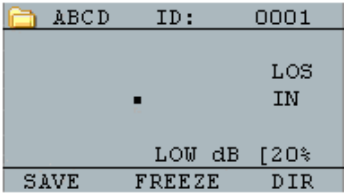


- Use the left and right arrow keys to select a file type. **See the next two sections for more information on selecting file type for the new file.**

Selecting a Custom Linear File

When you select a LINEAR file format you are prompted to select START and END file points. With the extended memory, you can store up to 100,000 readings allowing you more total files.

Pressing the **F3 (Done)** key again will take you to the **Measure** mode displaying the new filename in the top left corner and the next ID location in the top right corner.



Selecting a Custom Grid File

When you select a grid file type, the display changes as shown below. You can now select the number of rows and columns for your new file.

ABCD	SIZE	26
TYPE	2D	
START COL	A	
END COL	Z	
START ROW	1	
END ROW	1	
1ST INC	COL	
BACK	DONE	

Use the up and down arrow keys to select the END ROW option. Now press left or right arrow key to change the END ROW value. Then press down arrow key to select END COL option. Press left or right arrow key to change the END COL value. Since the file size is limited to 5000, the END COL value is limited to 5000/END ROW. Note that the 'FILE SIZE' will change depending on the END ROW and END COL settings.

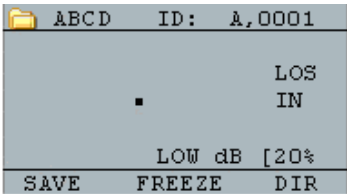
When you are finished selecting END ROW and END COL values, press F3 (Done). The display will go back to Measure mode, showing the new filename and next ID location in the top row as shown below.

ABCD	ID:	A,0001
	LOS	
	IN	
	LOW dB	[20%
SAVE	FREEZE	DIR

Reviewing a File

To review a file from the **Measurement** mode screen in datalogger version only, follow these steps:

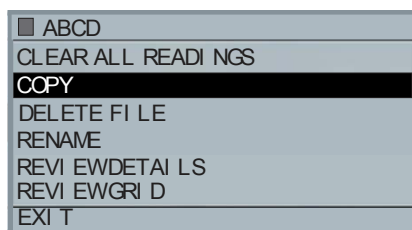
- 1. Press **[F3] (Dir)** from the **Measurement** mode screen.



The following screen appears:

NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TWO0	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

- 2. Select the file you would like to review using the up and down arrow keys and press the **OK** key. Based on the type of file you select, a screen will appear the same or similar to the one shown in the example below:



The three factory default files have only 3 options: Clear All Readings, Copy, and Review Details. Custom files have 5 options: Clear all readings, Copy, Delete file, Rename, Review details, and Review Grid. Select the **Review** option and press the **OK** key to review the file.

Reviewing a Linear File

The linear file shows the ID# and the stored readings along with the units. You can browse the readings by pressing the up or down arrow key. You can also press **F3 (Beg/End)** to go to the beginning or end of the file.

LINEAR		
1	0.080	IN
2	0.100	IN
3	0.103	IN
4	1.000	IN
5	0.908	IN
EXIT	CLEAR	BEG

To clear a reading from the file, select the reading to be cleared by pressing up or down arrow key and then press

F2 (Clear). Note that once a reading is cleared, it cannot be restored. To store another reading in the file location that has been emptied by the **Clear** operation, highlight that location by pressing up or down arrow key. Then press **OK** to go to the measure mode. When you have the new reading to be stored in the emptied file location, press **F1 (Save)**. The new reading will be saved in that location and the display will show the next empty file location in the top right corner.

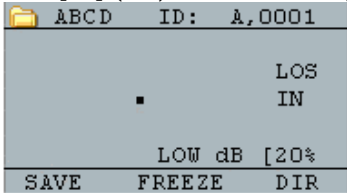
Reviewing a Grid File

The grid file shows the ID# as COL, ROW and the stored reading with the units. Use the F3 function key to go to the beginning (BEG) or END of a file list.

Renaming a File

To rename a file from the **Measurement** mode screen in datalogger version only, follow these steps:

- 1. Press **[F3] (Dir)** for the **Directory** mode.




The following screen appears:

NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TW00	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

- Use the up and down arrow keys to select the file you would like to rename and press the **OK** key.

