LE - 200 Elevator Ride Quality Tester

User Manual

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Profile

The manual describes how to use and analysis the elevator ride quality by LE-200 elevator ride quality tester (hereinafter referred to LE-200). Please read carefully before use.

LE-200 is a special instrument for measure and test, record and analysis the escalator ride quality, which can calculate the parameters such as elevator acceleration, deceleration, speed, distance, jerk and so on. LE-200 is compliant with ISO 18738 and ISO 8041 international standard, which has the following characteristics:

1. Can fulfill the function of analysis the ride quality of elevator and escalator independently by measure, record, analysis and display in real-time.
2. By using the android system design, to draw the real-time curves of elevator acceleration, deceleration, vibration and so on.
3. Can give the results and curves of elevator speed, distance, jerk, RMS, VSum and so on.
4. By using large touch screen LCD, it is easy to use in the field operation.
5. Built-in 4G memory, can store tens of thousands of test data.
6. Support the U disk and mouse;
7. LE-200 support through the MICRO USB port and the computer data communication, in this mode, LE-200 tester is equivalent to an android smartphone, you can according to need to copy files from the device to a computer.
8. Supported by the mainstream windows operating system software.
9. Support arbitrary frequency low-pass digital filter.

The first part: the instrument

Instructions

1. the structure of the instrument

LE-200 elevator ride quality tester is an embedded equipment based on Android system, which is mainly composed of embedded industrial computer, vibration acceleration test board and rechargeable lithium batteries, shown as in figure 1.1.

Figure 1.1

Instrument right side with the power switch, rechargeable holes and two USB port, the MICRO USB is with the computer communications, another standard USB port can support U disk, mouse, etc

2. using the instrument

2.1. the preparations before use:

Place the instrument horizontally in the center of the elevator car, the arrow of Y direction is point to the elevator door. open the instrument power switch, waiting for a while, the instrument will display as in Figure 2.1.

Figure 2.1 main interface

2.2. the baseline of zero:

Before test or change place position, you need to set the baseline of zero by click on the "Set" button the in the interface as Figure 2.1, then shown as Figure 2.2.

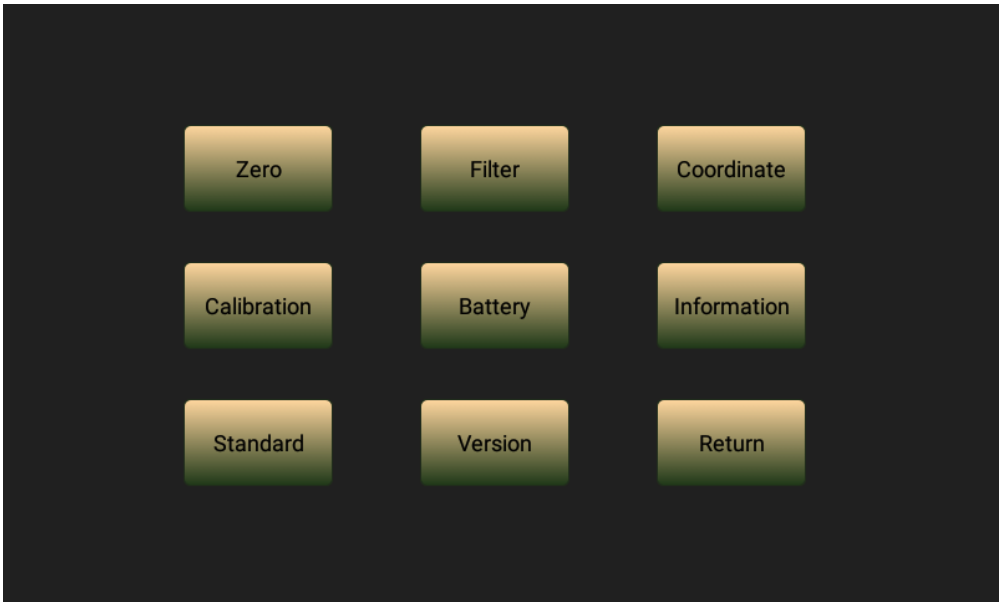


Figure 2.2 set interface

Click on the "zero" button can record current value as the baseline of zero, so please avoid vibration during zero operation. The aim of zero operation is to draw currently value of X, Y and Z in the 0 point. Zero operation can be done multiply. After zero operation operations, X, Y and Z curves are all close to 0 as shown in Figure. 2.3.

