

KWS-990P

Portable Suspended Solids (Sludge Concentration) Analyzer





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1.Introduction

The KWS-990P Portable Suspended Solids (Sludge Concentration) Analyzer consists of a portable instrument and a suspended solids (sludge concentration) sensor. It adopts an advanced scattered light measurement principle, requiring almost no maintenance, and its measurement results feature excellent repeatability and stability.

The instrument has an IP66 protection rating and an ergonomic curved design, making it suitable for hand-held operation and easy to handle in humid environments. It comes factory-calibrated, requiring no recalibration for one year, and also supports on-site calibration. The digital sensor enables convenient and fast on-site use, and realizes plug-and-play functionality with the instrument.

Equipped with a Type-C interface, it can charge the built-in battery and enable data export through this interface. The analyzer is widely used for on-site portable monitoring of suspended solids (sludge concentration) in industries and fields such as aquaculture, sewage treatment, surface water, industrial and agricultural water supply and drainage, domestic water, boiler water quality, and scientific research institutions & universities.

The outline dimension drawing of the instrument is shown in Figure 1 below (Unit: mm):

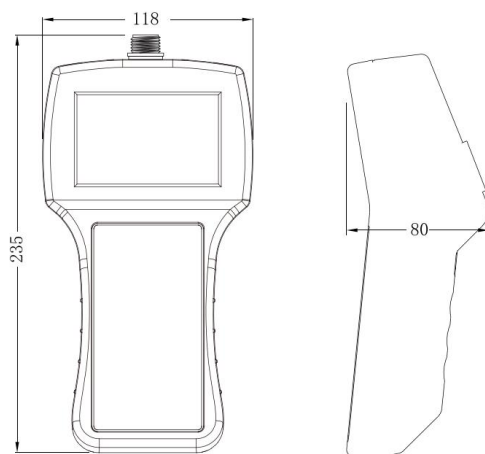


Figure 1 Outline Dimension Drawing of the Handheld Controller

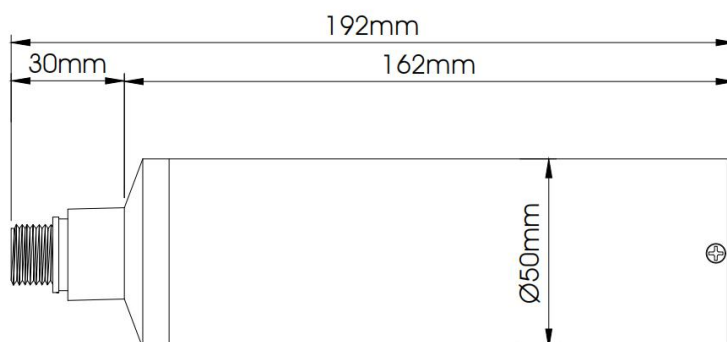


Figure 2 Outline Dimension Drawing of the Sensor

2.Measuring Principle

Based on the scattering principle, it adopts a near-infrared LED light source combined with adaptive software algorithms, which can effectively eliminate interference from ambient light. With a quartz glass light-guiding structure, it offers excellent repeatability and stability. The sensor requires no reagents, produces no pollution, and is more economical and environmentally friendly.

3.Technical Parameters

Technical Parameter	Specification
Measuring Range	0.001-100000 mg/L (Range Customizable)
Accuracy	$\leq \pm 5\%$ of Measured Value (Depending on Sludge Homogeneity)
Calibration	Standard Solution Calibration, Water Sample Calibration
Housing Material	Sensor Housing: SUS316L+POM
	Instrument Housing: PA+Glass Fiber
Storage Temperature	-15~60℃
Operating Temperature	0~40℃ (No Freezing)
Size/Weight	Sensor Size: Diameter 50mm * Length 192mm, Weight 0.6KG
	Instrument Size: 235*118*80mm, Weight 0.55KG
Protection Rating	Instrument: IP66, Sensor: IP68
Display	3.5-inch Color LCD Screen
Data Storage	16MB Data Storage Space, Approximately 360,000 Data Records

3.1 Safety Information

Before unpacking, setting up, or operating this instrument, please read this manual thoroughly. Pay special attention to all danger and warning statements. Improper operation may cause damage to the equipment. The equipment must be used and maintained strictly in accordance with the detailed instructions in this manual.

