Wood Moisture Tester

MT-900

Kett

Operating Manual

Thank you for purchasing this product.
Please read the operating manual carefully and use this product properly.

Safety Precautions

If the safety precautions for the wood moisture tester are not observed, injuries or damage to property may result. While the safety of the product has been given considerable attention, please read the precautions in the operating manual and use the instrument properly.

• Please observe the safety precautions.

Please read the precautions noted in the operating manual.

• Do not use if broken.

If the tester breaks or malfunctions, please consult our repair service.

• Meaning of warning symbols.

In order to prevent damage resulting from erroneously operating the equipment, the following symbols are indicated in the operating manual and on the product. The following are their meanings.

	**Note**	Items which the user should be aware of in order to use the unit safely.

CONTENTS

1. Features

- Built-in calibrations for hardwood and softwood
  In addition to the calibrations for the 16 wood groups up to now, calibrations corresponding to the overall hardwood and softwood can be selected with the single push of a button.
- Wide measurement range
  By using calibrations for hardwood and softwood, measurement from low to high moisture can be done.
- Automatic temperature compensation
  Compensation for the temperature of the wood is automatically performed by means of a built-in temperature sensor.
- Auto power off
  When inactive, the unit will automatically turn itself off after approximately 5 minutes to avoid draining the battery.
- Alarm setting
  Set any moisture value, and an alarm will sound if the measured moisture value is higher than the set moisture value.
- Bias adjustment
  The moisture value can be corrected corresponding to each calibration curve in the range from –9.9% to +9.9%.

2. Specifications

Measurement Principle	:	Electrical resistance
Applications	:	Veneer/wood
Calibrations	:	For hardwood and softwood use[*1] (Reference method: ISO 3130) 16 wood group classifications[*2]
Measurement Range[*3]	:	6 to 80% (hardwood), 7 to 80% (softwood) 4 to 40% (when wood groups 1-16 are selected, varies with group type[*2])
Measurement Precision	:	Below 20%: ±0.5%, 20% and higher: ±2.0% (precision with respect to base resistance)
Display	:	Digital (LCD)
Resolution	:	0.1%
Operating Temperature Range	:	0 to 40˚C
Functions	:	Automatic temperature compensation, average value display, Upper limit alarm setting (10 to 79% and Off), Auto power off (automatically turns off after approximately 5 minutes), Moisture value bias adjustment (–9.9 to +9.9%)
Power Supply, Power Consumption	:	1.5 V batteries (AA alkaline) (6), approximately 0.45 W
Dimensions and Weight	:	110 mm (W) x 210 mm (D) x 50 mm (H), 0.5 kg
Accessories	:	Needle probe, spare needle (10), conductive rubber (2), wrench, shoulder strap, 1.5 V battery (AA alkaline) (6), carrying case, operating manual, wood group number table (Japanese and English) (1 each)
Options	:	Printer VZ-390, Printer cable VZC70

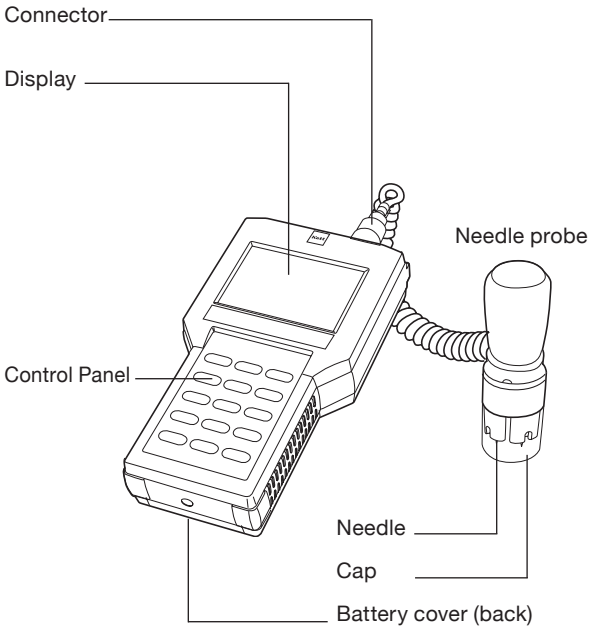
[*1] Calibrations were prepared using the most recent wood and measurement techniques. Different values are displayed for the calibrations of the 16 wood group classifications.