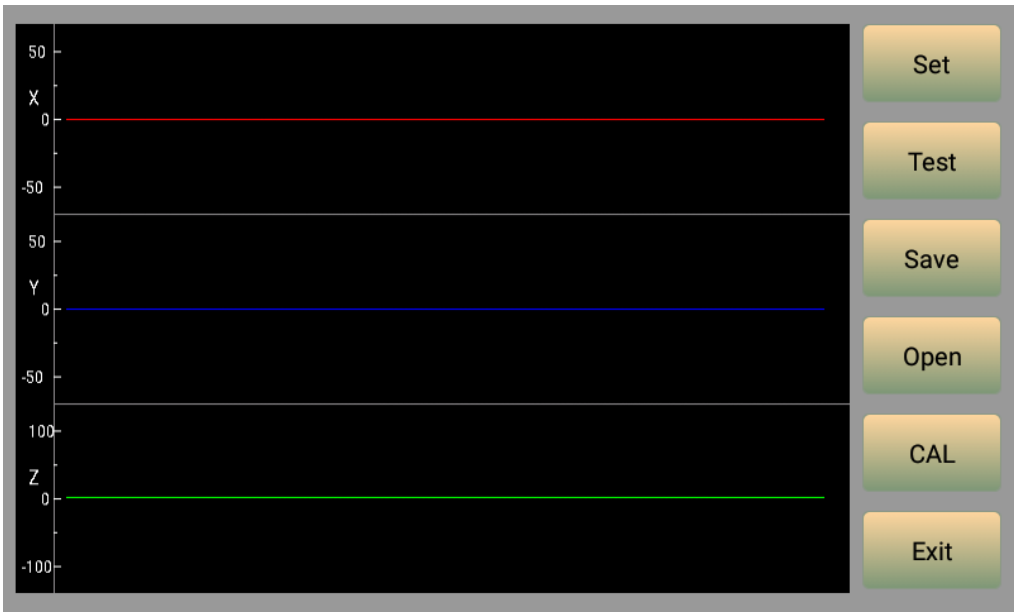


Figure 2.3

2.3. Set parameters

1) Set the test information

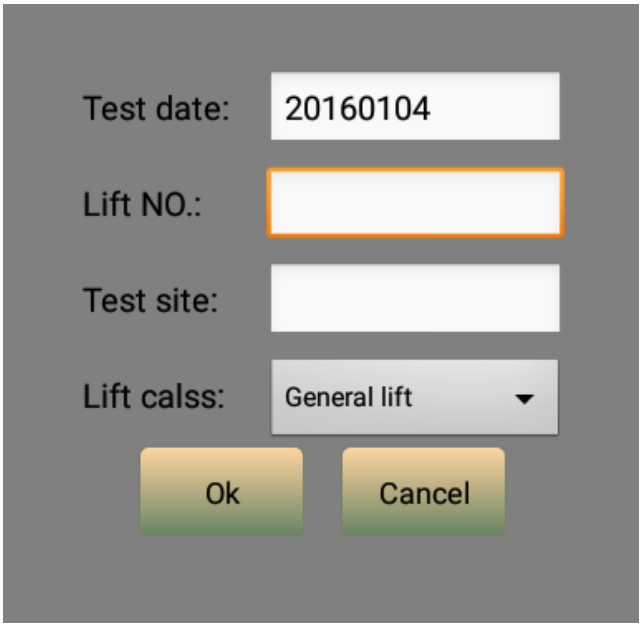


Figure 2.4 test information input interface

Before test, you can input corresponding test information such as date, ID and test location. The input method is to click on the "Info" button in set interface (Figure 2.2), then pop-up an interface as shown in figure 2.4.

After input the corresponding test information, click "Ok" button will save the information to the file. If you don’t input the test information, the system will add the date of the system to the test file automatically.

2) Set the filter

You can set different frequency low-pass filter before open a file. The method is to click on the "filter" button in set interface (Figure 2.2), then pop-up an interface as shown in figure 2.5.

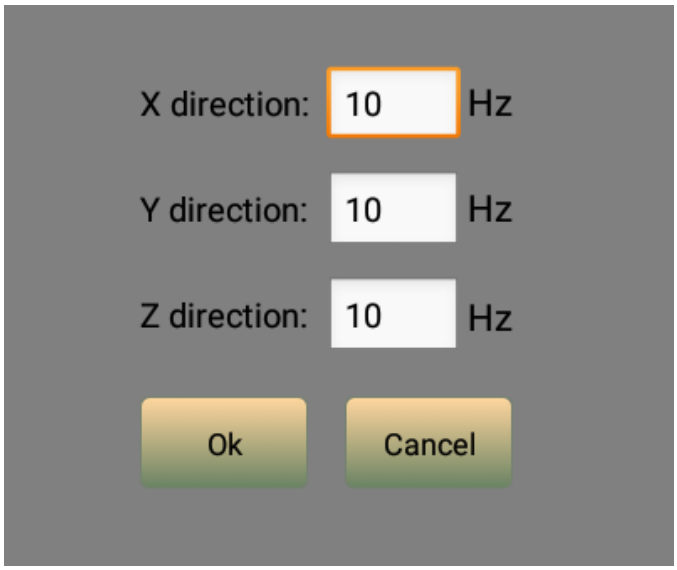


Figure 2.5 set filter interface

Different low pass filter can be chosen. If not input, the default setting is no filter. The settings are stored in the configuration file until you change it again.

