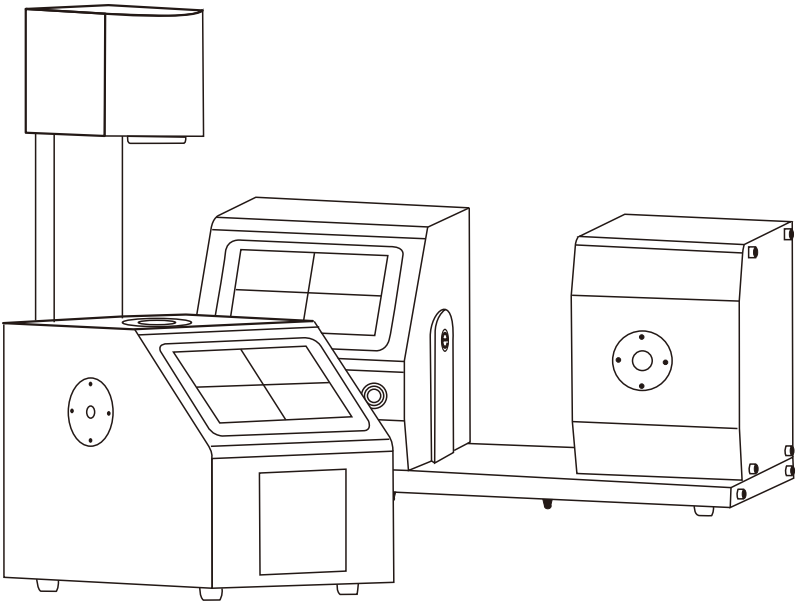
Haze Meter

OPERATION MANUAL



V1.0

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Safety Symbol

In order to avoid accidents caused by improper operation, the following symbols are used in this manual or on the instrument label.

This symbol instructs relative safety warnings or precautions.Read these instructions carefully to use this instrument safely and correctly.

This symbol is a description relating to the risk of electric shock. Read these instructions carefully to use this instrument safely and correctly.

This symbol is a description relating to fire danger. Read these instructions carefully to use this instrument safely and correctly.

Represents an operation that is prohibited. This operation must not be performed.

Represents an instruction. The instruction must be strictly performed.

Represents an operation that is prohibited.Do not dismantle the instrument.

Represents an instruction.Make sure that the AC adapter is pulled out from the AC socket.

Cautions

- It is strictly prohibited to copy or copy all or part of this manual without authorization of the Company.
- Contents of this manual are subject to change without prior notice.
- When compiling this manual, we have made our best efforts to ensure the accuracy of its contents.If you have any questions or find any errors, please contact your reseller or our authorized repair agency.
- The company does not assume any responsibility for any consequences caused by improper use of the instrument.

Safety Norms

To ensure proper use of this instrument, please read carefully and strictly observe the following points.

Warning: Warning: Failure to comply with the following points may pose a danger to personal safety.

	1.Do not use this instrument in a place where there are combustible or flammable gases (gasoline, etc.), otherwise it may cause fire. 2.Do not allow liquid or metal objects to enter the instrument, otherwise it may cause fire or electric shock.If a liquid or metal object enters the instrument, turn off the power immediately, unplug the AC adapter plug, and contact the nearest authorized maintenance institution. 3.Do not force, twist or pull the power cord of the AC adapter. Do not scrape or modify the power cord, or place heavy objects on the power cord, otherwise it may damage the power cord, and cause fire or electric shock. 4.Do not use wet hands to plug and unplug the AC adapter plug, otherwise it may cause electric shock. 5.Do not continue to use the instrument if it or AC adapter is damaged, smoking or smells, or it may cause fire. In this case, turn off the power immediately, unplug the AC adapter from the AC socket, and contact the nearest authorized service provider. 6.Do not measure directly at the face at the sample measurement port, as this may damage the eye. Do not place the instrument on an unstable or inclined surface as this may cause the instrument to slip or tip over and cause injury.

	1.Be sure to always use the standard or optional AC adapter and connect it to an AC socket with rated voltage and frequency. If you use other AC adapters that are not specified, you may damage the instrument, or you may cause fire or electric shock. 2.Be careful not to get your hand stuck in the cavity of the instrument, otherwise it may get stuck and cause injury.
	1.Do not disassemble or modify the instrument or AC adapter by yourself, otherwise it may cause fire or electric shock.
	1.If the instrument is not used for a long time, please unplug the AC adapter from the AC socket.If there are dust or water stains on the AC adapter pins, clean them before use, otherwise they may cause fire or electric shock. 2.When pulling the AC adapter plug from the AC socket, be sure to hold the plug itself at all times to avoid pulling the power cord, which may damage the power cord and cause fire or electric shock.

Operating Environment

- Please use the instrument at ambient temperature between 0°C and 40°C without condensation. Do not use it in areas with drastic temperature changes.
- Do not place the instrument in direct sunlight or near a heat source such as a furnace.In this case, the internal temperature of the instrument may be higher than the ambient temperature.
- Do not use the instrument in the environment with dust, cigarette or chemical gases, otherwise it may cause performance degradation and even system collapse.
- Do not use the instrument near devices that generate strong magnetic fields such as loudspeakers.
- The instrument and its standard AC adapter are designed for indoor use only.Do not use the equipment outside because rain or other factors may damage it.

Power

- Ensure that the power switch is set to "0" when the instrument is not in use.
- Be sure to always use the standard AC adapter and connect it to an AC socket with rated voltage and frequency.

Instruction

Haze meter is a domestic haze meter independently developed by our company with independent intellectual property rights. This series of instruments is divided into vertical and horizontal types. According to the CIE standard transmission 0/D (parallel light illumination, diffuse reflection receiving) design, the instrument can easily realize ASTM D1003 non-compensation method, ISO 13468 compensation method, full transmittance, fog measurement. With high hardware configuration of the instrument, open measurement area, both vertical and horizontal instruments can be used for vertical measurement and horizontal measurement. It is widely used in glass processing, film processing, display screen processing, lens processing, liquid medicine analysis, food hygiene, plastic processing and other aspects.

Note:

1.This series of instruments with compensation ports support ASTM or ISO measurement, and the instruments without compensation ports only support ASTM measurement;
2.In ASTM and ISO modes, except for the differences in the operating methods during calibration and measurement (which will be explained in detail in Section 2.2 and Section 2.4 of this manual), the operating methods of other functions are the same.

Cautions

1) This instrument is a precision optical measuring instrument. During measurement, drastic changes in the external environment of the instrument should be avoided, such as the flashing of ambient light and rapid changes in temperature, etc.
2) During measurement, the instrument should be kept stable, the measured object should be placed on the measuring platform, and the test port should be aligned to avoid moving.
3) The instrument is not waterproof, can not be used in high humidity environment or water mist.
4) Keep the instrument clean and tidy, avoid water, dust and other liquid, powder or solid foreign matter entering the integrating sphere and the instrument, and avoid the impact and collision of the instrument.
5) After the instrument is used, the power supply should be cut off, and the instrument, 0% calibration cover and compensation port cover should be put into the instrument case and stored in a dry and cool environment.
6) Users shall not make any unauthorized changes to the instrument. Any unauthorized changes may affect the accuracy of the instrument or even irreversibly damage the instrument.

1. Interface Description

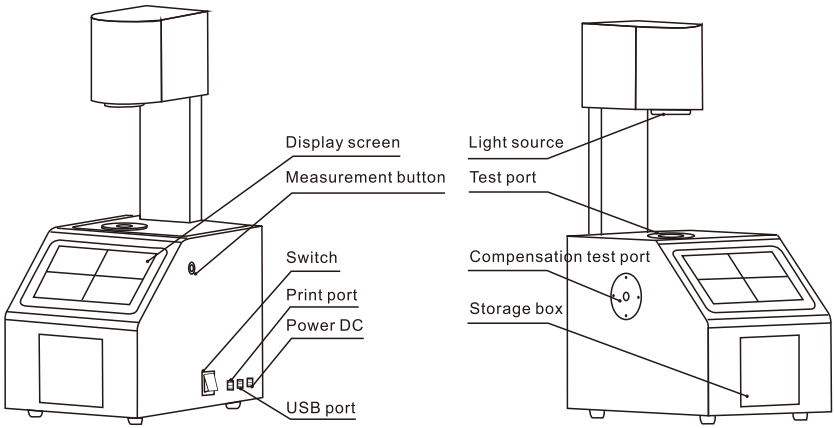

Figure 1 Schematic diagram of the button interface of a vertical instrument (compensation port)

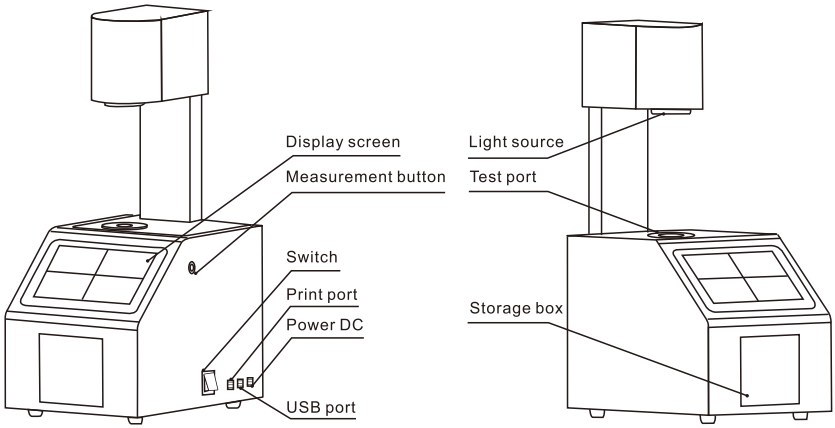

Figure 1-1 Schematic diagram of button interface of vertical instrument (without compensation port)

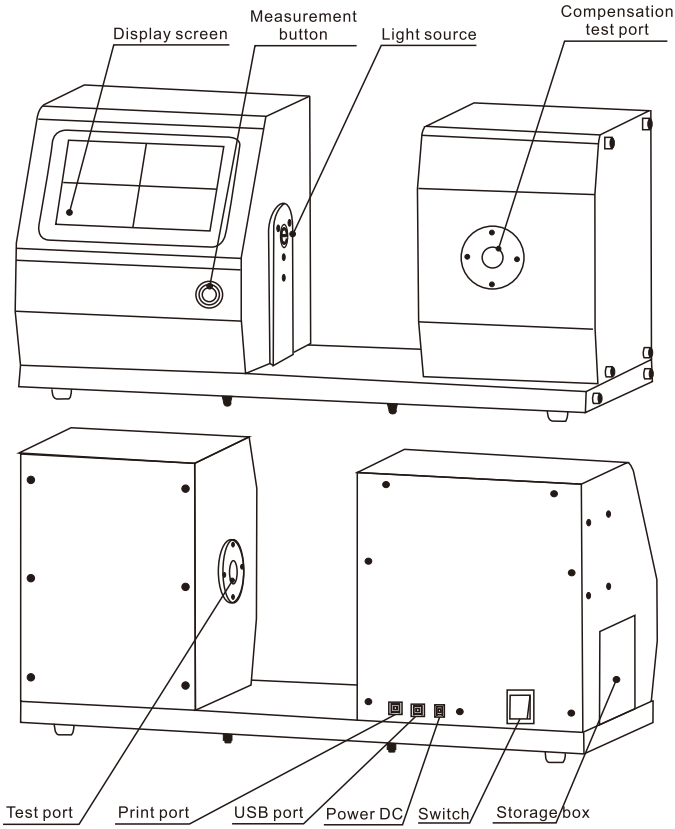

Figure 2 Schematic diagram of button interface of horizontal instrument (compensation port)

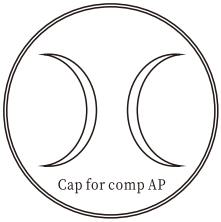

Figure 3 Schematic diagram of compensation port cover

Figure 3-1 Schematic diagram of 0% calibration cover

Display: 7-inch TFT pure color TV touch screen; used to display measurement data and instrument operation navigation.