[*2] Uses the same calibrations as our “TURKU, TURKU H, MT-8S, MT-8SK (production of the preceding 4 products discontinued), and MT-700” wood moisture testers. Refer to p. 25 “8. Wood Group Number Table”.

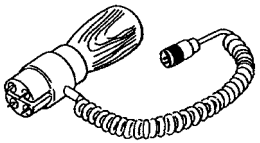
[*3] Range when measured at 20°C. For temperatures below 20°C, the measurable lower limit value increases by 0.1% per 1°C.

3. Part Names

<Main body>



<Accessories>

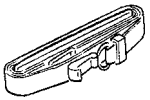


Needle probe

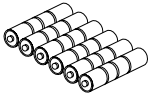
Spare needle (10)

Conductive rubber (2)

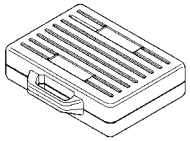
Wrench



Shoulder strap



1.5 V battery (AA) (6)

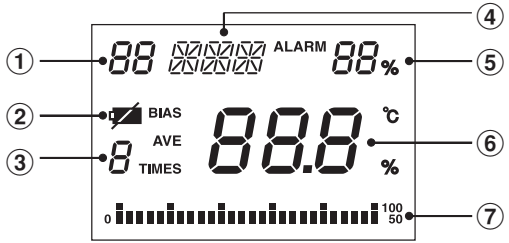


Carrying case

Operating manual

Wood group number table

4. Display

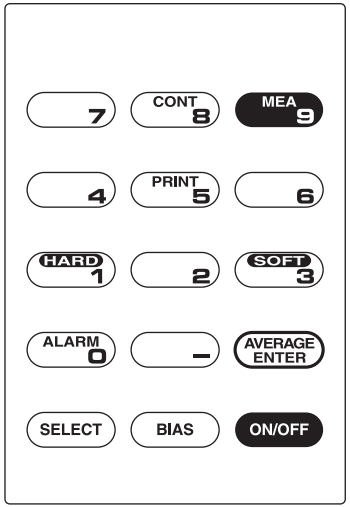


Description of display

Item No.	Name of display area	Description
①	Wood group number	Displays set wood group number.
②	Battery indicator	Comes on when battery is depleted.
③	Measuring times	Displays the number of times measured.
④	“HRD” or “SFT”	Displays the wood group selected.
⑤	Alarm set-point value	Displays the set-point value for the alarm for the upper moisture limit that was set.
⑥	Moisture value	Displays the measured moisture value (%).
⑦	Bar graph	Displays the measured moisture value by means of a bar graph. Displays up to 50% in 2% increments.

5. Description of Keypad

<Control panel>



Key	Function
ON/OFF	Power On and Off
BIAS	Bias correction
SELECT	Selection of wood group number
AVERAGE ENTER	Average value and number input
ALARM 0	Setting of upper and lower alarm limit
MEA 9	Making measurement
CONT 8	Continuous measurement
PRINT 5	Setting printer output
HARD 1	Selection of hard wood
SOFT 3	Selection of soft wood
–	Entering a minus input
7	Entering block functions

6. Directions

6-1. Before Measurement

1. The unit is powered by six 1.5 V batteries (AA, alkaline). Remove the rear battery cover, place the batteries into the compartment taking care to correctly orient the positive (⊕) and negative (⊖) terminals. Then attach the battery cover.

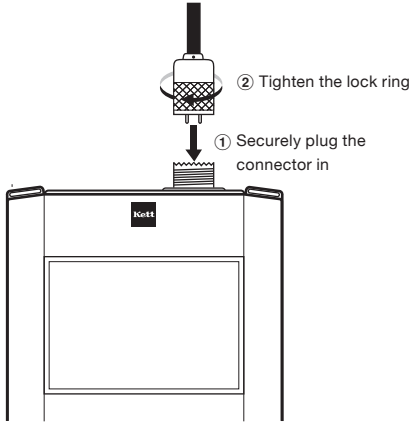
-  is displayed when the batteries are depleted. Replace all six with new batteries.