3) Set the coordinate axis

You can set the X, Y, Z axis coordinate range before open a file. The method is to click on the "Coordinate" button in set interface (Figure 2.2), then pop-up an interface as shown in figure 2.6.

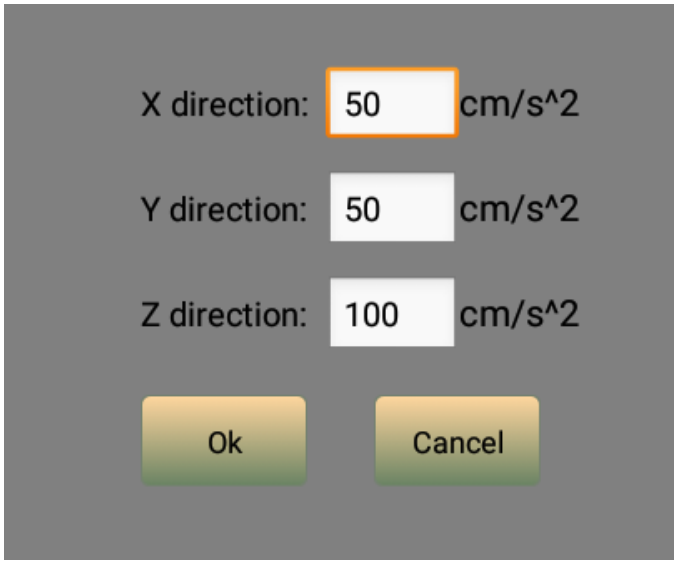


Figure 2.6 set scale interface

You can set X, Y and Z coordinates range, then click "OK" to save. The settings are stored in the configuration file until you change it again.

4) Battery check

You can check the capacity of the battery and working hour left. The method is to click on the "Battery" button in set interface (Figure 2.2), then pop-up an interface as shown in figure 2.7.

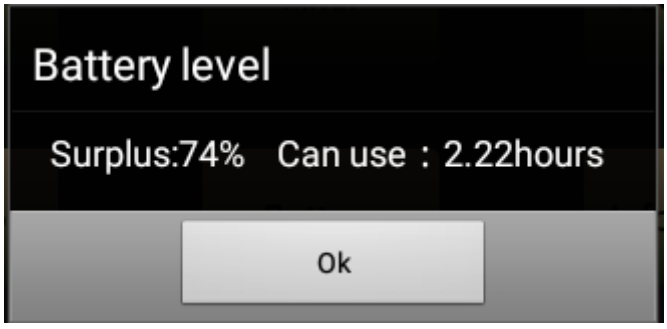


Figure 2.7 battery interface

When the battery is not sufficient or the screen twinkled, please charge in time. When charging, the indicator LED on the charger is red. After fully charging, the indicator LED on the charger turns from red to green.

5) Set the vibration standard values

In figure 2.2 interface, click the button "vibration standard" system setting vibration value is given dialog box, as shown in figure 2.8:

