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Operating Manual

Ultrasonic Thickness Gauge

UTM-210

TOKYO KEIKI INC.

FLUID POWER & CONTROL SYSTEMS CO.

Safety Precautions

- The user should thoroughly read and understand the safety precautions outlined herein and strictly observe them to insure safe handling and operation of the product.

The safety conventions and definitions used herein are as follows.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in physical injury or property damage

The following CAUTION labels are affixed to the product.



爆発注意 引火性の雰囲気で使用しない
CAUTION Do not use in the presence of flammable vapors or gases.



感電注意 ケース・ネジをはずさない
CAUTION High voltage inside. Do not open.

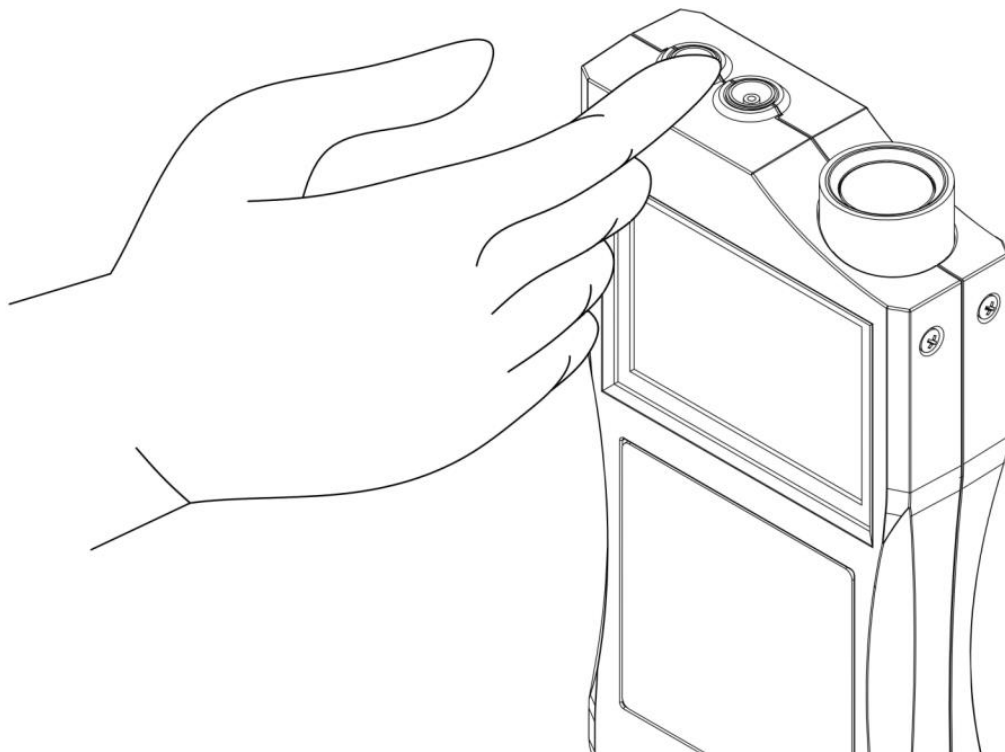
Safety-related labels and symbols are attached to the instrument at the locations shown in the figure below.





WARNING

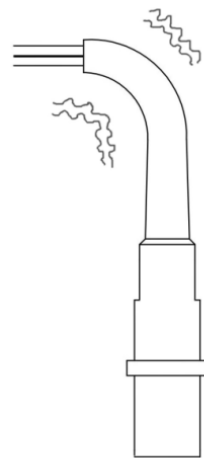
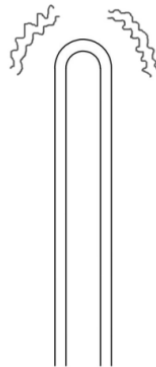
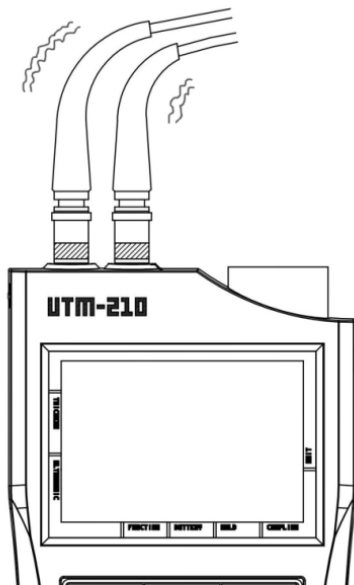
- Do not use thickness gauge in presence of flammable vapor or gas. Fire hazard.
- Do not disassemble instrument. High voltage parts could cause electrical shock.
- Do not touch the connectors on the gauge or insert metallic objects into the connector ports as this could cause electrical shock or equipment failure.





CAUTION

- Do not place instrument on unstable or non-level surfaces to prevent it from being inadvertently dropped and damaged.
- Do not clean and wipe the instrument with thinner or other organic solvent as such solvents could remove printing and mar the instrument's surface finish.
- When inserting and removing probes, always grasp the connector part of the probe, not the cable. Do not insert and remove probes by pulling at the probe cables as this may damage them. Also when inserting the connectors, make sure that the color (red, green) sleeves of the probe cable connector match the colors of the instrument-side connectors.
- Do not bend or pull the probe cables with excessive force.



- Keep probe cables away from heaters or other sources of heat.
- Do not attempt USB connection while the thickness gauge is turned ON as this might damage the gauge.
- Do not connect the probe cables to the thickness gauge while the gauge is turned ON as this might damage the gauge.
- If the thickness gauge is dirty, wipe it clean with a cloth dampened in lukewarm water and neutral detergent.



CAUTION

- Prevent the ingress of couplant, water, etc., into the instrument and do not get it wet as this could result in product failure. Be especially careful when using the thickness gauge under rainy weather and snowfall conditions, at seashores or around other bodies of water.
- After measurement, immediately wipe off the couplant. Remanent couplant on material surfaces could lead to corrosion, decomposition or other problems.
- Do not place objects on top of the thickness gauge to avoid damaging it.
- Do not allow metallic, combustible or other foreign material to enter the thickness gauge through open ports to avoid product damage or failure.
- Do not attempt to modify the thickness gauge as this could result in compromised performance and product failure.
- Do not leave the thickness gauge in damp or dirty places.
- Do not operate thickness gauge or attach and remove connectors with wet hands.
- Do not drop the thickness gauge or subject it to shock or impact. Make sure that the probe is not damaged as this could cause measurement malfunction.
- Remove battery from the thickness gauge if it is to remain inactive for prolonged periods.
- Do not allow the battery terminals to short.
- Ensure correct polarity when inserting the battery into the battery compartment to prevent malfunction and damage. A leaking battery can damage the gauge.
- Be careful when opening the cover of the battery compartment as it may open due to spring force.

About the Operating Manual

The following points relating to operation and safety precautions should be thoroughly understood by the user of the UTM-210 ultrasonic thickness gauge.

- The operating manuals provide information on safety precautions, product specifications, operating procedures, troubleshooting tips and maintenance inspection procedures.
- Users of this ultrasonic thickness gauge should possess basic knowledge regarding ultrasonic nondestructive testing.
- Information provided herein is subject to change without notice.
- Particular points to observe with regard to these operating manuals are as follows.
 - (1) Thoroughly read, understand and follow the instructions provided regarding the handling and operation of the UTM-210 ultrasonic thickness gauge.
 - (2) Maintain operating instructions with care
Operating instructions should be carefully maintained and be readily accessible.
 - (3) Operating instructions should be provided to the personnel who actually use and handle the product. Intermediaries such as sales agents should ensure that the operating instructions are provided to such personnel.
 - (4) Replace operating instructions immediately if lost.
If the operating instructions are lost, contact TOKYO KEIKI and order a replacement.

