SANKO

# MULTIFUNCTION TYPE MOISTURE METER

# MR－300

## ELECTRIC MOISTURE METER INSTRUCTION MANUAL

CAUTIONS:

- Before using the Meter, read this INSTRUCTION MANUAL thoroughly and use the Meter correctly.
- Keep this INSTRUCTION MANUAL carefully and refer to this when necessary.
- Connect/disconnect the probe after surely confirming the power OFF. It causes out of order.
- In the event of any doubt arising, the original INSTRUCTION MANUAL in Japanese is to be final authority.

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# 1. FEATURES AND APPLICATIONS

● The moisture contents for various materials/products can be measured with the probe connecting to the instrument proper.
Kinds of the probe: probe for wood, probe for paper, probe for mortar and plaster

● The moisture contents of all kinds of objects can be compared in the MC mode.
Measurement can be carried out by converting the mode of the instrument proper keeping on each probe connecting.
Select the probe to be connected in accordance with an electrical characteristic of an object to be measured.
Classification and comparison of dry and moisture for the object can be easily and quickly checked as these are displayed with values 1 to 100.

| | |
|---|---|
| WOOD | : Sewn lumber, wood for buildings, fittings, packing, plywood, compiled wood, particle board, wood for furniture, flooring, textile wood, wood works such as household goods |
| PAPER | : Moisture control while storing and keeping of high quality paper, craft paper, paper board, wall paper, corrugated paper, paper articles, used news paper, used magazine, other used paper, etc. |
| MORTAR AND PLASTER | : Moisture control of mortar, concrete, plaster, etc. Quality control for coating, clothing, tiling, all kinds of water proofing, etc. |
| MOISTURE CONTENT | : Moisture control of fabric, food, chemical synthetic products, ceramic, etc. Moisture contents are indicated with a certain value, so that the object can be judged by the comparison of the measured value. |

## 2. SPECIFICATIONS

■ MR-300 Instrument proper(Common specifications)

| | |
|---|---|
| Measuring method | DC electric resistance method |
| Measuring range | Depends on connecting probe |
| Probe | Selection for the objects |
| Conversion of mode | Moisture %, MC mode (Moisture Content) |
| Resolution | Moisture : 0.1 %<br>MC mode : 0.5, 1 (no unit) |
| Indication | LCD display with hold function, measuring values,<br>kind of connecting probe, hold, upper and lower limit values,<br>printer, voltage drop etc.<br>With EL back light, kana/alphabet by conversion |
| Alarm | Upper and lower limit values (setting only one limit value is also available)<br>Setting voluntary value with 0.1 % pitch |
| Memory | Fixed 5 blocks × 3000 points or<br>Voluntary Blocks × No. of memory = 15000 points(Max.) |
| Statistical treatment | Indication and printing out the No. of measuring values, No. of data,<br>Max. value, Min. value, average value, median, highest frequent value,<br>standard deviation and histogram. |
| Communication | Built-in RS-232C interface |
| Communication speed | 19200, 9600, 4800, 2400, 1200, 600 bps |
| Printer | Thermal paper with 58mm breadth |
| Compensation of temperature | Automatic compensation of temperature with ON, OFF function |
| Power source | Dry batteries R6P(1.5V) × 8 pcs. With auto power off function<br>(4 pcs. for controlling the instrument proper and 4 pcs. for the printer unit)<br>Continuously usable time is approx. 25 hours |
| Operating temperature | 0 to 40 ℃ (except dew condensing condition) |
| Dimensions and weight | 103(W) × 41(H) × 228(D)mm, 740g |
| Accessories | Cable for communication, AC adapter, Spare role paper for printer,<br>Carrying bag |
| Option | Moisture reading checker<br>Neck Strap |

■ MR-300 Standard probe

● Probe for wood

| | |
|---|---|
| Type | TG-PA(Standard probe for wood) |
| Measuring range | 3.5 to 50.0%<br>Hardwood(Hard)/Softwood(Soft) by conversion<br>MC-3(Moisture Content) by 1 to 100 indication<br>(1 to 50 : 0.5 pitch, Over 50 : 1.0 pitch) |
| Dimensions and Weight | 50(W) × 30(H) × 135(D)mm, 320g |
| Accessories | Hexagonal wrench, spare needle |

● Probe for paper and corrugated board

| | |
|---|---|
| Type | KG-PA(Standard probe for paper and corrugated board) |
| Measuring range | 3.5 to 40.0%<br>MC-2(Moisture Content) by 1 to 100 indication<br>(1 to 100 : 0.5 pitch) |
| Dimensions and Weight | 50(W) × 40(H) × 150(D)mm, 360g |
| Accessories | Hexagonal wrench, spare needle |

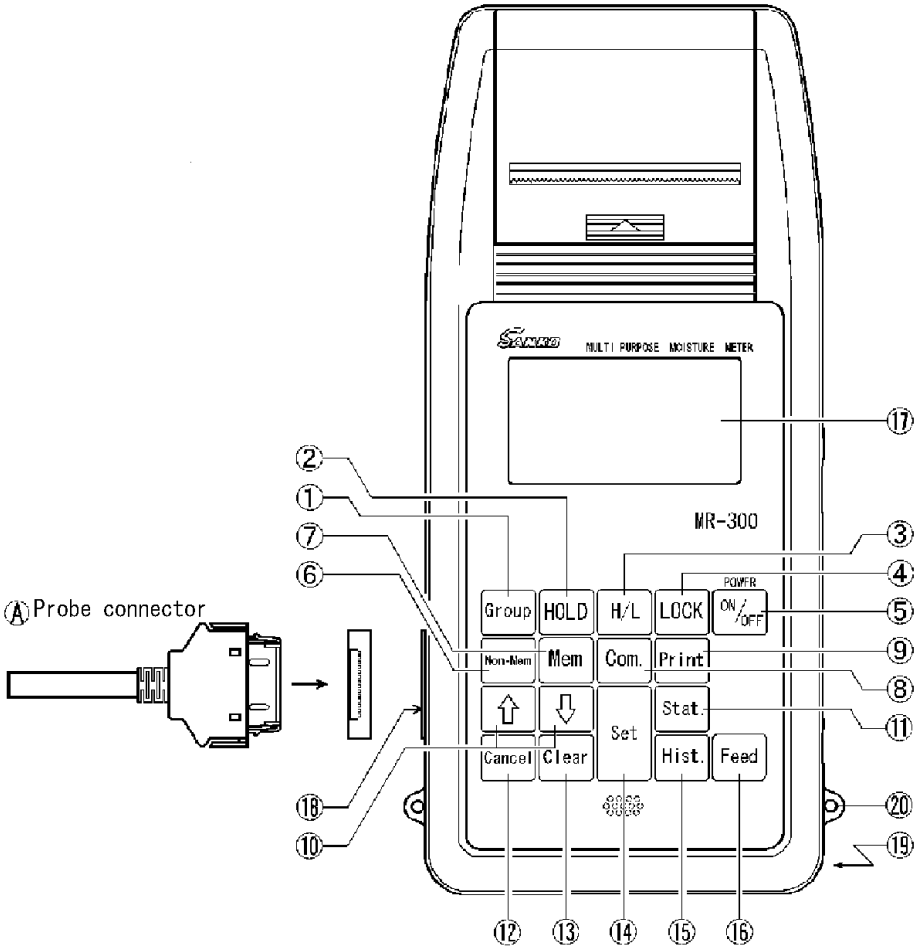
● Probe for mortar and plaster

| | |
|---|---|
| Type | PM-PA(Standard probe for mortar and plaster) |
| Measuring range | 0.8 to 15.0%<br>Mortar/Plaster by conversion<br>MC-1(Moisture Content) by 1 to 100 indication<br>(1 to 100 : 1.0 pitch) |
| Dimensions and Weight | 50(W) × 30(H) × 130(D)mm, 310g |

※ We will prepare or fabricate the optional probe suitable to the object to be measured other than above mentioned 3 kinds of the standard probe(PA type).
Please contact us at the nearest branch for details.

## 3. NAME OF PARTS

**3-1** Instrument proper




① Group key (GROUP)

Measurement mode is different depending on the connected probe.
The mode is converted each press of the key.
TG-PA : Measured value of the moisture in Wood (HARD/SOFT) and MC-3 mode are converted.
KG-PA : Measured value of the moisture in Paper and MC-2 mode are converted.
PM-PA : Measured value of the moisture in Mortar/Plaster and MC-1 mode are converted.

② Hold key (HOLD)

ON or OFF of the hold function is converted each press of the hold key.
The measured value is held until succeeding measurement in the hold ON state.

③ Setting key of upper and lower limit values(H/L)

Place the key to the setting mode for upper and lower limit values.
Set an arbitrary value by using the setting key of the value ⑩.

④ Lock key (LOCK)

By pressing the lock key, all keys except the power switch key ⑤ are locked and misoperation is avoided.

⑤ Power switch key (POWER)

Switch for power source ON or OFF.
When the probe is not connected to the instrument proper, [PE] probe error is indicated on the display and the power OFF. Power switch ON after surely connecting the using probe.

⑥ Non Mem. Key

Key for releasing the memory mode.
The mode is converted to the measurement mode without memory.

