Opreation Manual

FISON

Oil Particle Counter

FM-OPC-A102

Index

1. Introduction

Oil Particle Counter FM-OPC-A102 requires small sample volume to accurately count particle concentration of 10000/ml. Engineered with laser technology for high-precision detection of particles from 1 to 100 µm. Equipped with 8 detection channels for detailed analysis across various component sizes. Features real-time monitoring of wide range of operational parameters like pressure, viscosity, speed, etc. Our portable Oil Particle Counter offers chargeable built-in battery, suitable for variety of field work.

2. Features

- ✓ Robust and convenient design
- ✓ High detection sensitivity
- ✓ Intuitive setting interface
- ✓ Multiple data storage option
- ✓ Online & Offline data measurement

3. Specifications

Model No.	FM-OPC-A102
Particle Size Range	1 to100 μm
Detection Channel	8 (Size can be set free in the range of selected curve)
Resolution	< 10 %
Repeatability	RSD < 2 %
Optical Source	Laser
Sample Viscosity	＜350 cSt
Sample Volume	≥ 0.2 ml
Sample Speed	5 to 80 ml/min
Coincidence Deviation Limit	10,000/ml
Range Of Pressure	Low: 0 to 6 bar High: 3 to 400 bar
Storage Space	100 set
Power Supply	AC 220V ± 10 %, 50 Hz
Power	≤ 200W
Battery Capacity	5200 mA, 6 to 8 h
Data Output	RS232 and printer inside
Dimension (W × D × H)	555 × 440 × 290 mm
Gross Weight	17 Kg

4. Applications

Oil Particle Counter are vital for assessing contamination levels in hydraulic and lubrication systems, fuel quality testing and processing industries.

5. Instrument Introduction

Back Panel

Figure-1

1. Power Button
2. PC Port
3. USB Port
4. Pressure Sampler Port
5. Power port

6. Installation

- **Power Choice**: External power or Battery.
- Connect in and out the liquid pipe and put out the liquid pipe into the waste liquid container.
- **Printer Paper Installation**: Before installing or replacing paper, open the lid of the printer and take the paper core out.
- Confirm the installation direction of thermal paper then put it back.
- **Connection of pressure sampler or cabin**: If select the pressure sampler, make sure it is connected to the sampler serial port in the back of the instrument.
- **PC Connection**: If the user needs a PC to transfer data, make the serial port wire match with the PC port in the back of the instrument.

Notice Points:

- Preheat ten minutes after powering on before the test.
- Use a suitable solvent such as light petroleum to wash the pipeline and sample slit to ensure test accuracy before testing.
- After testing or before replacing other samples, must use a suitable solvent such as light petroleum to wash to make sure that the pipeline is clean, the user can turn off the instrument or continue the next test.
- High voltage, high frequency, and electromagnetic interference should be far away while testing.
- When the battery is low, it should be charged in time and Charge regularly unless the user often uses it.

7. Operations

7.1 System Menu

Main Interface	Setup	Time Settings, Print Settings, Measure Settings, Pressure Settings, System Settings, Administrator Settings, Reset All Settings
	Measurement	Online, Offline
	Data	View data, Blank data
	Calibration	Volume calibration, Size calibration, Noise level test
	Flush	Flush, Drain out, Backflush

7.2 Menu Function

7.2.1 Main Interface

Press the power button back of the instrument leading to the power-on interface, after a while self-check, the instrument will show the main interface

Figure-2

7.2.2 Setup

- Press the 'Setup' button as shown in the figure below, users can choose time settings, print settings, measure settings, pressure settings, system settings, administrator settings, and reset all settings.
- Press the 'home' button back to the main interface.

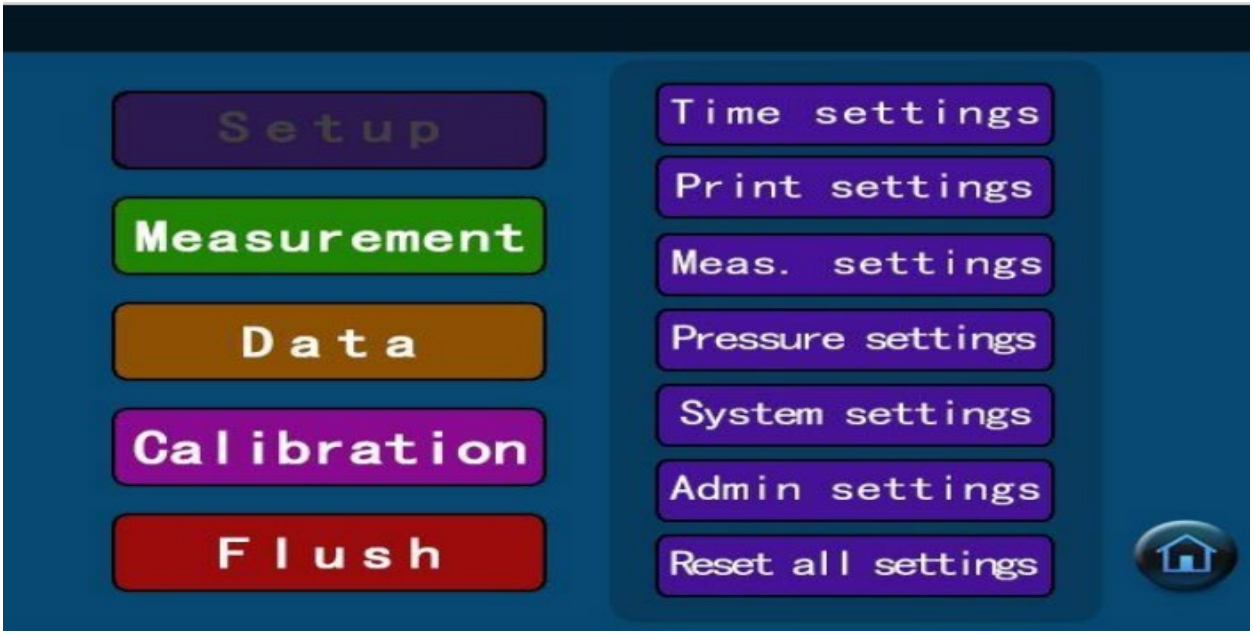

Figure-3

1) Time Settings

- Press the 'Time settings' button on the setting interface, users can modify the system time.
- Choose the "**Year**" "**Month**" "**Date**" "**Hour**" and "**Min**" buttons to edit them dependently, and press "OK" to save new settings back to the last menu, press "**ESC**" to go back to the last menu.
- But this operation is done in the case of users getting the administrator right.