CONTENTS

Safety Precautions	1
About the Operating Manual	5
1. About the UTM-210 Thickness Gauge	8
1.1. Operating principle and function	8
1.2. Features	8
2. Specifications and Composition	9
2.1. Specifications	9
2.2. Measurement range and measurement error	10
2.3. Thickness gauge	11
2.4. UTM-210 thickness gauge standard kit	12
2.5. Options	12
3. Operation	13
3.1. Preparation	13
3.2. Keypad	14
3.3. Quick start	15
3.4. Power ON / OFF	17
3.5. Zero compensation	18
3.6. Sound velocity calibration	19
3.6.1. Direct sound velocity calibration	19
3.6.2. Sound velocity calibration to a known thickness	19
3.6.3. Sound velocity calibration based on material data	20
3.7. Measurement	21
3.7.1. Basics	21
3.7.2. Probe holder	22
3.7.3. Pipe measurement	23
3.7.4. Measurement of structurally coarse materials	24
3.7.5. Measurement of ALUMINUM	25
3.7.6. Measurement of materials at high temperature	25
3.7.7. Measurement of thick materials	25
3.8. Data logger function	27
3.8.1. Data storage	27
3.8.2. Display log	27
3.8.3. Delete log	27

3.8.4. Data output.....	28
3.9. Backlight	29
3.10. Battery indicator	29
3.11. Initializing the gauge	30
4. Troubleshooting.....	31
4.1. No power	31
4.2. Measured values not displayed, repeated failures in zeroing probe	32
4.3. When measurements differ from expectations	33
5. Maintenance and inspection	34
5.1. Maintenance.....	34
5.2. Disposal	34
6. Appearance and Dimensions	35

1. About the UTM-210 Thickness Gauge

Thank you for purchasing the TOKYO KEIKI UTM-210 ultrasonic thickness gauge.

The TOKYO KEIKI UTM-210 is a hand-held ultrasonic thickness gauge designed for a wide variety of thickness measurement applications. The UTM-210 is especially useful in measuring the wall thickness of various types of materials including tubes and pipes.

Please thoroughly read, understand, and follow the operating instructions to insure proper handling and operation of the instrument and long years of service.

1.1. Operating principle and function

Ultrasonic thickness gauges operate on a principle similar to sonar except at much higher frequencies and speed. The probe (transducer) sends a short pulse of ultrasonic into the material (typically metal material). The pulse is reflected as an echo from the opposite surface of the material and returns to the probe.

The time needed for the pulse to make this round trip is divided by two and multiplied by the velocity of sound of the material under test. The result is the thickness of the material.

Ultrasonic thickness gauges are designed to measure the thickness of steel, stainless steel, aluminum and other metals as well as other types of material.

1.2. Features

- Simple operation
- Easy-to-read display
- Compact, light weight
- Integrated data-logger
- Backlight
- Precise measurement (repeatable accuracy: $\pm 0.05\text{mm}$)

2. Specifications and Composition

2.1. Specifications

Item	Characteristics Value/Mode	Description
Measurement principle	Pulse echo R-B ₁ method	Ultrasonic pulses are propagated into a material by a probe (transducer) and the thickness of the material is determined by measuring the amount of time it takes the pulses to traverse from the transducer through the material to the opposite surface and traverse back as an echo to the probe. The first back-wall echo is measured.
Frequency	Approx. 5MHz	The resonance frequency of transducers.
Measurement update rate	Approx. 1.3 times/sec or more (standard value)	Thickness is measured every 0.75 seconds and the display is updated.
Sound velocity setting range	1000 ~ 19999m/s	The range of possible sound velocity settings
Sensitivity adjustment	Automatic	Automatic amplitude adjustment of the receiving echo.
Probes	Double Transducer (vertical)	Probe with separate transmitter and receiver. Direction of ultrasonic pulse is vertical to the probe surface.
Repeat accuracy	±0.05mm : 0.70 ~ 80.00mm ±0.5% : 80.0(※1) ~ 250.0mm	Variances in repeated measurements of the same thickness.
Resolution	0.01mm : 0.70 ~ 80.09mm 0.1mm : 80.1 ~ 250.0mm	Minimum decimal digit displayed.
Measurement unit	mm (※2)	Unit of measurement.
Operating temperature range	-10 ~ 50°C	UTM-210 operating temperature range.
Storage temperature range	-20 ~ 60°C	Temperature range condition for storing gauge.
Power supply	Alkaline battery (one) Size : AA (LR6)	Battery type
Auto power off	3 minutes	Time after last measurement and key operation until gauge automatically shuts down.
Battery Life	More than 40 hours	Continuously measurable time using new battery. At low temperature, the operating time may become extremely short depending on the battery characteristics. Using a rechargeable battery such as Ni-MH, operating time may be shortened.
Data logger	Max. 1000 events	The number of thickness measurements that can be stored.
PC connection	USB	Connection to Windows PC.
Dimensions	69mm(W) × 127mm(H) × 24mm(D)	Dimensions of thickness gauge.
Weight	165g	Estimated weight of thickness gauge unit without battery and probe.

(※1) Above 80.01mm

(※2) For measurement in inches, apply to our company.

2.2. Measurement range and measurement error

The table below lists the measurement ranges and measurement errors for each probe type. All measurement ranges are based on steel material.

Test blocks used for error measurements are JIS standard RB-D, RB-E, RB-T and test blocks. Material of all test blocks is SB410 (steel).

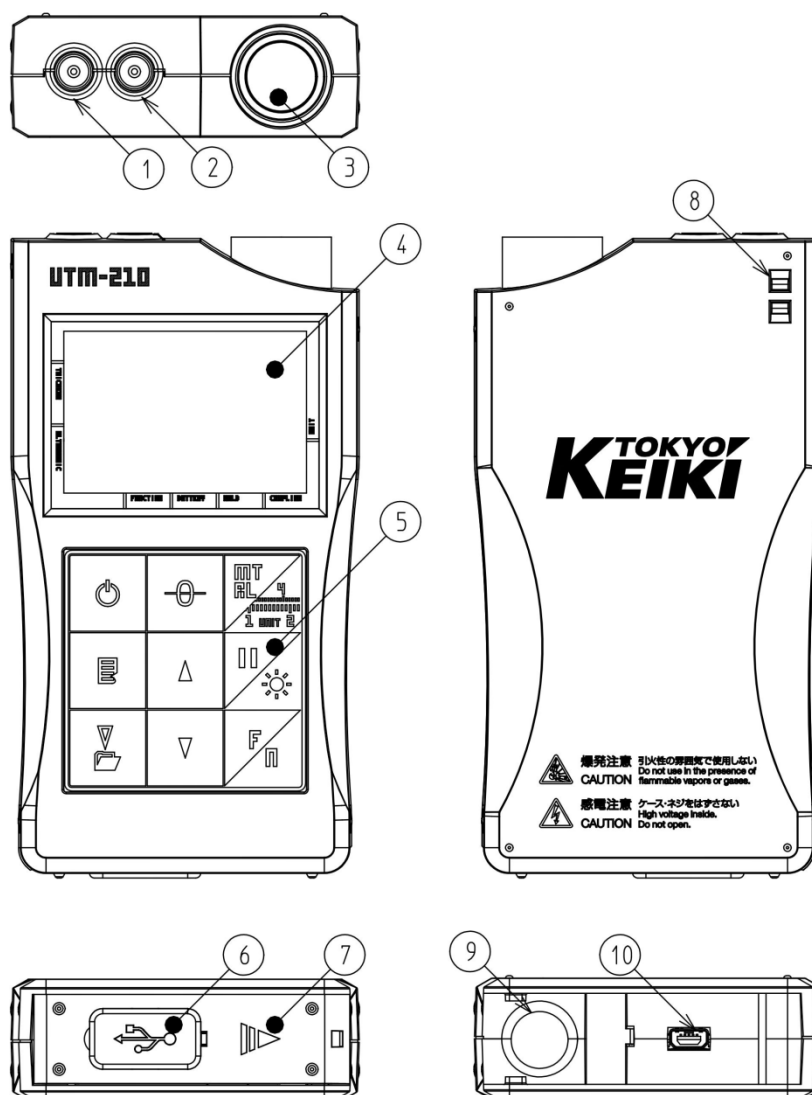
Select probe and probe holder to fit the application. See sections 2.4 for more information. TOKYO KEIKI cannot assure gauge performance when unspecified probes and probe holders are used.

Set the measurement mode that is appropriate for the job. Accuracy is not guaranteed if the measurement mode is not set properly. When switching between NORMAL and THICK MATERIAL modes, always "zero" the probe (zero compensation). For PIPE mode measurement, first zero the probe in the NORMAL mode before using PIPE mode (see P. 24).

Probe	Measurement Mode	Measurement Range [mm]	Resolution	Description
5C10NDT-10	NORMAL mode	0.70 ~ 80.00	±0.05mm	Standard probe
	THICK MATERIAL mode	80.0(※1) ~ 250.0	±0.5%	-
	PIPE mode	Pipe diameters ø30 mm and above and wall thickness 3.00mm and above.	±0.05mm	For pipe wall thickness measurement

(※1) Above 80.01mm

2.3. Thickness gauge



No.	Part Name	Description
①	Probe connector (transmit)	For connection of probe cable (red).
②	Probe connector (receive)	For connection of probe cable (green).
③	Test piece for zero point calibration	For probe zero compensation.
④	LCD	Displays measurements, material sound velocity, etc.
⑤	Keypad	Used to perform operations and functions. See 3.2 for details.
⑥	USB cap	Protects USB connector.
⑦	Battery cover	Battery compartment cover.
⑧	Hole for strap attachment	For wrist strap.
⑨	Battery compartment	For AA(LR6) alkaline battery
⑩	USB connector	For data download to PC.

