Oil particle counter

LWB-6

Instructions

ShangHai LUWATECH Industrial Co.,Ltd
http://www.luwatech.com

LUWATECH

List

1. Overview……..1
2. Technical specifications……..1
3. Instrument construction……..2
   3.1 Mainframe front panel 2
   3.2 Rear panel of mainframe 3
4. Menu functions……..5
   4.1 List of menu screen functions..... 5
   4.2 Settings 6
      4.2.1 Test settings.....7
      4.2.2 Alarm settings.....7
      4.2.3 Output settings..... 8
      4.2.4 Time Setting..... 9
      4.2.5 Calibration 9
   4.3 Date 12
   4.4 Test..... 13
5. Test……15
   5.1 Preparation for the test 15
   5.2 Test 15
   5.3Cleaning＆Maintenance..... 15

Appendix Ⅰ Equipment form and installation dimensions……18

Appendix Ⅱ Inlet screen cleaning method……19

AppendixⅢ Commonly used standard solid particle contamination class codes……20

1. Overview

The HM-Y30 portable oil particle counter is designed to detect the size and quantity of particles in liquids using the photoresist method (shading method) principle. It can be widely used in aviation, aerospace, electric power, petroleum, chemical industry, transportation, port, metallurgy, machinery, automobile manufacturing and other fields to detect solid particle contamination in hydraulic oil, lubricating oil, transformer oil (insulating oil), turbine oil (turbine oil), gear oil, engine oil, aviation paraffin, water-based hydraulic oil and other fluids, and to detect insoluble particles in organic liquids and polymer solutions.

2. Testing indicators

Oil particle size class testing

2.1. Technical specifications for granularity

1) Measuring range: 1μm~200μm
2) Measurement standards: GJB420B, SAE4059E, ISO4406, GB/T14039, GJB420A, NAS1638
3) Flow rate: 20ml-100ml/min
4) Overlap error limit: 10000 grains/ml
5) Power supply: AC220V±10%; 50Hz;
6) Built-in stainless steel miniature magnetic gear pump, can be adjusted to detect liquid flow
7) Built-in thermal printer
8) Built-in lithium polymer battery
9) Online pressure control between 0.1 and 0.3 Mpa

3. Instrument construction

3.1 Mainframe front panel

Main components:

Panel: monitor, printer, power switch, 220V power socket, U-disk port

The instrument is fitted with an intelligent lithium battery charger, which takes 5 hours to fully charge at a loss of power and 6 hours of continuous use for normal testing;

Right side of the instrument: oil inlet, oil outlet

Casing photo

Instrument start-up

Start-up process:

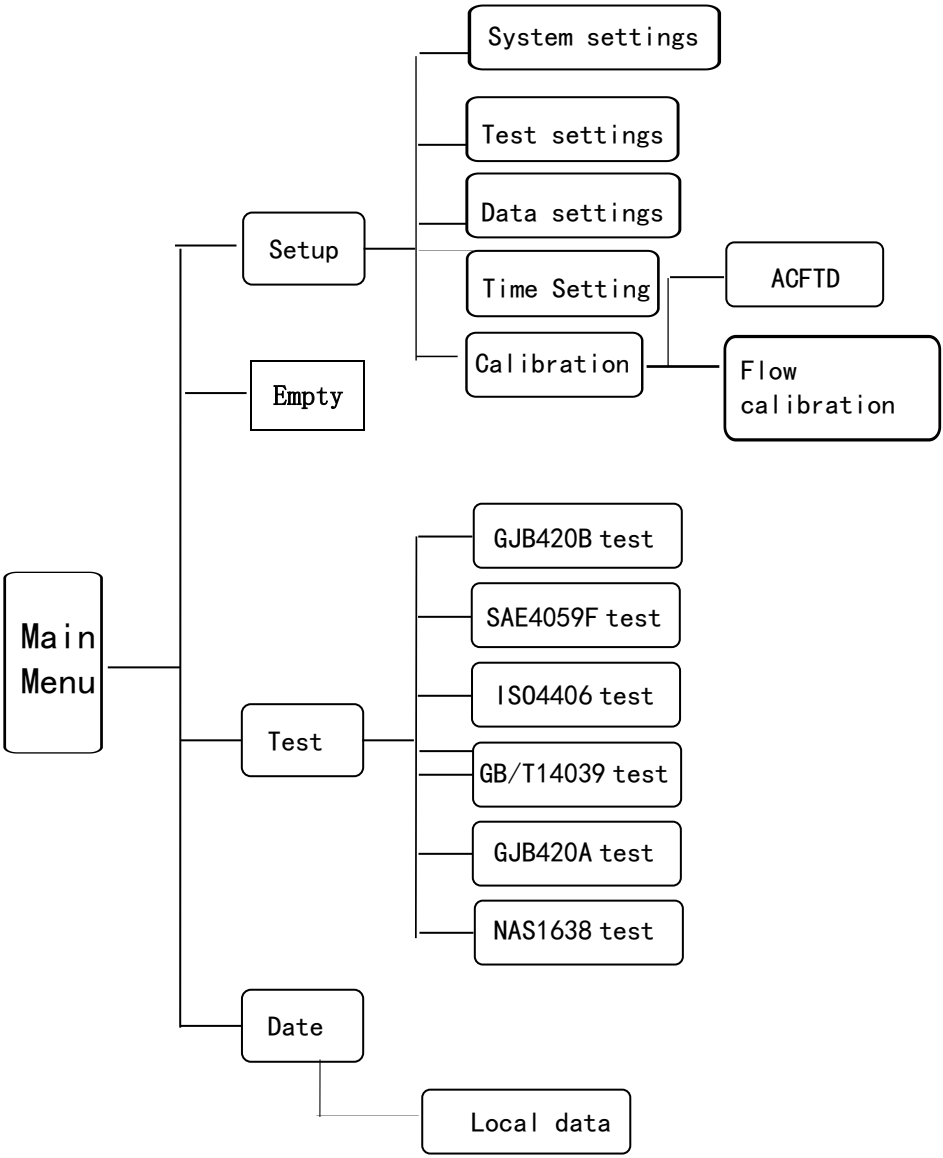
1) Built-in lithium battery, press the power switch to switch on and start. If it does not start, the battery is running low and can be recharged by plugging in the 220 volt power cable.
2) Plug in the 220 volt power cable to activate the on button.
3) Connecting the hose: Remove the stainless steel dust plug. Insert the inlet and outlet hoses.
4) Cleaning the instrument: Clean the instrument;
5) Testing the oil: test the oil sample into the container, connect to the instrument outlet and test in testing mode;
6) Emptying: after the instrument has been used, use the emptying function to empty the residual oil sample from the instrument, the instrument can be cleaned with petroleum ether reagent before emptying;

Testing under various environmental tests

1) On-line testing: If the pressure at the interface of the system to be tested is greater than 0.3 MPa, a pressure-reducing device is required.
2) Off-line testing: After setting the testing parameters, connect the inlet and outlet pipelines and the oil sample, which can be fed using the cleaning, and then start testing when the oil sample flows out of the outlet.

