SMART SENSOR®

Model：AR600E

Ultrasonic Cable Hight Meter
Instruction Manual

Preface

➤ Thank you for pruchasing SMART SENSOR® ultrasonic cable height meter.

➤ This manual provides relative information on how to use the unit and measurement functions of it as well as warnings on its use.

➤ To make the best use of this product's functions, read this manual thoroughly before use. Please keep this manual handy for ease of reference.

➤ Please be sure to do some test measurement to make sure it is performing properly before using it for real.

Maintenance & warranty

1). Maintenance:

a>. Protect the unit from shock and vibration.

b>. Do not store or use the unit in following locations where the unit may be subject to:

➤ Splashes of water or high levels of dust.

➤ Air with high salt or sulphur content or other gases.

➤ High temperature or humidity or direct sunlight.

c>. Clean the unit lightly as needed with little clean water.

2). Warranty:

a>. About relative warranties please read provided warranty card.

b>. This product has a two-year warranty period from your purchasing date. If your product appears any fault out of this warranty period, please contact your dealer or agent for product servicing and after-sales service which will cost corresponding expense.

c>. We disclaims any liability due to: transportation damages; incorrect use or operation; manipulation, alterations or repair attempts; without warranty card, invoice.

Special Declarations:

The product design and the manual updating, repairing by technician authorized by us, do not try any alternations or repair attempts.

Note items

➤ Theoretically, the measuring range of this product is up to 23m under 20℃~25℃, which using ultrasonic reflection to measure distance. But real measuring range is varying with atmosphere temperature that will not affect measuring accuracy. The lower the atmosphere temperature, the wider the range. For example: in atmosphere temperature of 0℃, the range increased by 12%, in 35℃, the range decreased by 10%.

➤ Elevation height will not bring about influence on operation accuracy of the unit, but the unit can't be used in the rainy or snow, since the raindrop or snowflake will produce mistake echo signal. If rain water enters the unit, should set it upside down to dry the ultrasonic cone, rain water will not damage unit, but will interference the produce of high quality sound beam. The unit can be used in fog, because fog is good deliver media of sound wave.
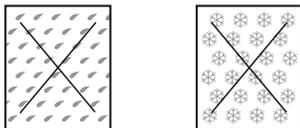
➤ The unit shows a reading from more than 3 meters, 3 meters below is a blind area with a showing symbol " LO ", this unit has intended to design so, which in order to prevent mistake reading from personnel or object interference.

➤ Whether the cable wires take electricity or not will not influence measured value.

Contents

1. Need to Know Before Use

2. Operation Explanations

3. Other Items

1. Need To Know Before Use

Check-up

Carefully unpack your kit and ensure that you have the following items when you decide to purchase this product. In the event that any item is missing or if you find any mismatch or damage, promptly contact your dealer.

➢ The host---1PCS

➢ 9V alkaline battery----------------------------------1PCS

➢ Chinese instruction manual-----------------------1PCS

➢ English instruction manual----------------------- 1PCS

➢ Warranty card---1PCS

➢ Accessory bracket (horizontal distance

measurement only) -------------------------------------1PCS

➢ Pouch --1PCS

➢ PP packing box ---------------------------------------1PCS

Familiar trouble shooting

The following is a list of actions to be taken if the unit is not working properly:

1). Screen is Blank:
Check the battery is inserted correctly.
Open the battery door on the bottom rear of the unit. The "+" and "-" symbols on the battery should match the corresponding "+" and "-" symbols on the inside of the battery compartment.

2). Unit does not measure all wires：
<1>. Ensure that horizontal distances between wires are within the sonic beam.
<2>. Check if the unit measuring head is parallel with the reflecting surface of the object to be measured.

3).Incorrect readings:
<1>. Ensure the measurement mode switch is in the correct position, "MEL" for cable height measurement, and "CAL" for horizontal distance to object measurement.
<2>. Ensure no walls or similar obstructions are within 2 meters either side of the unit as reflections from these can interfere with correct operation. Ensure the temperature reading has stabilized.

Operation
Explanations

3. Other Items

Low battery alarm and replacement of battery

1). While using the unit, if battery voltage is lower than 7.2V+-0.2 V, in the LCD display will be shown as a symbol " ▭ " , that indicates the unit is in low battery and can not work properly, please replace the battery at once.