Note: The **Rename** option is not available for the first three factory default files.

- Use the up and down arrow keys to select the **Rename** option and press the **OK** key to rename the file. A screen the same or similar to the one below appears.

<div>  ABCD_ </div>										
1	2	3	4	5	6	7	8	9	0	
A	B	C	D	E	F	G	H	I	J	
K	L	M	N	O	P	Q	R	S	T	
U	V	W	X	Y	Z	-	,	+		
EXIT			DEL			DONE				

4. Use the up, down, left, and right arrow keys to select the characters of the filename. Press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to delete the last character of the entered filename.
5. Press **[F3] (Done)** when you are finished entering the filename. The old filename will be updated with the new filename in the directory as shown in the example below.

Note: Press **[F1] (Exit)** to exit the screen without renaming the file.

Example:

A user erases a file named ABCD by pressing **[F2] (Del)** and selects XYZ as the new filename and presses **[F3] (Done)** to accept the entered new filename.

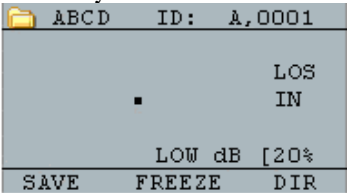
XYZ_												
1	2	3	4	5	6	7	8	9	0			
A	B	C	D	E	F	G	H	I	J			
K	L	M	N	O	P	Q	R	S	T			
U	V	W	X	Y	Z	-	,	+				
EXIT				DEL				DONE				

The old filename in the directory is updated with the new name.

Clearing a File

To clear (or delete) a single thickness reading at a time from a file, see **Reviewing a File** section. To clear all the readings from a file, use the clear file option. To do this, from measurement mode, press **[F3] (Dir)** for the

Directory mode.



The following screen appears:

NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TW00	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

1. Use the up and down arrow keys to select the file you want to clear and press the **OK** key.
2. Use the up and down arrow keys to select the **Clear All Readings** option and press the **OK** key to clear all the stored thickness readings in that file. The meter will prompt for

YES/NO/EXIT confirmation:

Press **[F1] (Exit)** to exit without clearing the thickness readings.

Press **[F2] (Yes)** to clear the stored thickness from the entire file.

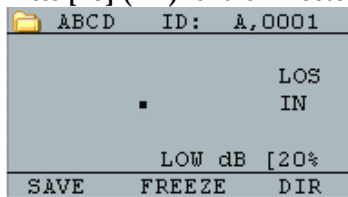
Press **[F3] (No)** to exit without clearing the thickness readings.

If the file is already clear, the unit will show 'NO READINGS TO CLEAR.' message.

Copying a File

To copy a file, from the **Measurement** mode screen in datalogger version only, follow these steps:

1. Press **[F3] (Dir)** for the **Directory** mode.



The following screen appears:

NAME	TYPE	SIZE	SV	%
LINEAR	LN	5000	T	<1
TWO	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

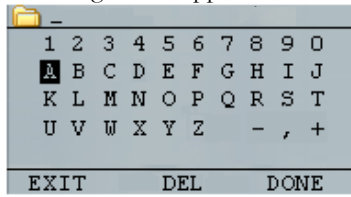
- Use the up and down arrow keys to select a file and press the **OK** key. Any file structure (factory default or custom) can be copied.

Note: When you copy a file only the structure of the file ID# is copied and not the associated file readings.

- Use the up and down arrow keys to select the **Copy** option and press the **OK** key. The following confirmation prompt or a similar prompt appears with the next Empty file highlighted as the default choice.

PICK FILE TO COPY TO				
COLINC	C,0001	C	<1%	
ABCD	A,0001	R	000	
EMPTY02				
EMPTY03				
EMPTY04				
EXIT				

Press up or down to select an Empty file and press **OK** to assign it a new filename. The following screen appears.

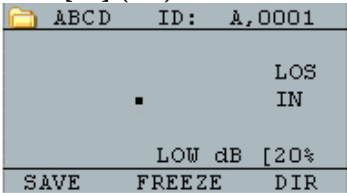


4. Use the up, down, left, right arrow keys to select the characters of the filename and press the **OK** key to accept the selected characters. If you make an error, press **[F2] (Del)** to erase last character before the cursor.
5. Press **[F1] (Exit)** to exit without copying the file.
6. Press **[F3] (Done)** when you are finished entering the filename. A new file with the selected name will be added in the directory with the file structure of the original file.