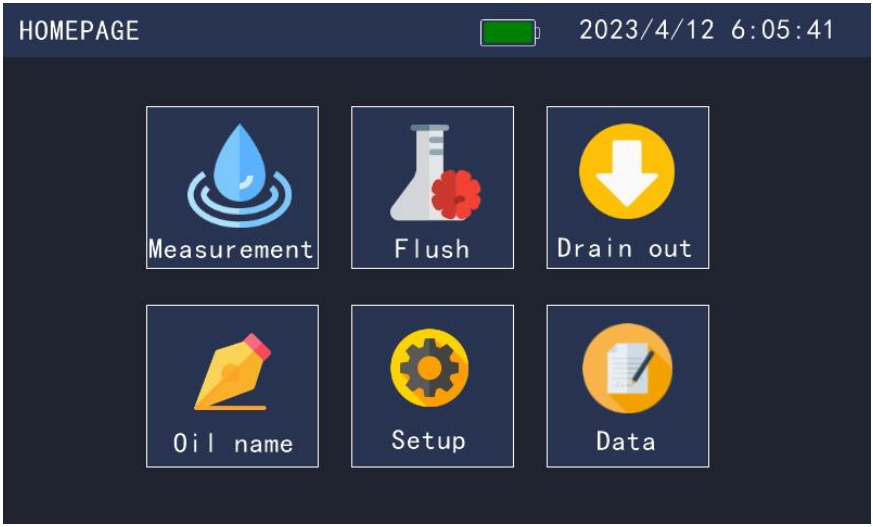
4. Menu functions

4.1 List of menu screen functions



4.2 Home page functions

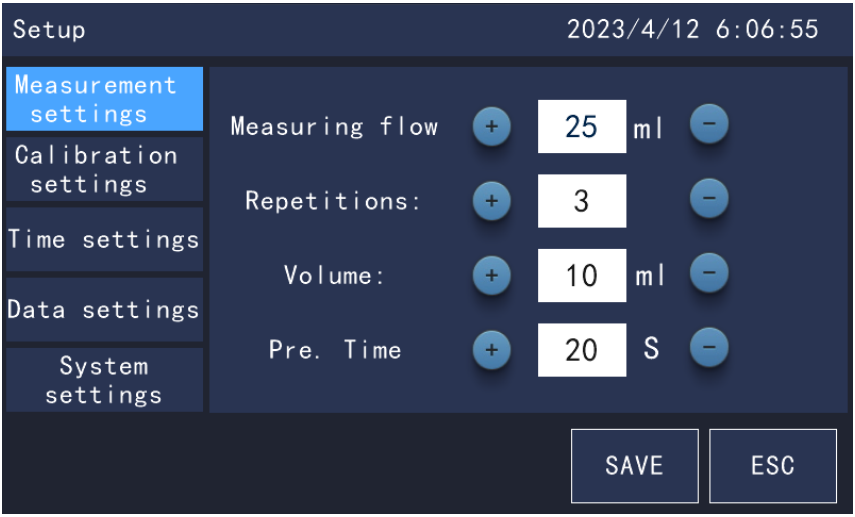
Testing, injection, evacuation, name setting, setup, data;



4.3 Settings

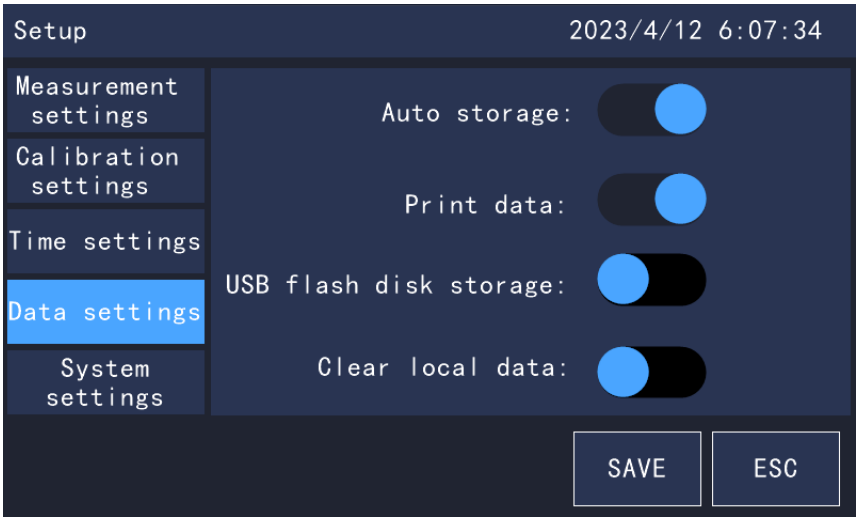
The main interface is accessed by pressing the **setup** button. Test settings (flow rate setting, number of tests, test volume, test interval) can be made;

Calibration settings, time settings, storage settings, etc. Press to select the corresponding setting to enter the settings screen; press the icon key to enter the corresponding setting option;



4.2.3 Storage settings

The **data settings** in the settings screen allow you to select whether to store the data and whether to print the data, then **save** it. The test results are automatically saved at the end of the test and can be viewed in the **data**;