Wake-up/measurement button: short press the measurement button in standby mode to wake up the system, short press the measurement button in measurement mode to start measurement.The measurement button is surrounded by an annular LED indicator, and the LED indicator is green. Power on the instrument (power on the power adapter, switch toggle to "1"), the indicator light is on. The green light flashes during the measurement process and is always on when the measurement is completed.

Power supply 1/0 switch: switch toggle to "1", power on the instrument; switch toggle to "0", the instrument power off. By toggle the switch for the hard switch machine.

USB interface: USB interface is used to connect and communicate with PC, and more functions can be extended through PC color management software.

Print interface: Used to connect PRINT, can print the measurement data of the measurement sample.

Power DC port: power supply for the instrument through the power adapter, the power adapter input AC (AC 110V-240V), output DC 24V/3A.

Transmission port: This position is the area where the sample to be tested is placed. During measurement, the parallel light emitted by the instrument's light source transmits through the sample to be tested, and then enters the integrating sphere through the transmission port. When calibrating, follow the prompts to close the 0% calibration cover to the transmission port or remove it.

Compensation port: According to relevant standards, the compensation port is used for light source compensation. During calibration and sample measurement, follow the prompts to close the compensation port cover or the tested sample to the compensation port or remove it.

0% calibration cover: When 0% calibration, follow the prompts to close the 0% calibration cover to the transmission port or remove it. In the standby state, cover the 0% calibration cover to avoid dust and dirt inside the instrument and protect the integrating sphere.

Compensation port cover: During 100% calibration, follow the prompts to close the compensation port cover or remove it. In the standby state, close the compensation port cover to avoid dust staining the inside of the instrument and protect the integrating sphere.

Light source port: full spectrum LED light source, calibration, measurement to provide lighting source, light through the transmission sample, into the integrating sphere.

Storage box: Press the storage box panel to pop out the storage box for storing items.

2. Operation Instructions

2.1 Power on&off

Switch toggle 1/0 to "1", power on the instrument, the system started;
Switch toggle 1/0 to "0", the instrument power off.
Under the power-on state (switch toggle 1/0 to "1"), if there is no operation for a long time, the instrument will automatically enter the sleep state. At this time, press the "wake up/measure button" or touch the screen to wake up the instrument and enter the working state. After starting the machine, enter the measurement interface directly, as shown in Figure 4.

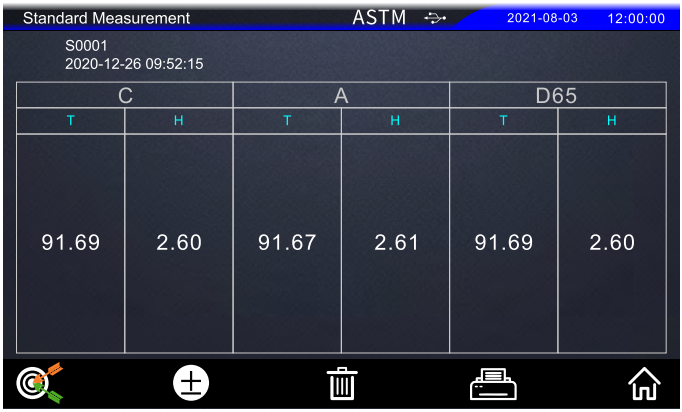

Figure 4 Measurement Interface (Standard Measurement)

Note: Please cut off the power when the instrument is not in use for a long time.

2.2 Calibration

0% calibration: During calibration, the 0% calibration cover is used to block all the light entering the integrating sphere from the instrument light source, and the instrument collects dark signals.

100% calibration: users can select corresponding 100% calibration reference objects according to different types of transmission samples to be tested.

Under normal circumstances, if the sample to be tested is plastic, glass, transparent film, etc., air can be selected as the reference for 100% calibration.

If the sample to be tested is liquid, a cuvette filled with deionized water or distilled water can be selected as a 100% calibration reference;

If the sample to be tested is a powder contained in a cuvette, you can select an empty cuvette as a reference for 100% calibration. Of course, the user can also select a calibrated standard solution (such as potassium

permanganate solution with calibrated transmittance) as the 100% calibration reference (calibration parameters should select the corresponding calibration channel).
After correct calibration, the instrument system will restart the timing according to the calibration validity period set by the user.

2.2.1 Reference Standard

There are two kinds of reference standards: ASTM (American Standard) and ISO. After switching between ASTM (American Standard) and ISO standards, the instrument needs to be re-calibrated when the sample is measured.In the measurement interface, press " ⌂ " Enter the main menu, and click "Confirm" on the bottom of other screens " ✓ " , return " ↩ " Enter the main menu, as shown in Figure 5.

Figure 5 Main menu

Click "Reference Standard" in the main menu to enter the setting interface of reference standard. ASTM or ISO can be selected. Select "ASTM" and click " ✓ " , the instrument into the ASTM (American Standard) measurement standard;Select "ISO" and click " ✓ " , the instrument is switched to ISO measurement standard as shown in Figure 6 .

Figure 6 Reference standard selection interface

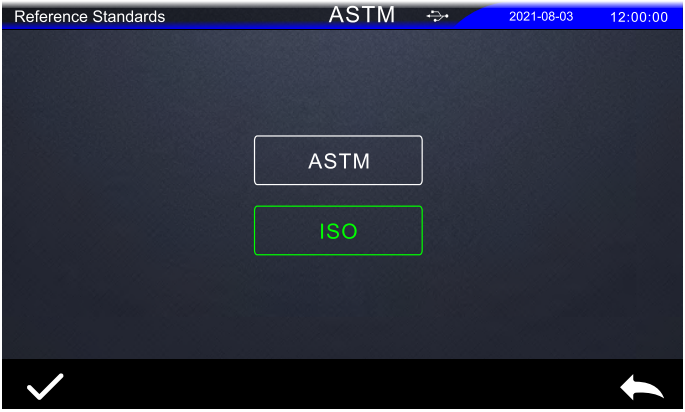

Figure 7 Select ISO Standard

2.2.2 Calibration (ASTM)

When the instrument enters the ASTM (American Standard) measurement standard, click "Calibration" in the main menu to enter the calibration interface, as shown in Figure 7-1. Display in the interface whether the current calibration is valid and the remaining effective time.

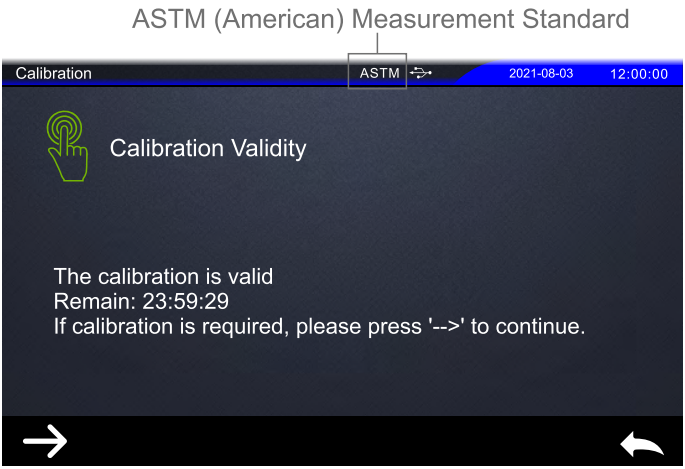

Figure 7-1 ASTM calibration interface

Click " → " to continue, and enter the 0% calibration interface in Figure 8. Follow the prompts to close the 0% calibration cover and compensation port cover to the transmission port and compensation port respectively, and then click " → " or press the "measurement button" for 0% calibration. Users can also click to return " ↩ " cancel calibration.

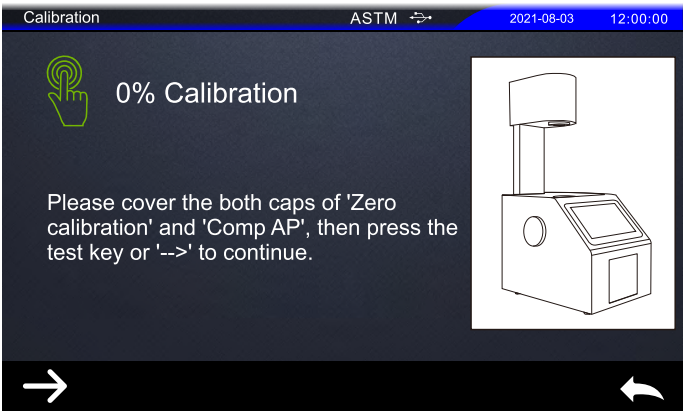

Figure 8 0% calibration

After the 0% calibration is completed, it will automatically enter to the 100% calibration interface, as shown in Figure 9. Follow the prompts to remove the 0% calibration cover of the transmission port, and then click "→" or press the "Measure button" for 100% calibration.Users can also click to return "↩" Cancel calibration.

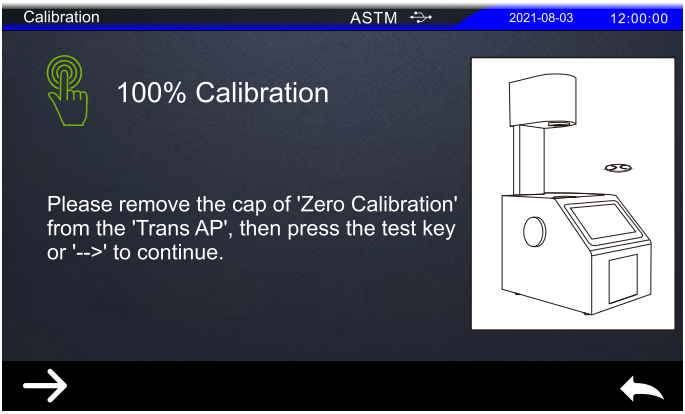

Figure 9 100% calibration

After the calibration is completed, the instrument system prompts the completion of the calibration, as shown in Figure 10, and re-time according to the calibration validity period set by the user. Users can click "→" to recalibration as needed, or click "↩" to return to the main menu.