2.4. UTM-210 thickness gauge standard kit

The UTM-210 thickness gauge standard kit is comprised of the following items.

Components	Qty	Model/Description
Thickness gauge	1	UTM-210
Probe	1	5C10NDT-10 (※)
Probe holder	1	TA21 Including attachment for flat and curved surfaces.
USB cable	1	USB2.0 mini-B, length 0.5m
Couplant container	1	Container only. Does not contain couplant.
Battery	1	Alkaline battery AA(LR6)
Operating manual	1	Basic guide to the handling, operation and maintenance of the thickness gauge. If lost, a replacement may be ordered from TOKYO KEIKI.
Carrying case	1	Carrying case for UTM-210 and accessories.

(※) Probes (transducers)

The UTM-210 is calibrated for the probe that is included with the gauge. Although 5C10NDT-10 probes separately purchased or otherwise acquired can be used, accuracy cannot be guaranteed. As such it is recommended that the UTM-210 gauge and probe to be used be sent out for calibration as a set.

2.5. Options

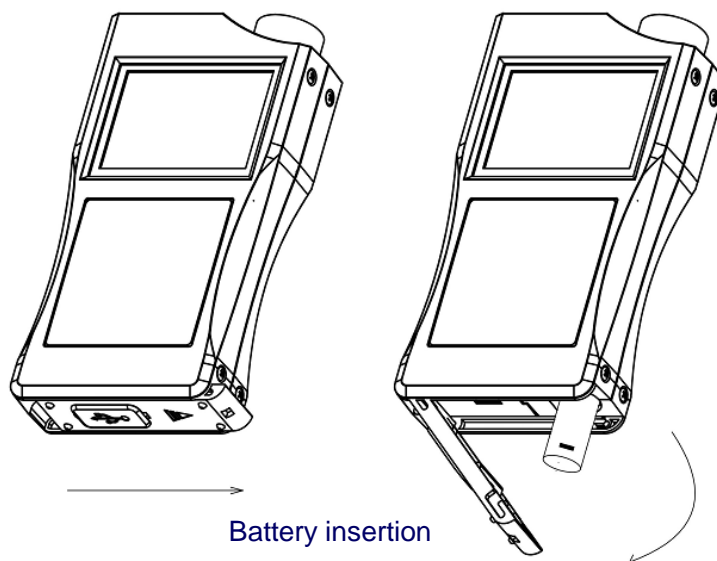
The following options are available.

Option	Description
Super Couplant	A special ultrasonic couplant with moderate viscosity and excellent acoustic characteristics. For details, contact us or our distributor.

3. Operation

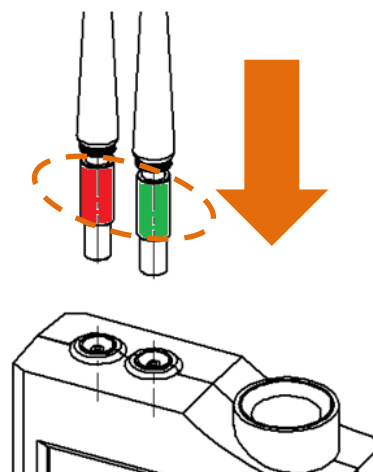
3.1. Preparation

- (1) Insert the battery in the battery compartment. When inserting the battery, open the battery cover to the right as indicated by the figure. Confirm polarity when inserting the battery. The cover end of the battery is "-". When replacing the battery be careful as the battery compartment cover may open with force because of the spring.

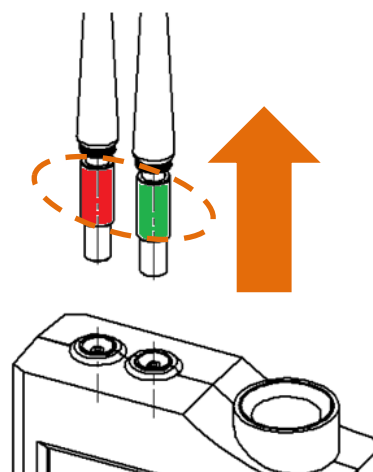


- (2) Connect probe.










Probe cable ends have color coded sleeves. They should be matched with the colors of the gauge-side connectors. When connecting the probe cables to the gauge, firmly grasp the connector portion of the cable (portion encircled by the dotted line in right figure) and insert probe cables fully until the locking mechanism "clicks".



- (3) To detach the probe cables from the gauge, firmly grasp the connector portion and pull upward as shown by the arrow in the right figure. This releases the locking mechanism. Do not attempt to pull on the cable above the connectors as the cables cannot be detached in this manner.

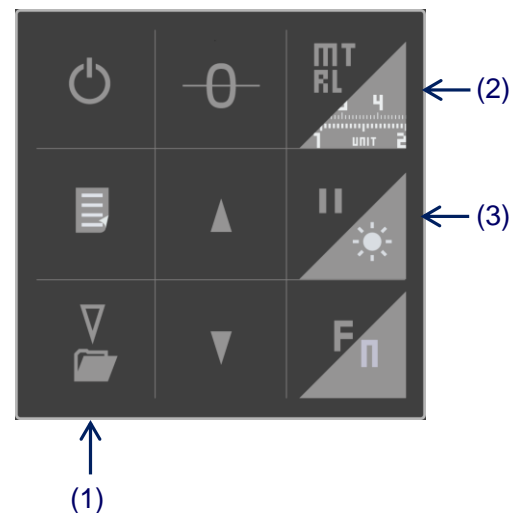


3.2. Keypad

Key	Name	Description
	POWER	Press and hold down this key to turn power ON or OFF. To turn power ON, press key for about 0.5 seconds, then release. To turn power OFF, depress key for about 2 seconds.
	LOG DISPLAY	Thickness measurement readings are displayed in list.
	SAVE /THICK MATERIAL mode	(In non-function mode) Saves currently displayed thickness reading in internal memory. (In function mode) Switches THICK MATERIAL mode ON/OFF.
	ZERO	Used to zero compensation.
	UP	Used to increase sound velocity or to return to previous page.
	DOWN	Used to decrease sound velocity or to advance to next page.
	MATERIAL /PIPE mode	(In non-function mode) Used to select material sound velocity. (In function mode) Switches PIPE mode ON/OFF.
	HOLD / BACKLIGHT	(In non-function mode) Used to set value/hold. (In function mode) Illuminates or turns off the backlight.
	FUNCTION	Switches function mode.


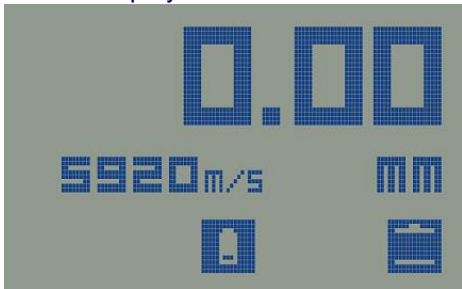



Key designations change depending on whether the function is enabled or disabled. Disabled function key is the default condition.







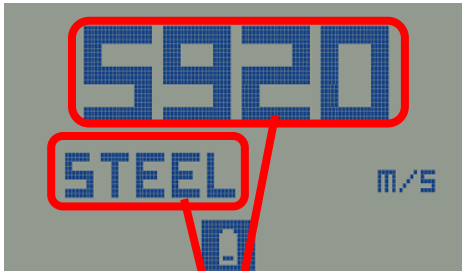
- (1) SAVE/THICK MATERIAL mode key
Function enabled: THICK MATERIAL mode key
Function disabled: SAVE key
- (2) MATERIAL/PIPE mode key
Function enabled: PIPE mode key
Function disabled: MATERIAL key
- (3) HOLD/BACKLIGHT key
Function enabled: BACKLIGHT key
Function disabled: HOLD key



3.3. Quick start

The following instructions refer to thickness measurements in the case where the sound velocity of the material is known.