3.2.1 Use of Danger Information

For various potential hazards, this manual uses signal words corresponding to the hazard level: Danger, Caution, and Note.



Danger

Indicates an immediate or potential hazardous situation which, if not avoided, could result in death or serious injury.



Caution

Indicates a potential hazardous situation which, if not avoided, may result in minor or moderate injury.

3.2.2 Reminder for Preventive Labels

Carefully read all labels and identifiers affixed to the instrument. Failure to do so may result in personal injury or instrument damage.

Label Symbol	Description
	If this label is marked on the instrument, please refer to the instrument manual for operation and/or safety information.
	If this label is marked on the product, it indicates that there is a fuse or current-limiting device here.
	If this label is marked on the product, it indicates that the device is susceptible to electrostatic discharge (ESD) damage. Protective measures should be taken to prevent damage to it.
	If this label is marked on the product, it indicates the location for connecting the ground wire here.

4.Setup and Operation

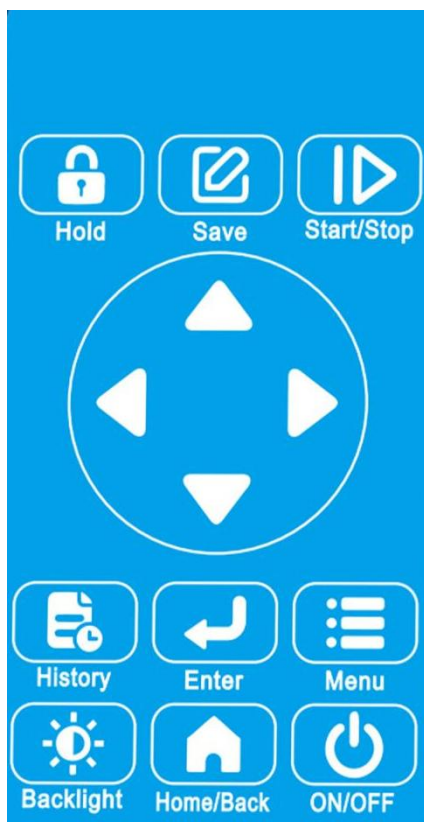
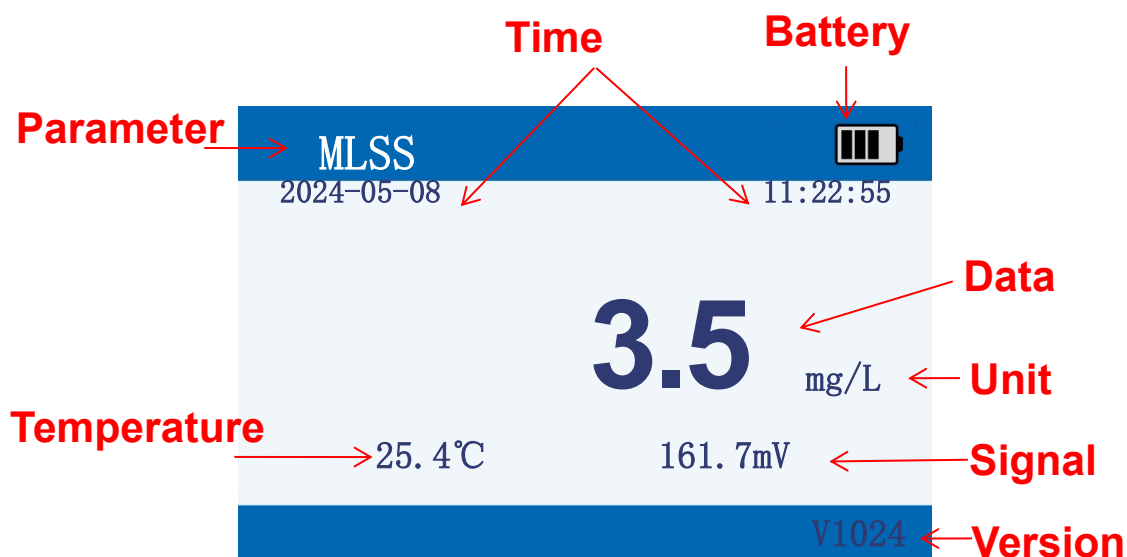