2). Replacement of battery:

uncover the unit back plank, open the battery door, take out the old 9 V battery, make change new battery. (Notice the battery polarity), then close the battery door, shown as following figure:
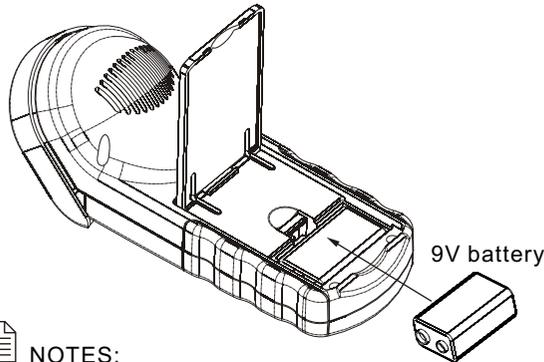
9V battery

📑 NOTES:

➤ Remove the battery from the unit if it is not required for extended periods of time in order to avoid damage to the battery life from a leaking battery.

➤ Dispose of battery should in accordance with local laws and regulations.

Introduction

This product adopts ultrasonic principle to take measurement of cable height. When taking measurement, the unit transmits an ultrasonic signal by a 15° angle to towards the wires and measuring the time it takes to pick up the echo from the signal.

This unit takes conveniently, operates easily, circuit maintainer can make measurement of cable height and wire to wire distance at any time anywhere, which not need to get in touch with electric (communicating) high cable.

Features and Functions

➤ For measuring the height up to 6 cables together.

➤ Convenient to take measurement, easy to aim at the measuring position and to read measuring results.

➤ For measuring the distance between wire and wire.

➤ Be applicable to different use of cables.

➤ Uses large measuring sensor, higher accuracy than existing cable height meter in market.

➤ Compact and easy to take along.

➤ For measuring dimension of house and distance between objects.

➤ The temperature compensation function enables the unit compensates error automatically under the temperature of -10℃+40℃, and ensures the measuring accuracy on different temperature conditions.

Product Specifications

Technical parameter	Technical specifications
Range (25mm cable min)	3~23m
Range (12mm cable min)	3~15m
Range (5.5mm cable min)	3~12m
Range (2.5mm cable min)	3~10m
Horizontal measuring range	3~18m
Operating temperature range	-10℃~40℃
Resolution (range<10m)	5mm
Resolution (range>10m)	10mm
Measuring accuracy	0.5%±2d
Minimum gap between wires	150mm
BOT mode: measuring the height of the most lower 6 cables	✓
TOP mode: measuring the height of the most higher 6 cables	✓
Auto power off delay	120S
Low battery alarm	7.2V+-0.2V
Imperial & metric unit transition	✓
Displays real time temperature.	✓
Operating voltage	9V 6F22
Dimension	75x72x200mm
Weight	205g(excluding battery)
Battery life	20H(continuous use)

Imperial unit LCD display：
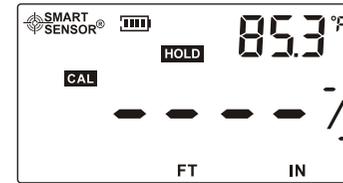
5). Align the unit head to the object to be measured, press the " $\boxed{\substack{\text{MEA-}\\\text{SURE}}}$ " key then release to get and display the measured result, if still showing "------", that means the unit did not receive echo signal from the object, needing a check if the plastic surface of the sensor is parallel with the reflecting surface of the object to be measured, or have already exceed the measuring range of the unit. Shown as following figure:

Wall surface

Operation
Explanations
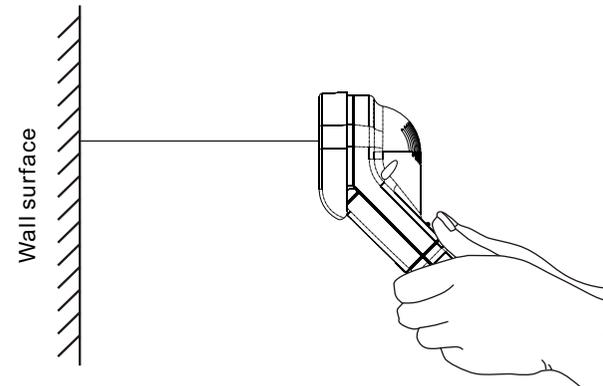
3). Press the " " key to power on, temperature reading shown on upper right of the LCD display will automatically adjust to be according with ambient, shown as following figures:

Metric unit LCD display:
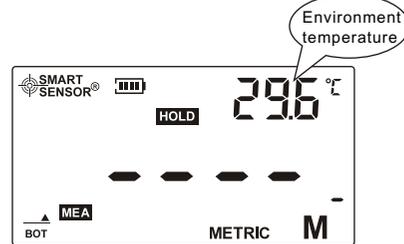
Imperial unit LCD display:
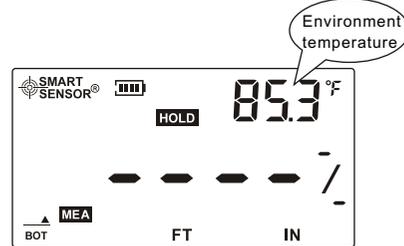
4). Press the " MEA/CAL " key to enter "CAL" mode, here the LCD display shows as following figures:

Metric unit LCD display:
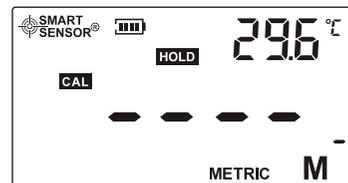
Explanations of product main parts
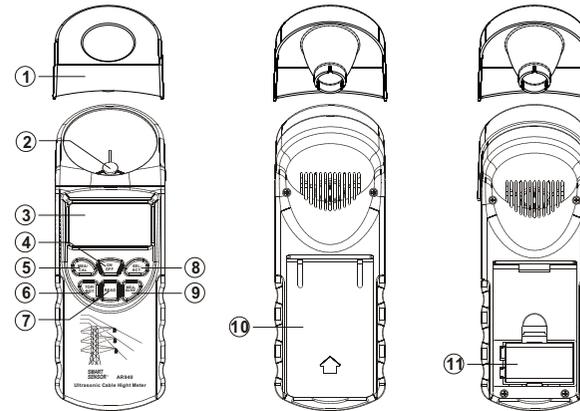
1). Accessory bracket: be used for accessory horizontal distance measurement which eliminates narrow space interference and enhances measuring accuracy.

2). Sensor

3). LCD display

4). ON/OFF : Power switch
press once to power on, again to power off.

5). MEA/CAL : "MEA" mode (default state), measuring cable height;
"CAL" mode, measuring indoor distance or other distance between objects.

6). (TOP/BOT) :Set initiative position of cable measurement.

TOP mode: measuring the height of the most higher 6 cables from ground in turn;

BOT mode: measuring height of the most lower 6 cables from ground in turn.

7). |READ| :Showing measured distances between cables in turn.

8). (SEL-ECT) :Select the measured cable height in turn.

9). (MEA-SURE) :Measure key

10). Maintain board

11). Battery compartment

📋 NOTES:
Above key functions descriptions just are simply introduction, for details please read "operation explanations" part .

This unit can be used for measurement of horizontal distance, such as distance between indoor walls, poles and transformers etc. The horizontal distances it measured can be up to 18m. It can also measure standard horizontal distance between objects, which as the basis of calibrating the unit. Detailed operations as following:

1). Set metric & imperial transition that the method is the same as "MEA" mode.
(concretely please read this manual on page 8 and diagrams to show)

2). For your reliable and accurate measuring results, please mount an accessory bracket when taking measurement of horizontal distance.
shown as following figure:

Accessory bracket:

The host:

Operation Explanations

7). Performance diagrams

Ultrasonic Transmitting Angle

1.4m   1.4m

0.9m 0.9m
0.7m 0.7m
0.6m 0.6m

Minimum Conductor Thickness:

2.5mm (0.1″) 5.5mm (0.2″) 12mm (0.5″) 25mm (1″)

10m (33ft)   12m (40ft)   15m (50ft)   23m (75ft)