Operation	Key Function	Display
<p>Turn power ON.</p> <p>Hold POWER key down for 0.5 seconds or more, then release. Power will not turn ON until the key is released.</p> <p>Also be aware that measurements cannot be made for a few seconds after power is turned ON.</p>		<p>Screen display.</p> 
<p>Zero compensation of probe.</p> <p>Placed a drop of couplant on the test piece located at the right side top of the gauge. Couple the probe to the test piece. Press the ZERO key.</p> <p>[Tip] Maintain steady contact of the probe against the test piece for about 3 seconds. When measurement stabilizes, press the ZERO key. Zeroing is successful when a "COMPLETED" message appears and unsuccessful if a "FAILED" message appears</p> <p>※Display shows example of a thickness. Actual measurements may vary.</p>		<p>Screen when zeroing is successful</p>  <p>Screen when zeroing failed.</p> 

<p>Calibrate sound velocity of the material to be measured. Use the UP or DOWN keys to change the sound velocity.</p> <p>[Note] Fine calibration of sound velocity can be made by pushing the function key.</p>		<p>The sound velocity appearing in the center of the display changes.</p> 
<p>Add a drop of couplant on the measured object. Couple the probe against the object to measure thickness.</p>		<p>Successful measurement is indicated by display of the coupling indicator (see 3.7.1 (3)) and the thickness reading.</p> 
<p>[Useful function: log save]</p> <p>During measurement, press the SAVE key to save thickness measurements.</p>		<p>When saving to the data logger is successful, "COMPLETED" appears in the middle line of the screen.</p> 
<p>[Useful function: sound velocity setting]</p> <p>Material sound velocity setting can be set in the MATERIAL key. Sound velocity can be changed using the UP or DOWN keys. Please push the hold key after select at sound velocity.</p>		<p>The sound velocity appears at the top of the display and the material is indicated in the middle line of the screen.</p>  <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="border: 1px solid red; padding: 2px 10px;">Material</div> <div style="border: 1px solid red; padding: 2px 10px;">Sound velocity</div> </div>

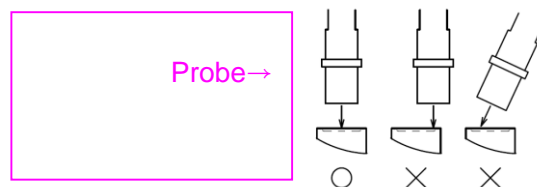
3.4. Power ON / OFF

- (1) Press and hold down the POWER key (0.5 seconds or more) then release.
When the key is released, the measurement screen will appear in the LCD.
※Sometimes there may be problems at startup or when the gauge is left idle.
If instrument does not startup correctly, press the power key again and hold it down for a few seconds then release.
- (2) When turning the power off, press and hold down the power key (for 2 seconds or more). If the measurement key remains inactive for 3 minutes or more, power will automatically shut off.

3.5. Zero compensation

Zero compensation is necessary when the probe is changed or when there is a $\pm 5^{\circ}\text{C}$ or greater change in ambient temperature. Zero compensation is recommended at every startup and at the beginning of the measurement task.

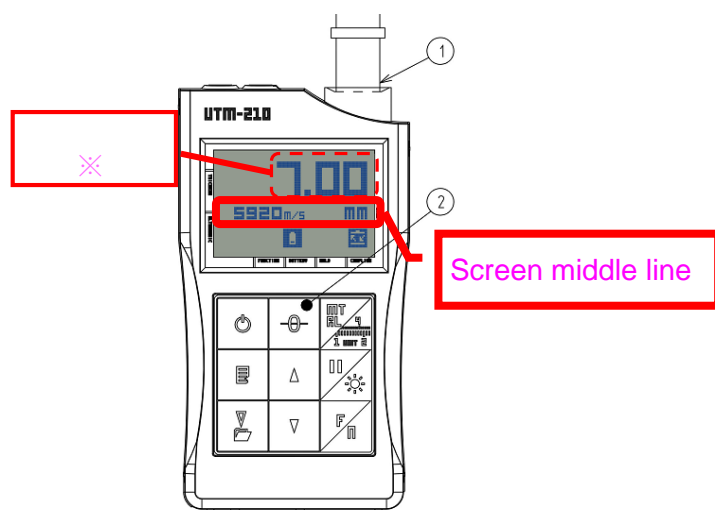
- (1) Add a drop of couplant on the test piece and press the probe against the surface. Make sure that the probe wearface is coupled firmly to the test piece.



- (2) When the probe is pressed against the test piece for about 3 seconds and measurement stabilizes, press the ZERO key.

In the middle of the display screen "0 ADJUSTING" appears and the sleeve of the zeroing test disc illuminates.

Successful zero compensation is confirmed when "COMPLETED" appears in the screen. Zero compensation failure is indicated when "FAILED" appears in the screen. In such case recheck the couplant as well as the contact of the probe.



- (3) Regardless of the success or failure of zero compensation the middle line of the screen will return to the original display.

(※) Thickness display after zero compensation

The actual thickness of the test piece is displayed after zeroing.

This thickness varies from set to set, but does not affect measurement because it is corrected by the software.

When "COMPLETE" is displayed, the zero adjustment is successful.

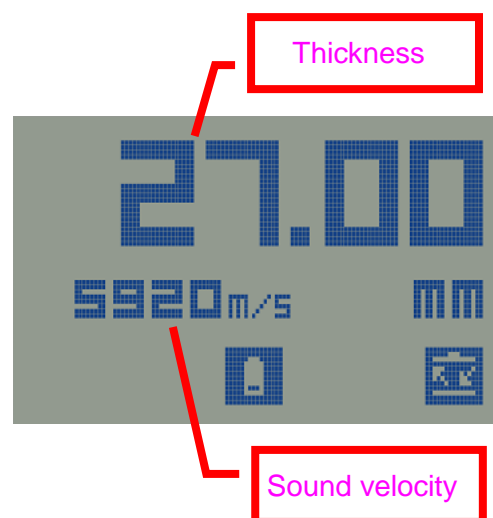
The test-piece is adjusted for each set.

For accurate measurement, always use the built-in test-piece and do not divert the other set's one.

3.6.Sound velocity calibration

In order to measure the thickness of a material with the thickness gauge, it is necessary to know the sound velocity of the material.

There are three methods to calibrate sound velocity with the thickness gauge – direct sound velocity calibration, calibration to a known thickness, and calibration to a known velocity based on prerecorded material sound velocities. Each method is described below.



3.6.1. Direct sound velocity calibration

Each press of the UP or DOWN keys increases or decreases the setting in 10m/s increments. Holding the key down longer increases or decreases the setting in 100m/s increments (in metric display mode). In the function mode, the increase/decrease is 1/10.

※ Sound velocity cannot be calibrated while the log is being displayed.

3.6.2. Sound velocity calibration to a known thickness

Calibrate according to the following procedure.

- (1) Measure material of a known thickness.
- (2) Retain the thickness display with the HOLD key.
- (3) Press the UP and DOWN arrow keys to increase or decrease thickness in 0.01mm increments and match the thickness display to the known thickness of the material. Sound velocity is automatically calibrated.
- (4) Release the thickness display with the HOLD key.
- (5) Occasionally, because of changes in the condition of the contact of the probe with the material surface during HOLD, the thickness measurements that are displayed may vary from the matched thickness of the material. In such case press the HOLD key and again match the thickness display to the thickness of the material.

3.6.3. Sound velocity calibration based on material data

Sound velocity can be calibrated according to type of material using the MATERIAL key. With each push of the MATERIAL key the screen displays each material and sound velocity in sequence 「STEEL→ALUMINUM→ SUS/INOX→·····」. Push the HOLD key to fix the sound velocity setting that is currently displayed.

Adjustments to increase or decrease sound velocity are described in 3.6.1. The calibration is maintained until the power is shut off. Sound velocity calibration that is set in the “User setting” is maintained even after power is shut off. The sound velocity settings of the thickness gauge at the time of shipment from the factory are shown in the table below.

Please be aware however that the sound velocities of each type of material are representative values. The sound velocity of cast iron especially may vary greatly. See details in 3.7.4.

Screen Display	Material	Sound Velocity [m/s]
STEEL	STEEL	5920
ALUMINUM	ALUMINUM	6350
SUS/INOX	STAINLESS STEEL	5790
COPPER	COPPER	4700
BRASS	BRASS	4640
CAST IRON	CAST IRON	4500
ZINC	ZINC	4170
TIN	TIN	3230
USER1	User setting 1	5920
USER2	User setting 2	5920

3.7. Measurement

3.7.1. Basics

(1) Measurement surface preparation

Measurement accuracy is greatly determined by the condition of the probe and the contact with the material surface. Normally surface roughness of 250 μ inch(6.3 μ m) or better is required. If there is rust, remove it with a wire brush or file.