Figure 3 Operation Keyboard Diagram

4.1 Power-On Interface

Press the "Power" key briefly to start the instrument, and the power-on interface will appear as follows:



Press the "Measure/Stop" button to start the measurement. The display interface is as follows:

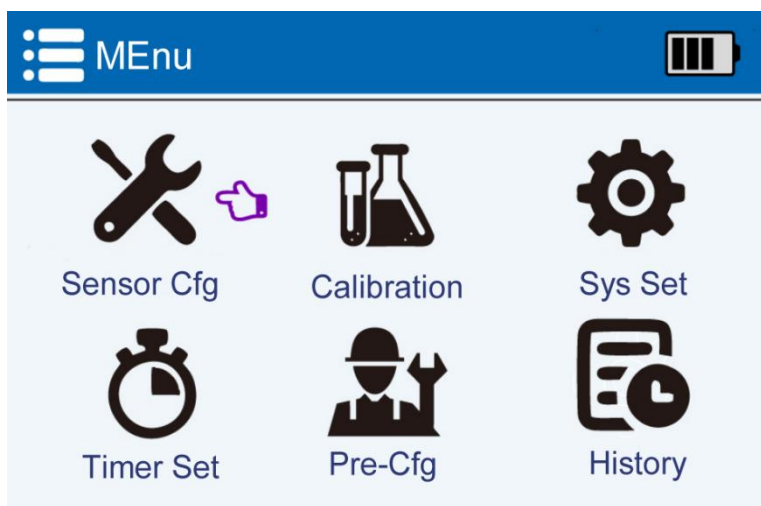


When taking measurements, you must press the "Measure/Stop" button to start measuring; otherwise, the instrument will remain in a non-measuring state and the data will not change.

If a yellow exclamation mark appears, it indicates that the sensor is not connected or the connection is abnormal.

During normal measurement, the lower-left corner of the main interface will display: "Cycle Measurement: Continuous Measurement." To stop measuring, press the "Measure/Stop" button again.

For a single measurement, press and hold the "Measure/Stop" button until the bottom bar displays "Single Measurement: Countdown Started."



Press the "Menu/Settings" button to enter the main menu interface. The main menu consists of "Sensor Configuration," "Calibration," "System Settings," "Timer Settings," "Preset Configuration," and "History."

4.2 Sensor Configuration

 Sensor Cfg 	
	1.1 Sensor: MLSS
	1.2 Sensor Type: MLSS/SS M
	1.3 ID: 001
	1.4 BPS: 9600
	1.5 Check Bit: No
	1.6 Target Add:0000
	1.7 Function Code:03
	1.8 Data Type:Float
	1.9 Decode Fmt:BADC
	1.10 Resolution:Auto

Sensor Type: Displays the detection parameter type of the current instrument. Options include MLSS/SS E and MLSS/SS M. MLSS/SS E refers to the spectroscopic measurement reference, while MLSS/SS M refers to the gravimetric measurement reference.

ID: Displays the communication address bit between the instrument and the sensor.

BPS: Used for communication settings between the instrument and the sensor. Configurable options: 4800, 9600, 19200, 38400.

Check Bit: Used for communication settings between the instrument and the sensor. Configurable options: None, Even Parity, Odd Parity.

Target Add: Serves as the communication identification address bit between the instrument and the sensor.

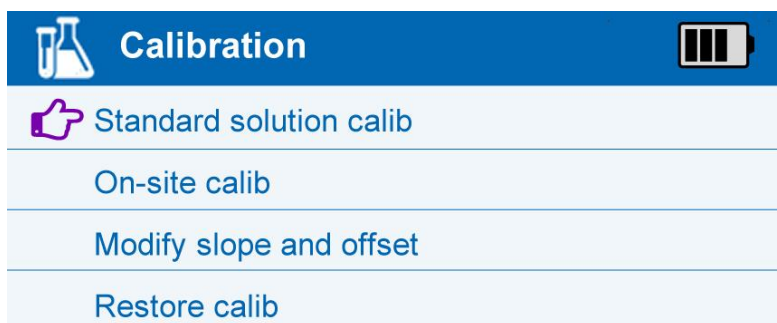
Function Code: Used for communication settings between the instrument and the sensor. Configurable options: 03, 04.

Data Type: Used for communication settings between the instrument and the sensor. Configurable options: Floating-Point Type, Integer Type.