⑦ Mem. key
Key for setting the memory block.
⑧ Com. key
Key for setting the communication mode with PC.
⑨ Print key
Measuring data, statistically calculated result and histogram are printed out.
⑩ Setting key of the values (「 ⇧ 」「 ⇩ 」)
Key for setting the upper and lower limit values, selection of the memory and setting the communication speed .
「 ⇧ 」「 ⇩ 」 key traverse 0.1% pitch and quickly advance(return) by keeping on keys pressing.
⑪ Stat. key
Key for indicating the statistically calculated process and result of the memorized data.
No. of the data (No. of the data of the mother group), Max. value, Min. value, distribution range, average value, median (middle value of numbers, but not the middle of value), highest frequent value (highest frequent measured value), standard deviation(by means of the following formula)

$SS = (\chi\ 1\text{-}n)^2 + (\chi\ 2\text{-}n)^2 + (\chi\ 3\text{-}n)^2 \cdots\cdots\cdots + (\chi\ Y\text{-}n)^2$

$V = SS/n$

$Ans = \sqrt{V}$

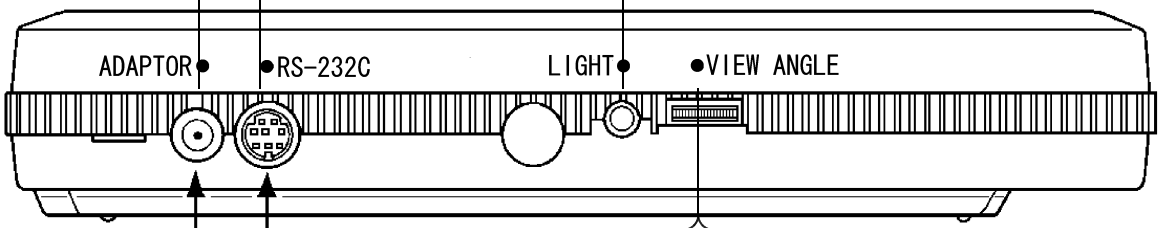
($\chi$ = individual data, n = average value, SS = flat square, V = dispersion)

⑫ Cancel key
Key for cancelling each mode such as print, statistical exercise and histogram. and for suspending the setting operation on the way.
⑬ Clear key
Key for restoring the memory block, erasing the memorized data and releasing upper and lower limit values.
⑭ Set key
Key for setting each mode such as 「Mem.」, 「Com.」, 「Print 」.
⑮ Hist.key
Key for indicating the process for drawing up and the result of the histogram of the memorized data.
⑯ Feed key
Key for feeding the paper of the printer.
⑰ LCD display
Kind of the connecting probe, measured values, upper and lower limit values, measurement mode, ［E］ showing LOW-BATT, etc. are indicated.
⑱ Receptacle for probe connector
Receptacle for connecting the probe.
⑲ Battery case(lower backside of the instrument proper)
Batteries are contained in this case.
⑳ Hook for neck strap
Be sure to fit the neck strap(option) and pass through the neck to prevent the Meter from dropping.
Ⓐ Probe connector
Connector for connecting the probe to the instrument proper.

Receptacle for RS-232C
- Out-put port for RS-232C
- When the Meter is connected to the instrument having the port of RS-232C such as P.C., use the attached communication cable for RS-232C.

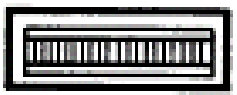
Receptacle for connecting the AC adapter
- When the Meter is used in AC100V, AC adapter is connected to this receptacle.
- Be sure to use the attached exclusive AC adapter, if necessary.

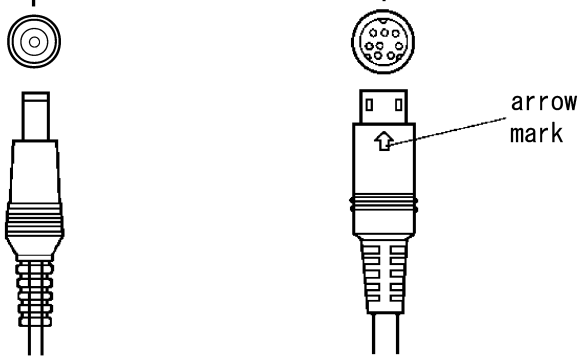
Button for the EL back light
- Button for switching ON the EL back light to raise the visibility in dark place.
- As the back light consumes a lot of capacity of the battery, be careful not to light it so long time.




Adjusting dial of view angle
- Dial for adjusting the density of the LCD display ⑰. The density becomes dark by turning it leftwards and faint rightwards. Adjust it to the easy position to read.

**dark** ⟷ **light**

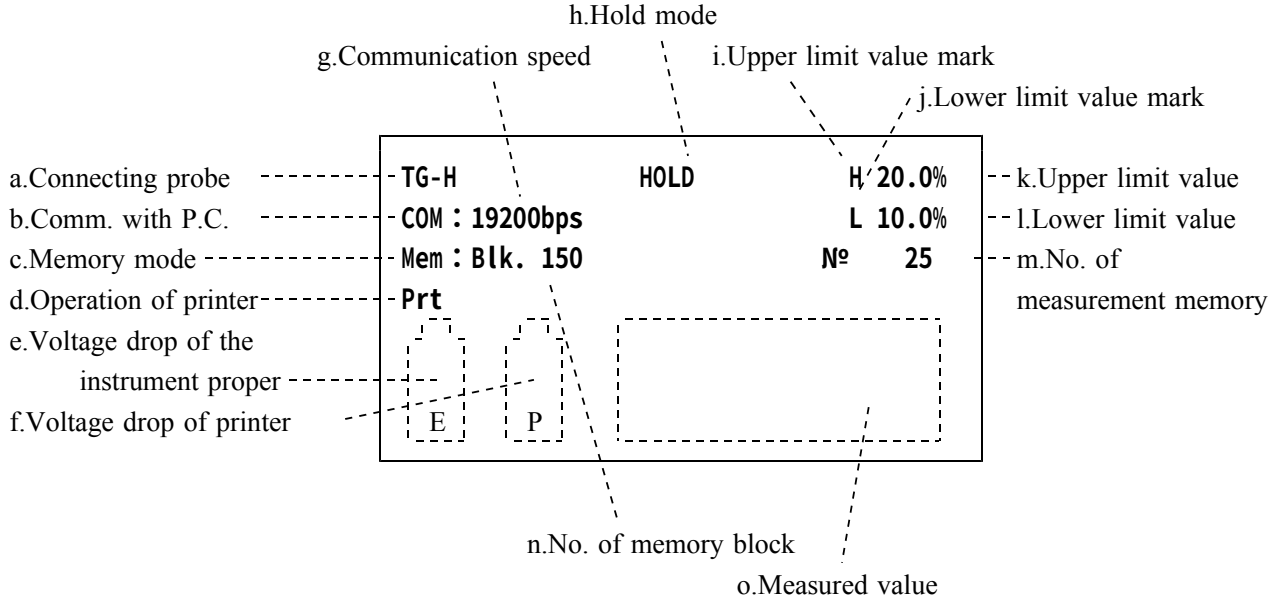





Connector for the AC adapter
Insert it in the receptacle to the bottom.

Connector for the RS-232C
Insert it in the receptacle to the bottom placing the arrow mark downwards.

**3-2** LCD display




a. Kind of the connecting probe
Display varies depending on the connecting probe and measurement mode as follows.
For Wood : TG-H, TG-S, MC-3
For Paper : KG, MC-2
For Mortar : MORTAR, PLASTER, MC-1

b. Setting of the communication with PC
When the communication function with PC is ON by the key operation, COM is displayed with the selected communication speed.
This mark is erased in OFF condition.

c. Memory mode
When the memory mode such as storage or retrieve of the data to/from the memory is set,
Mem is displayed with the memory block number. When the no mode is set, this mark is not displayed.

d. Operation of printer
When the printer is in ON condition, Prt is displayed and not displayed in OFF condition.

e. Voltage drop of the instrument proper
When the voltage of the battery supplying the power to the electronic circuit of the instrument proper drops until less than specific voltage, this mark is displayed.
When this mark is displayed, slide the cover of the battery space at the back side of the instrument proper downwards and replace all four alkaline dry batteries for the control part of the instrument proper placed in right hand with new ones quickly.
When replacing the batteries, turn OFF the power switch of the instrument proper before replacing.
If the dropped voltage is raised up to specific voltage with new batteries, the indicated mark disappears.
When the Meter is continuously used after voltage drop mark was indicated on the LCD display, following conditions will occur.