(2) Apply couplant

Coat the surface of the material to be measured with couplant. There must be no air gap between the probe and the surface of the material to be measured. The couplant may be any type of liquid such as machine oil, glycerin, grease, water glass, etc, TOKYO KEIKI provides a special couplant with good acoustic characteristics. (Super Couplant)

Because of differences in acoustic properties, measurement results may differ depending on the couplant.

(3) Measurement operation

Couple the probe to the surface coated with couplant. The probe should be firmly pressed against and vertical to the material surface. When measurement is successful, the coupling indicator icon (coupling indicator above the “○” in the Fig. below) appears and the reading is updated. It may take a few seconds after the probe is coupled to the material for measurement values to stabilize.

If the “no coupling” indicator icon shown (coupling indicator above the “×” in the Fig. below) appears, measurement has failed. In such case, check the coating of the couplant and the roughness of the material surface.

(4) Procedures after completing measurement

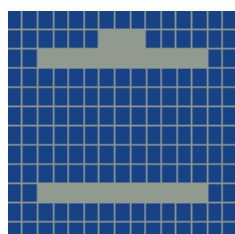
i. Probe

To keep the probe life long, carefully wipe off couplant with a soft cloth after use.

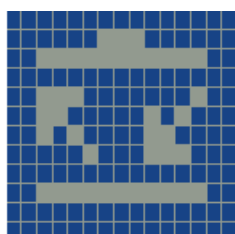
Residual couplant may damage the probe.

ii. Material surface

Wipe surface with cloth and remove any remaining couplant. In the case of steel material in particular, water or glycerin couplant could cause rust if not removed.



×



○



3.7.2. Probe holder

Use of a probe holder for measurement is convenient in the following cases.

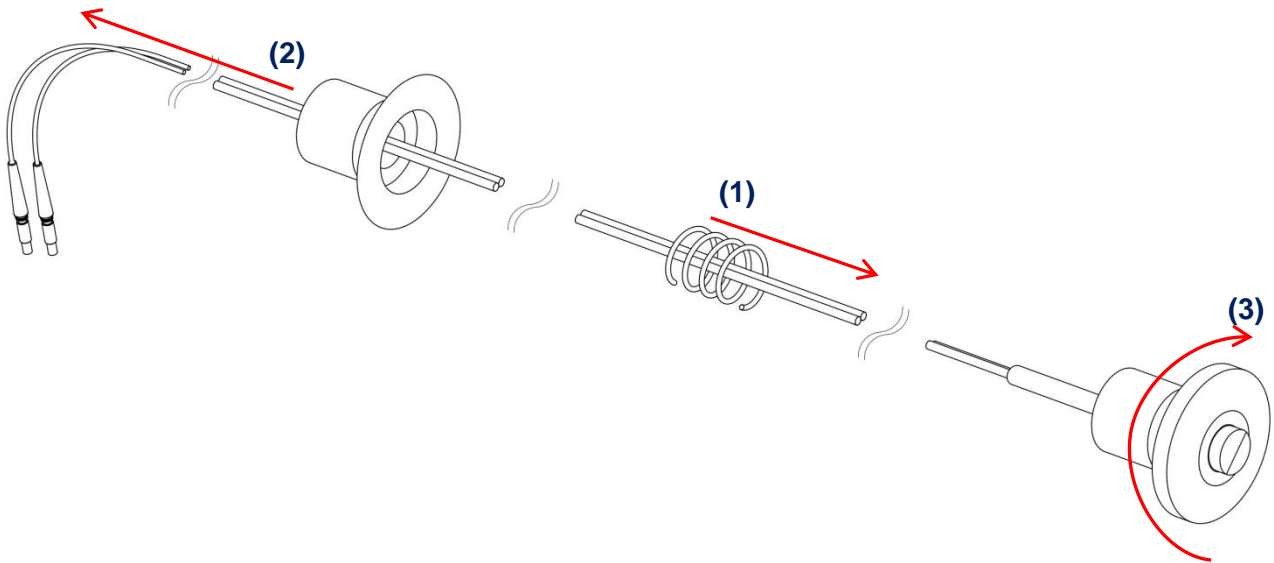
- Probe holder for flat surfaces: for multiple point measurements
- Probe holder for curved surfaces: for measuring pipe wall thickness

However use of a probe holder is not recommended in the following situations.

- For precise measurement work (as the holder makes it difficult to see the probe's wearface).

The illustration below shows how the probe holder is attached and detached to the probe.

- (1) Pass the spring over the probe cable.
- (2) Pass the bell-shaped part of the probe holder over the cable.
- (3) Screw the probe holder's material surface contacting cover into the bottom of the bell-shaped part and firmly secure the probe in the holder.



3.7.3. Pipe measurement

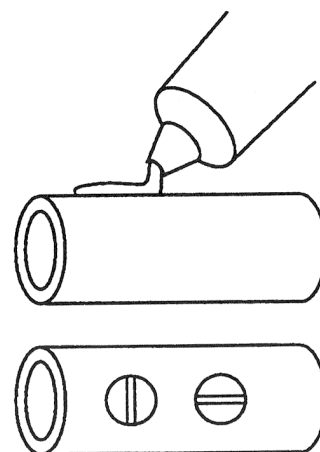
To measure wall thickness of pipe, the PIPE mode is used. The following procedure is used to set PIPE mode.

- (1) Press the FUNCTION key and confirm that the FUNCTION icon is displayed.
- (2) Press the PIPE mode key.
- (3) PIPE mode turns ON. Confirm that the PIPE mode icon is displayed.
- (4) To turn PIPE mode OFF, press the PIPE mode key again while FUNCTION is activated.



The procedure to measure pipe wall thickness is as follows. (see **CAUTION** below)

- (1) Zero the probe (with PIPE mode OFF).
- (2) Turn PIPE mode ON.
- (3) Coat the pipe with couplant (machine oil, glycerin, etc.).
Select couplant of higher viscosity to minimize 'drip' for easier measurement. TOKYO KEIKI provides a couplant (Super Couplant) which is ideal for such applications.
- (4) Measurement should be performed twice, once with the crosstalk (barrier of the dual element probe) perpendicular to pipe longitude and once with the crosstalk parallel to pipe longitude.
- (5) Of the two measurement values obtained, the 'thinner' value should be used.



(CAUTION)

Except when measuring pipe wall thickness, PIPE mode should be turned OFF.

If non-pipe wall thickness measurements are made with PIPE mode ON, erroneous measurements may result. Also the PIPE mode should be OFF when zeroing the probe before measuring pipe wall thickness. If the PIPE mode is ON, an error message is displayed and the probe cannot be zeroed.

Tip

When measurement is made with the crosstalk perpendicular to pipe longitude, readings are stable. But in cases of thin or small diameter pipes, the readings may be 'thickish'.

On the other hand, when measurements are made with the crosstalk parallel to pipe longitude, readings may be unstable but even for thin wall or small diameter pipe, the thickness readings tend to be more accurate.

3.7.4. Measurement of structurally coarse materials

Measurement failures and errors occur frequently in thickness measurements of cast iron and other materials with coarse material structures. In such cases, the following settings may enable better thickness measurements. Be aware however that such measurements are not assured.

- (1) Press the MATERIAL key (see 3.6.3) and select cast iron.
- (2) Press the HOLD Key and check the sound velocity of the material.
- (3) Set material sound velocity (see 3.6.1 or 3.6.2).

Tip

Measurement failures and errors occur when the material structure or pores interfere with the transmission of the ultrasonic pulses. This could greatly narrow the measurement range or make measurements impossible. In addition material sound velocities may fluctuate widely. For example, even in cases where the material structure is uniform, cast iron sound velocities may vary widely, in a range of 3500 ~ 5500m/s. And the reading may not stabilize.

3.7.5. Measurement of ALUMINUM

The sound velocity of aluminum differs according to the direction of measurement. As such you must make sound velocity settings each time after confirming the differences in sound velocity for each surface to be measured. The preset sound velocity for aluminum corresponds to 2024 aluminum alloy (longitudinal wave).

Perform measurement according to the following procedure.

- (1) Refer to section 3.6.3 (Sound velocity calibration based on material data).
Press the material key and select "Aluminum" and the mode will switch automatically to that for aluminum. (※)
- (2) Refer to section 3.6.1. (Direct sound velocity calibration) and 3.6.2. (Sound velocity calibration to a known thickness) and set sound velocity.

Note: A characteristic of aluminum material is its susceptibility to noise generation which could make measurement difficult or impossible.

※ If measurement is carried out with a different mode (for example, user set sound velocity mode, etc.) the effect of noise may be even greater, making it impossible to obtain accurate measurements

3.7.6. Measurement of materials at high temperature

The standard probe (5C10NDT-10) can be used on materials with surface temperatures up to 100°C. The contact of the probe to the material should be less than 10 seconds regardless of the temperature of the material (less than 100°C).