Decode Fmt: Used for communication settings between the instrument and the sensor. Configurable options: BADC, CDAB, ABCD, DCBA.

Resolution: Used to set the measurement resolution of the current instrument. Configurable options: Auto, Integer, 0.1, 0.01, 0.001.

4.3 Calibration



4.3.1 Standard solution calib

The suspended solids (sludge concentration) sensor supports up to 10-point calibration within the measurement range of 0.001–100,000 mg/L.

The concentration of calibration standard solutions follows the order from low to high: Standard Solution 1 → Standard Solution 2 → Standard Solution 3 → Standard Solution 4 → Standard Solution 5A/5B → Standard Solution 6 → Standard Solution 7 → Standard Solution 8A/8B → Standard Solution 9 → Standard Solution 10. The sensor is pre-calibrated before leaving the factory and can be used directly.

Notes:

Before calibrating the sensor, clean the measurement surface of the sensor with deionized water and wipe the measurement window dry with a dust-free tissue.

Fix the sensor with a lab stand during testing.

Tilt the sensor and lower it slowly into the solution to avoid air bubble formation.

After immersion, maintain a distance of >10 cm between the sensor tip and the bottom of the container, and >3 cm between the sensor and the container wall.

4.3.2 On-site calib

The suspended solids (sludge concentration) sensor can be "on-site calibrated" using a solution with a known concentration.

In the "Input" item, enter the known concentration value of the solution (input range: 0.001–100,000 mg/L).

Press the "Confirm" key to start calibration.

4.3.3 Linear Compensation and Offset Adjustment:

The linear coefficient after on-site calibration is stored in this menu. On-site calibration can also be performed by setting offset data, where the value can be directly increased or decreased.

4.3.4 Restore calib

This function is used to restore the data of standard solution calibration and on-site calibration. Use with caution.

4.4 System Settings

 System Set 	
	3.1 Timed shutdown:OFF
	3.2 Shutdown time:010min
	3.3 Backlight:32/64
	3.4 clock:17:05:46
	3.5 day:2025-09-18
	3.6 Key touch beep:OFF
	3.7 UpVal Alarm:+0200000.0
	3.8 DnVal Alarm:+0000000.0
	3.9 Password Set:OFF
	3.10 Password:000000
	3.11 Password Time:001min
	3.12 Factory Recovery:NO
	3.13 Clear Data:NO

Timed shutdown & Shutdown Time: When the "Scheduled Shutdown" function is disabled, the "Shutdown Time" setting is ineffective. When the "Scheduled Shutdown" function is enabled, setting the "Shutdown Time" allows the instrument to automatically turn off at the specified time.

Backlight: This item is used to adjust the backlight brightness of the display screen, which can be modified according to the usage environment.

Clock & day: The "Clock" allows setting of hours, minutes, and seconds; the "Date" allows setting of year, month, and day.

Key touch beep: This item enables or disables the sound prompt for key operations (i.e., whether a sound is played when keys are pressed).

UpVal Alarm & DnVal Alarm: This item is used to set the upper and lower limits for measurement value alarms, which serve to alert the user whether the measured data exceeds the standard range. When the

displayed value exceeds the alarm upper limit or lower limit, an upward  or  downward arrow icon will be displayed above the data.

Password Set & Password: When the "Password Setting" function is disabled, the "Password" item has no effect. When the "Password Setting" function is enabled, the number set in the "Password" item serves as the password for accessing the menu.

Factory Recovery: This item is used to restore the parameters in the "System Settings" menu to their factory defaults, excluding the "Clock" and "Date" items.

Clear Data: This function is used to delete the historical data recorded in the instrument.

4.5 Timer Settings

 Timer Set 	
	4.1 Measure Interval:OFF
	4.2 Interval Time:060s
	4.3 Start Time:005s
	4.4 Measure Time: 010s
	4.5 Read Interval:001s
	4.6 Lock for Stab:OFF
	4.7 Stable Range:0005%
	4.8 Data Logger: On

Measure Interval: It can be set to "On" or "Off". When this function is turned off, the measurement mode is "Continuous Measurement". When this function is turned on, the time interval below needs to be set.

Interval Time: It is used to set the time interval between the first measurement and the second measurement.

Start Time: It is used to set the preparation time before each measurement starts.