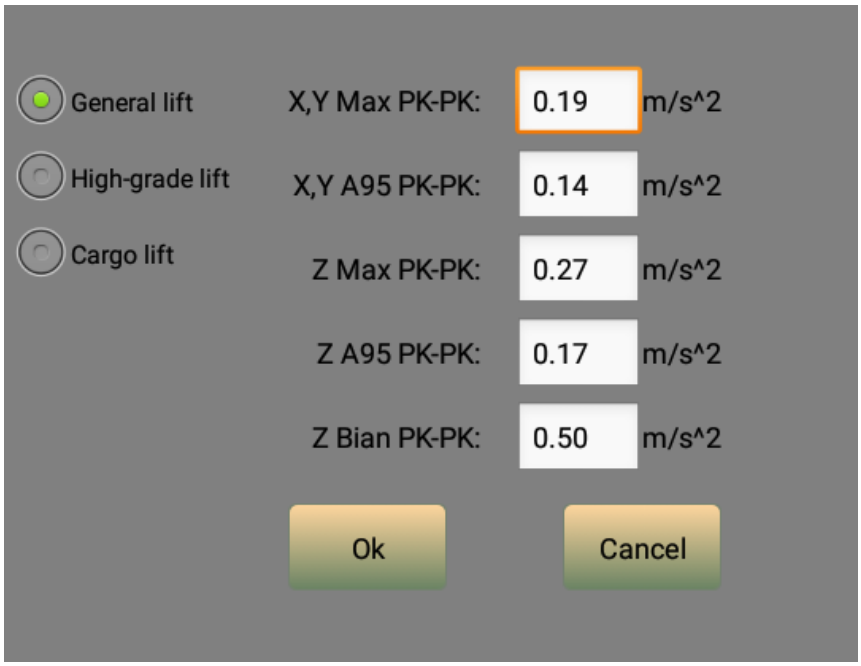


Figure 2.8

According to different kinds of elevator set the vibration of the corresponding standard value, so in the analysis can automatically judge excessive vibration, the parameters of the excessive vibration of three direction in red font display, be clear at a glance.

2.4. Test

The test function needs to record the whole process of the elevator run from starting to braking. That is, click “Test” in figure 2.1 to begin to test, then run the elevator immediately. After the elevator running then stop and open the door, click “Stop” to stop the test.

Make certain that the instrument is testing before the elevator begins to move. It is also important that no one should move while testing. People moving will create vibration which is unrelated to elevator vibration, and this will be recorded as well.

2.5. Save

After completion of the test, need to save the test data, generate the file, click "save" button on the interface of figure 2.1, the system gives the save dialog box, as shown in figure 2.9:

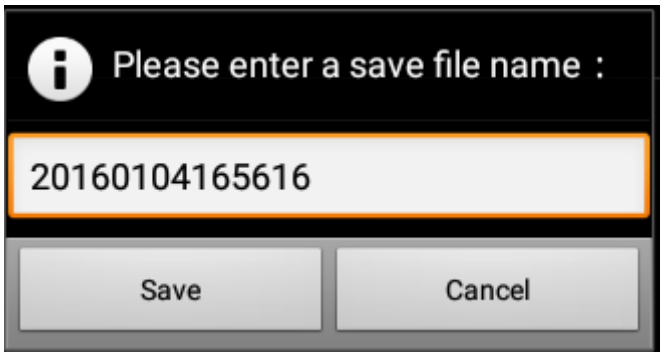


Figure 2.9 save interface

Note: save the file to the default in/storage/emulated / 0 / LE200_Data directory

2.6. Open

If you want to see the result of a test, firstly, open operation is needed. The method is to click on the "Open" button in main interface (Figure 2.1), then choose LE200_Data need to open the file directory, click “OK” will open the file as shown in figure 2.10.

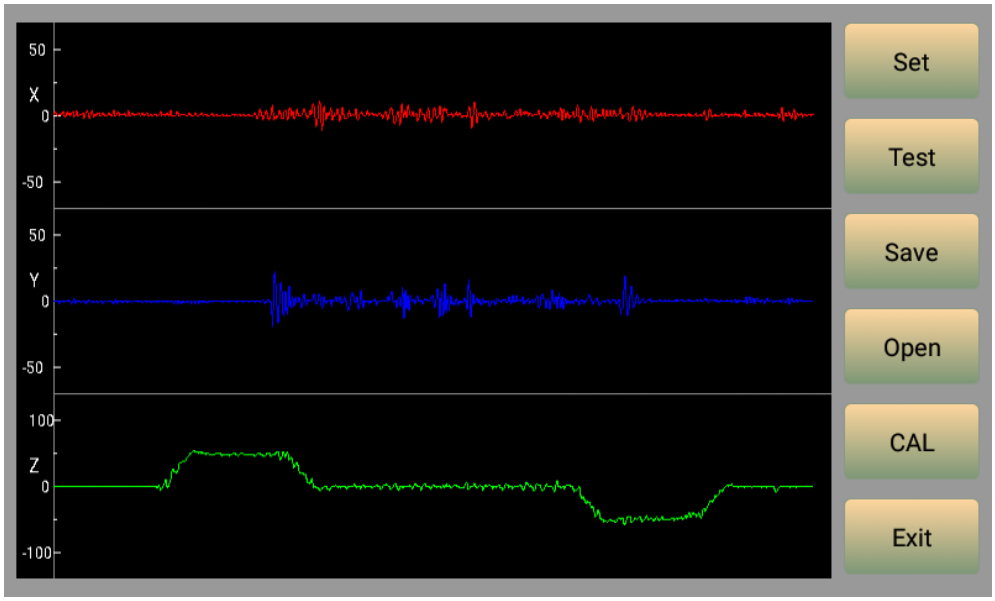


Figure 2.10

2.7. Analysis

After you open the file or complete a test, click on the "CAL" button in Figure 2.1 interface, the result will be displayed, the calculation results are shown as in figure 2.11. The detail meanings of the results are in the appendix.