- Though it differs depending on the characteristic and using condition of the dry batteries, the Meter can work for several hours. (Replace all 4 batteries with fresh specified dry batteries earlier.)
- When the Meter is continuously used as it is, measured values will become unstable.
- When the power switch is turned ON, the buzzer continuously sounds and key operation become impossible simultaneously. (Remove the batteries from the Meter.)
- When no indication is on the LCD display, the batteries are completely consumed.

f. Voltage drop of the printer
When the voltage of the battery supplying the power to the mechanical part and control part of the printer drops until less than specific voltage, this mark is displayed. (Displayed only while operating the printer)
When this mark is displayed, slide the cover of the battery space at the back side of the instrument proper downwards and replace all four alkaline dry batteries for the printer unit part placed in left hand with new ones quickly.
When replacing the batteries, turn OFF the power switch of the instrument proper before replacing.
If the dropped voltage is raised up to specific voltage with new batteries, the indicated mark disappears.

g. Indication of the communication speed
Communication speed of the data is displayed in the rate bit/second.
When the communication function with PC is OFF, the speed is not displayed.

h. Display of the hold mode
When the hold mode is set, [HOLD] mark is displayed and is not displayed in OFF condition.

i. Indicating mark of the upper limit value
When the upper limit value is set, [H] and the upper limit value are displayed together, and are not displayed in un-setting condition.

j. Indicating mark of the lower limit value
When the lower limit value is set, [L] and the lower limit value are displayed together, and are not displayed in un-setting condition.

k. Upper limit value
The input value with the keyboard or the upper setting value stored in the memory is displayed.
When no upper limit value is set, the value is not displayed.

l. Lower limit value
The input value with the keyboard or the lower setting value stored in the memory is displayed.
When no lower limit value is set, the value is not displayed.

m. Number of the measurement memory
When the initial block size is set, the memory capacity in one block is displayed.
While operating in the memory mode, memory number has been stored is displayed.
When no initial block size is set, the memory capacity is not displayed.

n. Number of the memory block
When the initial block size is set, total number of the blocks is displayed.
While operating in the memory mode, using block number is displayed.
When no initial block size is set, using block number is not displayed.

o. Indication of the measured value
Measured value is displayed.

● Indicating function by kana

When the Meter is delivered, the Meter is set with LCD display/printing mode by alphabet.
But the Meter can be converted to LCD display/printing mode by kana.
By pressing the [Clear] key ⑬ and [Cancel] key ⑫ simultaneously, display and printing mode are converted.
By pressing these two keys again, the mode returns to the mode by alphabet.
Converted mode is remained even after power OFF.
So in case the Meter power ON next time, the Meter can be used with the converted mode at previous power OFF condition.
Relation of the indication between alphabet and kana is as per following list.

◎ LCD Display

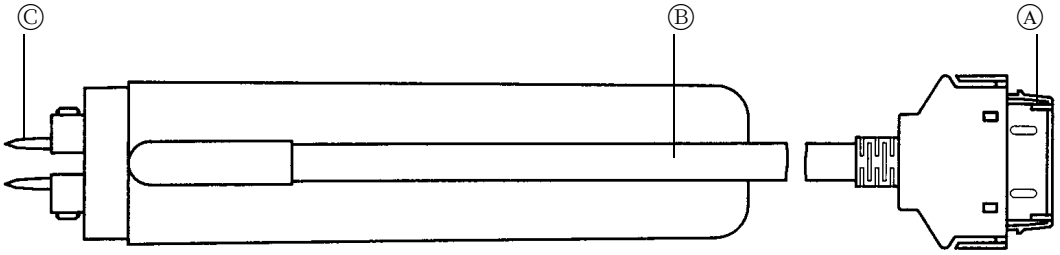
| Indication by the alphabet | Indication by the kana |
|---|---|
| TG-H | ﾓｸｻﾞｲ-H |
| TG-S | ﾓｸｻﾞｲ-S |
| KG | ｶﾐ |
| PLASTER | ﾌﾟﾗｽﾀ |
| MORTAR | ﾓﾙﾀﾙ |
| HOLD | ﾎｰﾙﾄﾞ |
| COM: | ﾂｳｼﾝ |
| Prt | ﾌﾟﾘﾝﾄ |
| Mem: | ﾒﾓﾘ |
| BLK. | ﾌﾞﾛｯｸ |
| | |
| fixed Block | ｺﾃｲｶﾞﾀﾌﾞﾛｯｸ |
| User's format Block | ﾕｰｻﾞｰｾｯﾃｲｶﾞﾀﾌﾞﾛｯｸ |
| stat. | ﾄｳｹｲ |
| Total | ｾﾞﾝｽｳ |
| Max | ｻｲﾀﾞｲ |
| Min | ｻｲｼｮｳ |
| Range | ﾊﾝｲ |
| Mean | ﾍｲｷﾝﾁ |
| Median | ﾁｭｳｵｳﾁ |
| Mode | ｻｲﾋﾝﾁ |
| S.D. | ﾍﾝｻﾁ |
| Temp ON | ｵﾝﾄﾞﾎｾｲON |
| Temp OFF | ｵﾝﾄﾞﾎｾｲOFF |
| inhibit | ｼｮﾖｳｷﾝｼ |
| X-mit | ｿｳｼﾝ |
| mem Overflow | ﾒﾓﾘｵｰﾊﾞｰﾌﾛｰ |
| Memory Clear | ﾒﾓﾘﾃﾞｰﾀ ｼｮｳｷｮ |
| Restor | ｻｲｾｯﾃｲ |
| Com Error | ﾂｳｼﾝｴﾗｰ |
| Erase | ｼｮｳｷｮ |
| No Data | ﾃﾞｰﾀﾅｼ |

◎ Printing

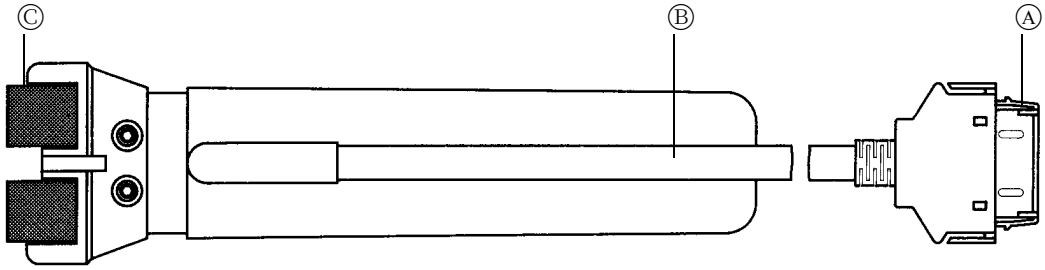
| Indication by the alphabet | Indication by the kana |
|---|---|
| TG-H | ﾓｸｻﾞｲ-H |
| TG-S | ﾓｸｻﾞｲ-S |
| KG | ｶﾐ |
| PLASTER | ﾌﾟﾗｽﾀ |
| MORTAR | ﾓﾙﾀﾙ |
| HOLD | ﾎｰﾙﾄﾞ |
| COM: | ﾂｳｼﾝ |
| Prt | ﾌﾟﾘﾝﾄ |
| Mem: | ﾒﾓﾘ |
| BLK. | ﾌﾞﾛｯｸ |
| H-set | ｼﾞｮｳｹﾞﾝ |
| L-set | ｶｹﾞﾝ |
| Statistics | ﾄｳｹｲﾃﾞｰﾀ |
| Memory Block No | ﾒﾓﾘﾌﾞﾛｯｸﾊﾞﾝｺﾞｳ |
| Total Count | ｾﾞﾝｽｳ |
| Max. Value | ｻｲﾀﾞｲﾁ |
| Min. Value | ｻｲｼｮｳﾁ |
| Range | ﾊﾝｲ |
| Mean.Value | ﾍｲｷﾝﾁ |
| Median | ﾁｭｳｵｳﾁ |
| Mode | ｻｲﾋﾝﾁ |
| Standard Deviation | ﾍﾝｻﾁ(ﾋｮｳｼﾞｭﾝﾍﾝｻ) |

**3-3** Standard probe

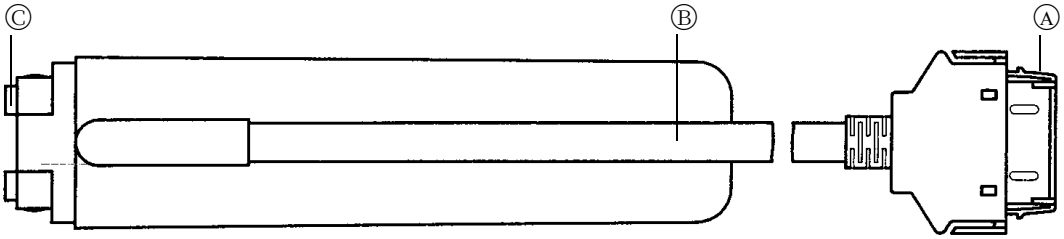
Probe for Wood(TG-PA)




Probe for Paper(KG-PA)



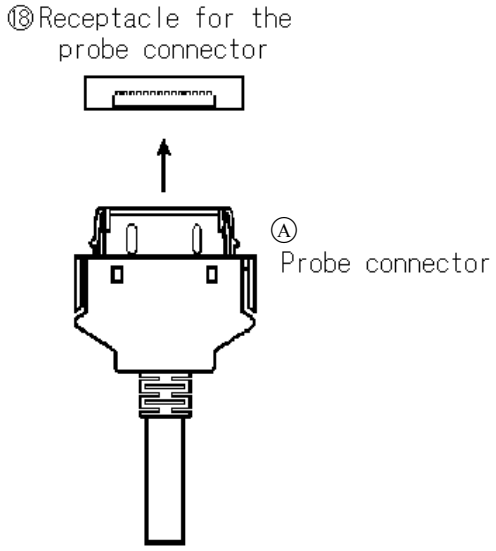

Probe for Mortar and Plaster(PM-PA)




Ⓐ Probe connector
Ⓑ Probe cord
Ⓒ Electrode
- Probe for Wood (needle electrode)
- Probe for Paper (needle electrode + SB attachment)
- Probe for Mortar and Plaster (rubber electrode)

# 4. OPERATING INSTRUCTIONS

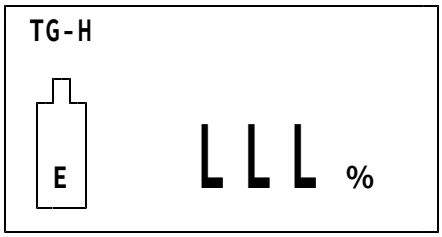
**4-1** Connecting(Disconnecting) the probe
(Be sure to confirm the power OFF.)