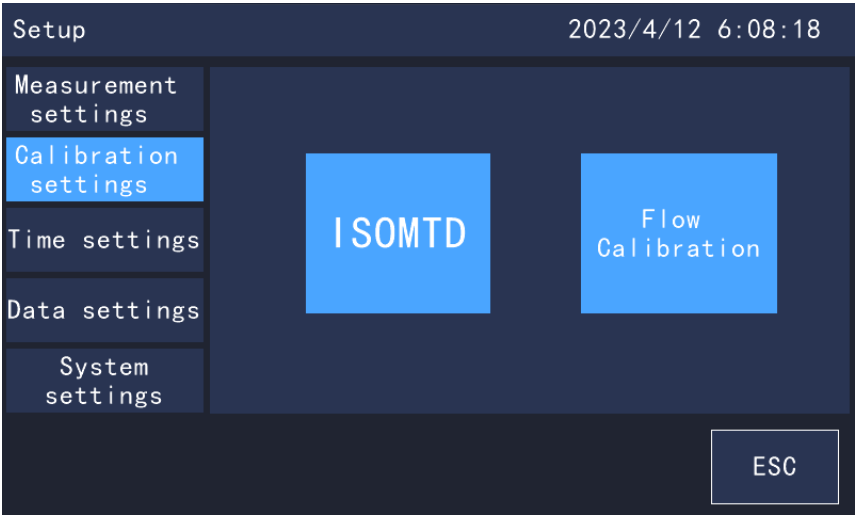


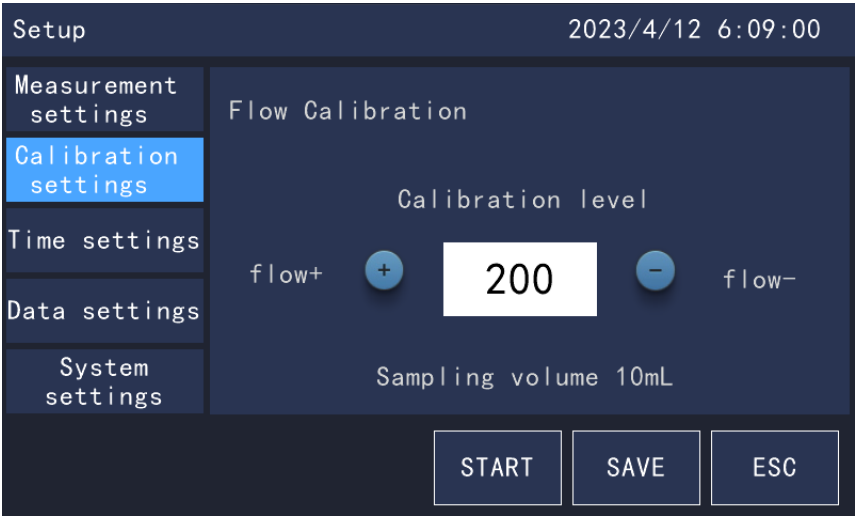
4.2.4 Time Setting

The **time setting** in the settings screen allows you to adjust the time and click **Save** to modify the time after adjustment.

4.2.5 Calibration

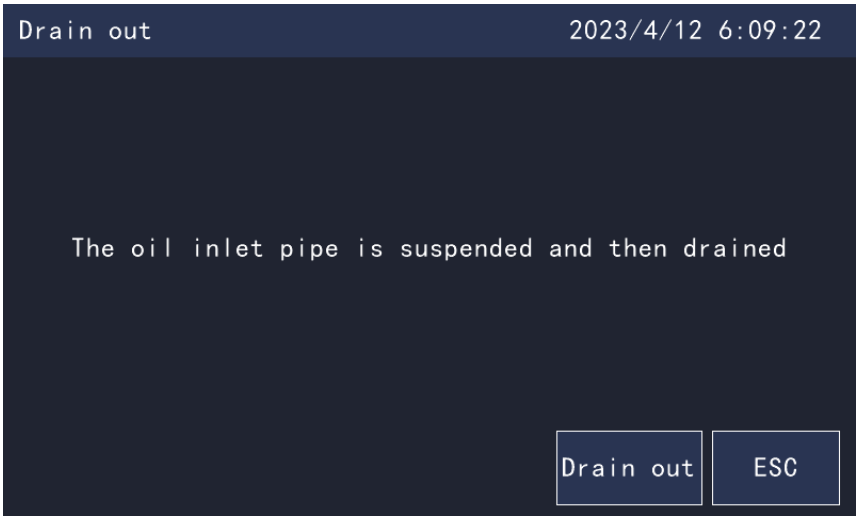
In the settings screen you can set the **calibration settings**.Click on OK to enter the calibration page, you can calibrate the flow rate, according to the actual flow rate is too large or too small to calibrate the flow rate, and then **save** the settings.





