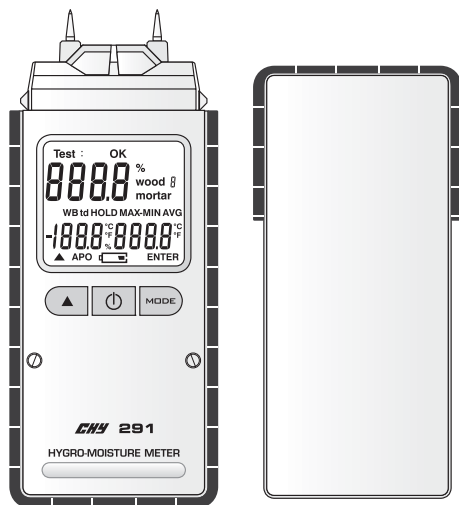# OPERATING INSTRUCTIONS
MODEL 291 CE
HYGRO-MOISTURE METER

INTRODUCTION

This instrument is designed to measure the moisture content in wide range of materials, environment temperature and humidity.

Moisture content is measured by means of measuring conductivity in the measured material with a pair of needle shape sensing electrodes.

Moisture measurement is shown on upper display, Dry-bulb temperature is shown in lower-right display. Humidity, due point or wet-bulb temperature (user selectable) measurements is shown in lower-left display.

SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the Material Moisture Meter.
1. When not use for long time remove battery.
2. Don't keep in place with high Temp, or high humidity.

> **WARNING**
> To avoid electrical shock, do not use this instrument to measure the surface with the danger of voltage that will be exposed to.

> **WARING**
> • When the meter is not in use, make sure the cap is closed to avoid getting hurt.
> • Take care of risk of injury from sensing electrodes.

SPECIFICATIONS

Moisture
Sensor: Electrical Resistance
Range:
8.8 to 54.8%
  For beech, spruce, larch, birch cherry and walnut (Grouped as wood 1)
7.0 to 47.9%
  For oak, pine, maple, ash-tree, Douglas-fir and meranti (Grouped as wood 2)
0.9 to 22.1%
  For cement screed, concrete and plaster (Grouped as mortar 3)
0.0 to 11.0%
  For anhydrite screed (Grouped as mortar 4)
0.7 to 8.6%
  For cement mortar (Grouped as mortar 5)
0.6 to 9.9%
  For lime mortar (Grouped as mortar 6)
0.1 to 16.5%
  For brick (Grouped as mortar 7)
Accuracy: conductivity measurement:
  $\pm1\%$ at $23\pm5°C(73.4\pm9°F)$
Temperature Coefficient:
  10% per °C out of $23\pm5°C(73.4\pm9°F)$.
Resolution: 0.1%

HUMIDITY

Sensor: Digital Capacitive humidity sensor
Range: 0% to 100% RH
Accuracy:
  $\pm2.5\%$ at $23\pm5°C(73.4\pm9°F)$, 10% to 90% RH
  $\pm5\%$ at $23\pm5°C(73.4\pm9°F)$, 0% to 10% RH, 90% to 100% RH
Sensor Response Time for 90% of Total Range:
  60sec typical
Sensor Hysteresis (excursion of 10% to 90% to 10% RH): $\pm1\%$RH typical
Temperature Coefficient: 10% per °C out of $23\pm5°C(73.4\pm9°F)$

TEMPERATURE
Sensor: Thermistor temperature sensor
Range: -20°C to 60°C (-4°F to 140°F)
Accuracy:
  $\pm0.5°C$ for 0°C to 45°C, at $23°C\pm5°C$
  $\pm1.0°C$ for -20°C to 0°C, 45°C to 60°C, at $23°C\pm5°C$
  $\pm1.0°F$ for 32°F to 113°F, at $73.4°F\pm9°F$
  $\pm2.0°F$ for -4°F to 32°F, 113°F to 140°F, at $73.4°F\pm9°F$
Temperature Coefficient:
  10% per °C out of $23\pm5°C(73.4\pm9°F)$
Resolution: 0.1°C/°F
Measuring Rate: 1 measurement/second
Operation Environment:
  -20 to 60°C (-4°F to 140°F)
Storage Environment:
  -20 to 60°C (-4°F to 140°F) and Relative Humidity <80% with battery removed
Battery: 1.5Vx2pcs AAA size
Battery Life:
  200 hours typical with alkaline battery
Low battery indication:
  The "⬛⬛⬛" is displayed when the battery voltage drops below the operating level
Dimensions:
  24.7mm(T) x 50.9mm(W) x 132.9 mm(H)
Weight: Approx 118g including batteries

OPERATIONS

There are 3 operation modes, namely Measurement Mode, Set Mode and Hold Mode.