2. Plug the needle probe connector into the socket on the main unit, and fasten and secure the lock ring.

3. Remove the cap on the needle probe.

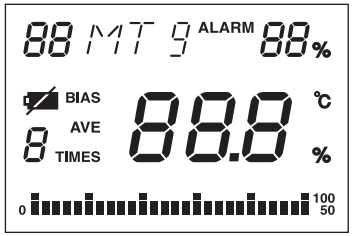
4. Prepare the wood sample to be measured. Allow the sample to equilibrate to the same temperature as the main unit.

- Errors may occur when there is a large difference in the temperature of the wood and the temperature of the unit. To make more accurate measurements, allow the temperature of the wood to equilibrate with the temperature of the unit.

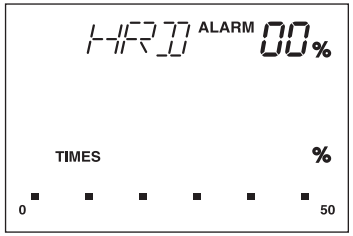


6-2. Measurement Method

1. Press the ON/OFF key to turn on the power. All elements of the LCD will be displayed for approximately three seconds. Subsequently, the “Wood group or wood group number”, “TIMES”, and “%” will be displayed.



- The display will indicate “HRD” for HARD (hardwood) or “SFT” for SOFT (softwood).
- If the display shows something other than that described above, there may be a problem with the unit. Refer to p. 23 “7. Error Display”.
- If the clock battery is depleted, the indicator will come on prior to the display described above. Servicing is required to use the clock function.



2. Select the wood group object to be measured.

A. When selecting hardwood / softwood:

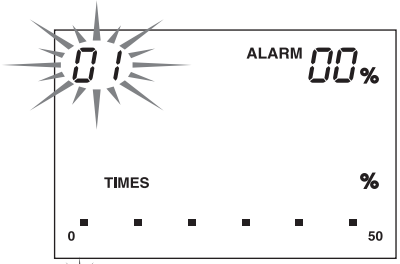
Press the HARD 1 key to select hardwood.

Press the SOFT 3 key to select softwood.

B.When selecting a wood group number:

Select and set the wood group to be measured from “8. Wood Group Number Table” on p. 25 or from an additional “Wood group number table”. First, press the SELECT key. The wood group number will blink. Then, enter a 2-digit wood group number.

- Two wood group number tables in Japanese and English have been included. Use by attaching the table to the battery lid of the necessary version.



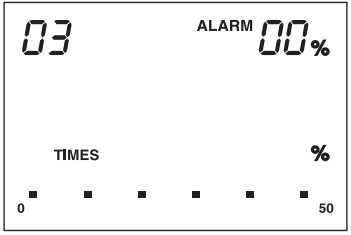
• The ✳ symbol denotes a blinking display.

Example: Entering the value 03

Press the ALARM 0 key. The first row will start blinking.

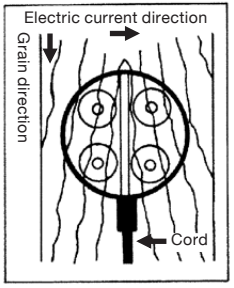
Then, press the SOFT 3 key. “03” will be displayed.

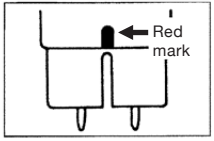
- Once the wood group or wood group number is set, it will be maintained in memory unless changed even when the unit’s power is off.



3.Hold the needle probe firmly, and insert the sensor needles completely into the wood such that the probe cord is parallel to the direction of the wood grain.

- Turn the red mark on the metal part of the needle probe in the direction of the grain.
- The tips of the sensor needles are sharp points. They may cause injury to the operator or other people if handled carelessly. Be very careful in handling the probe. The probe should always be capped after use.