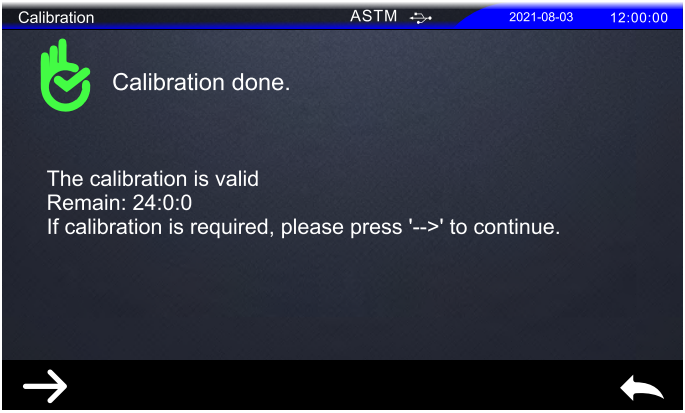

Figure 10 Calibration completed

2.2.3 Calibration (ISO)

When the instrument selects the ISO measurement standard, click "Calibration" in the main menu to enter the calibration interface. In the interface, whether the current calibration is effective and the remaining effective time are displayed as shown in Figure 11.

Figure 11 ISO Calibration Interface

Click "→ " to continue operation. According to the prompts, keep the compensation port open, and close the 0% calibration cover to the transmission port, click "→ " or press the "Measurement Button" to perform 0% calibration on the instrument as shown in Figure 12.

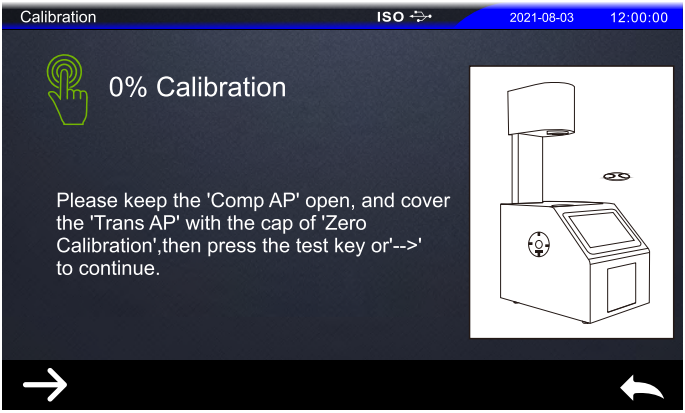

Figure 12 0% calibration

When the 0% calibration is completed, it will automatically enter to the 100% calibration interface, as shown in Figure 13. According to the prompts, remove the 0% calibration cover of the transmission port, and then click "→" or press the "measurement button". The instrument will perform 100% calibration.

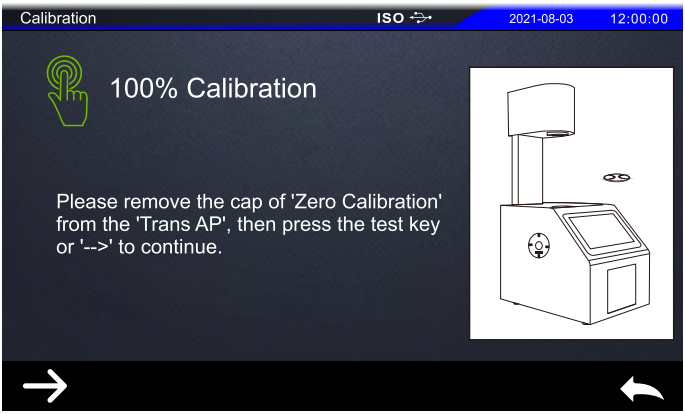

Figure 13 100% calibration

After completion of calibration, the instrument system will prompt completion of calibration, as shown in Figure 14, and re-time according to the calibration validity period set by the user. Users can click "→" to recalibration as needed, or click "↩" to return to the main menu.

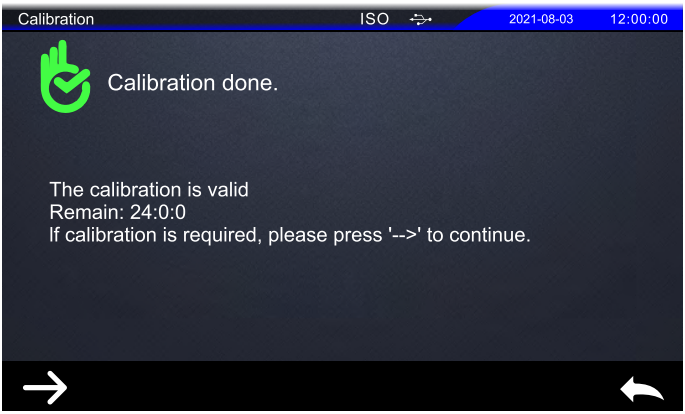

Figure 14 Calibration Completed

2.3 Measurement Interface

2.3.1 Standard measurement interface

From the main menu, press "Return" " " to enter the standard measurement interface. If you are not in the measurement interface, you can continuously click "Back" " " several times and return to the measurement interface.

The upper part of the standard measurement interface is divided into working state area, which is used to display the current setting working state, including: interface name, ASTM and ISO switching state, USB connection state, system time, etc. The middle part is the data display area, showing the measurement data of the current standard; At the bottom is the operation key area. Click the corresponding operation key to realize the operation of the current data as shown in figure 15.

Standard name: When measuring the standard,the instrument automatically generates the standard name, which is named after the serial number starting from T0001 by default. In the standard measurement interface, click the standard name to modify the name.

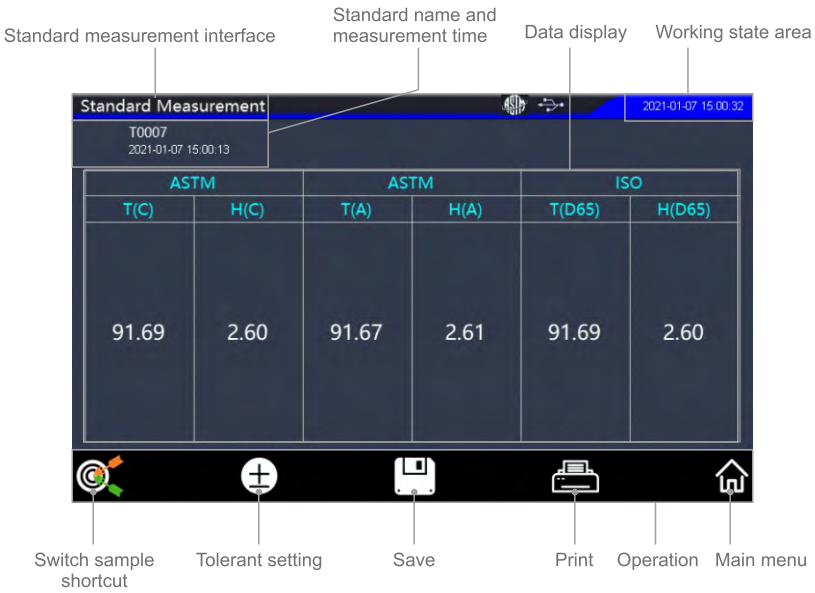

Figure 15 Standard measurement interface

2.3.2 Sample measurement interface

In the lower left corner of the standard measurement interface, click " " Quickly switch to the sample measurement interface associated with the standard, as shown in Figure 16.

The upper part of the sample measurement interface is divided into working state area, which is used to display the current setting working state, including: interface name, ASTM and ISO switching state, USB connection state, system time, etc. The middle part is the data display area. According to the current user's setting, the instrument displays the measurement data, the difference between the sample and the standard, and the measurement results prompt, etc. At the bottom is the operation key area. Click the corresponding operation key to realize the operation of the current data.

Sample name: During sample measurement, the instrument automatically generates sample name. The sample name associated with each standard is named with the serial number starting from S0001 by default. In the sample measurement interface, click the sample name to modify the name.

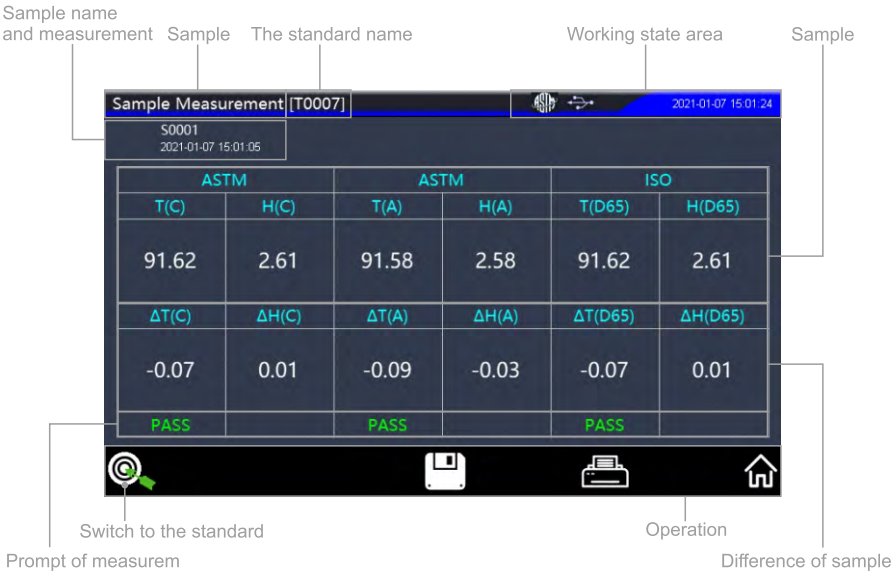

Figure 16 Sample Measurement Interface

2.4 Measurement

Haze Meter is generally used to measure the fog and total transmittance of the sample and the target sample. It can be compared intuitively to determine the qualified and unqualified.

After the calibration is completed, the measurement can be carried out. If you are not in the measurement interface, you can continuously click "return" " ↩ " on the interface several times and return to the measurement interface.

ASTM (American Standard) or ISO two different measurement standards can be selected for sample measurement, and it is divided into average measurement and continuous measurement. The standard measurement and sample measurement all can do average measurement and continuous measurement.

2.4.1 Average Measurement (ASTM)

When the measured items are relatively large or relatively uneven, multi-point average value can be obtained by measuring several representative test points, and the calculated results can better represent the real situation of the tested samples. The instrument can realize the average measurement of 0~100 times for each group, and the average measurement times can be set for both samples and standards.