Figure-4

2) Print Settings

- Press the 'print settings' button on the setting interface, the user can modify the print information including print format, sample name, and batch name.
- Click the check box to choose the print contents the user needs.
- **Name code**: from 0 to 499.
- Common sample setting information can be saved with the specified name code.
- Once needing to make a new sample print-setting, the user can call it out by its name code saved.
- **Batch name**: you can save 16 characters at most.
- **Sample name**: you can save 40 characters at most.
- Click 'download', the user can modify the name code and name of the testing sample by Communication between the PC and instrument.
- Back to the printer settings interface when it is finished
- press 'OK' to save new settings and back to the last menu, press 'ESC' to back to the last menu.

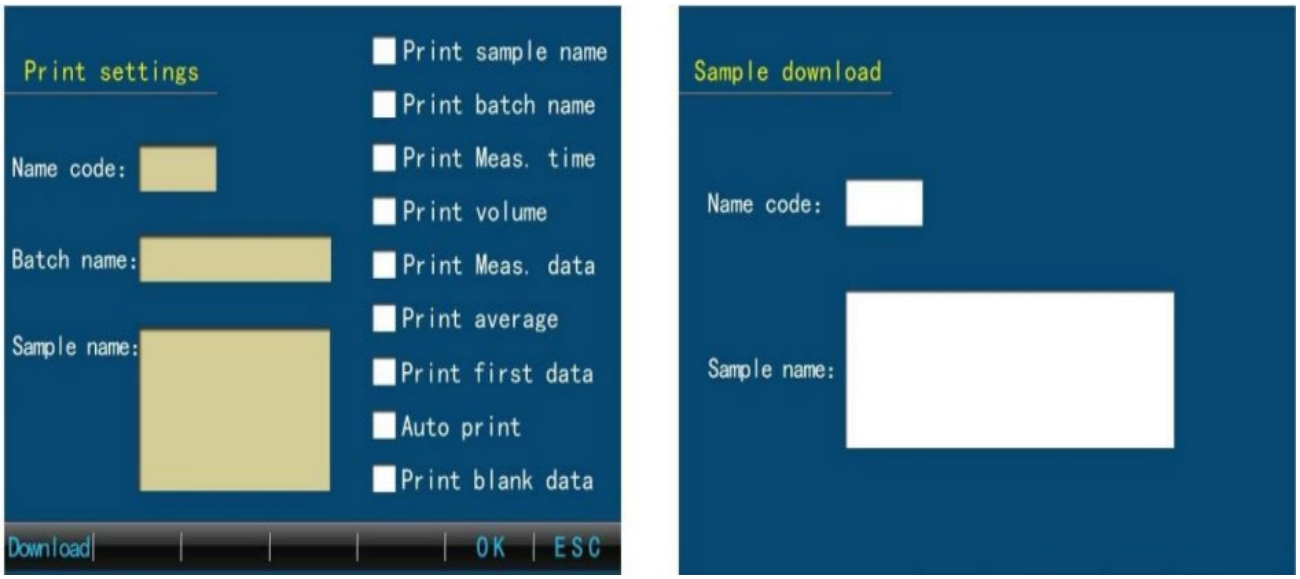

Figure-5

3) Measurement Settings

Press the "**Measurement setting button**" on the setting interface as it includes offline settings and online settings.

Figure-6

(1) Offline Settings

- **Repetitions**: Only for autotest
- **Pressure Volume**: It is defined before real-measure(0~9.9ml). Pretest means testing for washing pipes before a useful test, one time for auto test, or every time needed when manual.
- **Volume**: Sample volume for every test (0.2~999.9ml).
- **Measure Mode:** Manual and auto. manual needs pressure in and out by the operator, auto just does pressure work according to preset.
- The former conducts one test, but the user can get a team of data by the latter way when you start testing.
- **Calibration curve:** When you customize your test, select one curve for testing.
- **Remove blank**: Automatically removes stored blank data in standard test status if users choose.
- **Remove First:** Automatically removes the data for the first time of each set of test data.
- **Data Save:** Select to save the date at Internal storage(Memory)or external USB storage.
- Press the '**SIZE**' button as users can set particle size by themselves when doing a custom test.
- It is worth noting that particle size must not be out of the range of the calibration curve, or it means nothing.
- Press the 'ESC' button back to the interface. Press 'OK' to save or back to setting the main interface.