Deleting a File

To delete a file, from the **Measurement** mode screen in the datalogger version only, follow these steps:

- 1. Press **[F3] (Dir)** for the **Directory** mode.



The following screen appears:

NAME	TYPE	SIZE	SV	Z
LINEAR	LN	5000	T	<1
TH00	2D	4900	T	00
BOILER	B0	3120	T	00
EMPTY01				
EMPTY02				
BACK				

- 2. Use the up and down arrow keys to select the file to be deleted and press the **OK** key.

Note: Only custom files can be deleted. The factory default files cannot be deleted.

- 3. Use the up and down arrow keys to select the **Delete File** option and press the **OK** key. A

confirmation prompt for YES/NO/EXIT appears.

Press **[F1] (Exit)** to exit the screen without deleting the file.

Press **[F3] (No)** to exit the screen without deleting the file.

Press **[F2] (Yes)** to delete the file and remove the file from the directory.

7 Technical Specifications

Specifications for the TKG100/TKG150 Ultrasonic Thickness Gauges

Size:	5.4" (127 mm) (L) x 3" (76.2 mm) (W) x 1.25" (31.75 mm) (H)
Weight:	8.62 (.23 kg)
Thickness Range:	0.008 - 20 inches (0.20 mm - 508 mm), depending on material, temperature and transducer selection
Material Velocity/Calibration Range:	0.200-0.7362 in/μs (0.508-18.699 mm/μs)
Temperature:	Gauge Operating: -4° F to 122° F (-20° C to 50° C) Surface temperature of material: Depending on probe used, from -5° F to 1000° F (-20° C to 537° C)
Battery Life:	Up to 200 hours (40 hours with backlight on)
Battery Type:	2 "AA" Alkaline
Display:	128 X 64 Graphics LCD monochrome
Information Displays:	LOS, min, max, large reading while displaying min at the same time, velocity, zero, calibration, units, freeze, unfreeze, % battery life remaining, gain - low, std, high, echo-to-echo symbol (option)
Resolution:	0.001" (0.01 mm), 0.01" (0.1mm)
Accuracy:	Basic Accuracy is 0.004" but on clean smooth steel an accuracy of 0.001" is not uncommon. The more corrosive the environment, and pitted the surface under test, the closer to the 0.004" accuracy one can expect to be. As noted, a higher accuracy can be obtained when measuring on cleaner steel.
Probe Recognition:	Via pick list from a menu
Delay Line Measurement:	Auto at power up with listed numeric value. Ideal for correcting delay line wear/curvature and for transducer acoustic drift at elevated temperatures
Package:	Custom, splash-proof, high-impact plastic with rubber, illuminating keypad for go/no-go testing
Bandwidth:	0.5-20 MHz (-3dB)
Units:	English/Metric/Microseconds
Gain:	Low, Standard and High for varying test conditions
Measurement Rate:	4/sec and 20/sec in fast mode

Differential Mode:	Displays the difference from the actual thickness measurement and a user entered reference value
Alarms:	Minimum/Maximum depth, vibralarm, audible/visual indications as well as keypad illumination
Illuminating Keypad:	F1 = Red, F2 = Yellow and F3 = Green for easy, go/no-go testing (Patent Pending)
Automatic probe wear indicator:	(Transducer attendant): Automatically informs the operator to replace the transducer (Patent Pending)
Ergonomics:	User selectable left-handed or right-handed display changes via keypad (Patent Pending)
Backlight:	Light Emitting Diode, On/Off or Auto ON based on valid readings or last key-press
Shut Off:	Auto, time out (after X minutes user programmable after no reading, loss of signal LOS, or no key press)
Scan Mode:	Displays minimum or maximum thickness value at 20 measurements per second (ideal for high temperature thickness reading and tracking the minimum depth alarm). Press Freeze to capture last valid minimum thickness readings prior to Loss of Signal (LOS), without reading the couplant upon lifting probe off the test piece
Carrying Case:	Custom molded pouch with wrist strap for either left-handed or right-handed operators (optional)
Shipping Case:	Hard plastic with high-density molded cut out for all accessories (optional)
Freeze Mode:	Freezes display
Hold Mode:	Holds display to retain last thickness reading in reverse video display
Standard ITC Includes:	Ultrasonic thickness gauge, DK-537 potted, 5 MHz 0.375 inch diameter, operational manual, cable, couplant
Warranty:	Limited 2 year warranty