4.2.6 Emptying and cleaning

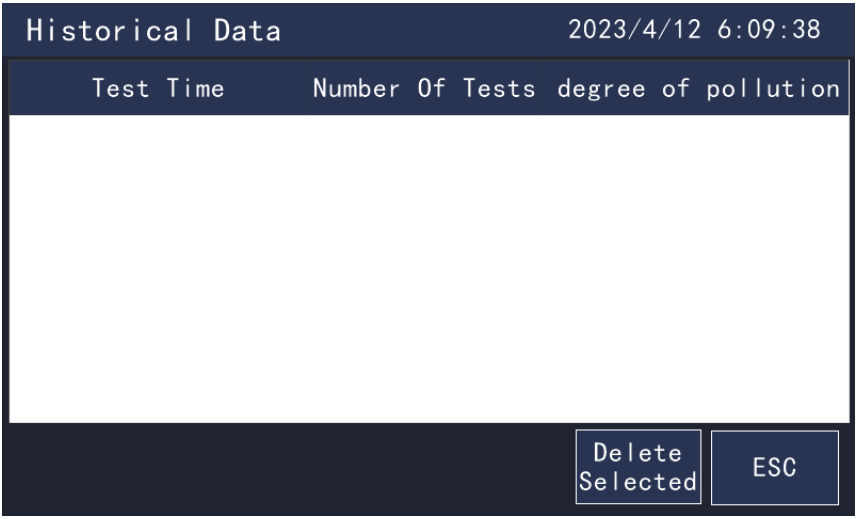
Click on **drain out** to **drain out** the instrument. Before emptying the oil outlet, leave the oil container before emptying. If the instrument is to be cleaned, prepare a petroleum ether solvent, connect it to the oil outlet line, click on **drain out** and carry out the cleaning operation, after cleaning 20-30 ml, the oil outlet line leaves the petroleum ether solvent and the instrument is emptied;



4.4 Date

In the main screen **data**, the test results saved after the test has been completed can be seen;

If the local data needs to be cleared, in the settings screen, select Clear Settings and Save for **historical date**;



4.5 Test

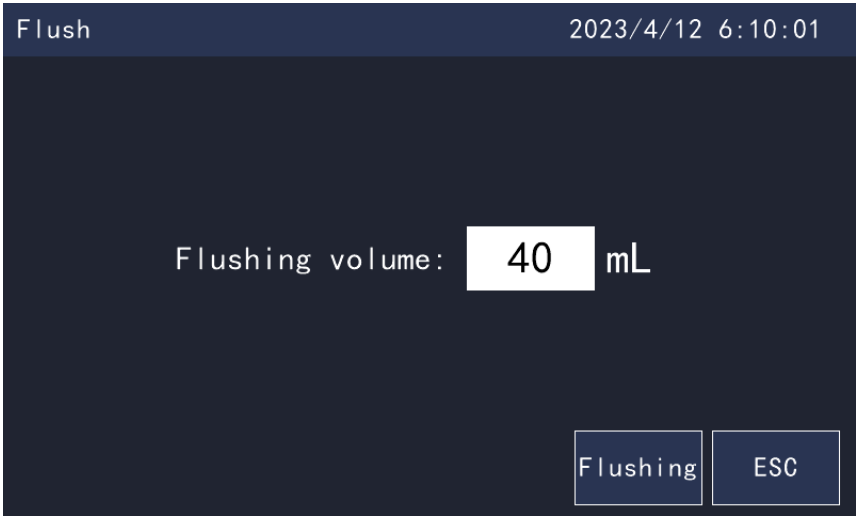
Six standard tests are available in the test interface, GJB420B, SAE4059F, ISO4406, GB/T14039, GJB420A, NAS1638; the standards can be switched in the **settings**.