Sudden temperature changes could skew the zero point of the probe. As such it is recommended that the probe be zeroed before each measurement.

TOKYO KEIKI Super Couplant is recommended for measurements involving materials that are at high temperatures.

3.7.7. Measurement of thick materials

It is recommended that the THICK MATERIAL mode be used when measuring materials of thicknesses greater than 80.01mm. To save measurements taken in the THICK MATERIAL mode, turn the FUNCTION key off and then press the SAVE key.

-

- (1) Zero the probe with the THICK MATERIAL mode ON.
- (2) Add a drop of couplant to the material.
- (3) Couple the probe to the material and measure thickness.

If a determinate thickness is exceeded, measurement failure or measurement errors may occur if the THICK MATERIAL mode is OFF. Refer to P.11 and select the appropriate measurement mode.

Examples: Measurement of 80.5mm obtained in the THICK MATERIAL mode
→ measure with THICK MATERIAL mode
Measurement of 75.0mm obtained in the THICK MATERIAL mode
→ measure with NORMAL mode.

3.8. Data logger function

The UTM-210 has an internal data logger. Data can be downloaded to Windows PC.

Be aware that the Mitsutoyo external data logger and printer cannot be used with the UTM-210.

3.8.1. Data storage

Measurement data is saved and stored in the UTM110's internal ROM. To store data, do the following.

- (1) See 3.7.1 and perform thickness measurement.
- (2) Confirm that the thickness reading is not '0' and press the SAVE key. The coupling indicator need not appear. "SAVING" appears in the middle of the screen.
- (3) After a fixed time, "COMPLETED" appears in the middle of the screen.

If measurement fails, "FAILED" appears. Check and make sure that there are no measurement failures and that readings are not made immediately after the instrument is turned on. Data cannot be stored if the maximum storage capacity is exceeded.

3.8.2. Display log

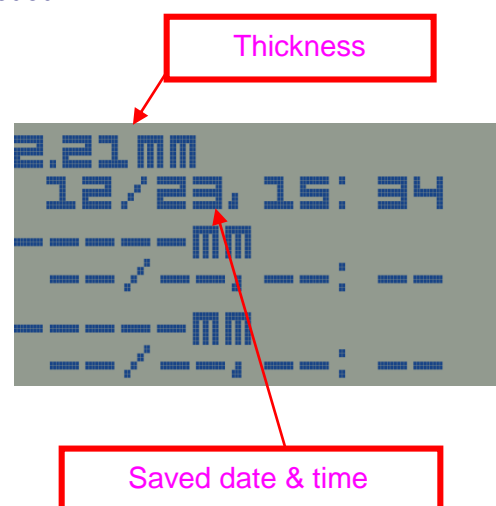
The stored log can be checked. As shown in the example of the log screen at right, the log is comprised of three measurement data.

To display the log, do the following.

- (1) Press the LOG display key.
- (2) A screen display such as that shown at the right appears.

It displays the month, day, and time that the data was saved. If there is no data, this is indicated as invalid data, "—". Push the UP key to return to the previous page and the DOWN key to advance to the next page.

- (3) Push the log display key again to return to the original screen.



3.8.3. Delete log

The stored data log can be deleted. Be careful as a single operation will delete all data.

To delete the log, do the following.

- (1) Press the LOG key.
- (2) Press and hold down the ZERO key.
- (3) "DELETING" appears in the screen.

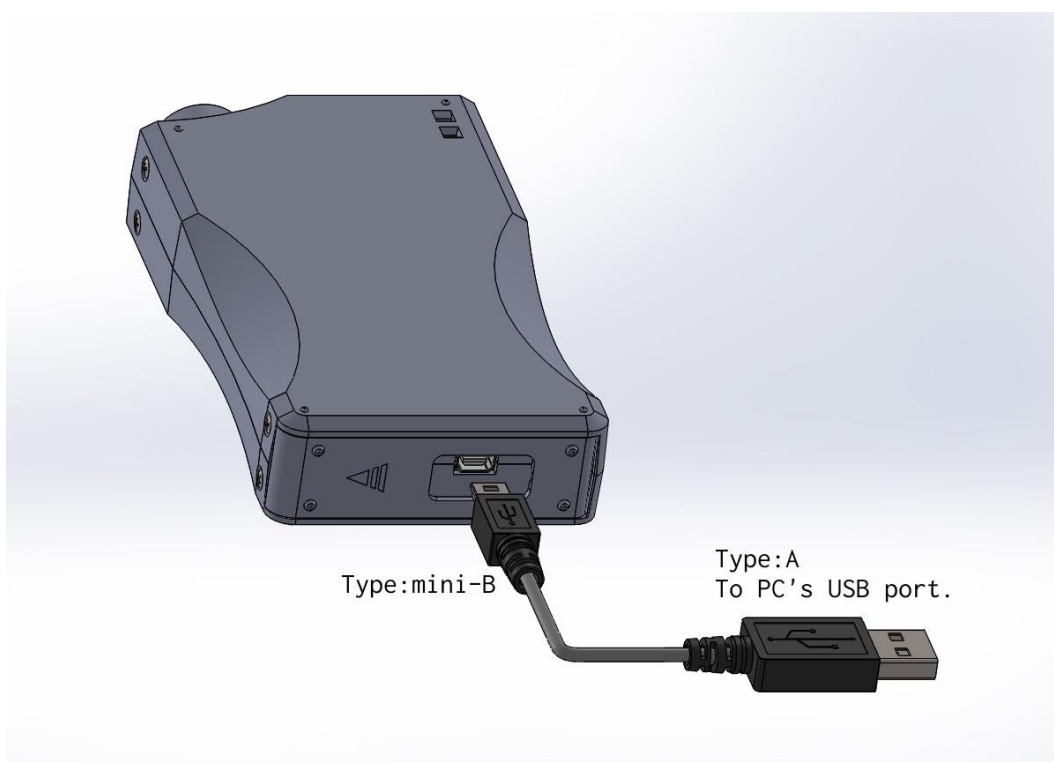
Be aware that there may be a wait time during the delete operation.

- (4) After "COMPLETING" appears, the initialized log screen is displayed.

3.8.4. Data output

Use the USB cable accessory or commercially available USB cable (mini-B type) to connect the instrument to a PC. Do not connect the USB cable while the thickness gauge's power is ON. As shown in the Figure, insert the mini-B connector end to the port on the bottom of the instrument and the Type A connector end to the USB port of the PC. Special software must be installed to enable data transmission. This software can be downloaded from the TOKYO KEIKI website, ultrasonic thickness gauge home page.

For information regarding operation of the software, refer to the electronic manual accompanying the software.



3.9. Backlight

The backlight feature enables viewing in dark conditions. To turn the backlight ON, do the following.

- (1) Press the FUNCTION key.

Check that the FUNCTION icon appears at the bottom of the screen.

- (2) Press the BACKLIGHT key.

- (3) The LCD backlight turns on. When turns off the light, please push the backlight key once again.

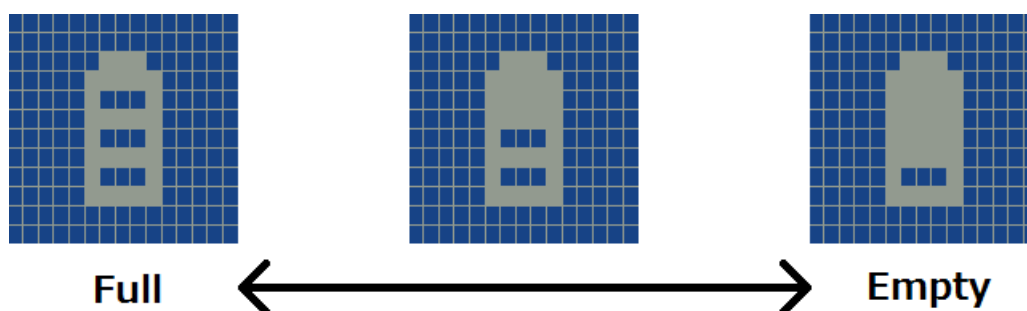
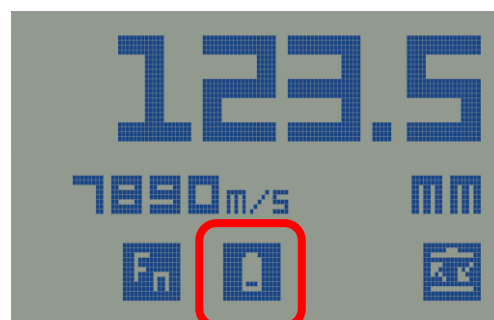


3.10. Battery indicator

A remaining battery indicator icon appears in the screen except in the log screen mode. Three levels of remaining battery are displayed as shown in the Figure below.