- To connect the probe:
  Carefully insert the probe connector Ⓐ of the using probe to the bottom into the receptacle for the probe connector ⑱.
- To disconnect the probe:
  After confirming the power OFF, carefully pull the probe connector Ⓐ releasing the locks located at both sides.
- If the cord is pull out of the receptacle without releasing the locks, it causes breaking of the cord or the connector.

※ If the probe connector Ⓐ is disconnected while the power ON, it causes out of order.

**4-2** Power ON・OFF




- Press the power switch ⑤, then the kind of connected probe is indicated on the LCD display ⑰ with a beeping sound.
  (When no probe is connected, [PE] probe error is indicated on the LCD display and the power goes off with beeping sounds of the buzzer.)
- Press the power switch again, then the power OFF after indicating [END] mark on the display with a beeping sound.
- The batteries consumption caused by forgetting the power OFF is prevented with the auto power OFF function.
  When the measurement is not carried out continuously for about 3 minutes, the power will go off automatically.

※ When switching over the power switch ⑤ ON or OFF, operate the switch with an interval of 3 to 5 seconds to prevent malfunction.

**4-3** Various measuring methods

MR-300 can be used with the combination of the probes and the following functions as well.
When the Meter is used with the combination of the functions, it is necessary to set up each function.
Set up the necessary function only when the Meter is used.

1)Measurement → Indication of the data (Refer to **5-1**)
2)Measurement → Indication of the data and printing (Refer to **5-7**)
3)Measurement → Indication of the data and communication with PC (Refer to **5-9**)
4)Measurement → Indication of the data, printing and communication with PC (Refer to **5-11**)
5)Measurement → Indication of the data and store of the data in the memory (Refer to **5-13**, **5-16**)
6)Measurement → Indication of the data, store of the data in the memory and printing (Refer to **5-18**)
7)Measurement → Indication of the data, store of the data in the memory and communication with PC (Refer to **5-19**)
8)Measurement → Indication of the data, store of the data in the memory, printing and communication with PC (Refer to **5-20**)
9)Printing of the stored data in the memory (Refer to **5-21**)
10)Communication with PC of the stored data in the memory (Refer to **5-22**)
11)Printing and communication with PC of the stored data in the memory (Refer to **5-23**)
12)Indication of the results statistically treated of the stored data in the memory (Refer to **5-24**)
13)Indication of the results statistically treated of the stored data in the memory and printing(Refer to **5-25**)
14)Indication of the results statistically treated of the stored data in the memory and communication with PC (Refer to **5-27**)
15)Indication of the results statistically treated of the stored data in the memory, printing and communication with PC (Refer to **5-29**)
16)Indication of the histogram drawn by the results statistically treated (Refer to **5-24**)
17)Indication of the histogram drawn by the results statistically treated and printing (Refer to **5-26**)
18)Indication of the histogram drawn by the results statistically treated and communication with PC (data of values) (Refer to **5-28**)
19)Indication of the histogram drawn by the results statistically treated, printing and communication with PC (data of values) (Refer to **5-30**)

※ Notice: The Meter can be used with the **hold mode only** except 1) item above mentioned.
The Meter indicates [inhibit] (kana:ｼｮｳｷﾝｼ) on the LCD display ⑰ besides the hold mode and can not be set. Be sure to press the [HOLD] key ②.

※ Notice: The Memorized data processing
When the memorized data are processed such as printing out, communication with PC, erase of the data, etc., the probe dealing with the memorized data must be connected,
otherwise the operation for the memorized data processing can not be carried out.

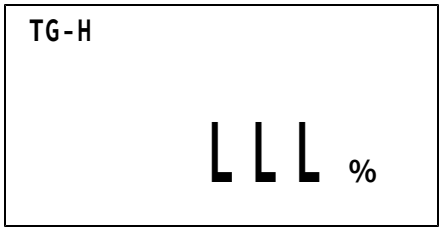
## 5. MEASUREMENT

**5-1** Preparation for the measurement

1. Connect the probe suitable for an object (wood, paper, mortar and plaster) to be measured.

2. Power switch ⑤ ON and confirm the indications on the LCD display ⑰.
   For wood =[TG-H]  For paper =[KG]  For mortar and plaster =[MORTAR]

Example: In case of connection of the probe for wood




★ When the probe is not connected, probe error [PE] is indicated on the LCD display ⑰ and the power OFF with 3 beeping sounds.
★ When [PE] is indicated on the LCD display ⑰ and power OFF with 3 beeping sounds though the probe is connected, power ON again after 2 to 3 seconds.
★ When [PE] is still indicated on the LCD display ⑰ in spite of power ON again after 2 to 3 seconds as above mentioned, it seems that the probe is out of order.
Please contact to the purchased agent or our sales office to repair.
★ When the power switch ⑤ ON keeping on the probe pressing against the object to be measured, once [LLL] is indicated on the LCD display ⑰ and the measured value is indicated in 3 to 4 seconds.

3. Press the 「Group」 key ①, select the mode suitable for the object to be measured.
Refer to **5-2** Converting the measurement mode on page 16.

4. Press the electrode with a constant force against the object to be measured and read the indicated value after settlement of the indication.
When the 2-needle electrode is used, thrust it to an object to be measured.

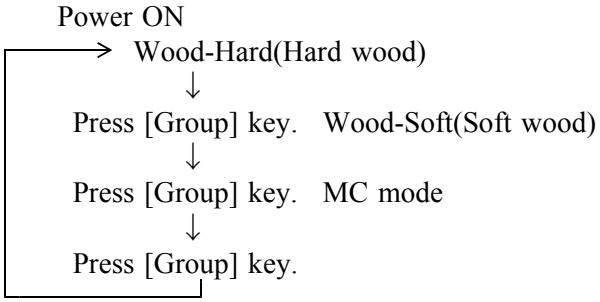
5. When the hold key ② is pressed, the indication on the display will be held at the time just removing the electrode from an object to be measured.
Refer to **5-3** Converting the hold mode on page 17.
Hold mode is released by pressing the hold key ② again.

※ Note: In case the measurement is carried out with the probe hammered into the wood which is an object to be measured:
Keep on the hold mode releasing until completion of the hammering of the probe.
Pay attention to convert the mode to the hold mode at the time when the measured value is read after completion of the hammering.
(When the hammering is carried out in hold mode, it causes measurement error as the data during hammering is held and indicated.)

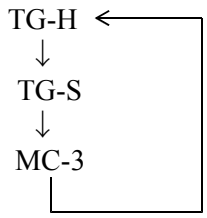
**5-2** Converting the measurement mode

- Normally the initial measurement mode of the selected probe is indicated on the LCD display.
- The measurement mode is converted each press of the 「Group」 key ① as shown in the following charts.

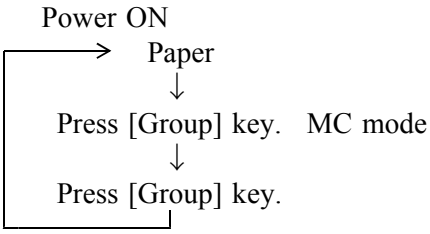
[Probe for Wood]



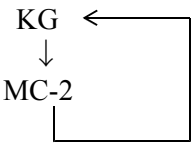

Indication on the LCD



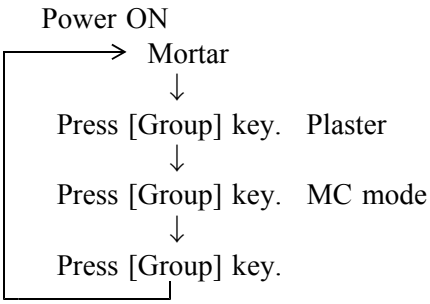

[Probe for Paper]



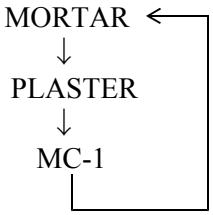

Indication on the LCD




[Probe for Mortar and Plaster]




Indication on the LCD

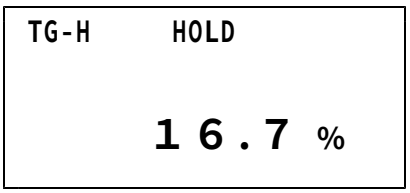



- When power ON again after power OFF, the mode will automatically return to the mode at previous power OFF condition.