When ASTM (American Standard) measurement standard is selected, click "Measurement Mode" in the main menu to enter the interface for setting measurement mode, as shown in Figure 17. Click "Average Measurement" to set "Standard Measurement Number" and "Sample Measurement Number" as required, as shown in Figure 18.

If the number of measurements input is 1, the measurement is carried out in the conventional way; If it is greater than 1, the average measurement results will be generated when all the measurement times set are completed during the standard and sample measurement.

Note: Average measurement and continuous measurement cannot be turned on at the same time. Turning on one will automatically turn off the other.

Figure 17 Measurement mode setting interface

Figure 18 Average measurement settings

The measurement times of standards and samples have been set. Click " ✓ " , the instrument enters the average measuring state. Continuously click to return " ↩ " to enter the average measurement interface.

1) Standard average measurement:

In the standard average measurement interface, when the sample to be tested has been placed above the transmission port, and the compensation port cover is pressed against the compensation port at the same time, gently press the "measurement button", the buzzer will emit a "buzzing" sound, accompanied by the indicator light on the measurement button flashes to stop, which means the first measurement of this group is completed. If multiple measurements are set, you need to manually perform multiple measurements according to the set measurement times until the set measurement times are all measured. During the average measurement of the standard, the average measurement result will be automatically updated every time the measurement is completed. After the measurement is completed, an average measurement result will be obtained.

Part of the ICONS on the measurement interface are described in detail below:

1.In the measurement interface, click " " , can quickly switch to the sample measurement interface, click " " , can quickly switch to the standard measurement interface;

2.In the standard measurement interface, click " ± " to set the tolerance of the standard. The setting method of the standard tolerance is the same as the setting method of the system tolerance, please refer to section 3.6.4. If the standard tolerance is not modified, the standard tolerance defaults to the system tolerance. The difference between the standard tolerance and the system tolerance is that the standard tolerance can be selected for "transmittance" or "haze", or both "transmittance" and "haze" can be selected at the same time. As shown in Figure 19.

When "Transmittance" is checked, the transmittance is used to judge the measurement result of the sample;
When "Haze" is checked, use the haze to judge the measurement results of the sample;
When the "Transmittance" and "Haze" are checked, the transmittance and haze are used to judge the measurement results of the sample.

Figure 19 Standard tolerance setting interface

Note: If both "Transmittance" and "Haze" are not checked, the tolerance judgment will not be prompted during sample measurement.
3.During measurement, click " ⌂ " or switch the measurement interface, and the system will prompt you to complete the measurement first or stop the measurement before carrying out relevant operations;
4.During measurement, click " ■ " to end the current measurement or click "••✗" to delete the last measurement data;
5.During the measurement process, display the current measurement number and the set measurement number. For example"1/3" in Figure 20, where 1 represents the current measurement number in the group, and 3 represents the set average measurement number (if continuous measurement, it represents the set continuous measurement number);

6.The measurement is completed, as shown in Figure 21. If the automatic storage function is enabled (please refer to Section 3.6.1 for the setting method of the automatic storage function), the average measurement results will be automatically stored in the average measurement mode, and the results of each measurement will be automatically stored in the continuous measurement mode. If the automatic storage function is not enabled, the save button will appear below the measurement interface " " (The interface with no automatic storage function is enabled, as shown in Figure 15). Click in the average measurement mode to store the average measurement result, and click in the continuous measurement mode to store only the last measurement result. After saving, the "Save" button will automatically change to "Delete" button " " ;

7.When the measurement is complete, click " " , when the instrument is connected to PRINT, if the current interface is the standard measurement interface, the current standard record and its associated sample record can be printed; If the current interface is the sample measurement interface, the current sample record can be printed. For the printing setting, please refer to Section 2.6.

8.When the measurement is complete, click " " , if the current interface is the standard measurement interface, the standard record and its associated sample record can be completely deleted; If the current interface is the sample measurement interface, this sample record can be completely deleted and the associated standard record can be retained.

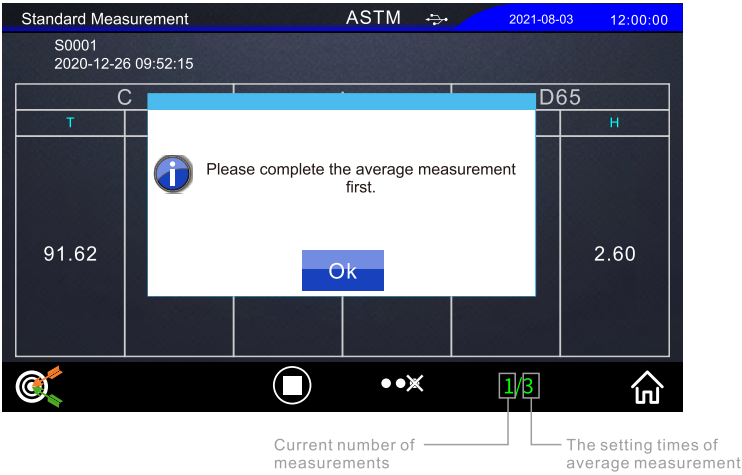

Figure 20 The first standard average measurement completed interface

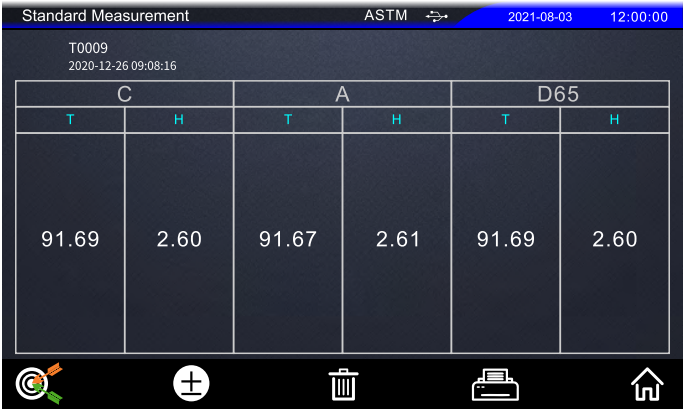

Figure 21 The average measurement completion interface for a group of standard

Note: The measurement process in this manual takes the measurement interface of a vertical instrument as an example, and the measurement interface of a horizontal instrument is subject to the actual interface.

2) Sample average measurement:

In the lower left corner of the average measurement interface of standard, click " " Quickly switch to the sample average measurement interface associated with the standard. The average measurement method of sample is the same as that of standard.

In the process of average sample measurement, the average measurement results will be automatically updated every time the measurement is completed. If the function of prompt test results is enabled (for the method of prompt test results, please refer to Section 3.5), it will indicate whether the test is qualified, as shown in Figure 22. After the measurement, an average measurement result was recorded, as shown in Figure 23.

The measurement results indicate that if the difference value of the average measurement result of the sample minus the standard measurement result is within the tolerance range set, it is judged pass, otherwise, it is failure.

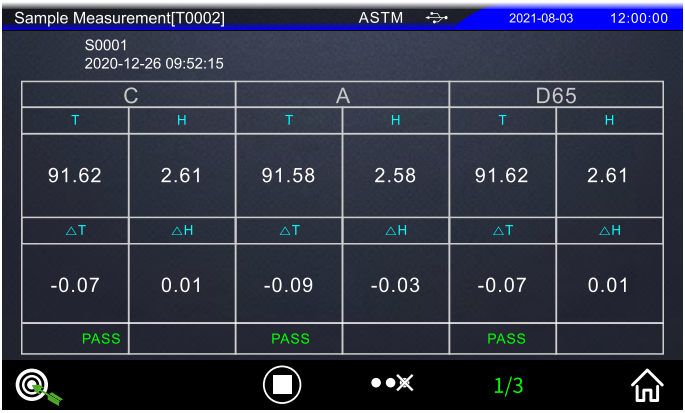

Figure 22 The first sample average measurement completed interface

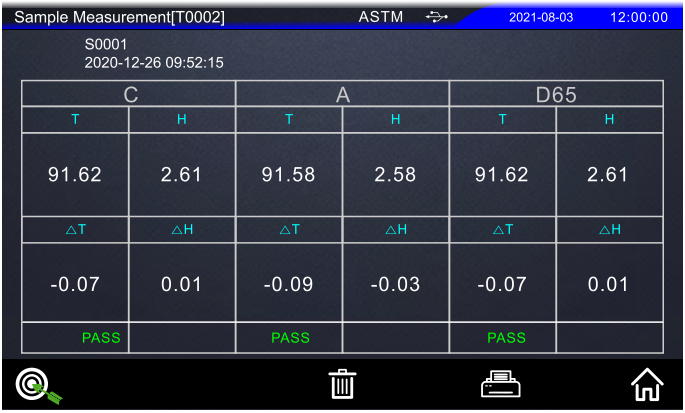

Figure 23 A set of sample average measurement completion interface

2.4.2 Continuous Measurement (ASTM)

When the measurement conditions are fixed and continuous measurement of samples is needed (such as the automatic operation process of the assembly line), continuous measurement mode can be used to reduce the operation steps and save measurement time.

The instrument can achieve each group of continuous measurement of 0~10000 times, the measurement interval between 5~300 seconds, sample measurement and standard measurement can set the number of continuous measurement and the time of each measurement interval.

When ASTM (American Standard) measurement standard is selected, click "Measurement Mode" in the main menu to enter the measurement mode setting interface, as shown in Figure 17. Click "Continuous Measurement" to enter the interface of continuous measurement setting. Users can set "standard measurement times" and "sample measurement times" as required, as well as measurement interval time, as shown in Figure 24. If the number of measurements input is 1, the measurement is carried out in the normal way; If it is greater than 1, when measuring standard and

samples, it will automatically make another measurement according to the set interval time after each measurement until the set number of measurements is completed. After setting the measurement times and measurement interval of standards and samples, click OK " ✓ " , the instrument enters the continuous measurement state. Continuously click to return " ↩ " to enter the continuous measurement interface.

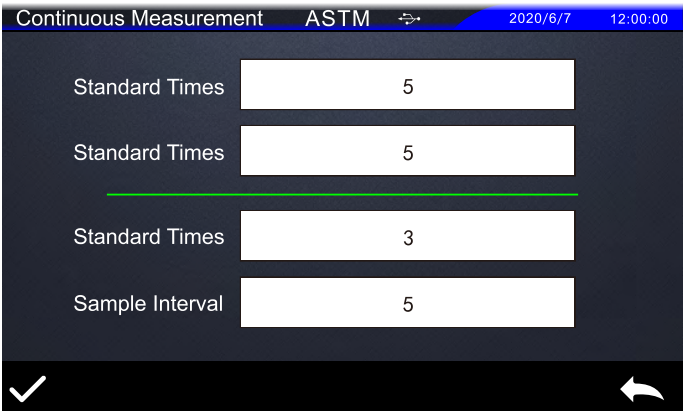

Figure 24 Continuous Measurement Settings

1) Standard Continuous Measurement

In the continuous measurement interface of the standard, when the sample to be tested has been placed above the transmission port, the compensation port cover should be close to the compensation port at the same time.Gently press the "measurement button", the buzzer will emit a "hum" sound. At the same time, the indicator light on the "measurement button" flashes to stop, which represents the completion of the first measurement of the group. If multiple measurements are set, the instrument will automatically make multiple measurements according to the set number of measurements and the interval time. Once the measurement is completed, a measurement result will be recorded (only when the automatic storage is turned on) until the set number of measurements are completed, and the results of each measurement will be recorded after the completion of the measurement.