25m
20m
15m
10m
5m
0m
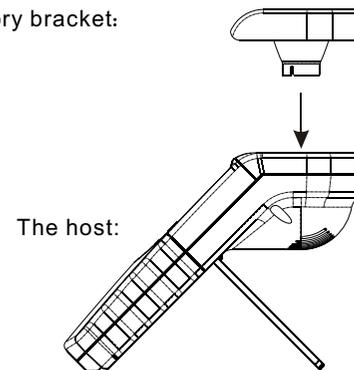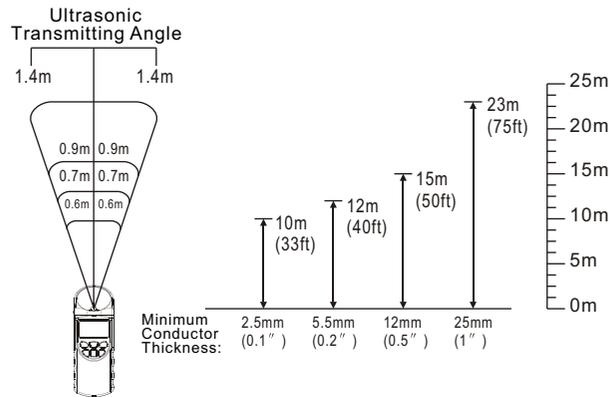
Displays functions
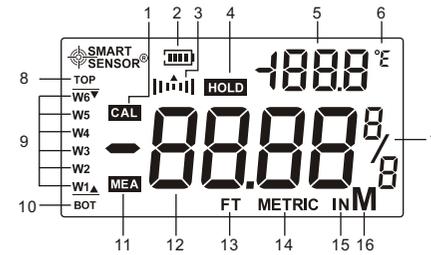
1). **CAL** : Means current selected measurement mode.

2). 📶 : Battery symbol, shows current residual battery voltage as following 5 grades:

    : battery is sufficient

    : battery is comparative sufficient

    : battery is nearly deficient

    : battery is nearly exhausted, need to have a replacement

    : battery is exhausted completely.

3). |ıl'ıl| : means the unit is on ultrasonic transmitting process, it appeares when releasing the " MEA-SURE " key .

4). **HOLD** : means data holding.

5). Environment temperature: the unit automatically adjusts the temperature value according to ambient environment after every power on, such as " 29.6 ℃ " .

6). ℃ :Temperature unit transition

When pushing slide switch to metric unit, the " ℃ "
symbol will appear.

When pushing slide switch to imperial unit, " ℉ "
symbol will appear.

7). Imperial unit

8). TOP :means measuring the height of the most higher
6 cables from ground.

9). The measured cable height reading.

10). BOT: means measuring the height of the most lower
6 cables from ground.

11). **MEA** :means current selected mode.

12). The measured reading, such as: *1 528*

13). **FT** :Imperial unit: feet/foot

14). **METRIC** :Metric

15). **IN** :Imperial unit: inch

16). **M** :metric unit: meter

corresponding "W3 W2", the reading value is negative;
press once again, the distance between the fifth highest
cable and the sixth will be shown by corresponding "W2
W1", the reading value is negative.

⬛ NOTE:

If there is a symbol "-" before the measured value,
it means negative, the rest is according to this
analogically. If the cable wires to be measured are
not enough 6, there are how many wires it will show
how many measured values, those not enough six the
measured values will be shown as "----".

6). Press the " [READ] " key to get distance between cables to be measured.

BOT mode:

Press once on "BOT" position, the distance between the first lowest cable and the unit bottom shown by corresponding "W1" will be shown in the display, the reading value is positive; press once again, the distance between the first cable and the second will be shown by corresponding "W1 W2", the reading value is positive; press once again, the distance between the second cable and the third will be shown by corresponding "W2 W3", the reading value is positive; press once again, the distance between the forth cable and the fifth will be shown by corresponding "W4 W5", the reading value is positive; press once again, the distance between the fifth cable and the sixth will be shown by corresponding "W5 W6", the reading value is positive.

TOP mode:

Press once on "TOP" position, the distance between the first highest cable and the unit bottom will be shown by corresponding "W6" in the display, the reading value is negative; press once again, the distance between the first highest cable and the second will be shown by corresponding "W6 W5", the reading value is negative; press once again, the distance between the second highest cable and the third will be shown by corresponding "W5 W4", the reading value is n egative; press once again, the distance between the forth highest cable and the fifth will be shown by

2. Operation Explanations

Cable height measurement(MEA mode)

1). Try to stand directly underneath the cable to be measured.