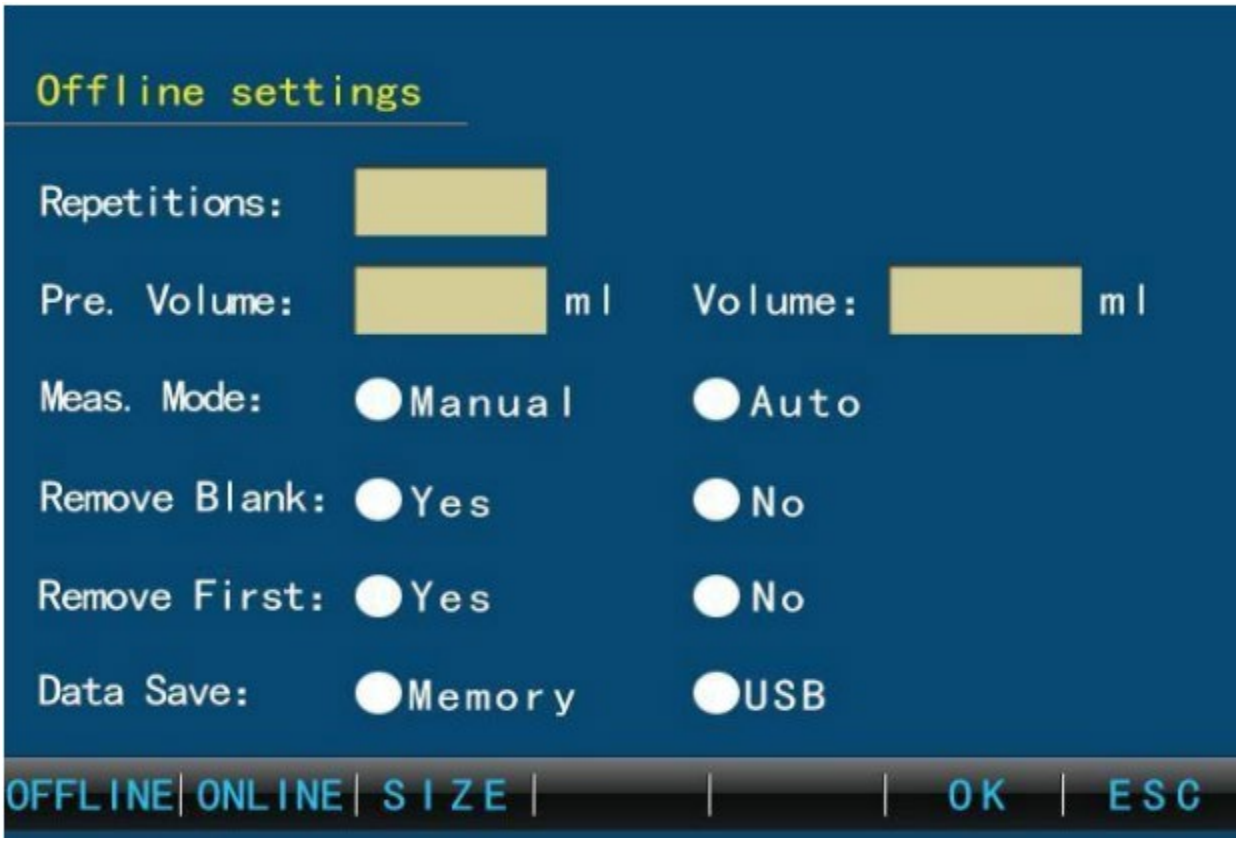

Figure-7

(2) Online Settings

- Press the 'online' button on the setting main interface as the users can set online measurement parameters here.
- **Tip:** choose an instrument with an online function.
- **Data save**: Select to save the date at Internal storage (Memory)or external USB storage.
- **Auto upload:** Select to upload data to the upper PC in the online test state.
- **Interval Time:** Select a time interval in the online test state between two testing groups.
- Press '**OK**' to save the setting or '**ESC**' not to save and back to setting the main interface. Other function settings are like offline.

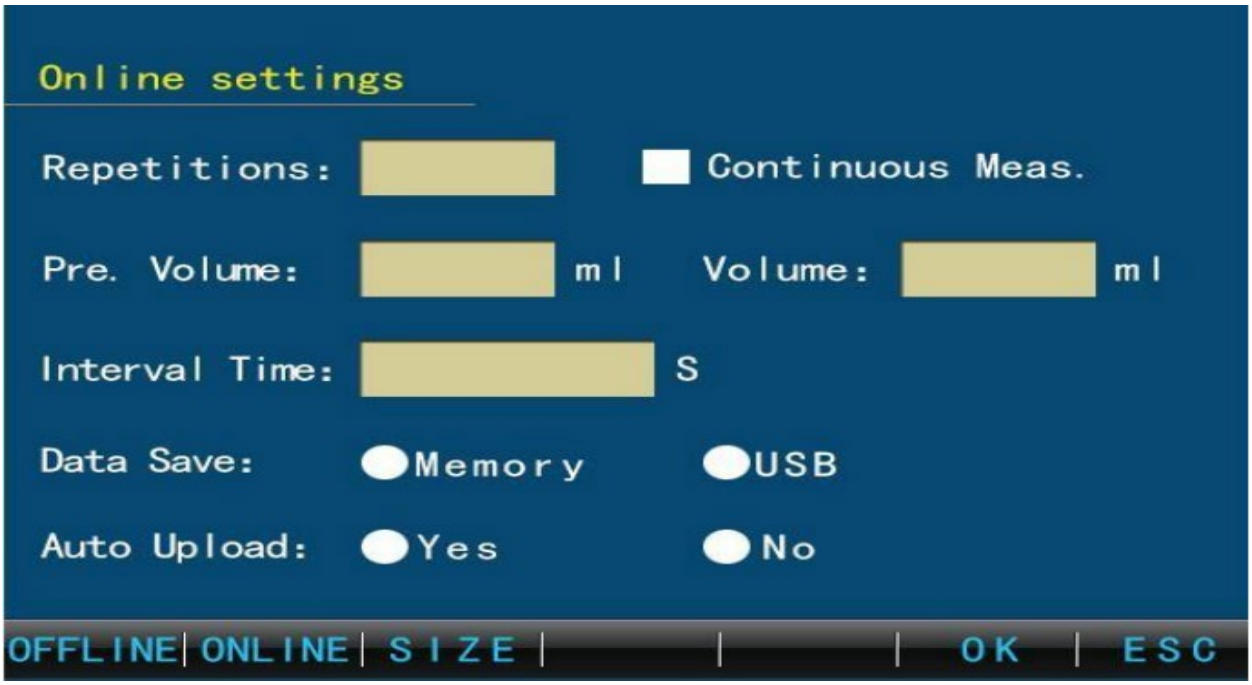

Figure-8

4) Pressure Settings

- Press the "**Pressure Settings**" button to set pressure data.
- **Positive pressure:** Set the pressure required when connecting the pressure sampler.
- **Vacuum:** Set the pressure required when degassing.
- Press "**OK**" to save settings or "**ESC**" not to save and back to setting the main interface.

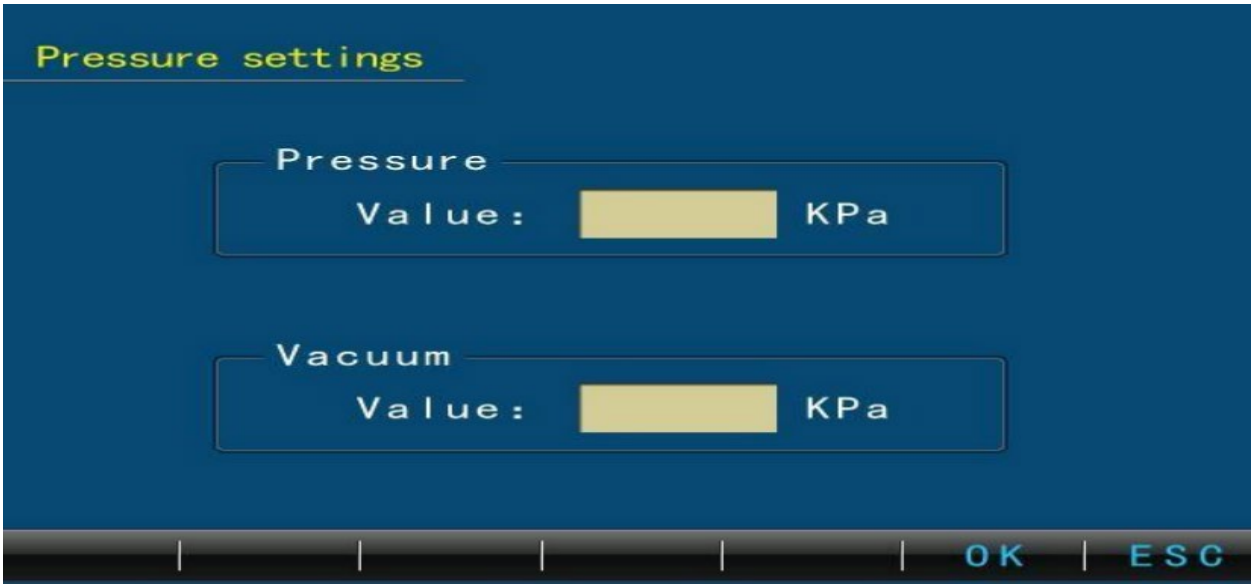

Figure-9

5) System Settings

- Press 'the system settings button as Pic 7.2.6.1 to set screen intensity and system language.
- **Screen intensity**: lighter or darker.
- **Language**: English (switching without restarting the machine).