The continuous measurement interface of the standard is shown in Figure 25, Figure 26 and Figure 27.

Note: In the continuous measurement process, if the automatic storage function is not enabled, only the measurement results will be displayed after each measurement, instead of stored. When the measurement is completed, click “Save” and only the last measurement results will be stored.

During continuous measurement, click " ⏸ " Or press the "measurement button" to stop the measurement; After pausing, click " ⏯ " Or press the "measurement button" to continue the measurement. The other ICONS for continuous measurements are the same as the definition for average measurements, as illustrated at the top of Figure 20.

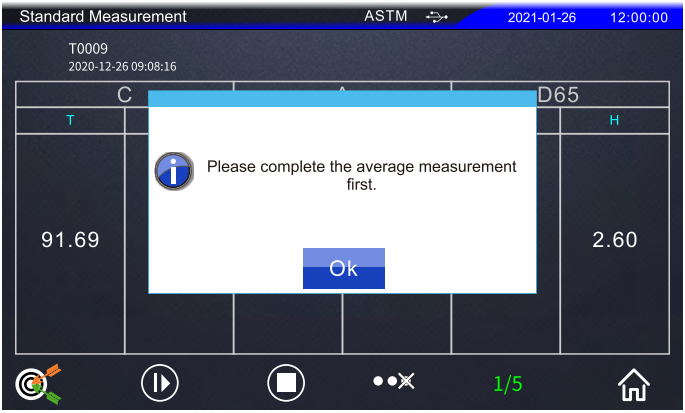

Figure 25 Interface for the continuous measurement completion of the first standard

Figure 26 Standard continuous measurement

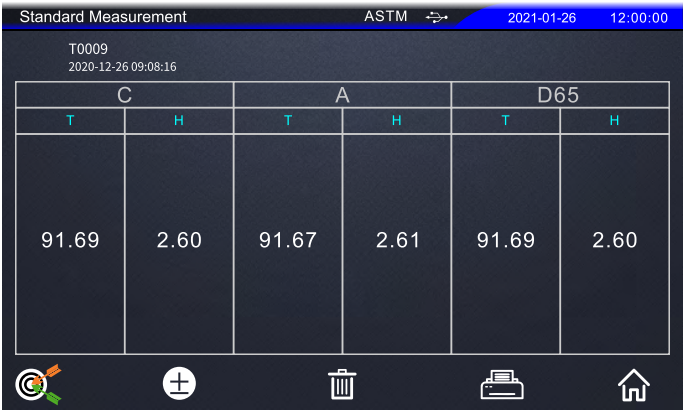

Figure 27 Interface for continuous measurement completion of a group of standard

2) Sample Continuous Measurement

In the lower left corner of continuous measurement interface of standard, click " " to quickly switch to the continuous sample measurement interface associated with the standard. The continuous measurement method of sample is the same as standard. The continuous measurement interface of samples is shown in Figure 28 and Figure 29.

During the sample continuous measurement, the measurement result will be recorded once each measurement is completed (only when the automatic storage is turned on), and it will prompt whether the sample is qualified (when the test result reminder function is turned on), until the sample continuous measurement is completed, and the measurement result of each sample is recorded after the measurement is completed.

The measurement results indicate that if the difference value of the measurement result of each successive sample minus the standard measurement result is within the tolerance range set, it is judged to pass; otherwise, it is failure.

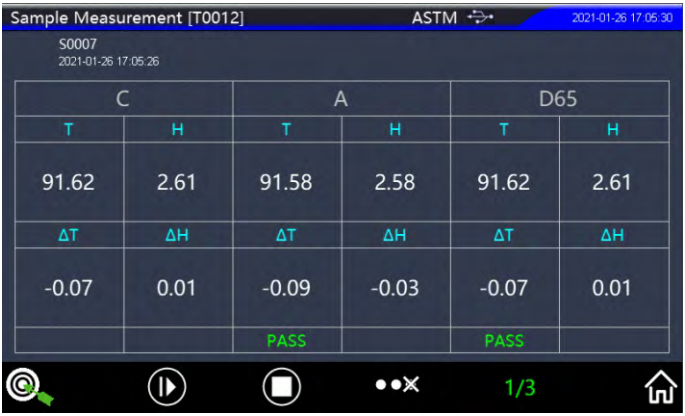

Figure 28 Interface for the continuous measurement completion of the first sample

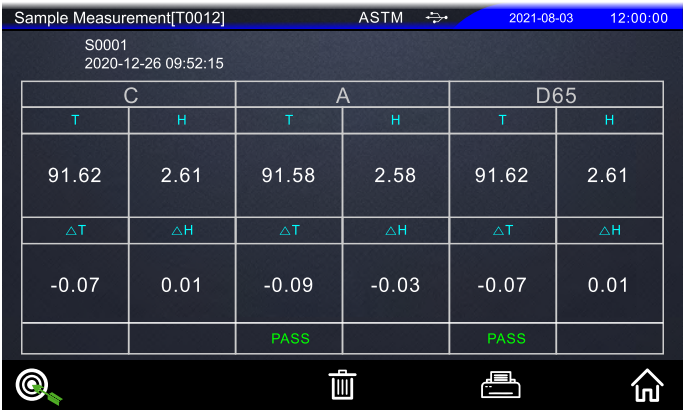

Figure 29 Interface for continuous measurement of a group of samples

2.4.3 Average Measurement (ISO)

When selecting ISO standard for standard measurement, the average measurement setup method is the same as ASTM (please refer to Section 2.4.1), but the measurement method is slightly different. For the difference between ISO and ASTM, please refer to Section 2.4.5.

2.4.4 Continuous Measurement (ISO)

When selecting ISO standard for standard measurement, the continuous measurement setup method is the same as ASTM (please refer to Section 2.4.2), but the measurement method is slightly different. For the difference between ISO and ASTM (see Section 2.4.5), please refer to Section 2.4.5.

2.4.5 Measurement Differences between ISO and ASTM standard

When the ASTM (American Standard) measurement standard is selected to measure the sample, it is only necessary to place the measured sample in the transmission port for measurement; when the ISO measurement standard is selected to measure the sample, it is necessary to place the measured sample in the compensation port for measurement.

Then place the sample to be tested in the transmission port for measurement. The following is a detailed description of the differences between ISO and ASTM (American Standard) measurement methods. When selecting the ISO measurement standard to measure the sample, according to the prompt, first place the sample to be tested on the compensation port while the transmission port is open, and then click "OK" to start the measurement, as shown in Figure 30. After the measurement of the compensation port sample is completed, according to the prompt, place the test sample on the transmission port while the compensation port is open, and then click "OK" to start the measurement, as shown in Figure 31. When the sample is completely measured at the compensation port and transmission port, it means that one sample measurement is completed. When the ISO measurement standard is selected to measure the sample, each standard measurement, sample measurement, average measurement and continuous measurement need to be measured at the compensation port and the transmission port. Other measurement procedures are the same as ASTM (American Standard).

Figure 30 Prompt for placing sample in “Comp AP” under ISO measurement standard

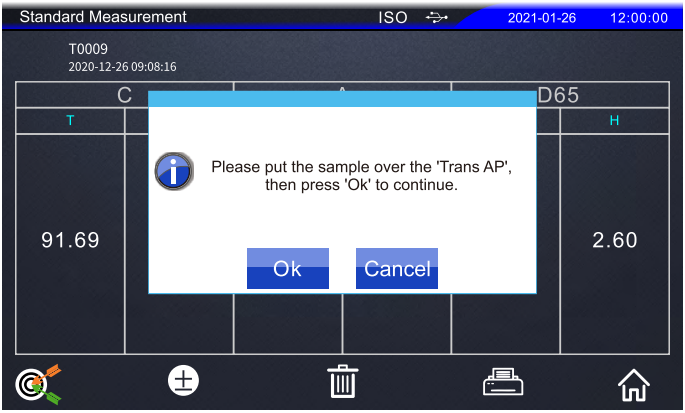

Figure 31 Prompt for placing sample in “Trans AP” under ISO measurement standard

2.5 Communicate with PC

The PC software has powerful expansion function, which can realize more measurement data analysis.This series of instruments can be connected with the color management software on PC through USB data line for communication.

Install the color management software on the PC and use USB cable to connect the instrument with the PC. The software can automatically connect the instrument with the PC. After successful connection, the status bar of the instrument will display the USB connection icon.

2.6 Print

The micro printer is a optional accessory and should be purchased separately. The user can first measure the standard data, save the record that needs to be printed, connect the micro printer to the instrument through USB, find the record to be printed in the standard or sample record, click is OK. You can also choose to print the record on the measurement completion screen.

3. Main Menu

In the measurement interface, press " ⌂ " Enter the main menu and click to return to " ↩ " Enter the main menu, from the main menu can enter the sub-menu to achieve all the system function Settings.

3.1 Data Management

Click " Data Management" in the main menu interface to enter the Data Management interface, as shown in Figure 32. Data Management mainly realizes the view and operation of the measured records. The Data Management interface includes "Browse", "Search", "Input Standard" and "Delete".

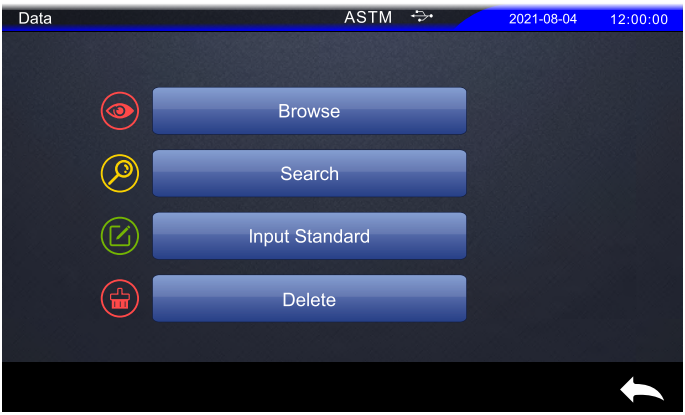

Figure 32 Data Management Interface

3.1.1 Browse

Click "Browse" in the data management interface and jump to the "Browse" interface, as shown in Figure 33. Click on the " ▼ , ▲ " Button to page to view all the standards, tick the name before the " □ " , select the current standard record.