★ Be sure to confirm the measurement mode when the power is ON.

**5-3** Converting the hold mode

When the hold key ② is pressed, the 「Hold」 mark is indicated on LCD ⑰ and indicated measured value will be held until the next measurement.
Hold mode will be converted ON or OFF each press of the key. [HOLD] is indicated on the LCD ⑰ at ON of the hold mode and no indication at OFF.




※ When the 「Hold」 key ② is pressed while measuring in later memory mode, the mode is converted to NON-HOLD measuring mode and memory mode is released.

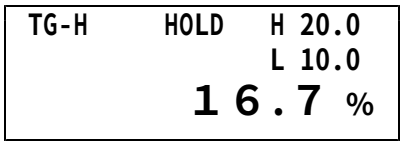
※ Printing out, communication with PC and measurement in memory mode can not be set with the indication 「INHIBIT」 on the LCD ⑰ if the hold mode is not ON. Handle the Meter after surely hold mode ON.

**5-4** Setting upper and lower limit values (in operating measurement mode)

H/L 「H」 mark showing upper limit value is indicated blinking.
↓
⇧ · ⇩ Input upper limit value (omit in case of lower limit value only)
↓
H/L 「L」 mark showing lower limit value is indicated blinking.
↓
⇧ · ⇩ Input lower limit value (omit in case of upper limit value only)
↓
H/L Mode returns to the measurement mode.

・When the upper and lower limit values are set and the measured value exceeds set upper limited value, 「H 」 and measured value are indicated blinking by turns with beeping sounds. For the value under set lower limit value, 「L」 and measured value are indicated blinking by turns with beeping sounds.

(Example) In case the upper and lower limit values for wood are set




・When the setting condition of upper limit value and lower limit value are needed to change, press the 「H/L」 key ③ again and repeat above mentioned procedures.

※ 1.When no upper limit value is needed, after pressing 「H/L」 key ③ at first, press 「H/L」 key again. In this case, as 「H」 mark showing upper limit value is erased and 「L」 mark showing lower limit value blinks instead, set the lower limit value.

※ 2.When no lower limit value is needed, after setting the upper limit value, press 「H」 key ③ again while blinking 「L 」 is indicating.
In this case, as 「L」 mark showing lower limit value is erased and only upper limit value is set.

※ 3.When the Meter is used in memory mode, carry out above procedure after selecting the store memory block.

**5-5** Releasing upper and lower limit values(in the operating measurement mode)

H/L
↓
Clear (Releasing both upper and lower limit values)

※ When erasing of upper and lower limit values in the memory block is needed, repeat above procedures after selecting the storage memory block.

**5-6** Converting the key lock mode

When the「LOCK」key ④ is pressed, all keys except the power switch key ⑤ are locked and misoperation can be prevented.
ON mark showing key lock mode is not indicated on the LCD ⑰.
This mode can be released by power OFF.

**5-7** Printing out the measured data(Printing out at each measurement in the operating measurement mode)

◇ Confirm the ON condition of the hold mode before pressing the key

Print 「Prt」is indicated blinking on the LCD.
↓ ← Cancel (When the setting is suspended)
Set Blinking「Prt」on the LCD stops.

**5-8** Releasing the printing out

Print 「Prt」is indicated blinking on the LCD.
↓
Cancel Indication of「Prt」on the LCD is erased.

**5-9** Communication with PC(Communication at each measurement in the operating measurement mode).

◇ Confirm the ON condition of the hold mode before pressing the key

COM. [COM:XXXX bps] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Select the communication speed)
(Example) [19200bps] ← setting communication speed(blinking indication).
↓ ← Cancel (When the setting is suspended)
Set Blinking indication of [COM:XXXXbps] on the LCD stops.

**5-10** Releasing the communication with PC

COM. [COM:XXXXbps] is indicated blinking on the LCD.
↓
Cancel Indication of [COM:XXXXbps] on the LCD is erased.

**5-11** Communication with PC and printing out of the measured data
(Communication and printing out at each measurement in the operating measurement mode)

◇ Confirm the ON condition of the hold mode before pressing the key

COM. [COM:XXXXbps] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Select the communication speed)
↓ (Example)[19200bps] ← setting communication speed(blinking indication)
Set Blinking [COM:XXXXbps] on the LCD stops.
↓
Print 「Prt」is indicated blinking on the LCD.
↓ ※ The order of [Com.] and [Print] is available also in reverse.
Set Blinking [Prt] on the LCD stops.

※ In case of suspending before pressing the [set] key ⑭ each, press the [Cancel] key ⑫.

**5-12** Releasing the communication with PC and printing out

For releasing the communication with PC, refer to item "**5-10**".

For releasing the printing out, refer to item "**5-8**".

**5-13** Setting the memory mode

MR-300 can store up to Max. 15,000 data in the memory mode.

There are following two ways for setting the memory block, so select one way of the two and set the memory block.

The construction of the memory can not be changed on the way of the measurement.

Restore the construction of the memory and reset as shown in item "**5-14**".

1. Fixed block system

   5 blocks fixed system (3,000 data/1 block)

2. An arbitrary block construction system

   This is a system to set the numbers of memory block and block size(numbers of the data storing in 1 block) within Max. 15,000 data arbitrarily.

   Max. number of the memory block will be 1,100 blocks and Min. of block size will be 10 data.

   Memory can not be additionally constructed on the way even though the memory capacity is not full.

① Setting the fixed block(Memory block: 5, Number of memory: 3,000)

◇ Confirm the ON condition of the hold mode before pressing the key

[Mem.] [Mem: Fixed Block] and [G:User's format Block] are indicated on the LCD ⑰.

↓

[Mem.] (Construct the fixed block) [Mem: BLK.1 No.---] is indicated blinking on the indicating part of the memory condition.

↓ ← [Cancel] (When the setting is suspended)

[Set] The setting of the fixed block is finalized and blinking on the LCD stops.
[Mem: BLK.1 No.0] is indicated and the measurement can be done in the memory mode.

● Before measurement, confirm the measurement mode, press the [Group] key ① and change the mode if necessary. After measurement, the block mode can not be changed.

② An arbitrary block construction system(Memory block × No. of memory ≦ 15,000)

◇ Confirm the ON condition of the hold mode before pressing the key.

[Mem.] [Mem:Fixed Block] and [G:User's format Block] are indicated on the LCD ⑰.

↓

[Group] [Mem.BLK.----No.----] is indicated blinking on the indicating part of the memory condition.

↓

[⇧] · [⇩] (No. of the memory block)

↓

(Example) [Mem.BLK.100] ← No. of block to be set(blinking indication)

[Group] [Mem.BLk.100 No.---] is indicated blinking.

↓

(Blinking indication of Mem.BLK. 100 stops.)

[⇧] · [⇩] (Block size)

(Example) [No.150] ← Size of block to be set(blinking indication)

↓ ← [Cancel] (When setting is suspended)

[Set] Setting of the block construction is finalized and the blinking indication on the LCD stops.
[Mem:BLK.1 No.0] is indicated and the measurement can be done in the memory mode.

● Before measurement, confirm the measurement mode, press the [Group] key ① and change the mode if necessary. After measurement, the block mode can not be changed.

※ When the stored numbers in the memory reach the Max. data numbers while measuring in the memory mode, the data is stored in the next empty block.

In case the data exist in the next block, the data will be stored in the third empty block.

If there are no empty block to store, the message [Memory Overflow] is indicated on the LCD ⑰ and the memory mode of the measurement is released.

**5-14** Restoring the construction of the memory(All data are erased for resetting.)

For restoring to the non-constructed conditions the constructed memory block, following procedures are needed.

Pay attention to proceed the procedures because **all data are erased**.

※ Same procedures are applied to both a fixed block system and an arbitrary block construction system. By restoring the memory, the upper and lower limit values have been set in each block are also erased together.

● Resetting all memories

[Mem.] [BLK.X] is indicated blinking on the memory indicating part of the LCD.

↓

[Group] Number of block and Max. data are indicated blinking on the memory indicating part of the LCD.

↓

[Clear] Message [Restore?] (Kana: ｻｲｾｯﾃｲ) is indicated blinking.

↓ ← [Cancel] (When restore is suspended)

[Clear] [Erase] is indicated on the LCD and all data in the memory are erased. The mode is reset to the initial condition(Non-Memory mode) with a beeping sound of the buzzer.

**5-15** Erasing the memorized data in the block

① Erasing the memorized data each block

In case the memorized data are erased, the upper and lower limit values have been set in its block are also erased.

[Mem.] [BLK.X] is indicated blinking on the memory indicating part of the LCD.

↓

[⇧] · [⇩] (Select the block erasing the data)

↓

[Clear] [Memory clear?] (Kana: ﾒﾓﾘﾃﾞｰﾀｼｮｳｷｮ?) is indicated blinking.

↓ ← [Cancel] (When erasing the data is suspended)

[Clear] [Erase] is indicated, and memorized data and the upper and lower limit values have been set are erased.