Although measurements may still be carried out with battery power at the lowest level, power may fail during measurement or fluid from the battery may leak if the gauge is low battery state for prolonged periods.

Thus when the lowest battery level is indicated, please replace it immediately.



3.11. Initializing the gauge

Initialization of the gauge can be performed with the following operations. (see **CAUTION**)

- (1) Depress the FUNCTION key for 10 seconds.
- (2) The initialization confirmation screen appears.
- (3) Select "YES" or "NO" using the UP and DOWN arrow keys.
 - If "YES" is selected, initialization is executed by depressing the HOLD key.
 - Select "NO" to return to the measurement screen.
- (4) Initialization takes a few seconds. Power is automatically switched OFF when initialization is completed.

(CAUTION)

With this operation, UTM-210's settings are initialized to factory shipment settings.

Be aware that the following items will be deleted during initialization.

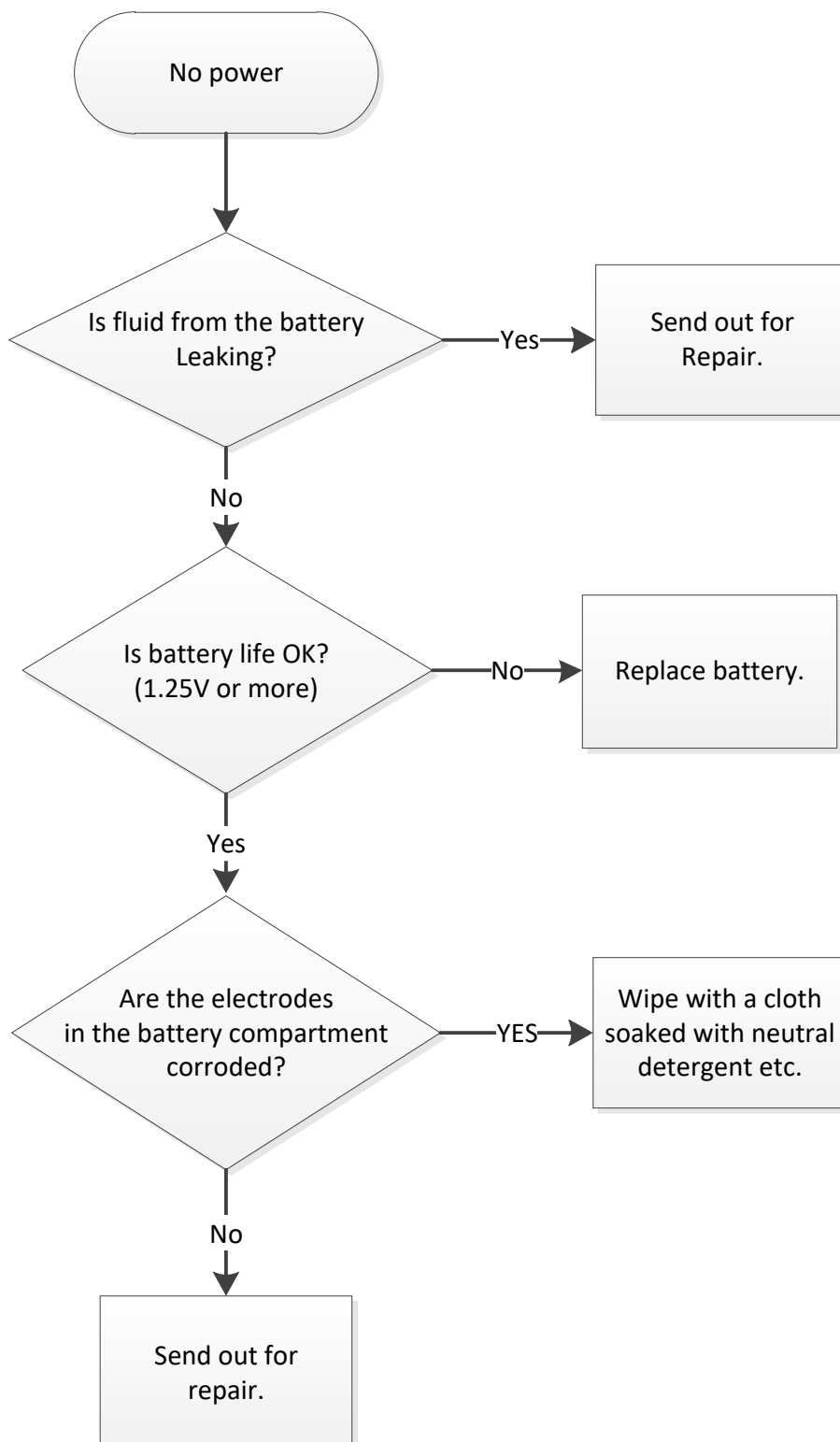
- Log of measurements
- User set sound velocities

If the gauge has a log of measurements, backup this data to a PC, etc., before proceeding with initialization. Also user set sound velocities must be reset after initialization.

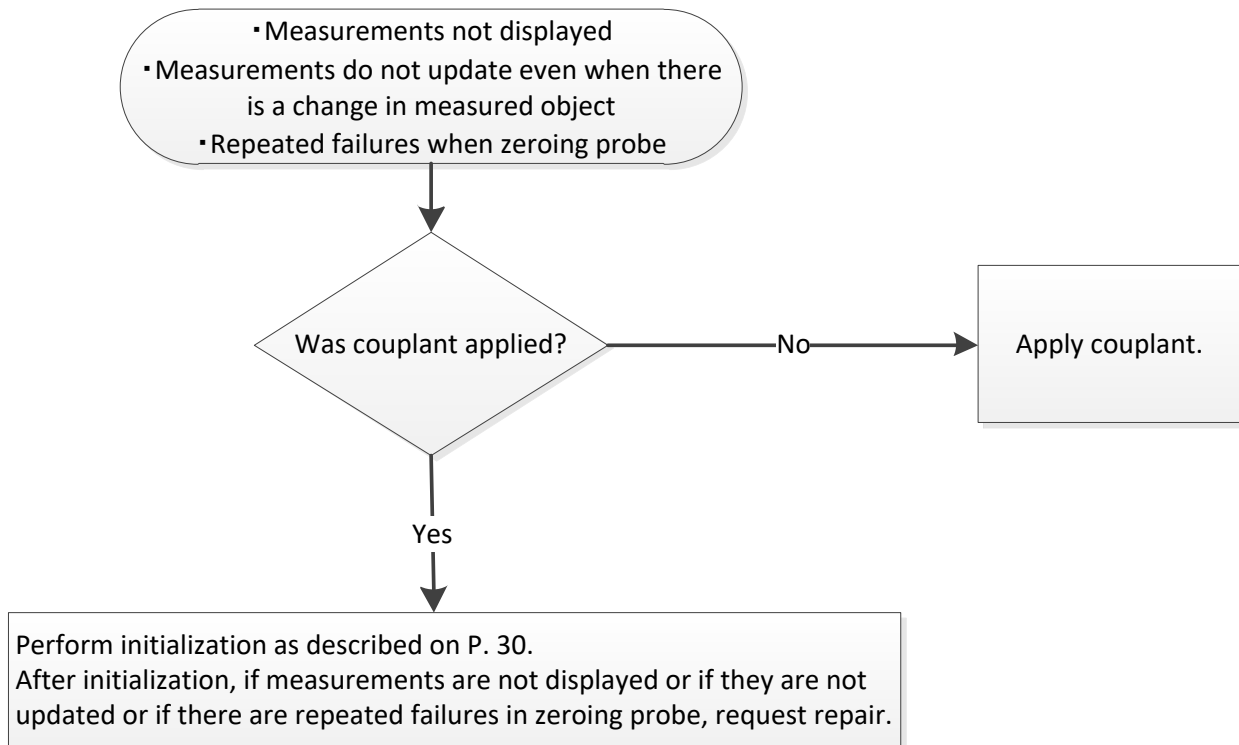
4. Troubleshooting

If instrument failure is suspected, investigate cause using the following flowcharts. If the cause of the failure cannot be determined after following this process, contact TOKYO KEIKI's sales or service center. If the product is to be shipped back to TOKYO KEIKI include brief information describing the symptoms, the measured material and measurement conditions.