1) Select a standard record in the "Browse" interface, and the operation of "View Details", "Call out ", "View Samples", "Lock" and "Delete" can be carried out.

2) Select a standard record in the "Browse" interface, click "View Details", and the "Browse Standards" interface pops up to view the measurement record of the current standard, as shown in Figure34. In the “View Standard” interface, click" ▼ , ▲ "Button, you can view the measurement records of other standards, click the standard name, you can modify the standard name.

Select	Name	Date/Time	ASTM-T (C)	ASTM-H (C)	ASTM-T (A)	ASTM-H (A)	ISO-T (D65)	ISO-H (D65)
☐	T0001	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0002	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0003	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0004	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0005	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☑	T0006	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0007	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0008	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0009	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60

Figure 33 Browse the standard interface

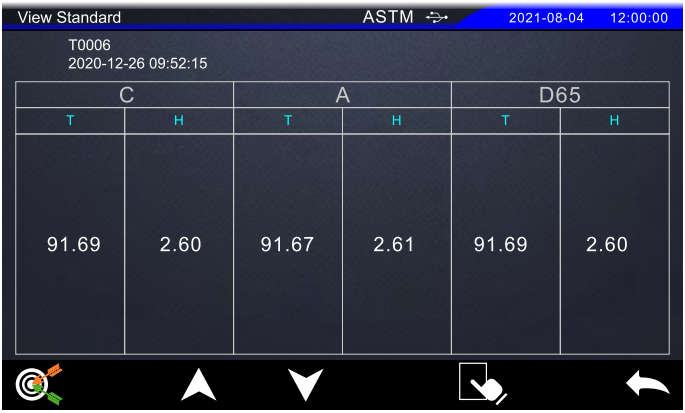

Figure 34 View the standard interface

3)In the "View Standard" interface as shown in Figure 34, click " " to "Delete", "Replace", "Tolerance", "Print", "Cull out" and "lock" the currently selected standard as shown in Figure 35.

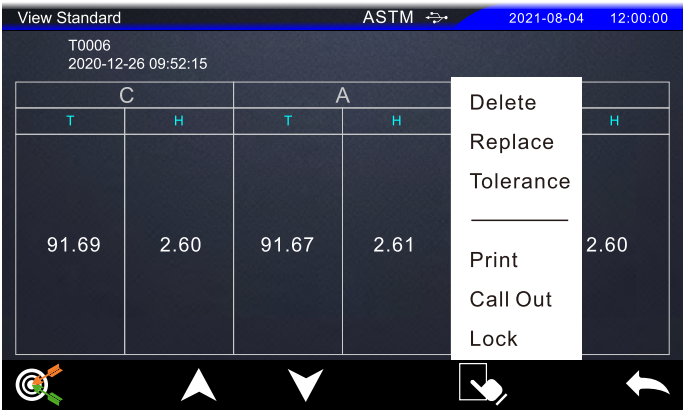

Figure 35 View Standard Interface

1. Click "Delete" or click "Delete Selected" in the "Browse" interface to delete the standard and the associated sample record;
2. Click "Replace" to remeasure a standard data to replace the current standard data.
3. Click "Tolerance" to set the tolerance for the standard, as shown in Figure 36. If you do not modify the standard tolerance, the current standard tolerance defaults to the system tolerance. The tolerance setting when viewing the standard sample is the same as the tolerance setting method when measuring the standard, please refer to section 2.4.1.
4. Click "Print", the current standard data and associated sample data can be printed;

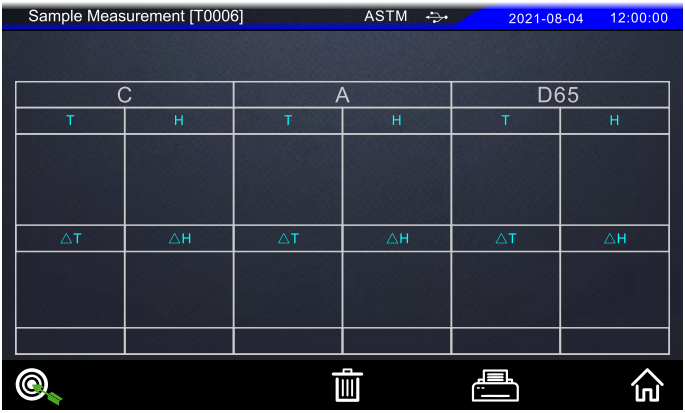

Figure 36 Change the standard record being viewed to the current standard

5. Click "Recall", or click "Recall Selected" on the "Browse Standard" interface, the standard record you are viewing can be adjusted to the current standard, and the associated sample measurement interface will pop up.
6.Click "Lock", or click "Lock Selected" in the interface of "Browse Standard", and the standard will be locked.

If the standard is locked, operations such as name modification, tolerance setting, replacement and deletion of the standard cannot be conducted. After the standard is locked, you can choose to unlock it.

4) Select a standard in the "Browse Standard" interface and click "View Sample". If there is an associated sample record under the current standard, the sample record associated with this standard will be listed on the pop-up browsing sample interface, as shown in Figure 37; If there is no associated sample record under the current standard, it is indicated that "the selected standard has no associated sample", as shown in Figure 38.

1. In the browse sample interface as shown in Figure 37, select a sample record and click "View Details" to view the measurement record of the sample; click the " ⮟, ⮝" button to view other sample records associated with the current standard ; Click the sample name to modify the name; click " " and select "Delete" to delete the current sample data, select "Recall" to adjust the current sample record to the standard, and select "Print" to print current data (when the printer is connected), as shown in Figure 39;

2. In the “Browse Samples” interface, as shown in Figure 37, select one or more sample records and click "Delete Selected" to delete the selected sample records, but the standard records associated with the sample will not be deleted;

3. In the “Browse Samples” interface, as shown in Figure 37, click "Diff-value" to quickly switch to the "Absolute Value" recording interface.

Select	Name	Date/Time	ASTM-T(C)	ASTM-H(C)	ASTM-T(A)	ASTM-H(A)	ISO-T(D65)	ISO-H(D65)
☐	T0001	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0002	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0003	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0004	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0005	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60
☐	T0006	2020-12-23 10:46:40	91.69	2.60	91.67	2.61	91.69	2.60

Figure 37 Browse Samples interface

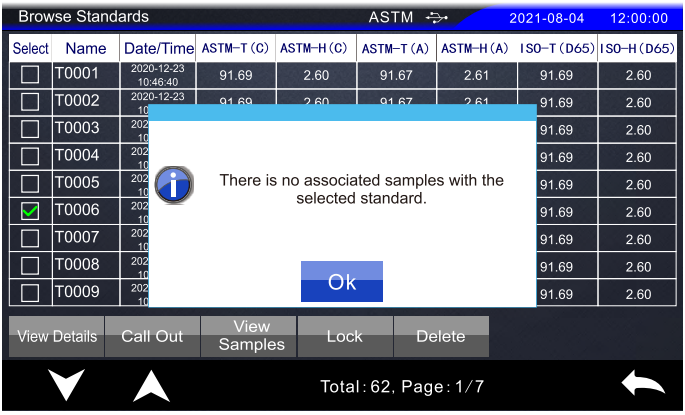

Figure 38 There is no sample record associated with the current standard

Figure 39 View sample details

5) When multiple standard records are selected in the "Browse standard" interface, "Lock Selected" and "Delete Selected" operations can be carried out, as shown in Figure 40, Figure 41 and Figure 42.

1.Click "Lock Selected", and the selected standard will be locked. After the standard is locked, operations such as name modification, tolerance setting, replacement and deletion of standard cannot be carried out.After the standard is locked, you can choose to unlock the lock;
2.Click "Delete Selected" to delete the selected standard and its associated sample record.

Figure 40 Browse standard interface

Figure 41 Standard locked state

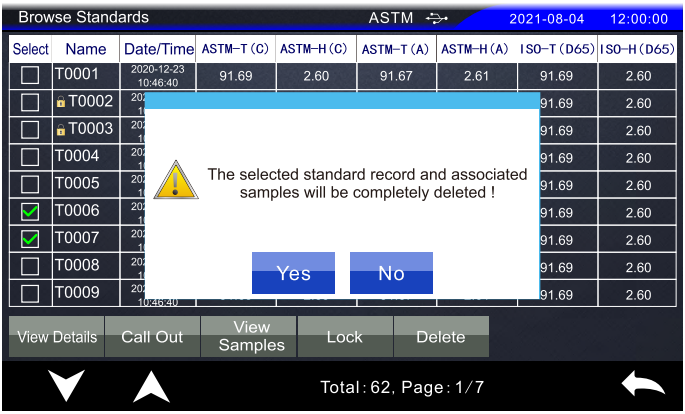

Figure 42 Prompt for deleting multiple standard records

3.1.2 Search

Click "Search" in the data management interface to enter the search record interface.

1) Click the "Name" column, to enter the text in the "Name" column of the standard or part of the sample name to be searched, click "OK", and then select "Search Standard" or "Search Sample" to find out that the name contains the standard or sample record of the name to be searched as shown in Figures 43 and 44;

2) Enter all the characters in the name of the standard or sample to be searched in the "Name" column, tick "Full Name Match", and then click "Search Standard" or "Search Sample" to find the standard or sample record whose name is exactly the same as the name searched;

3) Enter the name, and check the "specified date", select the date, you can find the standard or sample records within the specified date. You can also click "↩" to return to cancel the search.

Figure 43 Search record interface

Figure 44 Search record name input box

3.1.3 Input Standard

Click "input standard" in the data management interface to enter the input standard interface, as shown in Figure 45, Figure 45-1, and Figure 45-2. The input type can choose "Haze|Transmittance", "Haze" and "Transmittance". Enter the name of the standard and related parameters.

After the input is complete, click " ✓ " , and the standard will be stored in the standard record list. The standard record can be viewed through the "browse record" on the data management interface. For the method of viewing the standard record, please refer to section 3.1.1.