② Erasing the measured data

[Cancel] key ⑫ is pressed while measuring in memory mode, [Memory Clear] (Kana: ﾒﾓﾘﾃﾞｰﾀｼｮｳｷｮ?) is indicated and just previous measured data are erased by succeeding press of [Clear] key ⑬.

By repeating these procedures previous memorized data can be erased.

**5-16** Selecting the memory block

◇ Confirm the ON condition of the hold mode before pressing the key

[Mem.] Memory block No. and stored Nos. of data used till just before are indicated blinking.

↓

[⇧] · [⇩] (Select the storing memory block)

↓ ← [Cancel] (When the setting is suspended)

[Set] Storing memory block is set and blinking indication stops.

※ The connected probe differs from the selected memory block in measurement mode, [INHIBIT] is indicated blinking on the LCD ⑰ and block can not be selected.

Measurements in the hold mode are available but can not be measured in memory mode.

Select the same memory block as the connecting probe or connect the probe equivalent for the mode of the memory block.

(But, when the data is not stored in the selected memory block, the memory measurement is possible in the mode of the connected probe.)

**5-17** Measurement in the memory mode and releasing

Completing above item "**5-16** Selecting the memory block" measurement in the memory mode can be done.

When [Non Mem.] key ⑥ is pressed while measuring in the memory mode, the memory mode is released and transfers to the measurement in non-memory mode keeping the hold mode ON.

**5-18** Measurement in the memory mode and printing out

◇ Confirm the ON condition of the hold mode before pressing the key

[Mem.] [BLK. X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selecting the storing blocks)

↓

[Set] Blinking [BLK.X] stops.

↓

[Print] [Prt] is indicated blinking on the LCD.

↓ ← [Cancel] (When the setting is suspended)

[Set] Blinking stops, the memory measurement and printing can be available.

※ To release the printer mode, refer to "**5-8** Releasing the printer"

**5-19** Measurement in the memory mode and communication with PC

◇ Confirm the ON condition of the hold mode before press the key

[Mem.] [BLK. X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selecting the storing blocks)

↓

[Set] Blinking [BLK.X] stops.

↓

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

(Example) [19200bps] ← Communication speed to be set(blinking indication)

↓ ← [Cancel] (When the setting is suspended)

[Set] Blinking stops, the memory measurement and communication with PC can be available.

※ To release the communication mode with PC, refer to "**5-10** Releasing the communication with PC".

**5-20** Measurement in the memory mode, communication with PC and printing out

◇ Confirm the ON condition of the hold mode before pressing the key

[Mem.] [BLK. X] is indicated blinking on the LCD

↓

[⇧] · [⇩] (Selection of the storing blocks)

↓

[Set] Blinking [BLK.X] stops.

↓

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

↓ (Example) [19200bps] ← Communication speed to be set(blinking indication)

[Set] Blinking [COM:XXXXbps] on the LCD stops.

↓

[Print] [Prt] is indicated blinking on the LCD.

↓ ← [Cancel] (When the setting is suspended)

[Set] Blinking stops, memory measuring, communication with PC and printing can be available.

※ To release each mode, refer to "**5-8** Releasing the printer" and "**5-10** Releasing the communication with PC" each.

**5-21** Printing out the memorized data

[Print] [Prt] is indicated blinking on the LCD.

↓

[Mem.] [BLK.X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the block)

← [Cancel] (When the printing is suspended)

↓

[Set] Blinking stops and printing starts.

When continuous plural blocks are printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-22** Communication with PC of the memorized data

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

↓ (Example) [192000bps] ← Communication speed to be set(blinking indication)

[Mem.] [BLK.X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the block)

↓ ← [Cancel] (When the communication is suspended)

[Set] Blinking stops and communication starts.

When continuous plural blocks are communicated, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-23** Communication with PC and printing out of the memorized data

Com. [COM:19200bps] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the communication speed)
↓ (Example) [192000bps] ← Communication speed to be set(blinking indication)
Print [Prt] is indicated blinking on the LCD.
↓
Mem. [BLK.X] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the block)
↓ ← Cancel (When the operation is suspended)
Set Blinking stops, printing and communication with PC start.

When continuous plural blocks are communicated and printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-24** Graphically indicating the statistical data and the histogram

Mem. [BLK.X] is indicated blinking on the memory indicating part of the LCD.
↓
⇧ · ⇩ (Selection of the indicating block)
↓
Stat. (Omit when indicating the histogram only)
↓
Hist. (Omit when indicating the statistical treatment only)
↓ ← Cancel (When the operation is suspended)
Cancel Return to the measurement mode.

**5-25** Printing out the statistical data

Print [Prt] is indicated blinking on the LCD.
↓
Mem. [BLK.X] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the block)
↓ ← Cancel (When printing out is suspended)
Stat. [x-mit] is indicated on the LCD and printing out starts.

When continuous plural blocks are printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-26** Printing out the histogram

Print [Prt] is indicated blinking on the LCD.
↓
Mem. [BLK.X] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the block)
↓ ← Cancel (When printing out is suspended)
Hist. [x-mit] is indicated on the LCD and printing out starts.

When continuous plural blocks are printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-27** Communication with PC of the statistical data

Com. [COM:19200bps] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the communication speed)
↓ (Example) [19200bps] ← Communication speed to be set(blinking indication)
Mem. [BLK.X] is indicated blinking on the LCD.
↓
⇧ · ⇩ (Selection of the block)
↓
Stat. After completing the communication, the mode returns to the measurement mode in hold condition.

When continuous plural blocks are communicated, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

**5-28** Communication with PC of the histogram

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

(Example) [19200bps] ← Communication speed to be set(blinking indication)

↓

[Mem.] [BLK.X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the block)

When continuous plural blocks are communicated, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

↓

[Hist.] After completing the communication, the mode returns to the measurement mode in hold condition.

※ In case of suspending before pressing [Hist.] key ⑮, press the [Cancel] key ⑫

**5-29** Communication with PC and printing out of the statistical data

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

↓

(Example) [19200bps] ← Communication speed to be set(blinking indication)

[Print] [Prt] is indicated blinking on the LCD.

↓

※ The order of [Com.] and [Print] is available also in reverse.

[Mem.] [BLK.X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the block)

When continuous plural blocks are communicated and printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

↓

[Stat.]

After completing the communication, the data are printed out and the mode returns to the measurement mode in hold condition.

※ In case of suspending before pressing [Stat.] key ⑪, press the [Cancel] key ⑫.

**5-30** Communication with PC and printing out of the histogram

[Com.] [COM:19200bps] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the communication speed)

↓

(Example) [19200bps] ← Communication speed to be set(blinking indication)

[Print] [Prt] is indicated blinking on the LCD.

↓

※ The order of [Com.] and [Print] is available also in reverse.

[Mem.] [BLK.X] is indicated blinking on the LCD.

↓

[⇧] · [⇩] (Selection of the block)

When continuous plural blocks are communicated and printed out, select the first and last blocks. Data differ from the mode of the connected probe are not intended for the data processing.

↓

[Hist.]

After completing the communication, the data are printed out and the mode returns to the measurement mode in hold condition.

※ In case of suspending before pressing [Hist.] key ⑮, press the [Cancel] key ⑫.

## 6. MEASUREMENT IN THE MOISTURE CONTENT(MC) MODE

MC mode of moisture content can be applicable to the wide range object relating to the resistance.
Select the connecting probe based on the electric characteristics of an object to be measured.
The changes of the electric resistance caused by the dry or the moisture of an object to be measured are indicated by the values 「1 to 100 」.
Classification and comparison can be easily checked by checking the relative comparison values.

| Using probe | Measurement mode | Resolusion |
|---|---|---|
| For TG | MC-3 | 1 to 50 0.5 pitch , 51 to 100 1 pitch |
| For KG | MC-2 | 1 to 100 0.5 pitch |
| For PM | MC-1 | 1 to 100 1 pitch |

Optional probes suitable for an object to be measured other than 3 kinds of the standard probe(PA type) can be prepared or fabricated.
Please contact us at the nearest branch for the details.

## 7. COMMUNICATION WITH PC

MR-300 has a function for the communication with PC (Connection to RS-232C).
The communication cable is attached as standard.
Transmission of the data is carried out with the ASCII code.
After transmission, wait until receiving the ACK[06H].
When other code than ACK[06H] is received or there are no response for 3 seconds, wait the receiving after transmitting the data again.
When no ACK[06H] is received even after 3 times of transmission, stop the transmission as the transmission error.

Notice: Communication with PC consumes much power, so the battery capacity will drop so fast.
Operations connecting the attached AC adapter are recommended.

1.Communicating method：Start・stop synchronizing
( = start・stop bit method)
2.Bit line： {1 start bit}＋{7 data bit}＋{1 parity bit}＋{2 stop bit}
3.Parity ： Even-numbered parity
4.Communication speed：Select 1 out of 600, 1200, 2400, 4800, 9600 and 19200bps
5.Electrical characteristics of connecting part： Based on the subset of JIS-X5101(=RS232C)
6.Data format: ASCII code

| STX | Command | Data | ETX |
|---|---|---|---|
| 02H | X | | 03H |

An output format is roughly divided into 4 kinds. A group of transmitting the data which begins with STX[02H] is constructed with 1 letter' s command showing each output format followed by the data and finally ETX[03H].