Figure-10

6) Administrator Settings

- Press the "**Administrator Settings**" button as users can log in or log out of the administrator here.
- Time setting, factory resetting, volume calibration, volume error calibration, path calibration, noise setting, and clearing history data all need administrator rights.
- Input the administrator key number, press **'OK'** switching to administrator user or cancel administrator to common user.
- Booting defaults to common users.

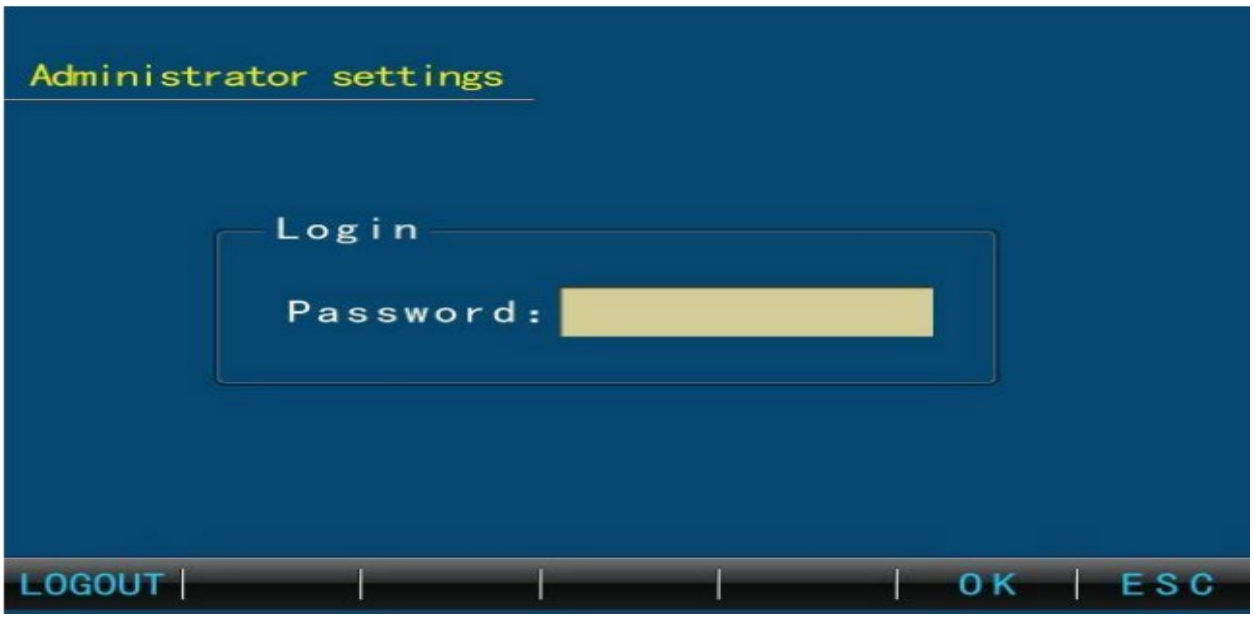

Figure-11

7) Reset All Settings

- Press the ' **Reset all settings'** button to lead users
- An administrator can recover all data and settings saved to the factory. Press '**OK**' to finish factory resetting not back.
- "**ESC**" button to give up reset.

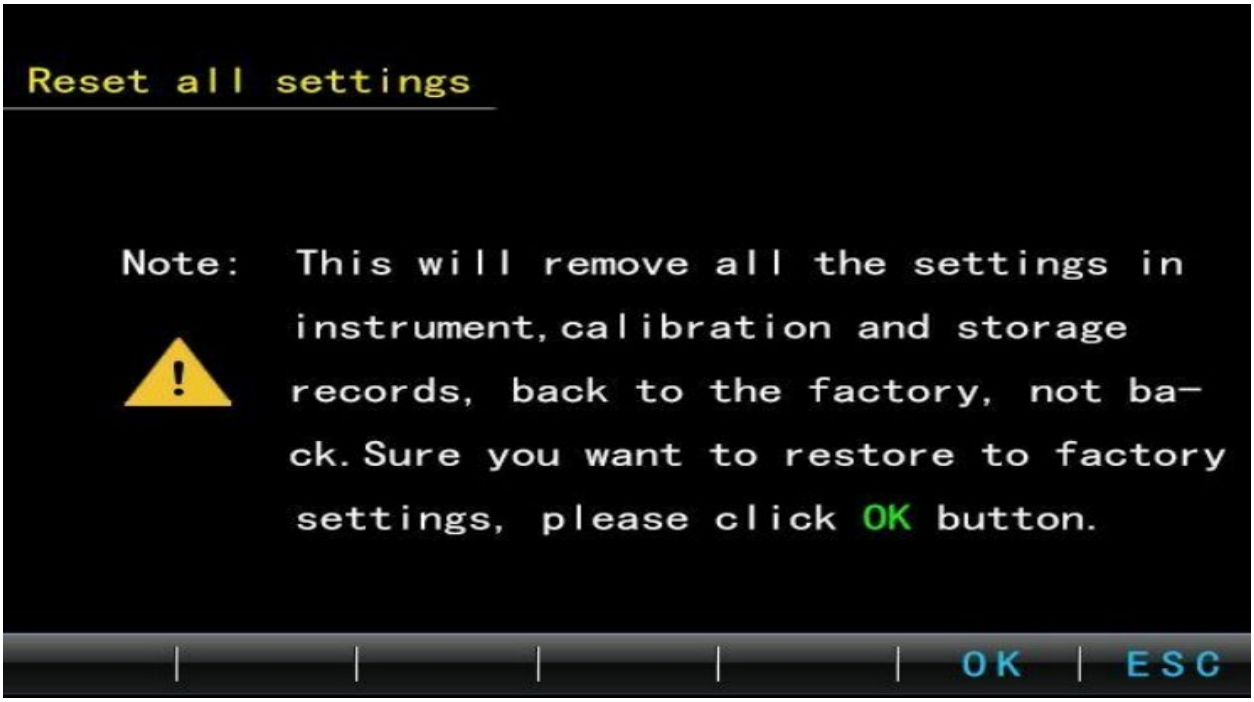

Figure-12

7.2.3 Measurement

- Press the button 'Measurement' in the main interface.
- The instrument will be tested according to Measurement settings parameters.
- Users can choose online or offline models and select test standards and custom tests according to test requirements.
- Measurement standards include **NAS1638, GJB420B, ISO4406 and SAE4059E**
  → **NAS1638 standard**: 5-15μm, 15-25μm, 25-50μm, 50-100μm, ＞100μm
  → **GJB420B Standard:** ＞4μm, ＞6μm,＞14μm, ＞21μm, ＞38μm, ＞70μm
  → **ISO4406 Standard:** ＞4μm, ＞6μm, ＞14μm
  → **SAE4059E Standard:** ＞4μm, ＞6μm, ＞14μm, ＞21μm, ＞38μm, ＞70μm
- Custom testing can set the number of channels and the size of the particles according to the test requirements. (See settings for details)
- **Test Operation:**
  — Use a suitable solvent to wash the pipeline and sample slit.
  — Measurement of the condition of the pipeline filled with liquid to be tested.
  — Choose offline or online test measurements mentioned below.