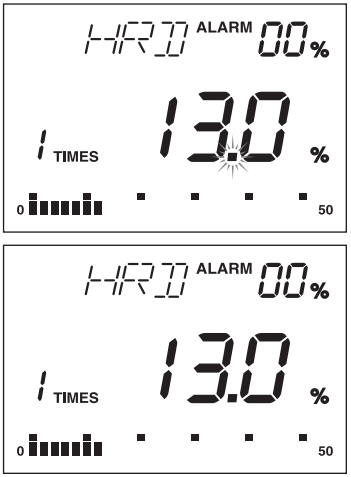




• Turn the red mark on the metal part of the “needle probe” in the direction of the wood grain.

4. Press the MEA 9 key. The decimal point will blink. After about 3 seconds a “beep” will sound and the “Measurement number”, “Moisture value”, and “Bar graph” will be displayed.

- The bar graph displays a 50% full scale in 2% increments.
- If the moisture value is outside of the measuring range, “HI” will be displayed if the content is higher than the measuring range, and “LO” will be displayed if it is lower.



5. Remove the needle probe from the wood. At this time, the moisture value will remain on display. To continue to make further measurements, start the procedure from Step “3. Hold the needle probe firmly...”.

   When finished making measurements, press the ON/OFF key to turn off the power.

- With its auto power off function, the unit will automatically turn itself off when inactive after approximately 5 minutes.

• The ☼ symbol denotes a blinking display.

6-3.Setting the Measurement Mode

There are two measurement modes: “Normal measurement mode” and “Continuous measurement mode”. Immediately after pressing the ON/OFF key and turning on the power, the unit will be set to “Normal measurement mode”. If the unit is set to “Continuous measurement mode”, measurements can be made without pressing the MEA 9 key for each measurement.

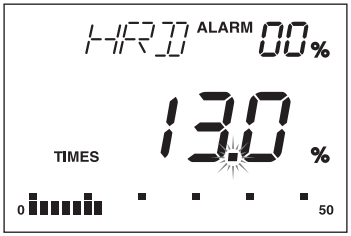
1. Continuous measurement mode setting

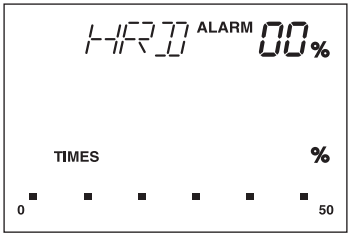
   In step “6-2. Measurement Method 4. Press the...”, press the CONT 8 key. The decimal point will blink, and the moisture value and bar graph will be displayed. “LO” will be displayed, and the decimal point will blink when the needle probe is not inserted into the wood or if the wood moisture value is below the measuring range.

2. Canceling the continuous measurement mode

   Press the CONT 8 continuously for at least 2 seconds until a “beep” sounds. The display will momentarily go blank. When you take your finger off the key, the unit will return to normal measurement mode.

- Pressing the ON/OFF key turns off the power and automatically cancels the unit.
- Note that the battery life is shorter in continuous measurement mode.

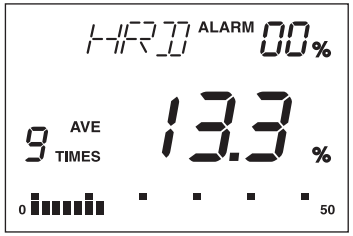




• The ☼ symbol denotes a blinking display.

6-4.Displaying the Average Value

When the number of measurements is from 2 to 9, and you press (AVERAGE ENTER), the “AVE”, “average value”, and “measurement number” will be displayed. At this time, the “AVE”, “average value”, and “measurement number” remain displayed, but if you proceed to make a measurement, the “measurement number” resets to “1”.



- If the number of measurements exceeds 9, the measured value up to that point resets and measurement starts from measurement number 1.
- The average value cannot be determined when making measurements in continuous measurement mode.