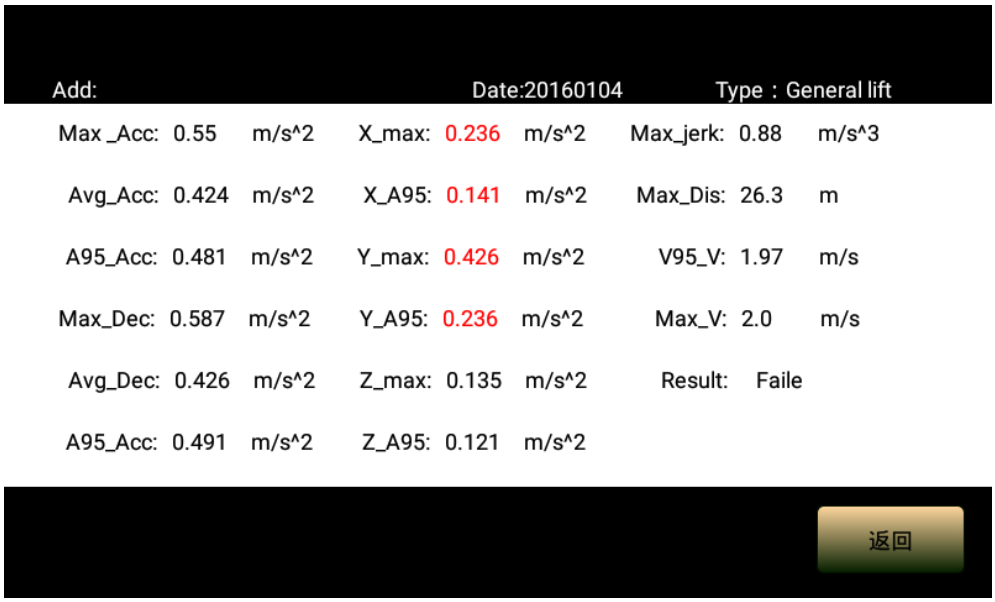


Figure 2.11 result interface

3. instrument calibration

In general the calibration is done in Metrology Institute, the calibration accuracy coefficient directly influence the test results of the instrument. It is suggested that individual users don't use this function.Instrument calibration includes linear calibration and frequency response. The linear calibration is carried out in 8Hz, calibration points are 40 cm/s^2, 80 cm/s^2, 120 cm/s^2, 160 cm/s^2 and 200 cm/s^2. Frequency calibration is in the amplitude of 200cm/s^2, calibration frequencies were 8Hz, 16Hz, 24Hz, 32Hz and 40Hz.

Error should not exceed 2% when correction factor (correction coefficient when choose 16 hz, 200 cm/s2), such as more than 2% error, to coefficient of correction again, click on the "calibration" button on the figure 2.2, the system is given as shown in figure 3.1 dialog box, enter the test value (that is, the instrument calculation value) and standard (standard of vibration table output). Compared to test again, until the error is less than 2%.

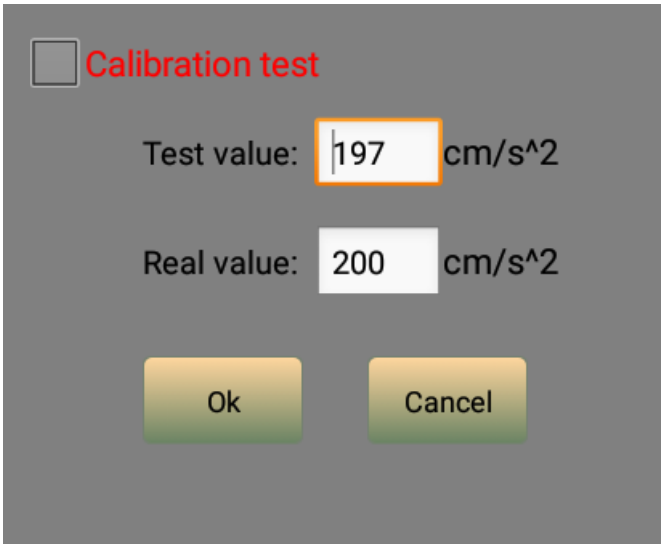


Figure 3.1

The operation method of calibrating test:

Before do calibration test, please will figure 3.2 "calibration test" is selected, then click "ok" button, and then exit the program, to run the program, the instrument that the calibration mode.

Instruments placed in vibration on the stage, is to "reset" operation, waiting for the vibration table, the stability of the standard signal is given, and then use instrument testing, test process in 5 ~ 10 seconds is appropriate, click the "stop" button, the instrument test values are given as a result, if the test value and the standard deviation is within 2% of the vibrating table don't need to be modified, more than 2% error, need to enter the form change coefficient of figure 3.2.