1) Offline Measurement

- Press the button 'Measurement' in the main interface into the test version, choose the offline test, and select standard test or custom test according to test requirements.
- Choose "**Standard**" in the interface as users can switch standards on the right, before testing choose one of them, then press the button "**sample**"
- The instrument will be tested according to the setting parameters.
- The test process is shown in the below figure as the test information is displayed on the right including measurement times, measurement volume, measurement standard, measurement state and measurement time as well as pressure sampler is connected or not.
- Click the 'end' button to stop the current test

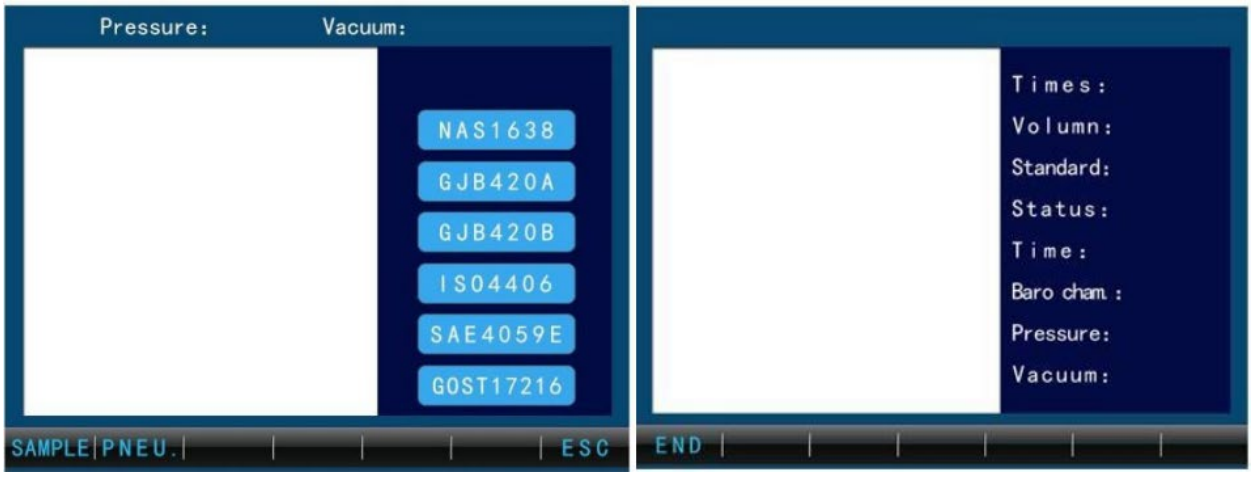

Figure-13

- If the sample viscosity is too large, a pressure sampler is necessary before the test. Press the button 'Pneumatic-positive' before the test, the automatic addition of a certain pressure will assist injection.
- Press '**Pneumatic'**, which will automatically add a certain negative pressure to help remove the bubbles in the oil.
- Press '**Pneumatic-air out**' on the pressure sampler to release pressure in the sampler. (See pressure sampler for details)
- Picture is shown after the test, switch standards to get different standard results **'Sample'** to continue the next test, and '**Save Blank'** to record space data.
- Press 'print' into, 'print settings' to set print content, 'print data' to finish the data printed out, and 'save' to save the current measurement data.

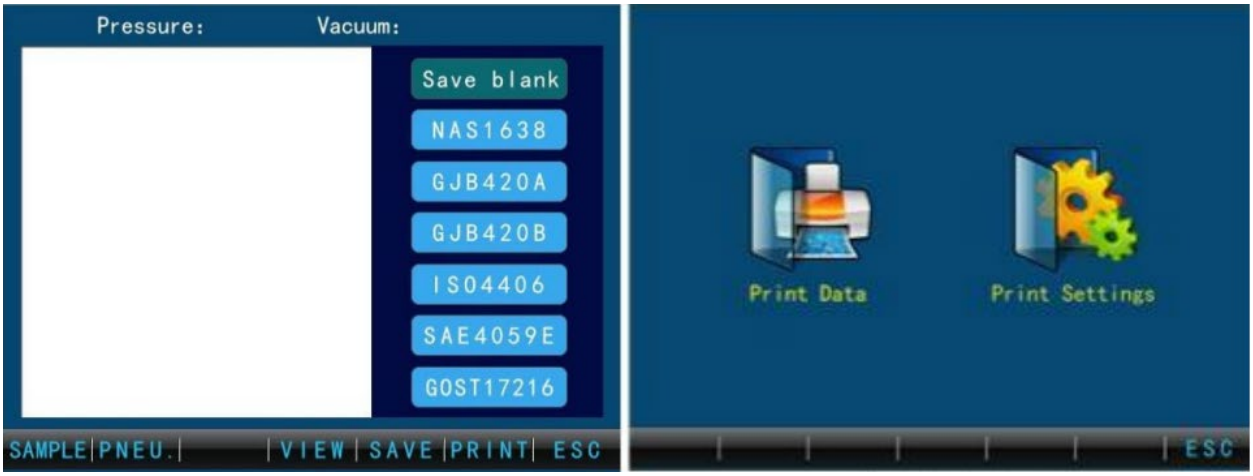

Figure-14

- Press the '**view'** button, to review the measurement data for the current group, and choose **'average'** to see the average of each particle size and the rank of pollution degree.
- The manual test view adds the delete function, the user can delete a certain group of test data.
- Choose '**Customer test'** in the interface and press the button **'test'**, The instrument will test according to the setting parameters.
- After each kind of test, users should use a suitable solvent to wash 10 times at least. Then users can turn off the instrument or continue the test.

2) Online Test

The difference between online and offline tests is the high voltage system, the test process does not require manual interference, or automatic testing based on set parameters.

Figure-15

7.2.4 Data

Press the "**Data**" button the user can see and print saved measurement data, blank data, and relevant information saved here.

