SHAHE® Grating Digital Display Roughness Tester (with 4 buttons)

Safety Precautions GB

To ensure operator safety, use this instrument in conformance with the directions and specifications given in this Users'Manual.

⚠ **CAUTION**

- Do not disassemble, short-circuit, charge, or heat the battery.Otherwise the battery content may leak to come into contact with the eye, or cause battery heating or explosion.
- If a battery is swallowed, immediately consult a doctor.

Disposal of Old Electrical & Electronic Equipment (Applicable In the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging indicates that this product shall not be treated as household waste. To reduce the environmental impact of WEEE (Waste Electrical and Electronic Equipment) and minimize the volume of WEEE entering landfills, please reuse and recycle. For further information, please contact your local dealer or distributors.

Boundary dimension

0-6.5mm
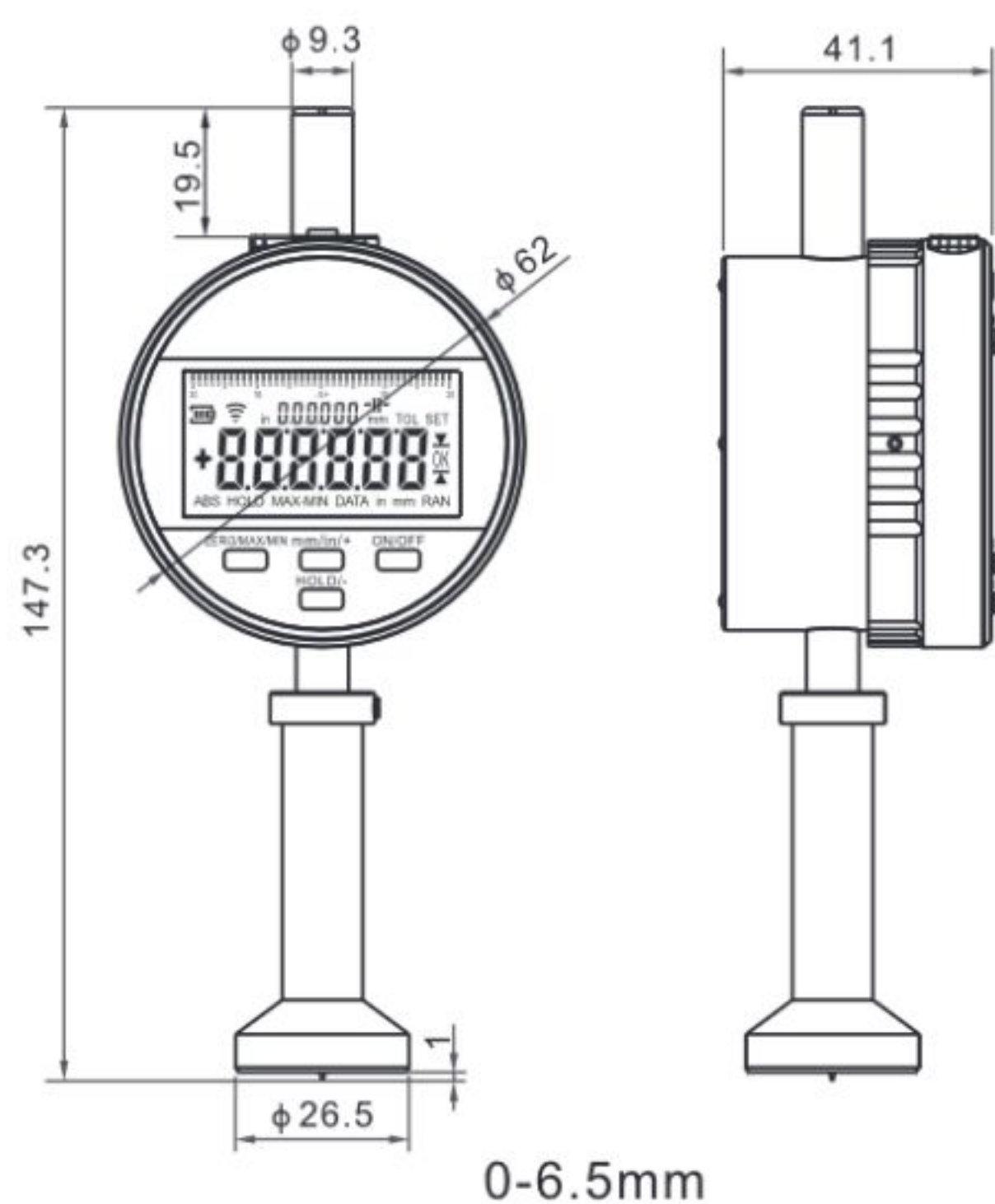
Usage

How to measure the surface roughness?
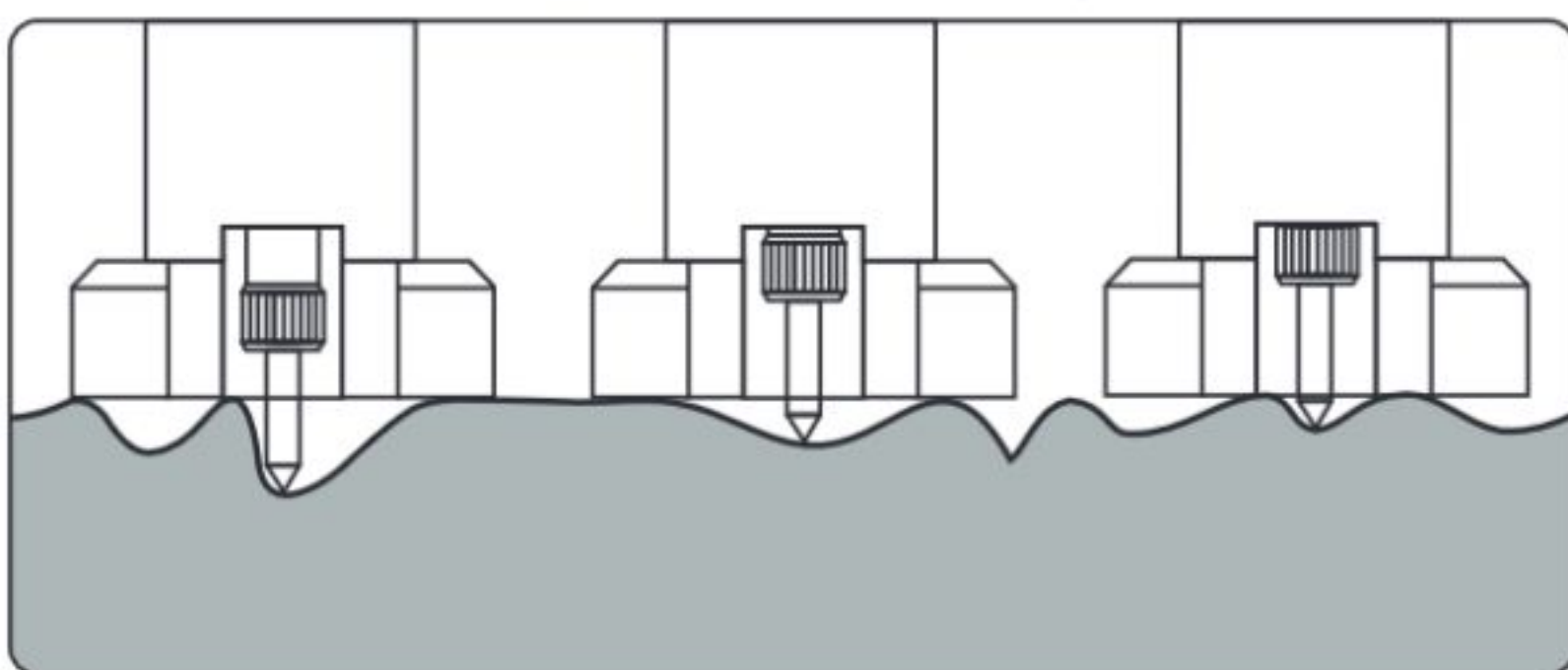
1. Press ON/OFF key to start up.
2. Put the tester on a flat place, such as glass plate, and press ZERO/MAX/MIN key to clear to zero.
3. After zero cleaning, it can be used to measure the surface to be measured.

Rang of application

This tester has the characteristics of high measurement accuracy, wide measurement range, simple operation, easy to carry, stable operation, etc., and can be widely used in the industries of shot blasting, sandblasting, printing, spraying anticorrosion, and mechanical processing, including the detections of flat surface, inclined surface, cylindrical surface small holes, grooves, axles and other metal and non-metal flat and uneven surfaces.

Notice for use

1. Please use the original charger for charging, otherwise the product and charger may be damaged.Avoid falling,Avoid impacting,Avoid flooding,Stay away from high temperature,Do not disassemble the raster indicator without permission.
2. In case of special situations, please use a non-original charger of 5V/2A or above, otherwise it will cause damages to the product or charger.

Note

1. If there is dust or dirt on the measuring rod that affects its movement, please wipe it clean with a dry cloth without oil.
2. If serious dirt on the case affects the reading, please use a neutral cleaner to wipe it with a duster cloth, do not use volatile solvents (such as thinner). To prevent damage to the case.
3. When not using the charging / data connector, please cover the protective plug to prevent dust and debris from entering.