Specification differences for TKG100 and TKG150 Models

Item	Specification	150	100
Thickness range	0.008-0.20 inches (20mm-508mm)	x	x
Delay line zero measurement	Auto at power up with listed numeric value. Ideal for correcting delay line	x	x
Scan mode	Displays minimum or maximum thickness value at 20 measurements per second	x	x
Hold mode	Holds display to retain last thickness reading with reverse video display	x	x
Freeze mode	Freezes display	x	x
Units	Inches/Millimeters/Microseconds	x	x
Gain	Low, Standard, or High for varying test conditions	x	o
Differential mode	Reference value	x	o
Alarms	Illumination and vibration	x	o
Illuminating keypad	F1=Red; F2=Yellow; F3=Green for easy, go/no-go testing (Patent Pending)	x	o
Auto probe wear indicator	Automatically informs operator to replace transducer (Patent Pending)	x	o
Echo-to-Echo	Measures the thickness only (ignores paint and coatings)	x	o
Non-encoded B-scan	Displays cross section of test piece	x	o
Datalogger version	Upgrade to datalogger version	x	o
Carrying pouch	Custom molded with belt clip and elastic strap	x	o

Note: All software options are field upgradable, no need to return the unit to the factory

8 Software Options

Echo-to-Echo (TKG150 only)

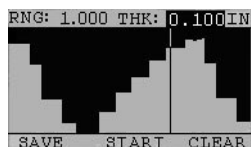
The Echo-to-Echo feature should and can be used within the thickness range of the chart listed below. To calibrate in Echo-to-Echo, first press MENU OK, scroll to set up, press MENU OK and find where E to E is displayed.

Use the right arrow to turn ON or press MENU OK and scroll to ON. You will see a symbol in the top right looking like Echo-to-Echo. Next, press MENU OK, turn on calibration and perform CAL VEL on the thick part with the coating and CAL ZERO on the think part with coating, then MENU OK **(note that a thickness block is required for this operation)**



B-Scan (TKG150 only)

The B-Scan represents a cross sectional view on the test piece. The simplest example is to show a 5 step test block. To turn on the B-Scan on the TKG150, press MENU/OK, scroll to MEASUREMENTS and press OK, select B-scan and press MENU/OK. First enter the maximum thickness you expect to scan using the up, down, left and right keys, then turn on the B-Scan scrolling down and right arrow (left arrow for off). Press F3 in lefty or F1 in righty mode when done. The bottom of the display will read SAVE, START or STOP and CLEAR. To Start a B-Scan, couple to a **test block** and press F2 [START]. If you uncouple the transducer, B-Scan will stop due to LOS. If you press F2 [STOP] the minimum thickness will be displayed in the center of the screen while a vertical cursor allows you to review readings. During review the thickness value is updated in the top right of the display. To save all the readings, press F1 [SAVE]. The amount of saved readings up to the file size of 5,000 readings or what was pre-determined in the current file (See Datalogging) set up. Here is a picture of the B-Scan on a test block.



9 Technical Assistance

Call Extech Instruments for specific technical assistance or troubleshooting questions. See the customer care information on the following pages or visit the website www.Extech.com

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Support Lines: U.S. (877) 439-8324; International: +1 (603) 324-7800

Technical Support: Option 3; E-mail: support@extech.com

Repair & Returns: Option 4; E-mail: repair@extech.com

Product specifications are subject to change without notice

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Lignes d'assistance: États-Unis (877) 439-8324

International: +1 (603) 324-7800

Service d'assistance technique : Option 3 ; E-mail : support@extech.com

Réparations et retours : Option 4 ; E-mail : repair@extech.com

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Líneas de soporte: EE.UU. (877) 439-8324; Internacional: +1 (603) 324-7800

Soporte Técnico Opción 3; correo electrónico: support@extech.com

Reparación / Devoluciones: Opción 4; correo electrónico: repair@extech.com

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