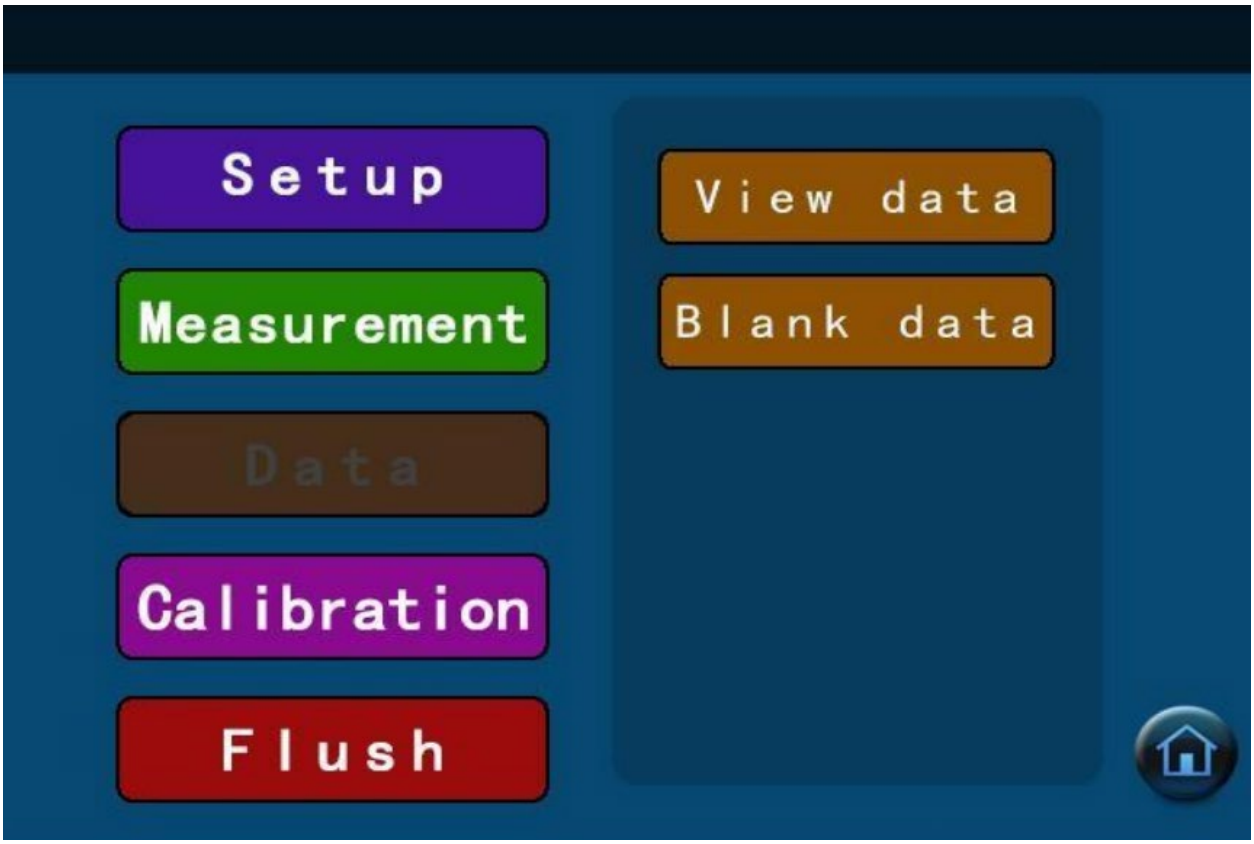

Figure-16

1) View Data

- Press "**View data**" to choose offline data, online data, and all data.
- Every data includes standard data, custom data, and all data.

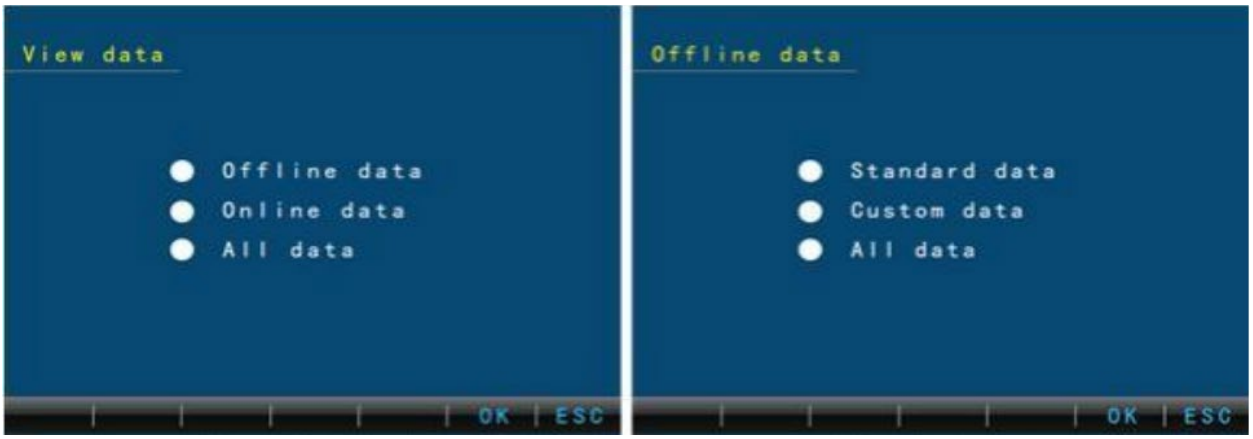

Figure-17

- The figure below shows you that you can view the last and the next data of the current group and view data under different standards on the right.
- Click "**Message**" to see the sample name, batch name, test time, and test volume, remove the blank, and print information.
- Press **'Print'** to print the current saved data.
- Press '**Upload**' to upload the current group of data to the upper PC.
- Press '**Search**' to find data messages according to '**Year**' '**Month**' '**Date**' '**Hour**' '**Min**' input as each page displays ten sets of data at most, you can flip through the upper page and the next page.
- Use the right arrow to change the number of times in this group.
- Press 'print' to print the current group of data or ESC to back.