Measure Time: It is used to set the duration for each single measurement.

Read Interva: It can be set within the range of 1-900 seconds (s).

Lock for Stab: It can be set to "On" or "Off". When this function is turned off, the measurement mode is "Continuous Measurement". When this function is turned on, the data display will be locked and unchanged when the data fluctuates within the "Stability Range" (the "Stability Range" can be set below).

Stable Range: It is used to set the percentage range that defines data stability.

Data Logging: It can be set to "On" or "Off", with the default state being "On". When this function and the "Measurement Interval" function are turned on simultaneously, the instrument will automatically record data according to the set time once measurement starts; the current time and corresponding data will be saved in the instrument. The recorded data can be queried in the "Historical Records" section. The instrument can store up to approximately 360,000 sets of data, and data can also be exported via the USB (Type-C) interface.

4.6 Pre-Configuration

 Pre-Cfg 	
	5.01 Sensor Type: MLSS
	5.02 ID: 001
	5.03 Baud Rate: 9600
	5.04 Check Bit: None
	5.05 Target Add: 0000
	5.06 Function Code: 03
	5.07 Data Type: Floating-Point
	5.08 Decode Fmt: BADC
	5.09 Resolution: Integer
	5.10 Use Pre-Cfg 1: No

Sensor Type: Displays the detection factor type of the current instrument. Options include MLSS/SS E and MLSS/SS M. MLSS/SS E refers to the spectroscopic measurement reference, while MLSS/SS M refers to the gravimetric measurement reference.

ID: Displays the communication address bit between the instrument and the sensor.

Baud Rate: Used for communication settings between the instrument and the sensor. Configurable options: 4800, 9600, 19200, 38400.

Check Bit: Used for communication settings between the instrument and the sensor. Configurable options: None, Even Parity, Odd Parity.

Target Add: Used as the communication identification address bit between the instrument and the sensor.

Function Code: Used for communication settings between the instrument and the sensor. Configurable options: 03, 04.

Data Type: Used for communication settings between the instrument and the sensor. Configurable options: Floating-Point Type, Integer Type.

Decode Fmt: Used for communication settings between the instrument and the sensor. Configurable options: BADC, CDAB, ABCD, DCBA.

Resolution : Used to set the measurement resolution of the current instrument. Configurable options: Auto, Integer, 0.1, 0.01, 0.001.

Use Pre-Cfg 1: Used to set sensor configuration parameters in advance. Options: "Yes" or "No", with the default being "No". When "Yes" is selected and confirmed, the pre-configured settings will be applied to the sensor configuration.

4.7 Historical Records

History 					
1	2024-05-09	15:30:18	3.48	25.4°C	
2	2024-05-09	15:30:18	3.48	25.4°C	
3	2024-05-09	15:30:18	3.48	25.4°C	
< 4	2024-05-09	15:30:18	3.48	25.4°C	>
5	2024-05-09	15:30:18	3.48	25.4°C	
6	2024-05-09	15:30:18	3.48	25.4°C	
1 / 1					

After the user manually operates "Data Save" or the data save is automatically changed, historical data can be queried in the "Historical Records" section. The instrument can store up to approximately 360,000 sets of data, and data can also be exported via the USB (Type-C) interface.

4.8 Data Export

Use a Type-C to USB data cable to connect the instrument to a computer. After the computer recognizes the instrument automatically, open the EXCEL file in the corresponding disk drive.

5. Maintenance and Care

1. Sensor Outer Surface: Clean the outer surface of the sensor with tap water. If debris remains, wipe it with a damp soft cloth. For stubborn dirt, add a small amount of household detergent to tap water for cleaning.
2. Check whether the measurement window of the sensor is contaminated.
3. Do not scratch the optical lens during use, as this may cause measurement errors.
4. The sensor contains sensitive optical and electronic components. Ensure the probe is not subjected to severe mechanical impact. There are no components inside the probe that require user maintenance.
5. When the sensor is not in use, put on the rubber protective cap to protect the sensor.
6. Do not disassemble the sensor without authorization.

6. Package Contents

Name	Quantity
1) Portable Analyzer Electronic Unit	1 unit
2) Portable Analyzer Sensor (including cable)	1 piece
3) Operation Manual	1 copy
4) Certificate of Conformity	1 copy
5) Warranty Card	1 copy