Note: the calibration test is completed, once again into the form, figure 3.1 in the case of not selected "calibration experiment", click "ok" button, this instrument is in normal working mode.

The second part: the software installation and operation

4. Software installation

4.1. Application software installation

Insert the supplied CD into the CD-ROM, enter the CD directory, then run Setup.exe, and complete the install

5. Software operation

5.1. Get the file

Copy the files from the instrument to the computer, there are two ways:

1) through the U disk, copy the file from the instrument to the U disk.

2) by the instrument's own Micro usb cable will instruments are connected to the computer, instrument is equivalent to an android smartphone, access to a mobile phone LE200_Data directory, you can copy the file you need.

5.2. Parameter setting

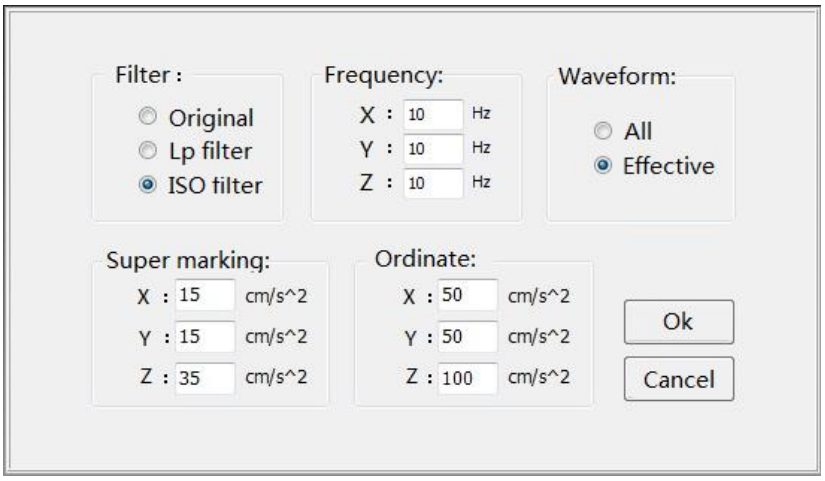


Figure 5.1 setting interface

Run the LE-100 computer software, click the "Settings" menu "parameter" option, then pop-up an interfaceas figure 5.1.

In this interface, the filter, filter frequency, coordinate, super marking and waveform all can be set. After setting, click "OK" button, these parameters are all stored in the computer configuration files until you change them again.

The meanings of filter, frequency and coordinate parameters are the same as in instruments. Super marking means add three reference bars when open a file, so it’s easy to judge where the wave amplitude exceeds the setting reference bar. Waveform means how to open a file. If you select all, it will display the whole test period wave. If you select effective, it will display the test wave from elevator starting to braking (a main part of the whole test period wave).

5.3. Open the file

Click on the "file" menu under "open" option, the system gives the open file dialog box, as shown in figure 5.2.

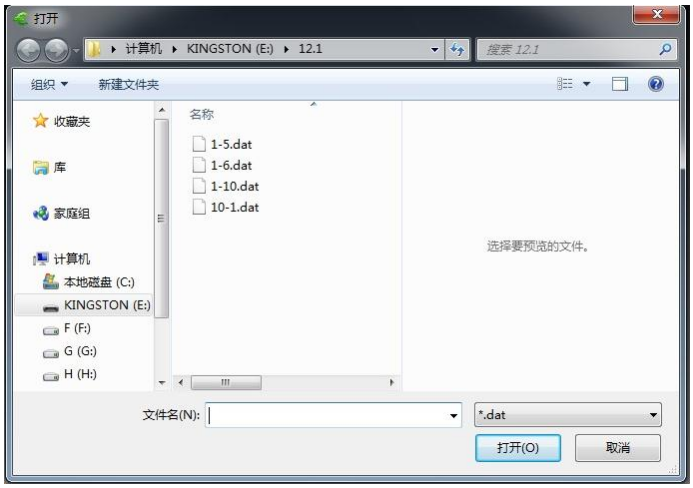


Figure 5.2

Click on the file name which you want to open, then click “Open” will open the file as shown in figure 5.3.