Channel particle size settings for various tests:

GJB420B>4μm(c)、>6μm(c)、>14μm(c)、>21μm(c)、>38μm(c)、>70μm(c);
SAE4059F>4μm(c)、>6μm(c)、>14μm(c)、>21μm(c)、>38μm(c)、>70μm(c)
ISO4406：>4μm(c)、>6μm(c)、>14μm(c);
GB/T14039：>4μm(c)、>6μm(c)、>14μm(c);
GJB420A：>2μm、>5μm、>15μm、>25μm、>50μm;
NAS1638：5-15μm、15-25μm、25-50μm、50-100μm、>100μm;

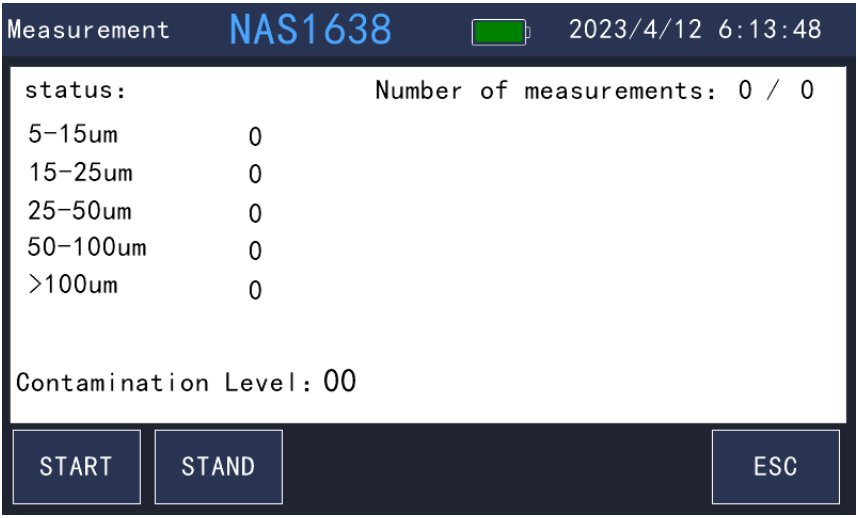
Feeding samples：

The oil can be **flush** before the test and can be tested as normal once the oil has completely flowed from the outlet. The sample volume can be adjusted by **clicking on the white box in the middle**.



Test:

Clicking on the **measurement** starts the test and displays the current particle count and contamination level. The data is saved and printed when the test is completed;



5. Test

5.1 Pre-test preparation

Open the instrument and connect the inlet and outlet pipes to the oil sample container;
Click on **Home** - **flush** and waiting for the oil to flow completely out of the outlet, when the test preparation is complete;

5.2 Test

1) Setting of parameters such as test volume, number of tests and test criteria;
2) After setting, enter the test interface and press the **test** key to start the test. The test interface is refreshed in real time with the number of contaminated particles per particle size, and at the end of the test, the printer prints the test data and saves the test results to the local data;
3) The current test can be ended by pressing the **end** button. Automatic storage of data at the end of the test;

5.3 Cleaning & Maintenance

1) Emptying: After the instrument has been used, the oil inlet tube is left suspended from the oil sample container and the emptying function is used to empty the residual oil sample inside the instrument;
2) Maintenance: If the oil has been contaminated for a long time or if the contamination level is abnormal, the stainless steel cartridge (4 mm hexagonal spanner) can be removed from the inlet fitting of the instrument and the cartridge and lines can be cleaned with petroleum ether solvent.

Portable oil particle counter
Improving cleanliness accuracy Notes on use:

Factors affecting the correctness of cleanliness:
Reasons for installation and maintenance calibration, reasons for setting, operational aspects (air ingress, insufficient flow of contamination, excessive pressure, emulsification of oil with water, ingress of soluble particles)

1. Reasons for maintenance calibration

1) After switching on the instrument, clean the lines with 20 ml of petroleum ether. The instrument should also be cleaned after use.
2) The oil sample is taken in a purification bottle and shaken for a minute with ultrasonic super-shock for more than a minute before testing, so as to defoam and distribute the particles evenly.
3) The oil inlet of the instrument is on the right side, the tube should be inserted to the end and a short section of the worn hose should be cut after a period of time.
4) The oil inlet of the instrument. There is a filter inside. It can be dismantled with a 5mm inner hexagon and cleaned repeatedly with petroleum ether 90-120.
5) After the instrument has been used once, it should be stored for a period of time without being used, and the lines should be flushed with petroleum ether to clean the hydraulics.
6) The instrument is a gauge, use it for one year to calibrate the instrument. Contact a third party institution or the manufacturer.