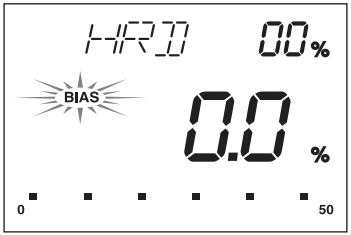
6-5.How to make Bias Adjustment

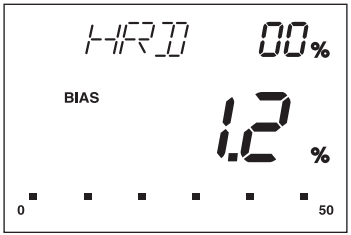
The moisture value scale of this unit has been prepared by determining the relationship between the overall drying method and the electrical resistance for each wood group and statistically processing these results. However, depending on various conditions, there are cases where the standard measurement method and the moisture value do not agree. In these cases, a moisture value bias adjustment can be made (–9.9% to 9.9% for each wood group) by the following method.

1. Press the HARD 1 or SOFT 3 key or the SELECT key and select the wood group.
2. Press the BIAS key. The “BIAS” indicator will blink, and the previously entered bias value will be displayed. The bias is initially set to “0.0%”.
3. Enter the bias value.

   Enter a 2-digit number. To enter “1.2%”, press the HARD 1 key and the 2 key in succession. For a negative value, press the – key before the numbers.
4. Press the MEA 9 key to make measurements.

- If a correction value has been entered, “BIAS” will be displayed during measurements.
- To cancel the correction value, enter “0.0%”.



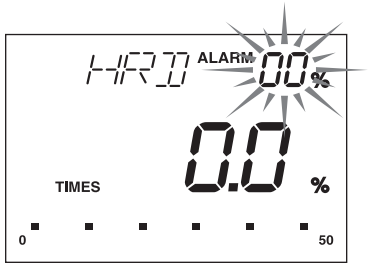


• The ✳ symbol denotes a blinking display.

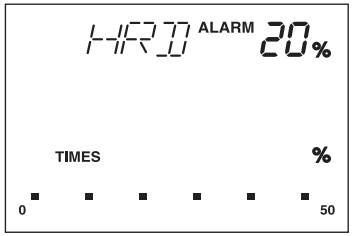
6-6.Setting the Alarm

An upper limit moisture alarm can be set. When wood is measured having moisture higher than the set moisture value, the alarm sounds with a beeping tone.

1. Press the ALARM 0 key.
   The numbers to the right of “ALARM” will blink.



2. Enter the alarm value.
   Enter a 2-digit number. To enter “20%”, press the 2 key and the ALARM 0 in succession.



3. The set value for the alarm is displayed. Then, press the MEA 9 key to make measurements.

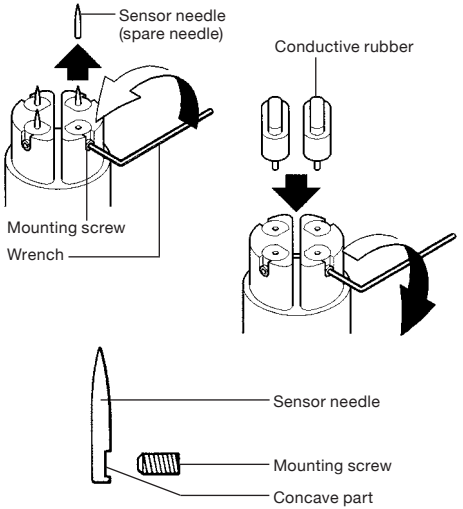
- To cancel the set value for the alarm, enter “0.0%”.

• The ☼ symbol denotes a blinking display.

6-7.Spare needle, Conductive rubber Replacement

To replace needles in the needle probe or to install a conductive rubber piece, use the included wrench, and replace them by loosening the mounting screw. When installing a sensor needle, orient the concave part of the needle so that it comes in contact with the head of the screw as shown in the diagram.

- For thin sheets such as veneer, laminate, etc., or for cases such as product inspections in which you do not want to scratch the surface, use a “conductive rubber” to make measurements.



6-8.Printer Output

Measured values can be printed out by using the optional printer (VZ-390). The content output is “wood group or wood group number”, “measurement number”, “moisture value”, and “average moisture value”.

1. How to set up

   Press the PRINT 5 in normal measurement mode.