When data can be received in PC side normally, transmit the ACK[06H].
When the parity error or no data can be received normally, transmit NAK[15] to a Moisture meter.

When NAK is received by the Moisture meter and a response within 3 seconds is time out, repeat the transmission of the data Max. 3 times(total 4 times).
Refer to the next "Communication output" for each output format.

Communication output

① Data while measuring

When the function of the communication with PC is ON, transfer the measured values (values on hold) to PC.

Transmit the measurement mode, upper limit value, lower limit value, measured values with the first transmission of the data.

When no upper and lower limit values are set, transfer the「0 」.

When one of the mode, upper limit value or lower limit value, is changed on the way of the measurement, transfer the measurement mode, upper limit value and lower limit value again as same at the first time.

When the measured value exceeds the upper limit value, add the letter「H」 in front of the measured value, and letter「L」 for the value under the lower limit value.

For the values except above mentioned, add symbol mark space "△" in front of the measured values.

◎ Output format (Example: TG-H mode)

First output C: Command X: Figure 1 letter △: Space

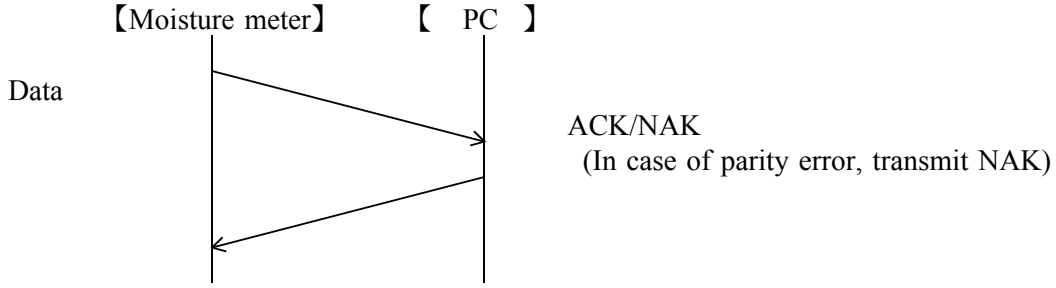
| STX | C | Measurement mode | Upper limit value | Lower limit value | Measured value | ETX |
|---|---|---|---|---|---|---|
| [02H] | $ | : TG-H | : H XX.X | : L XX.X | : △ XX.X | [03H] |

When H/L does not point, H △ 0.0 : L △ 0.0 is output.

Second and after output

| STX | C | Measured value | ETX |
|---|---|---|---|
| [02H] | $ | : △ XX.X | [03H] |

Basic protocol



② Memory data

Transfer the data stored in the memory in a block as a unit.
Transfer the measurement mode, upper limit value, lower limit value and number of the data at first and followed by all data in blocks.
When the measured value exceeds the upper limit value, add the letter「H」in front of the measured value, and letter「L」for the value under the lower limit value.
For the values except above mentioned, add symbol mark space "△" in front of the measured values.

◎ Output format (Example: TG-H mode)

Index data C: Command X: Figure 1 letter △: Space

| STX | C | Block No. | Measurement mode | Upper limit value | Lower limit value | Data No. | ETX |
|---|---|---|---|---|---|---|---|
| [02H] | 1 | : XXXX | : TG-H | : H XX.X | : L XX.X | : XXXX | [03H] |

When H/L does not point, H △ 0.0 : L △ 0.0 is outputted.

Repeated data

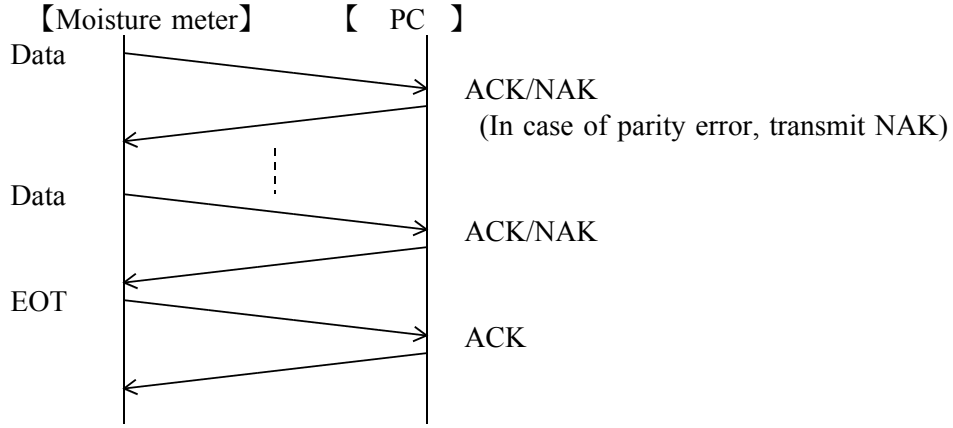
| STX | C | Measured value | ETX |
|---|---|---|---|
| [02H] | 1 | : △ XX.X | [03H] |

When no data is in the applicable memory, NO DATA is outputted.

Index data

| STX | C | Block No. | | ETX |
|---|---|---|---|---|
| [02H] | 1 | : XXXX | : NO DATA | [03H] |

Basic protocol



③ Statistical data

Statistical results of the data memorized in the memory are transferred.
Those are transferred in block units.

◎ Output format (Example: TG-H mode)

Index data C: Command X: Figure 1 letter △: Space

| STX | C | Block No. | Measurement mode | Upper limit value | Lower limit value | Data No. |
|---|---|---|---|---|---|---|
| [02H] | 2 | : XXXX | : TG-H | : H XX.X | : L XX.X | : XXXX |

| Max. value | Min. value | Mean value | Median value | Highest Frequency value | Standard deviation |
|---|---|---|---|---|---|
| : XX.X | : XX.X | : XX.X | : XX.X | : XX.X | : XX.X |

| Distribution range | ETX |
|---|---|
| : XX.X : XX.X | [03H] |

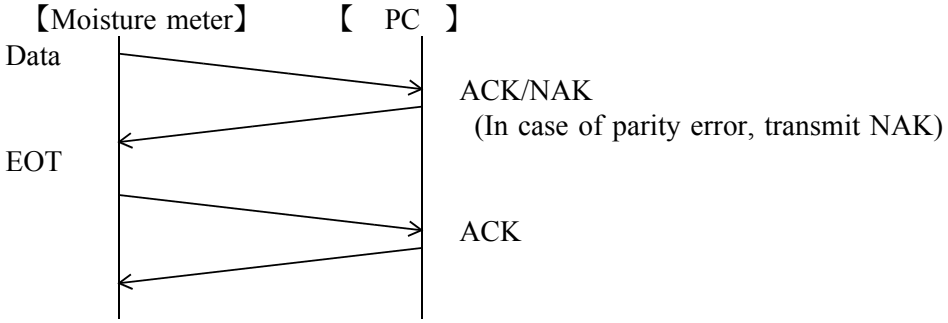
When H/L does not point, H △ 0.0 : L △ 0.0 is outputted.

When no data is in the applicable memory, NO DATA is outputted..

Index data

| STX | C | Block No. | | ETX |
|---|---|---|---|---|
| [02H] | 2 | : XXXX | : NO DATA | [03H] |

Basic protocol



④ Histogram data

Histogram of the data memorized in the memory are transferred.
The measured values only of which data have been memorized are transferred in block unit.

◎ Output format (Example: TG-H mode)

Index data C: Command X: Figure 1 letter △: Space

| STX | C | Block No, | Measurement mode | Upper limit value | Lower limit value | ETX |
|---|---|---|---|---|---|---|
| [02H] | 3 : | XXXX | : TG-H | : H XX.X | : L XX.X | [03H] |

When H/L does not point, H △ 0.0 : L △ 0.0 is outputted.

Repeated data

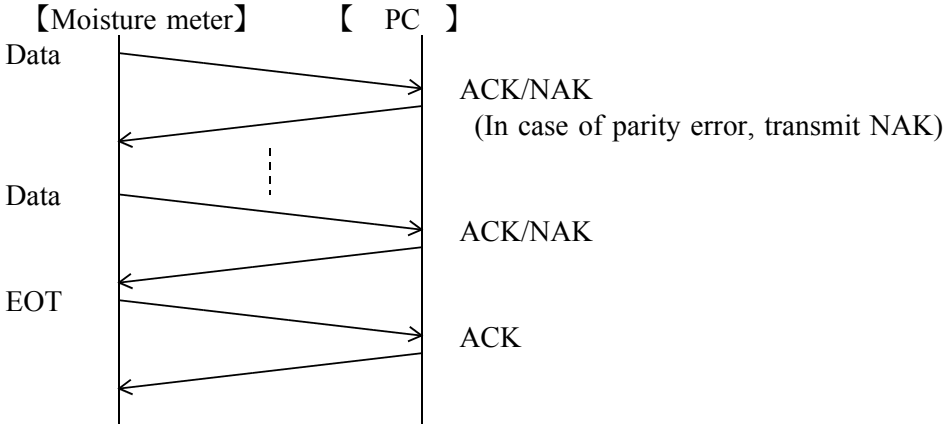
| STX | C | Measured value | Data No. | ETX |
|---|---|---|---|---|
| [02H] | 3 : | △ XX.X | : XXXX | [03H] |

When no data is in the applicable memory, NO DATA is outputted.