2. Reason for instrument setup

1) Factory setting Flow rate: 25-30 ml/min, with micro flow control valve, factory set at 30 ml/min.
2) Number of tests: 0 without stopping, 1 test and 1 stop. 2-9 tests and stop after adding up the average value of the results.

3) Time interval: 2 seconds - 1 hour, especially if set to detect more than 2 times at this point.
4) Pre-test volume: 10-50ml This prevents air from entering and ensures that the inlet line is full and free of air.
5) The alarm is set to NO. No alarm, the alarm value must not be set too low, the alarm will stop. Press Start to re-test.

3. Reasons for operating sessions

1) Air entry: If there are sudden large fluctuations in the test results and an increase in large particles, air may have entered.
2) Insufficient flow: If the test result suddenly becomes smaller or even zero, the system flow is insufficient or cut off, the filter element is blocked.
3) Strong pollution enters: serious oil pollution, system filter element damage or pipeline pollution and other reasons, more filter system oil.
4) High pressure: Keep the pressure within 0.1-5 bar, high pressure can damage the laser lens and cause oil leakage. For high pressure, add a pressure reducing valve (420 bar).
5) Emulsification of the oil with water: if the oil contains too much water, the oil will emulsify and the liquid will not transmit light or produce test results, clean the instrument with petroleum ether and isopropyl alcohol.
6) Soluble particles and entry: the oil enters soluble particles, the liquid becomes cloudy and opaque, and the size of the particles cannot be detected.
7) Black particles and other pigments enter: the liquid becomes cloudy and opaque and the size of the particles cannot be detected.

Appendix I Equipment shape and installation dimensions

1) Size: 450X350X200MM
2) Weight: 6.8KG

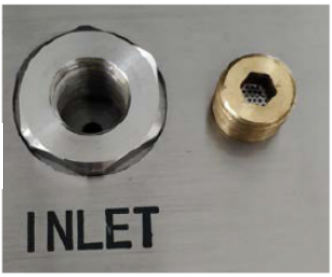
Appendix I Inlet screen cleaning method

The cleaning method of the inlet filter is as follows

1. Empty the line
2. Remove the fluid inlet tube.
   Unscrew the fluid inlet pipe using a 4mm allen key.
3. Remove the fluid inlet port.
   Remove the liquid inlet port by hand using a 4mm Allen key.
   The filter inside the port can be seen. (Picture 1)
4. Remove the filter screen.
   Remove the filter screen by hand using the matching hexagonal wrench. (Picture 2)
5. Clean the filter.
   After cleaning the impurities on the screen, the
   Clean the screen with a suitable solvent until it is clean.
6. Install the screen.
   Use the matching hexagonal spanner to install the cleaned screen.
   Note: Make sure the screen is installed with the screen side facing up as shown in Figure 3!
7. Install the liquid inlet port.
   Use the 4mm Allen key to install the inlet port.
8. Installing the Liquid Inlet Tube: Use a 4mm Allen key to install the liquid inlet tube.
   Use a 4mm Allen key to install the inlet pipe.