Technical index

Model	Range(mm)	Accuracy	Resolution	Power supply mode	Charging/communication interface	Waterproof
GS5337	0-6.5mm	±3 μm	1μm	3.7V lithium battery	USB Type-C	IP54

Function Introduction

- ON/OFF key: Press this button to start or shut down the machine;
- MM/IN key: Short press this key to convert metric or English units; The LCD displays the mm character to represent the metric unit; The LCD displays the in character to represent the british unit;

Short press the mm/in key

long press this key to change the direction of measurement.

Long press the mm/in key

- HOLD key: Short press this key for data retention; The LCD show the HOLD character to indicates that the display data is locked; The LCD does not show the HOLD character to indicate that the display data is unlocked.
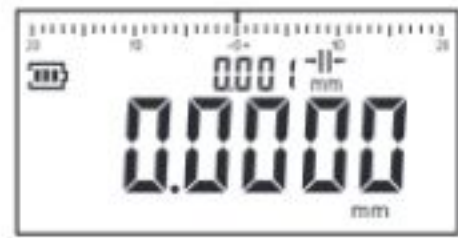

Short press the HOLD key

Long press this key to set the current analog pointer to zero.

Long press the HOLD key

• ZERO/MAX/MIN key: Short press this key to set the LCD data to zero.

Press this key for a long time to start or exit the maximum value, minimum value, range measurement, etc. The procedures for measurement are as follows:

Press ZERO/MAX/MIN key for a long time to enter the maximum value measurement. LCD displays MAX and RAN character. Press HOLD key again for re-measurement after the ending of this measurement.

Press ZERO/MAX/MIN key for a short time to enter the minimum value measurement. LCD displays MIN and RAN character. Press HOLD key again for re-measurement after the ending of this measurement.

Press ZERO/MAX/MIN key for a short time to enter the range value measurement. LCD displays MAX-MIN and RAN character. Press HOLD key again for re-measurement after the ending of this measurement.

Press ZERO/MAX/MIN key for a long time to exit measurement.

Long press the ZERO key
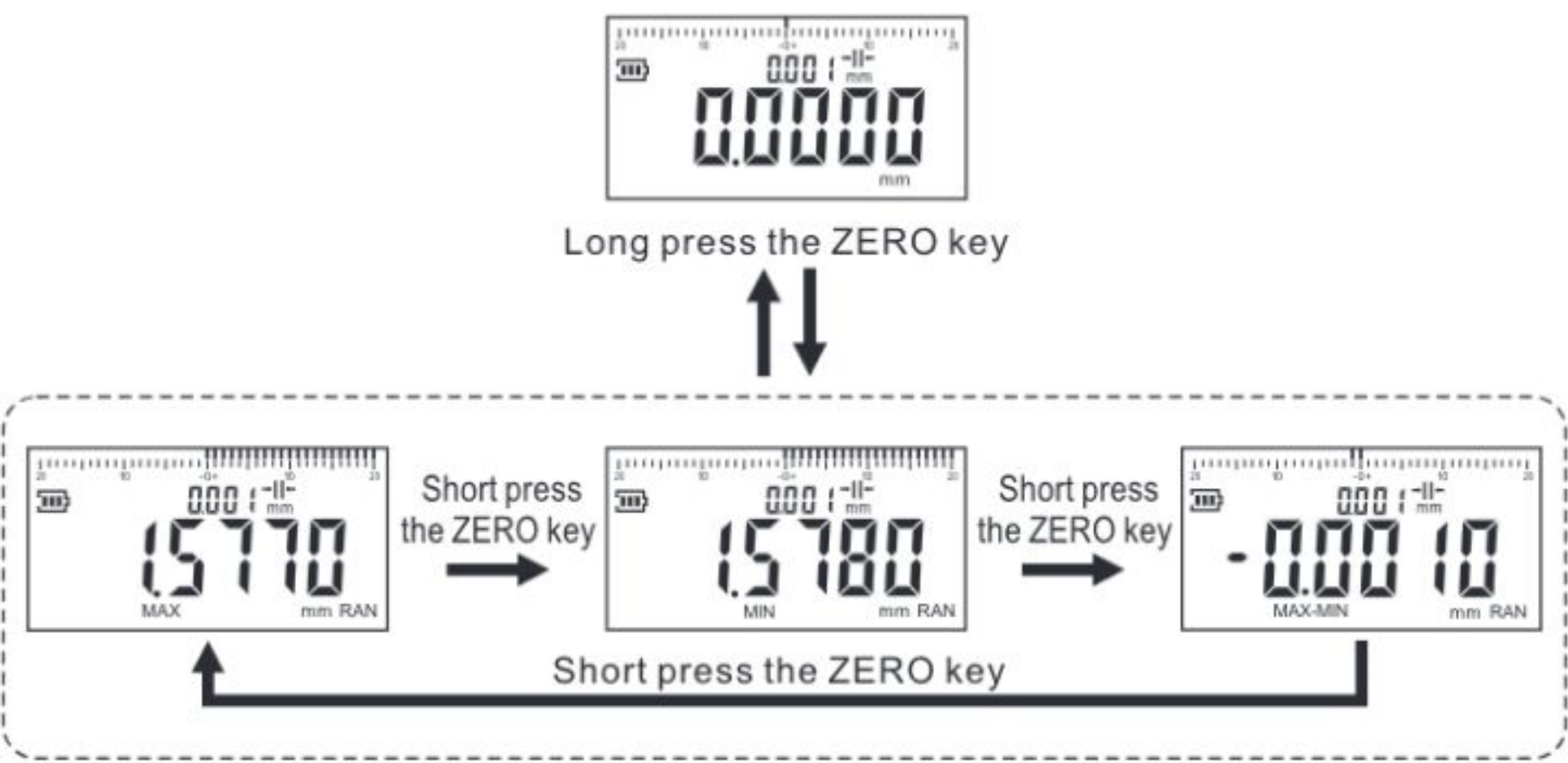
Communication interface protocol