1. Turning on and off the meter:
  When power is off, a short push on "①" key turns on the meter and enter Measurement Mode.
  When power is on, press and hold "①" key for 2 seconds turns the power off.

2. Measurement Mode:
  Right after power on, all the indicators on the LCD display lights up for one second.

Material selection:
  Press "▲" key to select the material to be measured. Keep push the key until the desired material appears.
  wood 1: beech, spruce, larch, birch, cherry, walnut
  wood 2: oak, pine, maple, ash-tree, Douglas fir, me anti

mortar 3: cement screed, concrete, plaster
mortar 4: anhydrite screed
mortar 5: cement mortar
mortar 6: lime mortar
mortar 7: bricks

Testing the instrument function:
Press "▲" several times until "Test:" lights up. Connect sensing electrodes with the contacts of the test resistor on the top of the protection cap.
- "Test" flashes.
- "Test: ok" lights up: instrument is ready measurement.
- If "Test: ok" does not light up, clean sensing electrodes and contacts on the top of the pro tection cap.
Press "▲" back to measurement menu.

MEASURING

Moisture:
Stick the sensing electrodes into the surface of material to be measured, the moisture content shows on the main display.
The moisture contact may not be homogenous. Taking measurement at several different point is advisable.
The meter perform temperature and humidity measurements automatically while power is on.

Change Lower-Left Display:
Press and hold "▲" key more than 2 seconds each time to change the display through humidity %(RH), td (dew point) and WB (wet bulb temperature)

Backlight:
In measurement mode, a short push on "①" key turns on the backlight for dark environment, it goes off automatically after 15 seconds if without further operation.

3. Set Mode:
In set mode, user can set °C/°F unit and turn on/off APO function. (APO = Auto Power Off, when APO is ON, the meter power off automatically if no operation in 10 minutes)
When power is off, press and hold "①" key for 2 seconds to enter Set Mode.
3.1 °C/°F Unit: short push on "▲" key switches between °C and °F.
3.2 Push "MODE" key to save the setting, exit °C/°F setting mode and enter APO setting mode.

3.3 APO ON/OFF: short push on "▲" key switches between ON and OFF.

3.4 Push "MODE" key to save the setting, exit APO setting mode and enter measuring mode.

※**Note:** To turn off power in Set Mode abandon the current setting and previous settings remain unchanged. If "⊏▬" indicator appeared, the setting value can works till power off but did not save to meter.

4. Hold Mode:

In Measurement Mode, short push "Mode" key to enter Hold Mode with indicator "HOLD" shows at center of LCD.

Right after entering this mode, shown in the LCD is the last measurement and the reading will not be updated with new measurement.

Push "Mode" key each time the display changes in following sequence:

4.1 Last Measurement: with indicator "HOLD"

4.2 Maximum value recorded: with indicator "HOLD" + "MAX".

4.3 Minimum value recorded: with indicator "HOLD" + "MIN".

4.4 Maximum-Minimum value recorded: with indicator "HOLD" + "MAX-MIN".

4.5 Average of values recorded: with indicator "HOLD" + "AVG".

4.6 Exit the Hold Mode and return to Measurement Mode.

※ **Max/Min/ Max-Min/AVG－display for humidity and temperature only.**

To clear the recorded values:

In Hold Mode and during viewing MAX, MIN or AVG, press and hold "Mode" key for 2 seconds, to clear the recorded data and return to measurement mode.

SPECIAL CONSIDERATIONS

• Before a reliable measurement can be made, the measuring hygrometer and medium to be measured must be in temperature and humidity equilibrium.

• Temperature measurement errors
Due to too short measurement time, sunshine during the measurement, heating, cold outer walls, air draft (e.g. fans), radiating hand and / or body heat etc.

• Humidity measurement errors
Due to steam, water splashes, dripping water or condensation (not water condensate) on the sensor etc. However, repeatability and long-term stability are not impaired by this.

MAINTENANCE
Installing and Replacing Battery
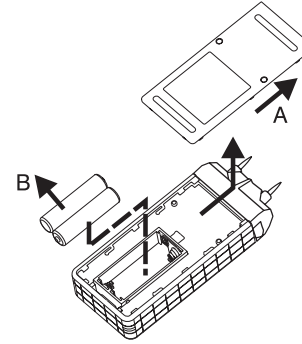
A. Battery Cover
B. Battery

1. Power is supplied by 2pcs 1.5V (AAA SIZE).
2. The "⊏▬" appears on the LCD display when replacement is needed.
3. Push the Battery Cover and lift it in the direction as shown in the figure.
4. Remove the batteries from battery compartment.
5. Replace with 2 new AAA batteries with polarity as indicated on the bottom of Battery Compartment.
6. Replace the Battery Cover.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.