(Picture 1)

(Picture 2)



(Picture 3)

Appendix II Commonly used standard solid particle contamination class codes

GJB420B-2006 Solids contamination level (grains/100ml)

Size Code	A	B	C	D	E	F
Size	>1μm	>5μm	>15μm	>25μm	>50μm	>100μm
	>4μm(c)	>6μm(c)	>14μm(c)	>21μm(c)	>38μm(c)	>70μm(c)
000	195	76	14	3	1	0
00	390	152	27	5	1	0
0	780	304	54	10	2	0
1	1560	609	109	20	4	1
2	3120	1220	217	39	7	1
3	6250	2430	432	76	13	2
4	12500	4860	864	152	26	4
5	25000	9730	1730	306	53	8
6	50000	19500	3460	612	106	16
7	100000	38900	6920	1220	212	32
8	200000	77900	13900	2450	424	64
9	400000	156000	27700	4900	848	128
10	800000	311000	55400	9800	1700	256
11	1600000	623000	111000	19600	3390	512
12	3200000	1250000	222000	39200	6780	1020

GJB420A Classification of fluid solids contamination for aircraft hydraulic systems (grains/100mL)

Pollution level	Particle size range (/μm)				
	>2	>5	>15	>25	>50
000	164	76	14	3	1
00	328	152	27	5	1
0	656	304	54	10	2
1	1310	609	109	20	4
2	2620	1220	217	39	7
3	5250	2430	432	76	13
4	10500	4860	864	152	26
5	21000	9730	1730	306	53
6	42000	19500	3460	612	106
7	83900	38900	6920	1220	212
8	168000	77900	13900	2450	424
9	336000	156000	27700	4900	848
10	671000	311000	55400	9800	1700
11	1340000	623000	111000	19600	3390
12	2690000	1250000	222000	39200	6780

ISO4406 Pollution level criteria

Number of particles per ml		Code
more than	less than	
2500000		>28
1300000	2500000	28
640000	1300000	27
320000	640000	26
160000	320000	25
80000	160000	24
40000	80000	23
20000	40000	22
10000	20000	21
5000	10000	20
2500	5000	19
1300	2500	18
640	1300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2.5	5	9
1.3	2.5	8
0.64	1.3	7
0.32	0.64	6
0.16	0.32	5
0.08	0.16	4
0.04	0.08	3
0.02	0.04	2
0.01	0.02	1
0.00	0.01	0

NAS1638 Oil cleanliness class (grains/100ml)

Pollution level	Particle size range /μm				
	5-15	15-25	25-50	50-100	>100
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1000	178	32	6	1
3	2000	350	63	11	2
4	4000	712	126	22	4
5	8000	1425	253	45	8
6	16000	2850	506	90	16
7	32000	5700	1012	180	32
8	64000	11400	2025	360	64
9	128000	22800	4050	720	128
10	256000	45600	8100	1440	256
11	512000	91200	16200	2880	512
12	1024000	182400	32400	5760	1024

SAE AS4059F Aerospace Fluid Power. Classification of hydraulic fluids by contamination level

Pollution level	5-15um	15-25um	25-50um	50-100um	>100um
	6-14 um(c)	14-21 um(c)	21-38 um(c)	38-70 um(c)	>70 um(c)
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1000	178	32	6	1
3	2000	350	63	11	2
4	4000	712	126	22	4
5	8000	1425	253	45	8
6	16000	2850	506	90	16
7	32000	5700	1012	180	32
8	64000	11400	2025	360	64
9	128000	22800	4050	720	128
10	256000	45600	8100	1440	256
11	512000	91200	16200	2880	512
12	1024000	182400	32400	5760	1024

GB/T14039 Hydraulic transmission fluid solid particle contamination class code

Number of particles per ml		Code
more than	less than	
2500000		>28
1300000	2500000	28
640000	1300000	27
320000	640000	26
160000	320000	25
80000	160000	24
40000	80000	23
20000	40000	22
10000	20000	21
5000	10000	20
2500	5000	19
1300	2500	18
640	1300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2.5	5	9
1.3	2.5	8
0.64	1.3	7
0.32	0.64	6
0.16	0.32	5
0.08	0.16	4
0.04	0.08	3
0.02	0.04	2
0.01	0.02	1
0.00	0.01	0

Note: For codes less than 8, repeatability is influenced by the actual number of particles measured in the liquid sample and the original count should be greater than 20 particles.

ShangHai LUWATECH Industrial Co.,Ltd
Address：2F, South Gate, Building 5, No. 333 Kangqiao East Road, Pudong New Area, Shanghai
TEL（FAX）: +86 021 58073569
E-mail：maorong.long@luowansy.com
http://www.luwatech.com
Particle Counter Specialist Supplier