2). Set metric & imperial unit:

Open the battery door, select your required measurement units by setting the metric & imperial switch.

➢ Set the switch to "$^\circ$C", means the temperature unit is "$^\circ$C" and length unit is "M";

➢ Set the switch to "$^\circ$F", means the temperature unit is "$^\circ$F" and length unit is "INCH".

(Note: The transition of temperature unit and length unit are simultaneous. Shown as following diagrams:
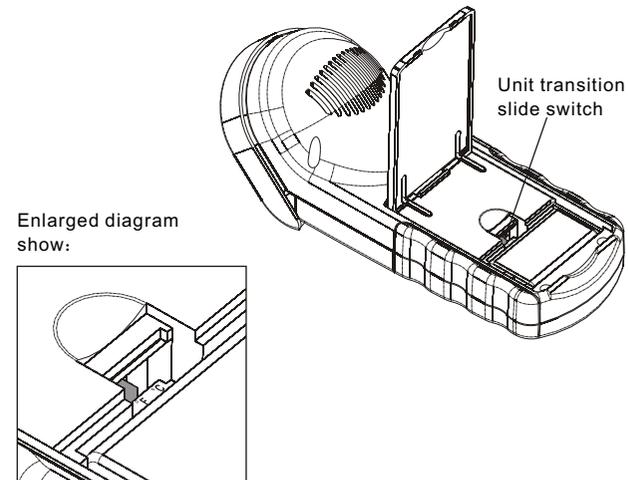
Unit transition slide switch

Enlarged diagram show:

3). Press the " [ON/OFF] " key to power on, temperature reading shown on upper right of the LCD display will automatically adjust according to ambient. as following diagrams:

Metric unit
LCD display：

Environment temperature

SMART SENSOR® HOLD 29.6 ℃

MEA

BOT   METRIC **M**

Imperial unit
LCD display：

Environment temperature

SMART SENSOR® HOLD 85.3 ℉

MEA

BOT   FT   IN
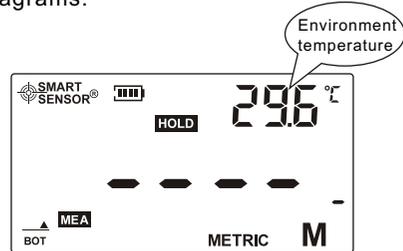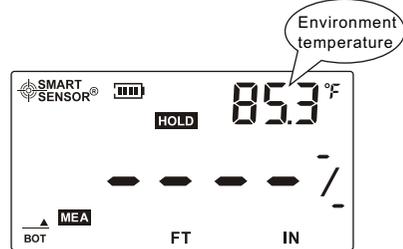
4). Setting measuring:
It is defaulted as "MEA" mode after power on (cable height measurement), press the " [TOP/BOT] " key to select your required measuring mode that the defaulted mode is "BOT", which means measuring the height of the most lower 6 cables.

Imperial unit
LCD display：

SMART SENSOR®
TOP
W6▼   HOLD 85.3 ℉

MEA

74.10⁶/₈

FT   IN
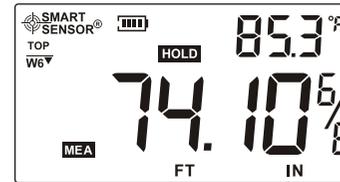
Note:
Above LCD displayed reading are supposed data, concretely please take your actual measured reading as accuracy.

Operation
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If measuring the height of the most lower 6 cables, the LCD display will be as following figure:

Metric unit LCD display:

SMART SENSOR® 29.6℃ HOLD 12.86 S W1▲ MEA BOT METRIC M

Imperial unit LCD display:

SMART SENSOR® 85.3℉ HOLD 42.02 2/8 W1▲ MEA BOT FT IN
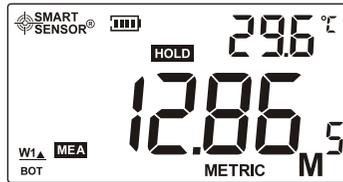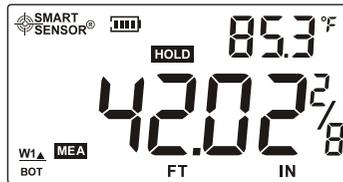
If measuring the height of the most higher 6 cables, the LCD display will be as following figure:

Metric unit LCD display:

SMART SENSOR® TOP W6▼ 29.6℃ HOLD 22.83 S MEA METRIC M

Imperial unit LCD display:

SMART SENSOR® 29.6℃ HOLD ─ ─ ─ ─ ─ ▲ BOT MEA METRIC M

Imperial unit LCD display:

SMART SENSOR® 85.3℉ HOLD ─ ─ ─ ─ ─/─ ▲ BOT MEA FT IN
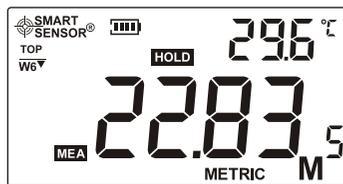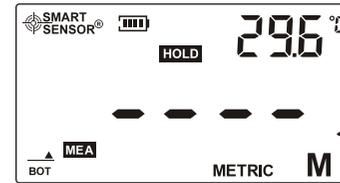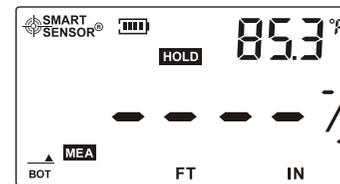
If want to measure the height of the most higher 6 cables, set the " TOP/BOT " key to "TOP" mode, shown as following figure:

Metric unit LCD display:

SMART SENSOR® TOP ▼ 29.6℃ HOLD ─ ─ ─ ─ ─ MEA METRIC M

Imperial unit LCD display:

SMART SENSOR® TOP ▼ 85.3℉ HOLD ─ ─ ─ ─ ─/─ MEA FT IN
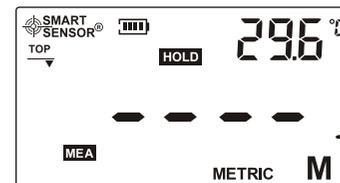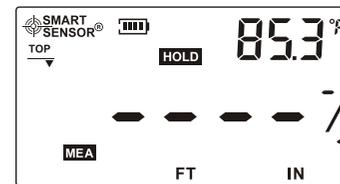
5). Hold level and steady the unit with two hands before chest part, press the " [MEA-SURE] " key for 1~2 seconds the LCD will show the symbol "HOLD" ,you can measure totally 6 cables height at one time, and measured data and such as W1、W2、W3、W4、W5、W6. Press the "SELECT" key you will read the measured data from W1 to W6 in turn, shown as following figure:
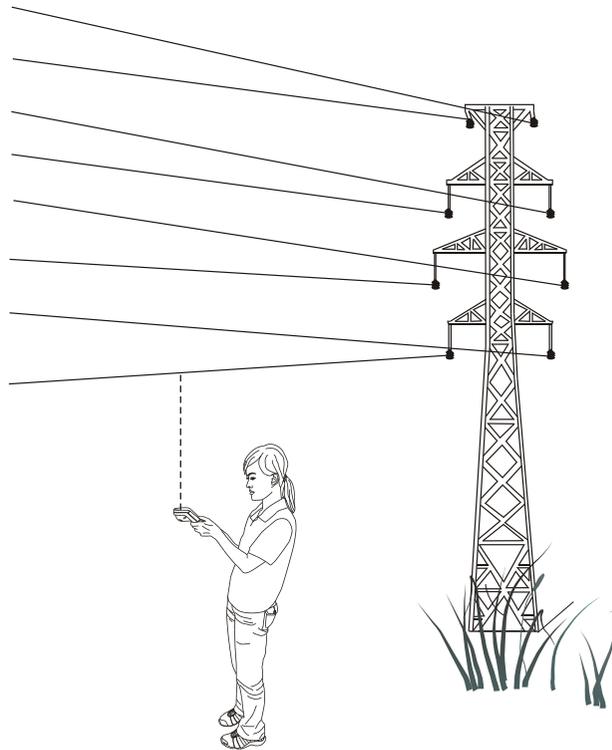
Note:
It can be also put in the ground to make measurement, If ground is neat, here your measured height is the distance between the cable and the unit top,
shown as following figure:

Horizontal ground

Operation
Explanations