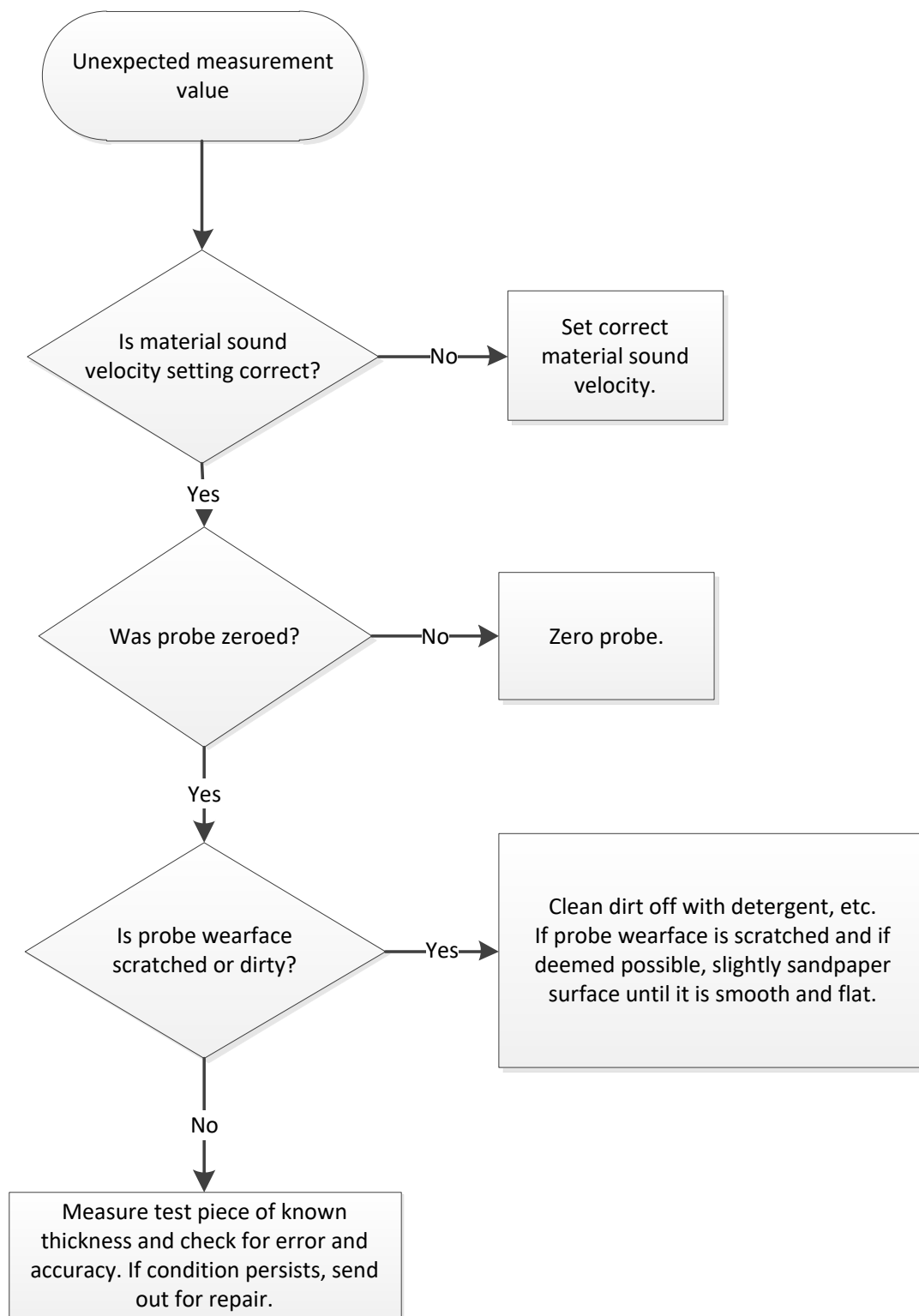
4.1. No power



4.2. Measured values not displayed, repeated failures in zeroing probe



4.3. When measurements differ from expectations



Note on when measurements differ from expectations

If there is a coating of paint or film of oil on the measured surface, measurement values will be thicker, adding maybe 2 ~ 4 times the thickness of the actual paint coating or oil film to the measurement values displayed. Likewise in the case of a coating of paint, if the paint coat is peeling or if the application of paint is thick, ultrasonic waves might not propagate to the base material. To obtain accurate measurement, remove the paint coat or oil film before measurement.

Also, be aware that ultrasonic thickness gauge measurements cannot measure materials that contain numerous pockets of air or air bubbles. (Examples: concrete, wood, styrene foam, etc.) Also because ultrasonic waves tend to attenuate dramatically in soft material such as plastics, rubber, etc., measurements of such material could be erroneous.

If the measured surface is rusted or corroded, remove the rust or corrosion with sandpaper before attempting measurement. Although it is not problematic to perform measurement on material where the opposite side of the material is rusted or corroded, unevenness of the opposite surface due to such rust or corrosion could cause erroneous measurements.

In addition, if the measured side and opposite side surfaces are not in parallel, ultrasonic waves may not be reflected back correctly and this could lead to mis-measurements.

For measurement of thick materials, follow the correct procedure (see P. 26).

5. Maintenance and inspection

5.1. Maintenance

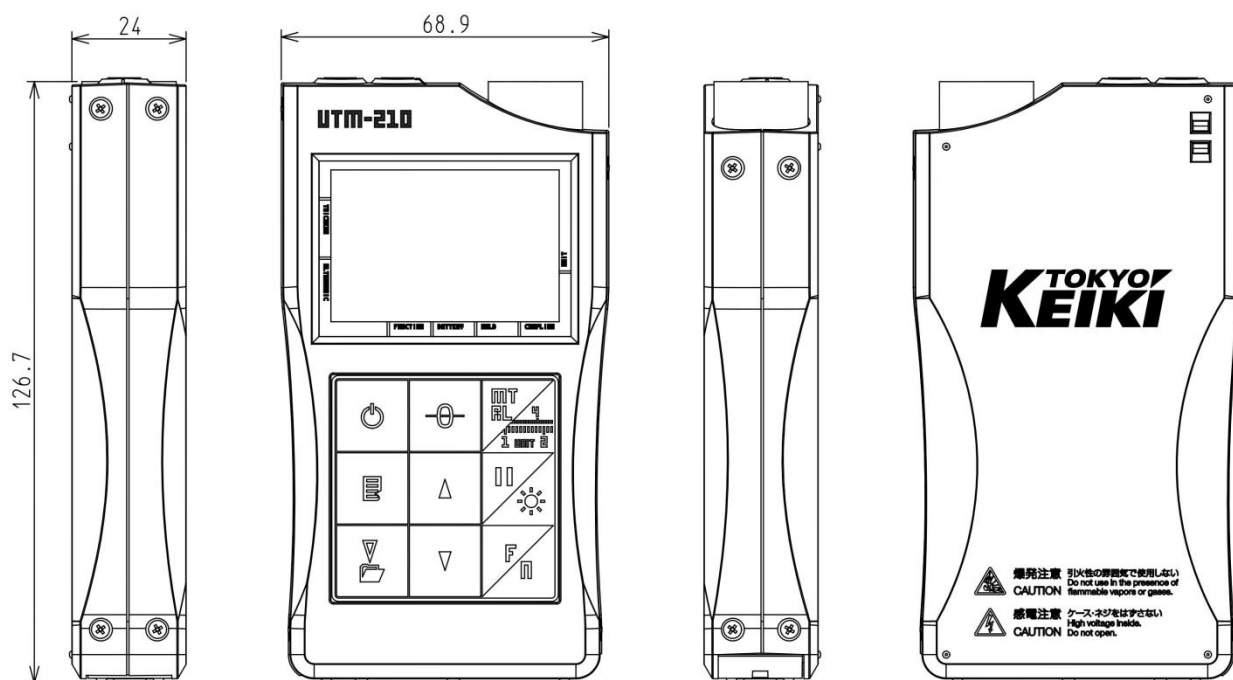
In order to preserve measurement accuracy, it is recommended that the gauge be sent out for calibration once a year. Contact TOKYO KEIKI (see last page of this manual) or the sales channel through which the gauge was purchased to arrange calibration.

When storing the gauge, store it in the same condition that it was when originally purchased.

5.2. Disposal

Dispose of unit in accordance with applicable laws and local ordinances.

6. Appearance and Dimensions



Ultrasonic Thickness Gauge
UTM-210
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Contents of this operating manual are subject to change without notice.



CAUTION

Thoroughly read, understand and follow the instructions provided regarding the handling

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