Index data

| STX | C | Block No. | | ETX |
|---|---|---|---|---|
| [02H] | 3 : | XXXX | : NO DATA | [03H] |

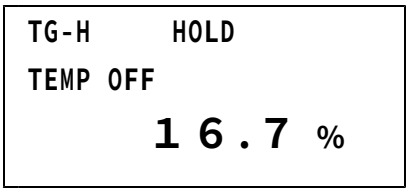
Basic protocol



## 8. TEMPERATURE COMPENSATION

The automatic temperature compensating function is set ON at the initial setting condition and the indicating value is automatically temperature compensated based on 20 ℃.
When an object to be measured is high temperature due to dry treatment by heating etc., measure it after the automatic temperature compensating function OFF.
In case the temperature of an object to be measured differs from the probe, it will cause the error in measurement.
ON or OFF of the automatic temperature compensating function can be converted by pressing both 「⇧」 key and 「⇩」 key of the value setting keys ⑩ simultaneously.
Then, [TEMP OFF] or [TEMP ON] is indicated on the LCD ⑰ for about 2 seconds and the setting condition is converted.

Ex: In case the compensation is set OFF for wood



When the automatic temperature compensating function is set OFF, refer to the following list for the temperature compensation.

◎ For wood

| Temperature(℃) \ Moisture(%) | 4 to 11 | 12 to 20 | above or 21 |
|---|---|---|---|
| below 0 | + 2.0 | + 2.5 | + 3.0 |
| 0 to 1 | + 2.0 | + 2.5 | + 3.0 |
| 2 to 3 | + 2.0 | + 2.0 | + 3.0 |
| 4 to 5 | + 1.5 | + 2.0 | + 2.5 |
| 6 to 7 | + 1.5 | + 1.5 | + 2.0 |
| 8 to 9 | + 1.0 | + 1.5 | + 2.0 |
| 10 to 11 | + 1.0 | + 1.0 | + 1.5 |
| 12 to 13 | + 1.0 | + 1.0 | + 1.0 |
| 14 to 15 | + 0.5 | + 0.5 | + 1.0 |
| 16 to 17 | + 0.5 | + 0.5 | + 0.5 |
| 18 to 19 | 0 | + 0.5 | + 0.5 |
| 20 to 21 | 0 | 0 | 0 |
| 22 to 23 | 0 | − 0.5 | − 0.5 |
| 24 to 25 | − 0.5 | − 0.5 | − 0.5 |
| 26 to 27 | − 0.5 | − 0.5 | − 1.0 |
| 28 to 29 | − 1.0 | − 1.0 | − 1.0 |
| 30 to 31 | − 1.0 | − 1.0 | − 1.5 |
| 32 to 33 | − 1.0 | − 1.5 | − 2.0 |
| 34 to 35 | − 1.5 | − 1.5 | − 2.0 |
| 36 to 37 | − 1.5 | − 2.0 | − 2.5 |
| 38 to 39 | − 2.0 | − 2.0 | − 3.0 |
| above or 40 | − 2.0 | − 2.5 | − 3.0 |

◎ For paper, mortar and plaster

| Temperature in measurement | Compensating values to the indication |
|---|---|
| Over 20 ℃ | − 0.1% per temperature 1 ℃ |
| Below 20 ℃ | + 0.1% per temperature 1 ℃ |

## 9. NOTES FOR THE MEASUREMENT

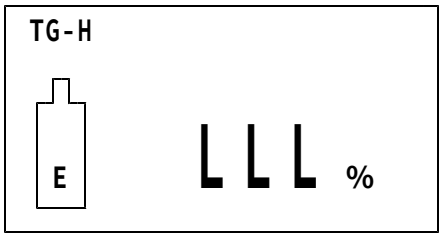
The electric resistance type Moisture meter utilizes the characteristics that the electric characteristics of an object to be measured reacts specially sensitively on its moisture contents, but the relation is not perfectly related in one-to-one ratio.

When its composition and proportion are different or change in quality and contamination exist or special processing and chemical treatment are performed even though the same object, it is necessary to avoid the measurement at these places or to use the measured values after compensating.

## 10. BATTERY

### 10-1 Indication of the voltage drop

When [E] showing the voltage drop is indicated in the left of the LCD display ⑰, the batteries close to the limit of use due to consumption.
Open the battery case ⑲ by sliding the cover downward and replace all alkaline batteries R6P(1.5V) × 8 pcs. with new ones. (ensure the limit of use.)




When the Meter is continuously used after voltage drop mark [E] was indicated on the LCD display, following conditions will occur.

- Though it differs depending on the characteristic and using condition of the dry batteries, the Meter can work for several hours.
  (Replace all 4 batteries with fresh specified dry batteries earlier.)
- When the Meter is continuously used as it is, measured values will become unstable.
- When the power switch is turned ON, the buzzer continuously sounds and key operation become impossible simultaneously.
  (Remove the batteries from the Meter.)
- When no indication is on the LCD display, the batteries are completely consumed.

### 10-2 Handling while the Meter is not in use

- Even if the power switch ① OFF, the battery capacity has been slightly consumed.
- In case the Meter will be not used for 1 month or more, it is recommended to store the Meter after removing the batteries from the case.

## 11. MAINTENANCE AND INSPECTION

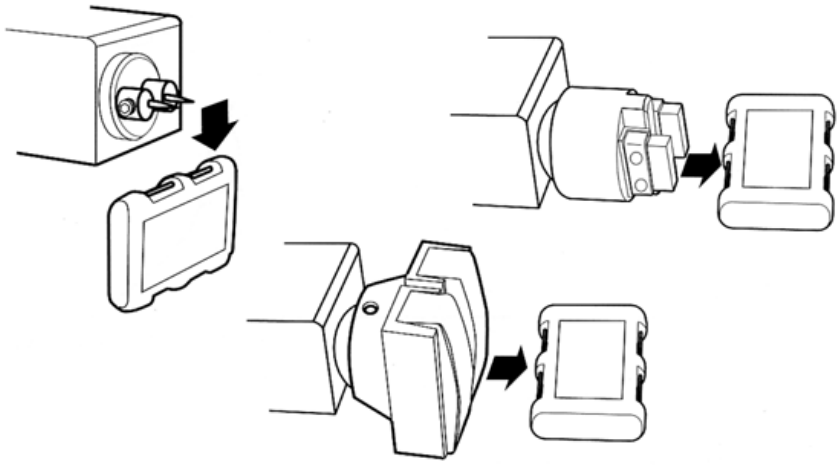
- Wipe dirt off with soft cloths, etc. after using the Meter.
  Specially care to keep the probe connector, electrodes, groove between electrodes, etc. clean and dry.
- Prevent the Meter from exposing to shock, direct sunlight, high temperature, high humidity, etc.
- Select a dust free, clean and well-dried place for storing the Meter.
  In case the Meter will be not used for 1 month or more, remove the batteries from the Meter.
- Carry out the periodically inspection and calibration to keep the efficiency of the Meter.

# 12. Miscellaneous

## 12-1 How to use the Moisture reading checker(option)

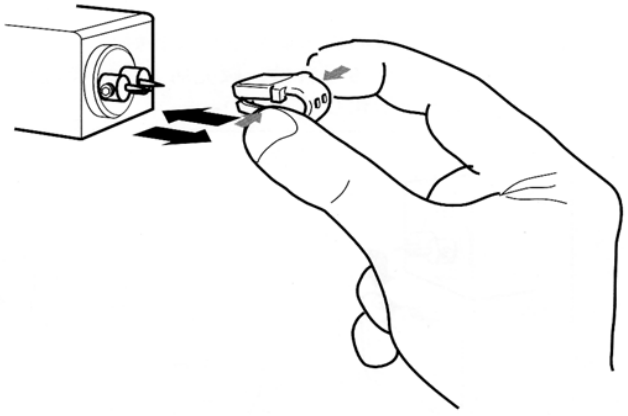
Press the electrode against the checker as shown in the following sketch in power ON condition.
When the reading of the Meter matches the figure on the checker, the Meter's reading is acceptable.
When the reading deviates from the checker's, please request our agent or the nearest our branch to calibrate the Meter.

※ An object for checking by the Moisture reading checker differs face side from back side.
Use after surely confirming model, type of the Meter and measurement mode.
※ When checking the Meter, carry out after turning the temperature compensating function OFF.
Refer to 7.TEMPERATURE COMPENSATION for the details.



## 12-2 Cover for the needle electrode (Fitting/removing methods of the cover)

Fit the cover in the needle electrode spreading out by fingers holding both sides of the cover for the electrode.
When the cover is tight, fit by force prying it.
Carry out the same procedures for removing the cover.
Fitting / removing the cover by force causes an injury occasionally.



**Be careful not to be injured with the needle electrode.**

**Ver.5 November 2007**

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**Manufacturer:**

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Osaka branch Konishi Bldg., 2-3, Sugawara-cho, Kita-ku, Osaka 530-0046, Japan
Tel 81-6-6362-7805 Fax 81-6-6365-7381

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