Figure 45 Input Standard interface-Haze|Transmittance

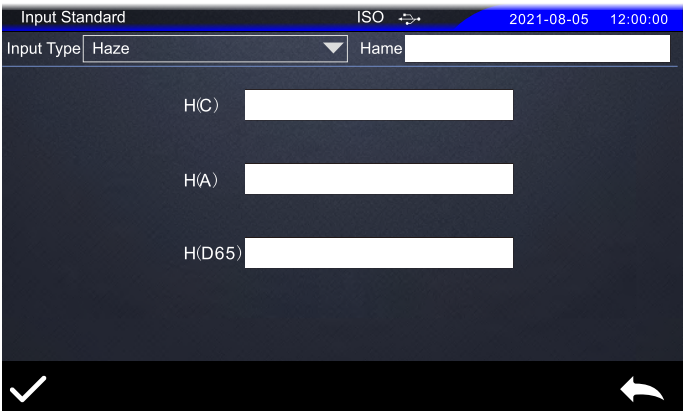

Figure 45-1 Input standard interface-Haze

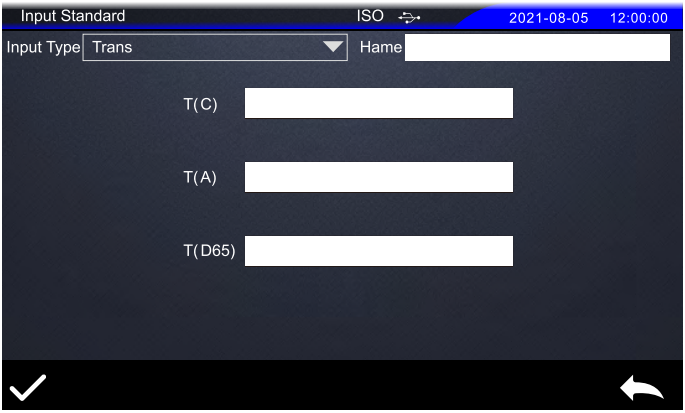

Figure 45-2 Input standard interface-Transmittance

3.1.4 Delete

Click "Delete" on the data management interface to enter the delete record interface. All samples and standards can be deleted, or samples and standards can be deleted by time, as shown in Figure 46. Click the corresponding option to enter the delete prompt and warning interface. Click "Yes" on the warning interface to delete all corresponding records; If you do not want to delete, you can click "No" as shown in Figure 47.

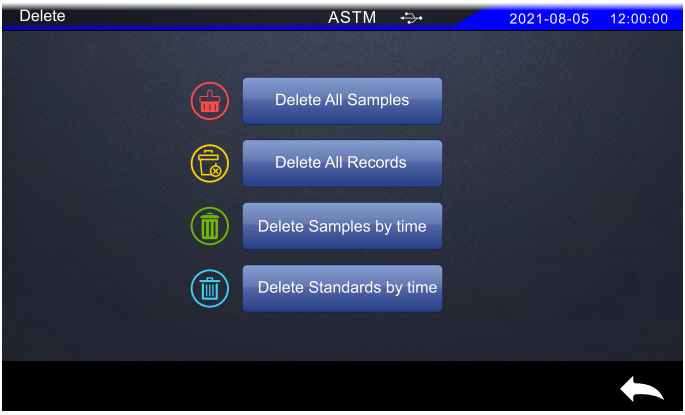

Figure 46 Delete record interface

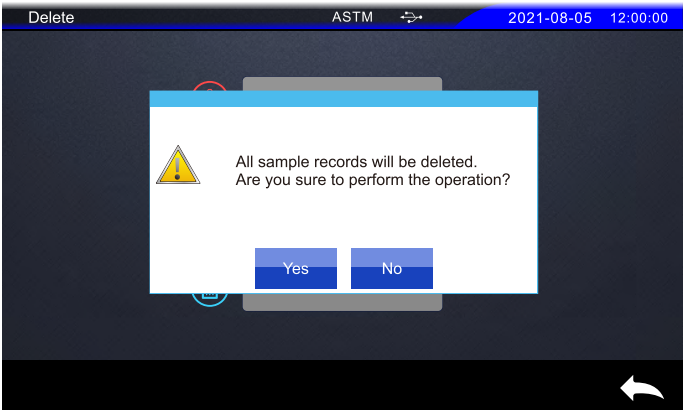

Figure 47 Prompt for deleting all sample records

3.2 Calibration

Calibration as the measurement benchmark, must be accurate, otherwise it will affect the validity of the measurement data. This series of instruments requires calibration in the following situations:

1)When the calibration environment and the current sample measurement environment are quite different (such as severe temperature fluctuations), the instrument needs to be calibrated in time;
2)The instrument has exceeded the expiration date of calibration, and it needs to be re-calibrated when measuring samples;
3)After the ASTM (American Standard) and ISO standards are switched, the instrument needs to be recalibrated when measuring samples.
For the calibration method, please refer to section 2.2.

3.3 Reference Standard

There are two kinds of reference standards: ASTM (American Standard) and ISO. After switching between ASTM (American Standard) and ISO for this series of instruments, the instrument needs to be re-calibrated when conducting sample measurement. Please refer to Section 2.2.1 for detail.

Note: Instruments without compensation ports do not support ISO standards.

3.4 Measurement Mode

Average measurement and continuous measurement can be set in the measurement mode. Please refer to Section 2.4 for detail.

3.5 Display Setting

Click "Display Settings" on the main menu interface to enter the Display Settings interface, as shown in Figure 48.

When the "Test Result Prompt" is turned on, when the sample is measured, if the error between the sample and the standard is within the tolerance range, the green word "Pass" is displayed, otherwise the red word "Fail" is displayed.

This series of instruments can be set as horizontal screen or vertical screen.

Figure 48 Display Setting Interface

3.6 System Setting

Click "System Setting" in the main menu to enter the interface of System Setting, as shown in Figures 49, 50 and 51.

System Setting include "Auto Save", "Auto Print", "Beep", "Set System Tolerance", "Control Method", "Calibration Validity", "Language Setting", "Date/Time", "Backlight", "Restore Factory Setting" and "About Instrument", etc.

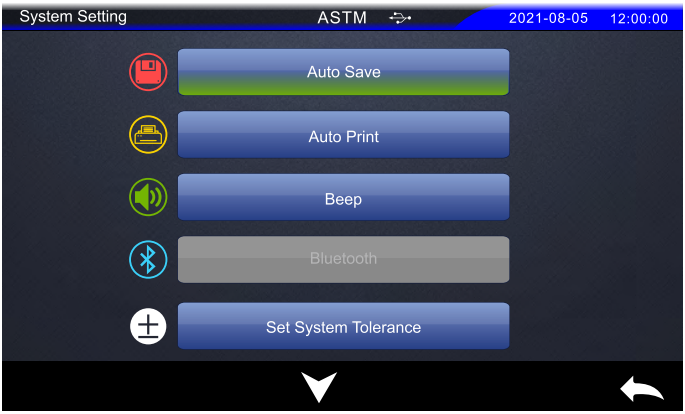

Figure 49 System setting interface

Figure 50 System setting interface

Figure 51 System setting interface

3.6.1 Auto Save

When the Auto Save function is turned on, every time sample measurement results will be automatically stored in the instrument. Otherwise, the measurement record will not be automatically saved after finishing the sample measurement, and it needs to manually save it.

3.6.2 Auto Print

When automatic printing is turned on, the sample will be automatically printed every time it is measured. Otherwise, the sample will not be automatically printed after finishing sample measurement, and you need to manually click "Print". Open "Auto Print" in "System Setting" interface and connect to the printer before printing. Please refer to Section 2.6 for detail.

3.6.3 Beep

The beep switch controls whether the prompt sound is sounded during the measurement. When the beep function is open, a beep voice will be sounded for each measurement, otherwise, there will be no beep voice during measurement.

3.6.4 Set System Tolerance

Tolerance is for the standard. The standard tolerance will affect the instrument to determine the sample measurement results.The system tolerance is the default tolerance assigned to the standard by the instrument. If the standard tolerance is not set, the system tolerance is used by default.

Click "Set System Tolerance" on the system setting interface to enter the tolerance setting interface, as shown in Figure 52. In this interface, the tolerance range of "Transmittance" and "Haze" can be set. Click the corresponding tolerance value to enter the corresponding value setting interface, as shown in Figure 53, after setting, click "✓" to save, that is, this tolerance is the system tolerance. If you click "↩", the setting will be cancelled and the tolerance setting interface will be exited.

In the transmittance and haze tolerance settings, the upper tolerance limit on the right must be greater than the lower tolerance limit on the left.

Figure 52 System tolerance setting interface

Figure 53 System tolerance value input interface

When measuring the sample, judge whether the sample is within the acceptable range according to the tolerance type and range set by the standard. If the error between the sample and the standard is within the tolerance range, it is judged as pass, otherwise it is fail (when the test result prompt function is turned on).

3.6.5 Control Method

When the instrument communicates with the PC software, the user can set the specific measurement control mode according to needs. Click "Control Method" on the system setting interface to open the measurement control interface (as shown in Figure 54), select the corresponding method, and then click OK " ✓ " .

Figure 54 Control Method

PC software: When this mode is selected, instrument measurement can only be triggered into data test by the measurement button of the PC software, and the data can be uploaded to the PC software.

Key | PC software: If choose this mode, customers can complete the sample test, and the data upload through the instrument test button or PC software measurement button. This mode is the default selection mode of the instrument.

Key: When this mode is selected, instrument measurement can only be triggered into data test by the measurement button of the instrument, and the data can be uploaded to the PC software.

Note: The measurement control method is only effective when the instrument is connected to the PC software. In the case of unconnected, the measurement button can only be used at all times.

3.6.6 Calibration Validity

Click "Validation Validity" on the system setting interface to manage the timeliness of calibration, as shown in Figure 55.

Figure 55 Calibration validity period selection interface

Click "Calibration Validity" in the system setting interface to enter the selection interface of calibration validity. You can select "4 hours", "8 hours", "24 hours" and "Power on Calibration".

If 4 hours is selected, the validity period of the instrument's calibration will expire after each 4 hours of calibration. If it expires, you can only view the data but cannot complete the measurement. After re-calibration, the calibration validity will start the timing again.

If 8 hours is selected, the validity period of the instrument's calibration will expire after 8 hours of each calibration.If it expires, you can only view the data but cannot complete the measurement. After re-calibration, the calibration validity will start the timing again.

If 24 hours is selected, the instrument's calibration validity period will expire after each calibration 24 hours. If it expires, you can only view the data but cannot complete the measurement. After re-calibration, the calibration validity will start the timing again.

If you choose power on calibration, the instrument's calibration period will expire at each start up. If it expires, you can only view the data but can not complete the measurement. The measurement can only be performed after correct calibration.

3.6.7 Language Settings

The language used to set up the instrument interface. In the system setting interface, click "Language Settings", and then select the corresponding language confirmation " ✓ " as shown in figure 56.

Figure 56 Language setting interface

3.6.8 Date/Time

When the instrument leaves the factory, it is usually synchronized with the local time of the manufacturer. The user can also set the time of the instrument according to the actual situation. Click "Date/Time" in the system setting interface to enter the setting interface of year, month, day, hour, minute and second.Select date and time. After setting, click OK "✓ " to save the Settings and click Return " ↩ " to unsave as shown in figure 57.

Figure 57 Date/time setting interface

3.6.9 Backlight Settings

Click "Backlight Settings" in the System Setting. interface to enter the backlight Settings selection interface. You can select screen brightness and backlight time, as shown in Figure 58.

To adjust the brightness of the screen, move the brightness regulator left and right in the Brightness Settings bar.