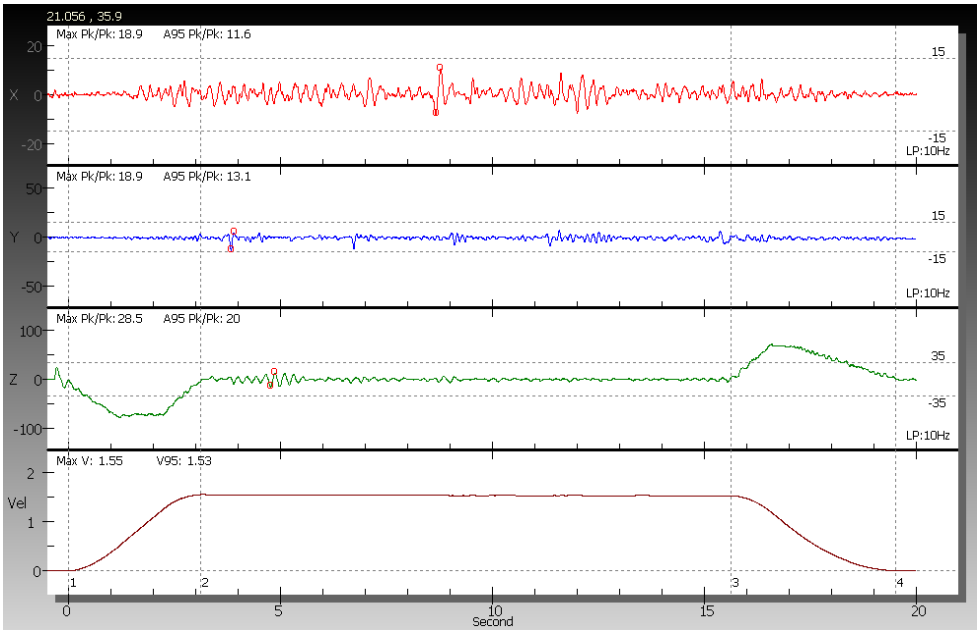


Figure 5.3

5.4. the analysis file

1) display parameters

After open a file, select "analysis" menu "parameter display system", give the results of the analysis, as shown in Figure 5.4, you can also change the analysis method by changing filter and frequency filtering in Figure 5.1.

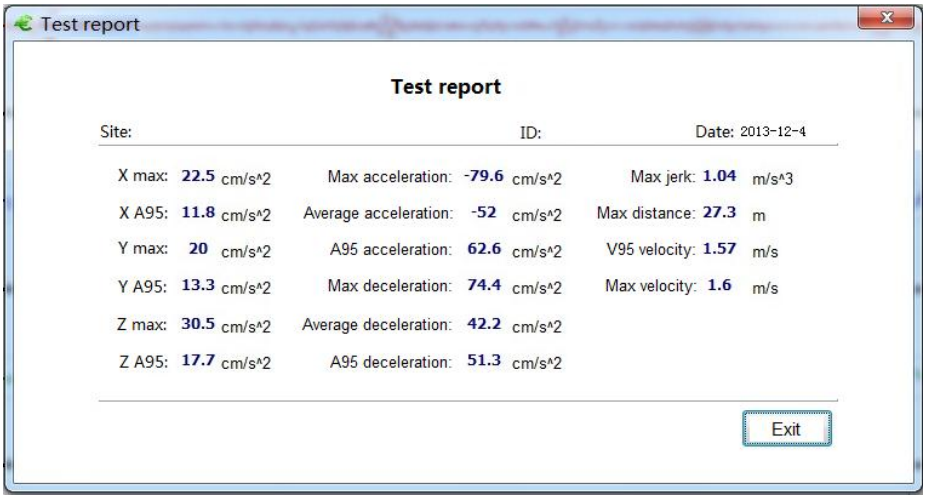


Figure 5.4

2) analysis curve

Analysis curve including: velocity, distance, jerk, RMS and VSum. Open the file, as shown in Figure 5.3, the top three waves is X, Y, Z vibration acceleration curve and the bottom is the velocity curve, you can choose "analysis" the corresponding item to change the displayed curve in the bottom, each values displayed on the left top of the curve are calculated according to each curve.

Such as: if you choose "analysis" menu under "distance", then the interface is shown as in figure 5.5.