   “P” will be displayed to the right of “TIMES”. Set up is complete.

- The timing of the output is just after the measurement or just after the display of the average value. However, there is no output if the measured value is outside the measuring range.
- After setting up the printer (VZ-390, sold separately), connect the printer cable (VZC70, sold separately). Refer to the operating manual for the printer for how to set up the printer.

2. How to cancel the settings

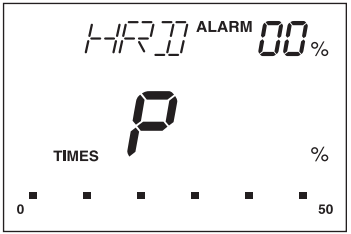
   Press the PRINT 5 key in normal measurement mode.

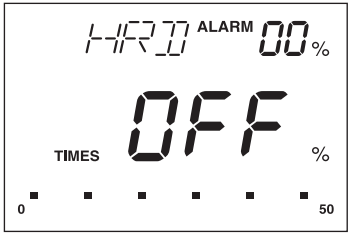
   “OFF” will be displayed to the right of “TIMES”. The settings have been cancelled.

- The settings in both 1 and 2 will be retained in memory when the power is turned off.

[Printout example]

MT-900	HARD
TIMES	[%]
1	18.5
2	18.4
3	18.4
4	18.3
5	14.7
6	18.4
AVERAGE	17.8





6-9.Data Storage

Up to 250 measurement values are stored automatically.
The contents of the data are “data number”, “year/month/day”, “time”, “wood group or wood group number”, and “moisture value”.

- If the number of stored data items exceeds 250, the oldest data item is deleted and the new data item is added.

1. Batch output of stored data

   Press the keys in the order of [4] ➡ [HARD 1] ➡ [AVERAGE ENTER] to output the data.

- After setting up the printer (VZ-390, sold separately), connect the printer cable (VZC70, sold separately).
- Refer to the printer’s operating manual for how to set up the printer.

2. Block function

   For cases such as different measurement samples, pressing the [7] key between measurements is recognized as a separator signal, and a line feed is inserted when printing out.

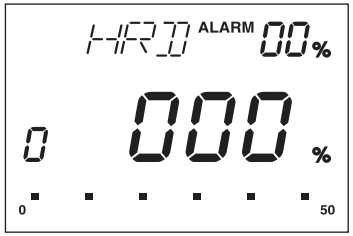
[Printout example]

001	2020/01/23	13:17	HARD	24.1%
002	2020/01/23	13:17	HARD	24.2%
003	2020/01/23	13:17	SOFT	17.8%
004	2020/01/23	13:17	SOFT	17.8%
005	2020/01/23	13:17	SOFT	17.8%
006	2020/01/23	13:17	SOFT	17.8%
007	2020/01/23	13:18	SOFT	17.7%
008	2020/01/23	13:18	#03	17.7%

3.Bulk erasing of stored data

Press the keys in the order of 4 ➡ – ➡ AVERAGE ENTER.

A tone sounds and “0” will be displayed for the measurement number. Next, the display for moisture changes from 0 ➡ 00 ➡ 000. The original display will return after approximately 15 seconds.



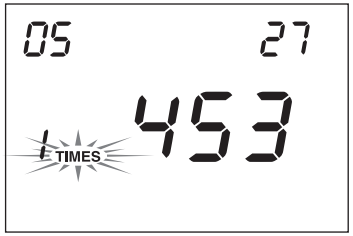
6-10.Date and Time Display

Press the keys in the order of 6 ➡ HARD 1 ➡ AVERAGE ENTER.

The date and time (24-hour system) are displayed. “TIMES” will blink. An display example is shown as 27 May, 14:53.

After displaying, press the ON/OFF to turn off the power.

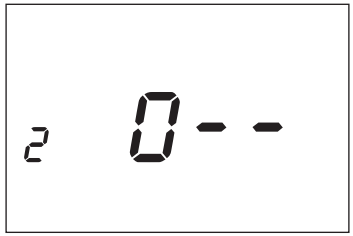
[Display example]



- If the clock is slow or the display is abnormal, the clock battery has been depleted. If the is blinking when performing the above operation, the clock battery has likewise become depleted. Servicing is required to use the clock function.