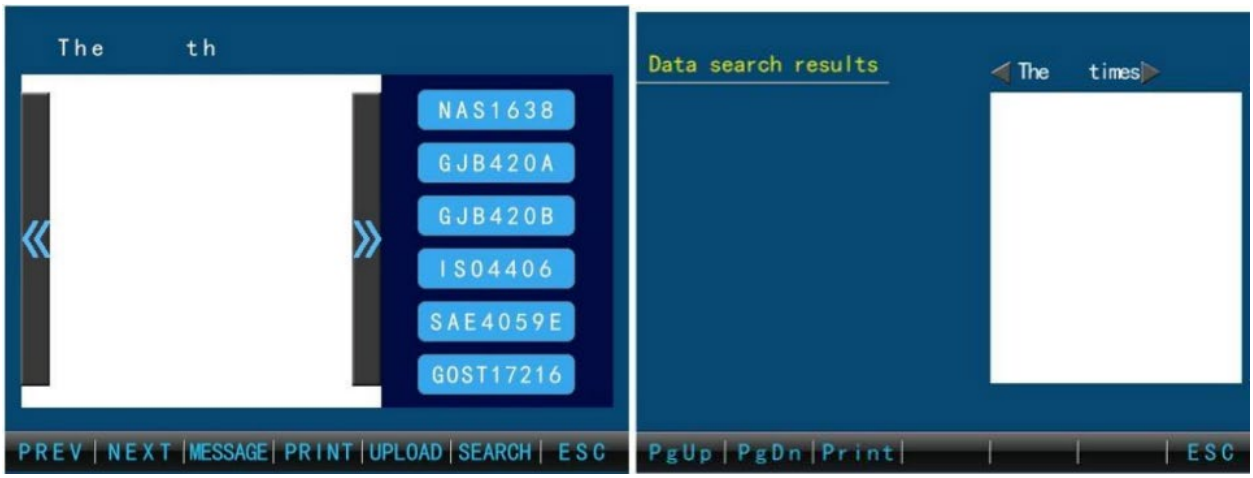

Figure-18

2) Blank Data

Press '**Blank Data'** and choose a different measurement standard to view blank data correspondingly.

7.2.5 Calibration

- Press '**Calibration**' into the calibration interface, and users can make Volume calibration, size calibration, and noise level tests as in the figure below.
- Click on the corresponding calibration to enter the corresponding calibration interface.

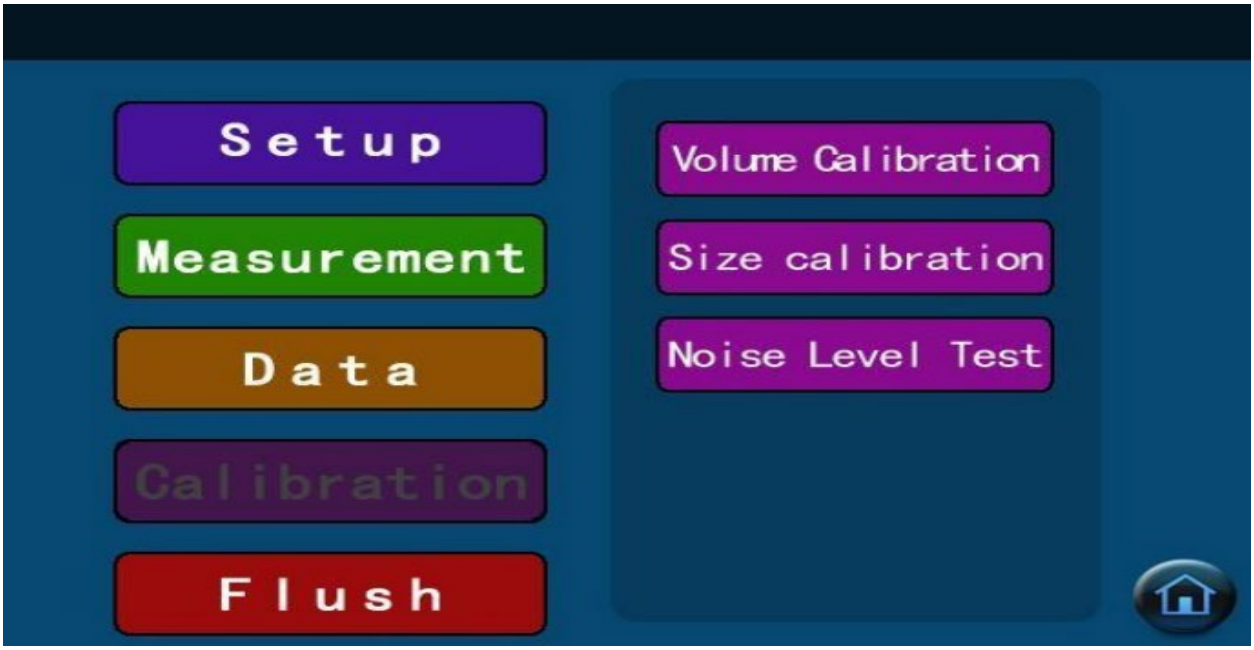

Figure-19

1) Volume Calibration

- Press '**volume calibration'** into the calibration interface, and the sampler will reset and make for sample, then it shows volume calibration in the figure.
- The pipeline shall be filled before the calibration of the volume.
- According to the prompt, weigh the calibration fluid first, then press '**OK**' to start the volume.
- Users will see screen tips as wait for sampling and this operation cannot be shut down in the process.
- When sampling overcomes as shown in the figure, weigh the calibration fluid again.
- The input volume difference between two times. Press '**OK**', and it will finish auto-check.
- After volume calibration is completed, it will go back to the calibration home page.
- If the difference is out of 10ml, go back and press '**Restore**' and then make volume calibration.