1. Interface Output Description:
   Interface name: USB Type-C 16P

   Interface pin definition:
   D+ : Data receiving RXD
   D- : Data transmission TXD
   GND: ground

   Interface signal: RS232 signal.

2. data frame format: RTU pattern
   communication parameters: Baud rate 38400
   Data frame: 1 start bit, 8 data bits, no parity, 2 stop bits.

Read the data of raster indicator

Host query command 01 03 00 00 00 02 C4 0B		Response of indicator 01 03 04 01 00 12 39 37 7D			
address code	01H	address code	01		
function code	03H	function code	03		
first address to access register	00H	length of data word	04		
	00H	data word 1 high 8 bits	01H		flag bit
length of data word	00H	data word 1 low 8 bits	00H	Data of indicator	measured data (hexadecimal)
	02H	data word 2 high 8 bits	12H		
CRC(low 8 bits)	C4H	data word 2 low 8 bits	39H		
CRC(high 8 bits)	0BH	CRC(low 8 bits)	37H		
		CRC(high 8 bits)	7DH		

Instructions:

1. Example of the host machine and indicator communication, the host issues an 8-byte fetch command, Indicator responds to 9-byte data. The high position is in front, data word 1-2 is the measurement data of indicator.

2. The measured data is 4 bytes, the first byte is the symbol bit, representing the plus-minus sign, and the two and fourth bytes are the hexadecimal measured data.

3. The measured data in the case are converted into decimalism as 4665; the sign bit is 01H, representing a negative number, so the actual displacement length corresponding to the high-precision ten thousandth meter and the ten thousandth meter is -0.4665mm; the displacement length corresponding to the micrometer is -4.665mm.

4. The CRC efficacy code of this machine is 16-bit CRC efficacy code, and the polynomial is $X^{16}+X^{15}+X^2+1$. See the appendix for an example of table lookup algorithm.

Reset protocol

host reset command 01 06 08 00 AB 56 74 A4		Response of indicator 01 06 08 00 AB 56 74 A4	
address code	01H	address code	01H
function code	06H	function code	06H
first address to access register	08H	first address to access register	08H
	00H		00H
reset command sign	ABH	reset command sign	ABH
	56H		56H
CRC(low 8 bits)	74H	CRC(low 8 bits)	74H
CRC(high 8 bits)	A4H	CRC(high 8 bits)	A4H

1. This command can reset the indicator.

2. The CRC efficacy code of this machine adopts 16-bit CRC efficacy code, and the polynomial is $X^{16}+X^{15}+X^2+1$. See the appendix for an example of table lookup algorithm

Appendix 1: Examples of CRC algorithms

```
unsigned short CRC(unsigned char frame[],int n)
//The array frame is the object to be checked by CRC, and n is the number
//of bytes to check
{
    int i,j;
    unsigned short crc,flag;
    crc=0xffff;
    for(i=0;i<n;i++)
    {
        crc^=frame[i];
        for(j=0;j<8;j++)
        {
            flag=crc&0x0001;
            crc>>=1;
            if(flag)
            {
                crc&=0x7fff;
                crc^=0xa001;
            }
        }
    }
    return(crc);
}
```

Note: In the MODBUS CRC check code transmission, low bits are the first, high bits are the last.