• The symbol denotes a blinking display.

The following procedure sets the western calendar date and time.
Example: 23 January 2020, 4:56



- In the operation below, to confirm an input number press the AVERAGE ENTER key.
  If you make a mistake when pressing an input number, press the _ key.

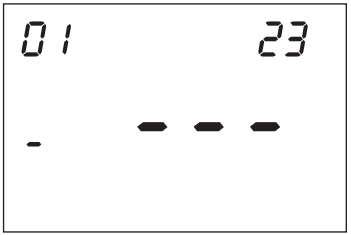
1. Entering the western calendar date
   When the date and time are displayed, press the 6 key. This will display the screen as in the upper-right figure. Next, enter the last two digits of the western calendar year. Press the keys in the order of 2 ➡ ALARM 0 ➡ AVERAGE ENTER.

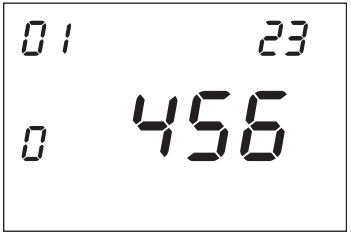
2. Entering the date
   For single-digit days and months, enter a “0” in the 10’s decimal place.
   Here, enter 23 January.
   First, enter the month by pressing the keys in the order of ALARM 0 ➡ HARD 1 ➡ AVERAGE ENTER. Next, enter the day by pressing the keys in the order of 2 ➡ SOFT 3 ➡ AVERAGE ENTER.

3.Entering the time

After the input of step 2, the screen at the right will be displayed. In the same manner as for the month and day, enter a “0” in the 10’s decimal place for single-digits. Here, enter 4:56. First, enter the hour by pressing the keys in the order of ALARM 0 ➡ 4 ➡ AVERAGE ENTER.

Next, enter the minutes by pressing the keys in the order of PRINT 5 ➡ 6 ➡ AVERAGE ENTER.





4.Set up is complete.

After the input of step 3, “TIMES” will blink as in the figure on the right. At this point, the set up is complete. Press the ON/OFF key to turn off the power.

• The ☼ symbol denotes a blinking display.

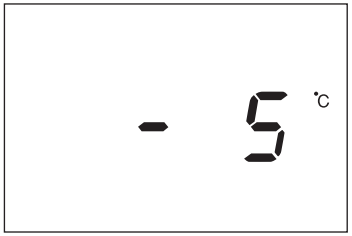
7. Error Display

When there is a problem with the unit or with the measurement conditions, the following errors will be displayed for 4 seconds, and then the power will turn off.

1. There is a problem with the temperature sensor. Servicing is required.

2. There is a problem with the electronic circuit used for moisture measurement. Servicing is required.

3.The measurement cannot be made because the temperature of the unit is below –5°C. Bring the temperature of the unit up to the operating temperature range (0 to 40°C), and make the measurement again.



4.The measurement cannot be made because the temperature of the unit is above 50°C. Bring the temperature of the unit down to the operating temperature range (0 to 40°C), and make the measurement again.

8. Wood Group Number Table

Number	Representative wood type	Measurement range
01	Oak, Zelkova, Maple	5 to 40%
02	Japanese oak, Linden, Chestnut, Beech tree, Cherry	5 to 40%
03	Katsura tree, Birch, Paulownia	5 to 40%
04	Apitong, Keruing, Kabul, Sengyan	4 to 40%
05	Ramin, Kempas, Chinese quince	6 to 30%
06	Japanese ash, Elm, Ash	4 to 40%
07	Teak	6 to 40%
08	Lauan, Castor aralia	5 to 40%
09	Japanese larch	6 to 40%
10	Japanese white-barked magnolia, Cottenwood	6 to 40%
11	Hemlock	6 to 40%
12	Yeddo spruce, Spruce	7 to 40%
13	Cypress	5 to 40%
14	Douglas fir	6 to 40%
15	Cedar	5 to 35%
16	Fir	5 to 40%

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