Backlight time is divided into: "constant light", "1 minute", "5 minutes", "10 minutes" and "30 minutes". If you select constant light, it will not automatically break the screen when there is no operation. If set to "1 minute", the instrument will be timed from the last operation, and the screen will rest after 1 minute and enter the power-saving mode. The setting items of "5 minutes", "10 minutes" and "30 minutes" have the same meaning as above.

The instrument can be lit up by pressing the "measurement button" or touching the screen during the rest time. The default screen backlight time of the instrument is "5 minutes", which puts it in power-saving mode.

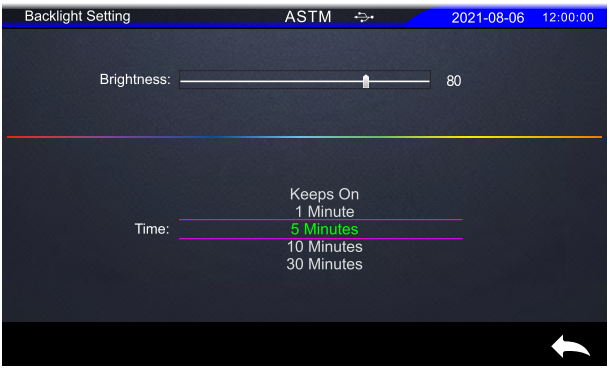

Figure 58 Screen backlight setting interface

3.6.10 Restore factory Settings

Click "Restore Factory Settings" in the system setting interface to enter the interface shown in Figure 59, and click OK "✓" The instrument clears all measurement records and user Settings, and returns to the factory state. Click Return "↩" to cancel this operation.

Note: This operation instrument will clear all data and user Settings, and restore to the factory setting state, all data can not be recovered, please be careful.

Figure 59 Restore factory Settings interface

3.6.11 About Instrument

Display instrument model, SN number and current software and hardware version number.

4. Daily Maintenance

1) This instrument is a precision optical instrument. Please keep and use the instrument properly and avoid using and storing the instrument in the environment of humidity, strong electromagnetic interference, strong light and heavy dust. It is recommended to use and store the instrument in a standard laboratory environment (temperature 20~25 ° C, 1 standard a atmosphere, humidity 30~70%RH).

2)The standard plate (haze film, etc.) is a precision optical component, which should be properly stored and used. Avoid hitting the working surface with sharp objects, avoid dirt on the working surface, and avoid exposing the standard plate to strong light. The surface of the standard board is extremely sensitive. It is strictly forbidden to wipe the working surface of the standard board to avoid dust scratches. Dust and fluff will affect the measured value. The standard plate must be cleaned with oil-free compressed air before use.

Be very careful when cleaning the standard plate with distilled water. Use a new soft cloth to ensure that particles that may damage the surface of the standard plate are not adhered to the cloth, and wipe gently. To remove stubborn dirt, add a small amount of acid-free household detergent to distilled water and wash in distilled water. After cleaning, dry it with oil-free compressed air to blow off residual dust or fluff.

Do not contact corrosive cleaning agents, such as solvents, alcohol, trichloroethylene, benzene, strong alcohols, acids or alkalis, polishing agents, and other destructive chemical cleaning agents to the standard plate.

3)In order to ensure the validity of the measurement data, it is recommended to go to the manufacturer or qualified metrological research institute for metrological inspection one year from the date of purchase of the haze meter.
4)The instrument is powered by external power adapter. Please use the original power adapter. At the same time, the power should be used in a standard way to avoid frequent unplugging of the power, protect the performance of power and extend the service life of power.
5)Please do not disassemble and install the instrument without consent. If you have any problems, please contact the relevant after-sales staff. Tearing off the easy-to-tear label will affect the after-sales maintenance service of the instrument.

5.Technical Parameters

5.1 Product Features

1)High hardware configuration: 7-inch TFT pure color TV touch screen; Up to more than 20,000 storage capacity;
2)High optical resolution, dual optical path, accurate CIE 1931/2 visual response (error ~ 3%), High life span full spectrum LED;
3)A variety of measuring diameter: conventional caliber Φ 20 mm, Φ15 mm, Φ8 mm, Φ 4 mm diameter can be customized.
4)Temperature monitoring and compensation, built-in temperature sensor, monitoring and compensation of the test environment, to ensure more accurate measurement results;
5)Independent light source detector, always monitor the change of light source, to ensure the reliable light source;
6)A variety of measurement modes to meet the needs of more customers;
7)A variety of accessories, fixture (optional), suitable for more working conditions;
8)The PC color management software has a powerful extension function.

5.2 Technical Specifications

Product Model	Serie shaze meter (compensating port/no compensating port)
Optical Geometry	Transmittance :0/D(Parallel light illumination, diffuse viewing) Conforms to:ASTM D1003/1044,ISO 14782，GB/T 2410,JJF 1303-2011，CIE 15.2，GB/T 3978,ASTM E308，JIS K7105，JIS K7361，JIS K 7136
Character	The instrument can easily achieve ASTM D1003 non-compensation method, full light transmittance,haze test. Open measuring area for vertical and horizontal testing. In glass processing, plastic processing, film, screen processing, packaging and other industries are widely used in transmittance,haze detection.
Integrating Sphere Size	Φ154mm
Light Source	400nm to 700nm, combined LED light
Specular Component	/
Sensor	The PD array detector satisfies CIE V(λ)2 degree visual response
Wavelength Range	/
Wavelength Interval	/
Semiband Width	/
Transmittance measurement range	0~100%

Measuring Aperture	Φ20mm/Φ15mm/Φ8mm/Φ4mm(Select a single aperture)
Sample Size	Thickness < 170mm
Color Space	/
Color Difference Formula	/
Other Colorimetric Index	Haze(ASTM D1003/1044,ISO13468),Transmittance T(ISO),Transmittance T(ASTM)
Observer Angle	2°
Illuminant	D65,A,C
Displayed Data	PASS/FAIL Result
Measuring Time	About1.5s
Haze resolution	0.01unit
Haze repeatability	Φ20mm,within 0.1 (After preheating and calibration of the instrument, standard deviation values of standard haze tablets with a test haze of about 40 for 30 times were taken at intervals of 5s.)
Inter-instrument Error	Φ20mm,with 0.4 (After the instrument is preheated and calibrated, the standard deviation between the standard haze tablet and the reference value is tested at an interval of 5s.)
Dimension	L*W*H=290X211X511mm
Weight	About7.6kg
Power	AC 24V, 3A Power adapter power supply
Illuminant Life Span	5 years, more than 3 million times measurements
Display	7-inch TFT color LCD, Capacitive Touch Screen

Data Port	USB & Print serial port
Data Storage	Standard 1000 pcs,sample 20000 pcs
Language	Simplified Chinese,Traditional Chinese,English
Operating Environment	0~40℃（32~104°F）
Storage Environment	-20~50℃（-4~122°F）
Standard Accessory	Power Adapter, User Guide,Quality Management Software (download from the official website),USB cable,0% calibration box,Aperture.
Optional Accessory	Micro-printer,Test fixture, standard haze sheet, foot switch
Note:	The specifications are subject to change without notice.

Appendix

1) Terms and definitions:

Haze: The ratio of the scattered luminous flux that deviates from the incident light direction through the sample to the transmitted luminous flux, expressed as a percentage (for this method, only the scattered luminous flux that deviates from the incident light direction by more than 2.5° is used to calculate the haze) .

Luminous transmittance: The ratio of the luminous flux passing through the sample to the luminous flux hitting the sample, expressed as a percentage.

According to the above definition of luminous transmittance, there are currently two different standards to measure this data. They are the American standard (ASTM standard) and the international standard (ISO standard). These two standards respectively correspond to the non-compensation method of transmittance measurement and the compensation method of transmittance measurement.

2) Non-compensation measurement method

When the standard reflectance plate is placed at the light exit port of the light path, the measurement is performed when the sample is removed. The data read by the photoelectric sensor is T1, which is the total energy of the incoming light. Place the sample in the transmission port for measurement. The data read by the photoelectric sensor is T2, which is the total energy of the incident light absorbed by the sample. Then the calculation formula for transmittance can be obtained:

$\tau = T2/T1$

The above is the transmittance of the sample, and this method is the transmittance measured by the non-compensation method.

3) Compensation measurement method

In the above non-compensation measurement method, if we study carefully, we will find that when we measure T2, the value of T2 is not only the total energy of the incident light absorbed by the sample, but also includes includes the reflected energy of the sample surface after the integrating sphere is illuminated to the sample surface, and we did not consider the reflected energy of the sample surface when measuring T1. This is a certain deviation that occurs when the non-compensation method measures light transmittance. Therefore, the International Organization for Standardization (ISO) proposed a method for measuring transmittance based on compensation.

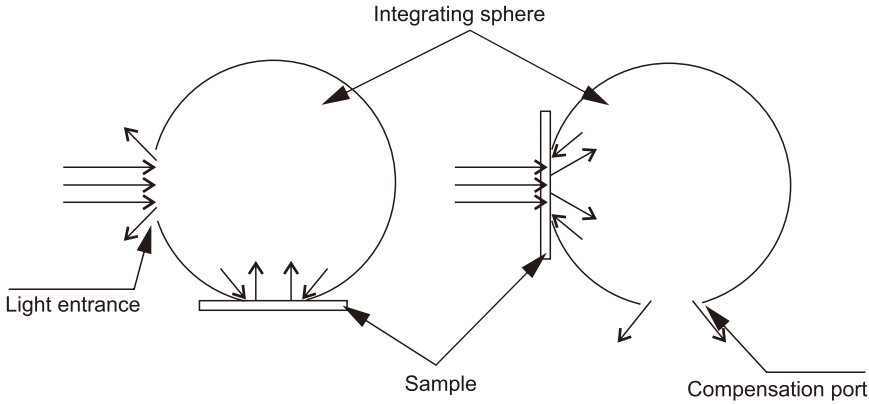

Figure 60 Schematic diagram of measurement principle of compensation method

The measurement method of the compensation port is as follows. First, place the sample surface on the compensation port and measure the total energy T1 of the incident light. At this time, the T1 value already includes the reflected energy value of the illuminated integrating sphere irradiated on the sample surface, and then place the sample at the transmission port and measure the total energy value T2 of the incident light after passing through the sample. The T2 value at this time also includes the reflected

energy value of the illuminated integrating sphere irradiated on the surface of the sample. Then the calculation formula of transmittance can be obtained:

$\tau = T2/T1$

The transmittance value at this time takes into account the reflection of the sample surface and is more accurate. This method is the transmittance measured by the compensation method.

Based on the above-mentioned test principle and formula derivation and comparison of actual test data, the transmittance measured by the non-compensation method is slightly different from the transmittance measured by the compensation method, but the difference is not large. The transmittance measured by the compensation method is more accurate.