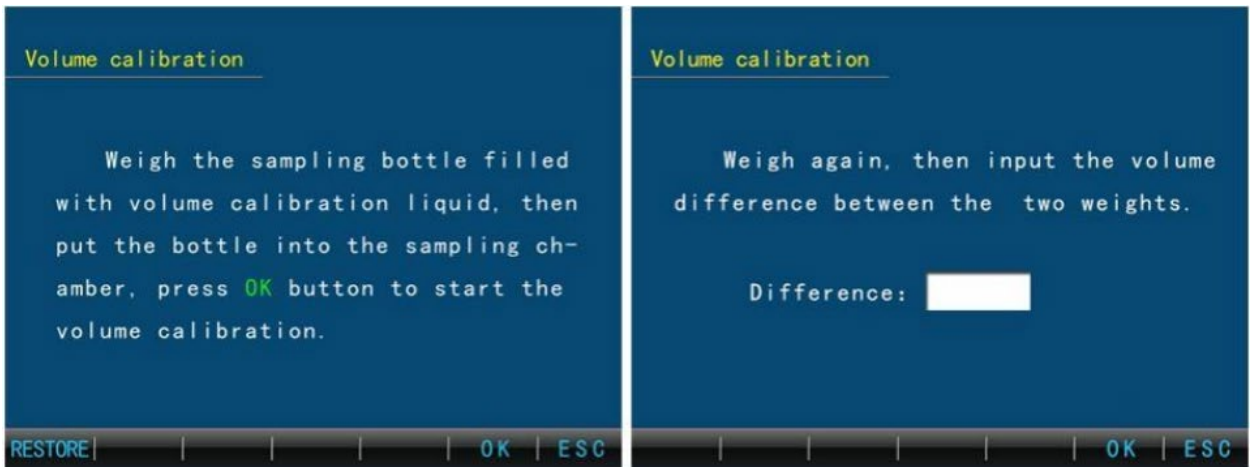

Figure-20

2) Size Calibration

- Press 'Size calibration' into the calibration interface, it includes ACFTD, MTD, and curve 3 calibration.
- Click size and threshold to edit the value level
- Click "**SAMPLE**" to start the calibration
- Click "**Settings**" to set parameters
- Click "**View**" to review the calibration points saved
- Click save to store calibration points
- ESC back to calibration main interface.
- **Settings:**
  - Sample volume(1-9ml)
  - Sample speed
  - Curve to calibrated(ACFTD, ISOMTD, Curve3)
  - Click 'OK' to save settings and back to the calibration main interface.
  - Click ESC back to calibration main interface without saving.
- Press the button 'Sample' in the calibration main interface to begin calibration according to the particle size set and its threshold value.
- It will be shown that counting and differential counting of corresponding threshold values and in the process of course user can choose to end sampling.
- If the data is biased, modify the particle size and the corresponding threshold in the figure below and test until the requirements are met to specific standards.
- Press " **Print**" to print out the channel calibration data value.

Figure-21

- Press the button '**Save**' in the calibration main interface and, choose the calibration points of the calibration curve to save with buttons of '**ALL**' and '**NONE**'.
- Click '**Save**' for storage and go back to the main interface.
- Press the button '**View**' in the calibration main interface, the user can delete the calibration particle size chosen on the current page.
- Press 'calibration' to start calibration according to the current particle sizes and threshold value of at least 4 calibration points.
- After calibration back to the size calibration main interface.

Figure-22

3) Noise Level Test

- Press '**Noise level test'** into the calibration interface and four groups of noise level inputs can be made.
- The sensor should be full of liquid before testing(one-time washing operation or test).
- Stand still for five minutes, and press '**Sample**', it will last about the 60s.
- If data is not satisfied, modify the size threshold and test until the requirements are met. Now the size threshold is right at the noise level.
- Users can press 'Sample' to continue the noise level test after the test, click '**OK**' to save the noise level, and back to the calibration main interface.
- Click '**ESC'** back to the calibration main interface without saving.

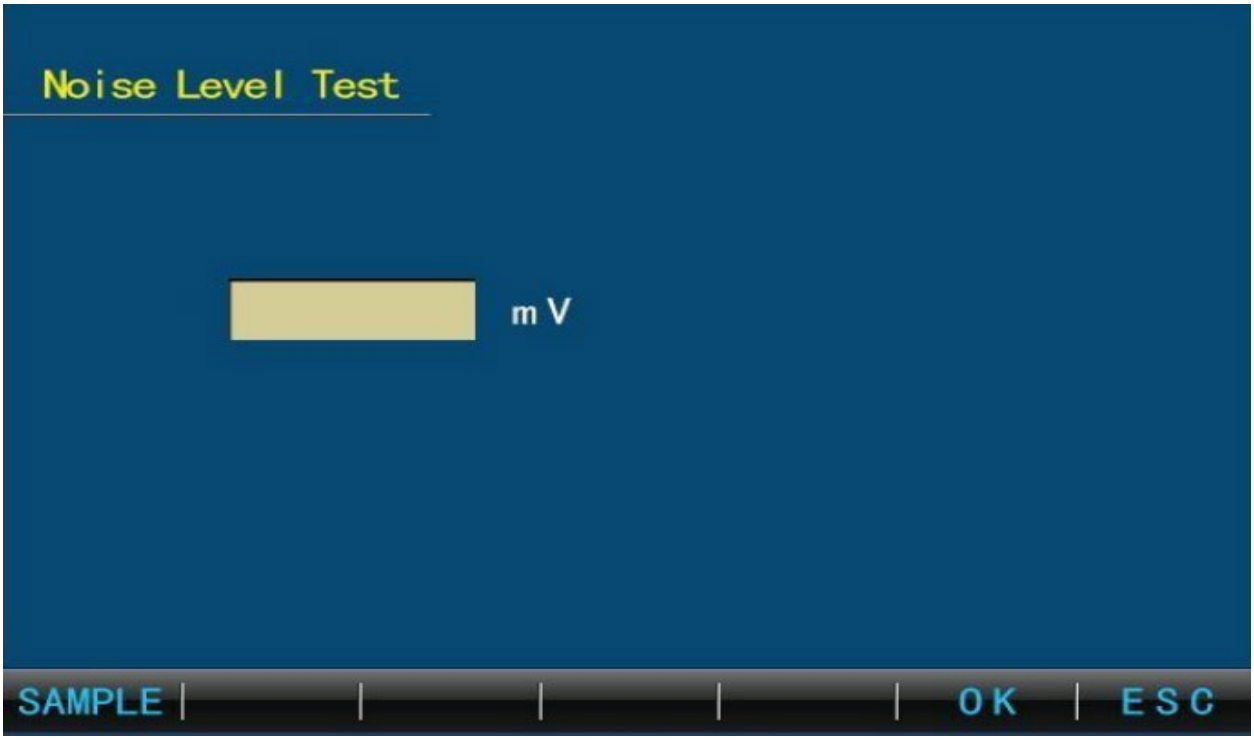

Figure-23

7.2.6 Flush

- Flush includes flush, drain out, and back flush.
- Press '**flush**' into the flush interface.
- Input flush times at most 9, then start flushing.
- Back to flush main interface after flush and you can stop it any time.

Figure-24

1) **Drain Out**
   - Press '**Drain Out'** into the flush interface.
   - The sampler needle should be above the liquid surface.
   - Press '**Start**', and the instrument will finish one time.
   - Users can drain out as many times as the pipe is completely drained.

2) **Back Flush**
   - Place the drainpipe in a beaker filled with cleaning liquid and Inlet pipe in the waste liquid bottle before back flush.
   - Then press '**Start**' to begin back flush.
   - **Attention**: Back flush must go after drain-out operation.

Figure-25

8. Maintenance

- The laser sensor parts must not be disassembled under any circumstances
- The casing should be kept dry in case of inspection corrosion
- The power should be off when the instrument is not in use to extend the service life of the laser sensor.
- The instrument often detects specimens of greater consistency or with larger size particles, which may be easy to cause sample slit blockage.
- Behave as a sample time extending, many bubbles coming in data out of control, and so on. The solution is as follows:
  - **Backflush:** As shown in the figure-26
  - **Alternate flush:** Go to the cleaning interface and select a test method.
  - Release the liquid level into the fluid pipe while sampling to alternate air and sample into slits.
  - Repeat several times until blockages are removed, pipeline-free meanwhile.

9. Accessories

- Power Cord
- Two open-end wrenches
- One hexagonal wrench
- Sample inlet tube
- Sample discharge tube
- Printing paper
- Fuse

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