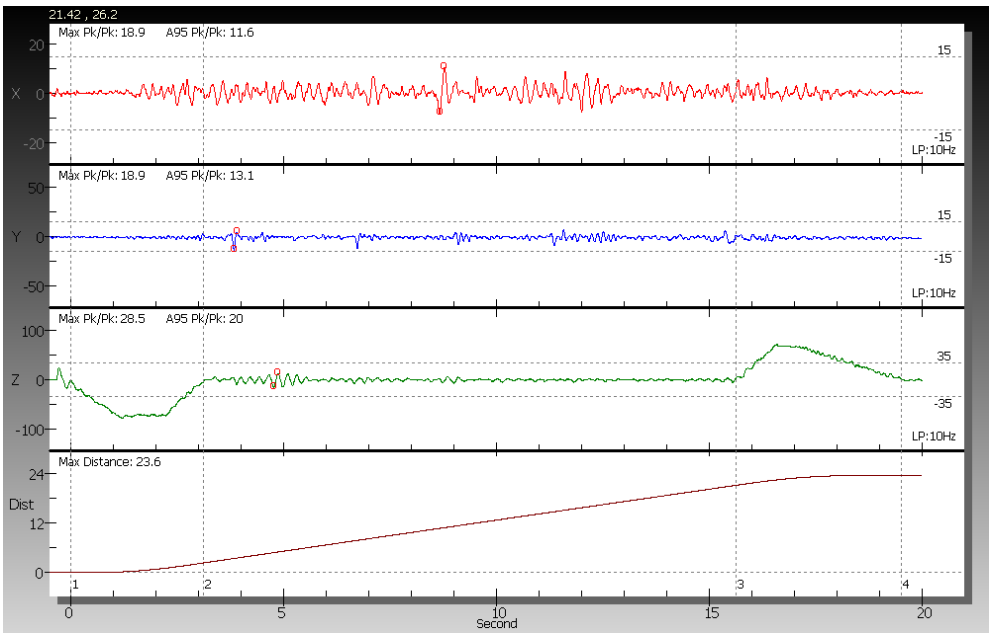


Figure 5.5

3) mouse operation

After open a file, mouse operation function can be used.In the main interface as Figure 5.3, you can use mouse selection function to see the value on any point of the curve, also you can use drag mouse function to zoom the curve.

A), mouse selection to check one point

Move the mouse to the point you want to check on the curve, when the mouse icon changed from "+" to "", there will display values on the left top of the screen (on the top gray rectangle area), as shown in Figure 5.3. The first value means the time

of that point where the mouse icon located, the second value means the amplitude of that point where the mouse icon located.

Also, when the mouse icon changed from "+" to "  ", left-click the mouse the mouse icon turns to a big cursor bar shown as in Figure 5.6. If you want to check any point value on the curve, you can move the big cursor bar to the point by press the ↑, ↓, ← or → key of the PC keyboard. The values are also displayed on the left top of the screen (on the top gray rectangle area).

When the mouse icon changed from "  " to "+", click mouse again will close the big cursor bar.

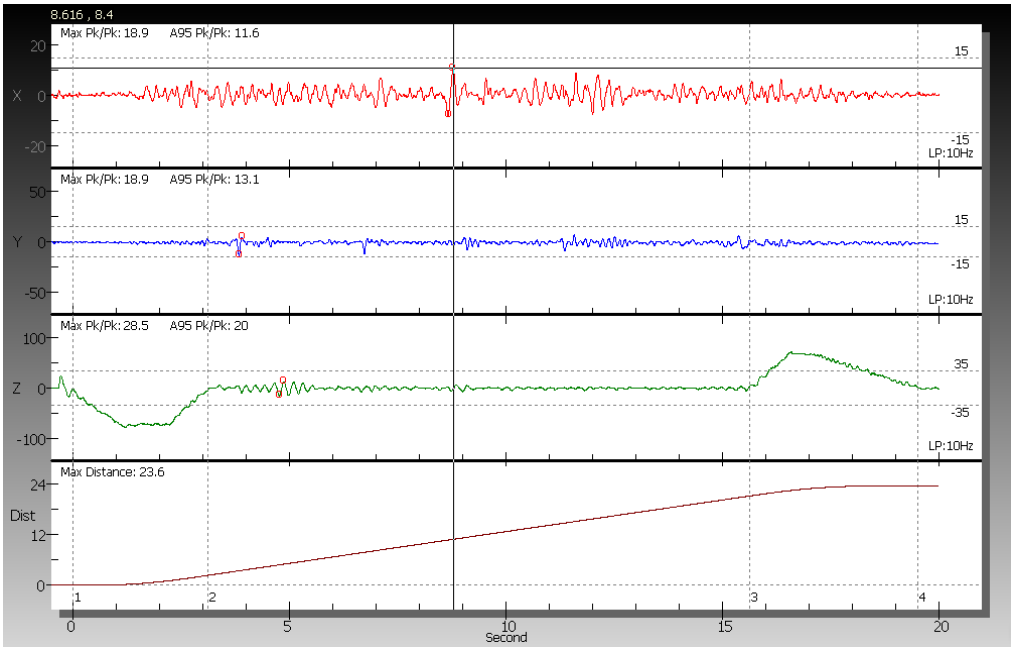


Figure 5.6

B), drag mouse to zoom the curve

In Figure 5.3, move the mouse to the beginning of the point of interest, when the mouse cursor is "+", keep the left-button of the mouse down and move to drag an area, which will be zoomed after you release the left-button of the mouse, shown as in Figure 5.7. When you move mouse on the zoomed window, the big cursor bar also moved, and corresponding valued are displayed on the left top of the zoomed window.

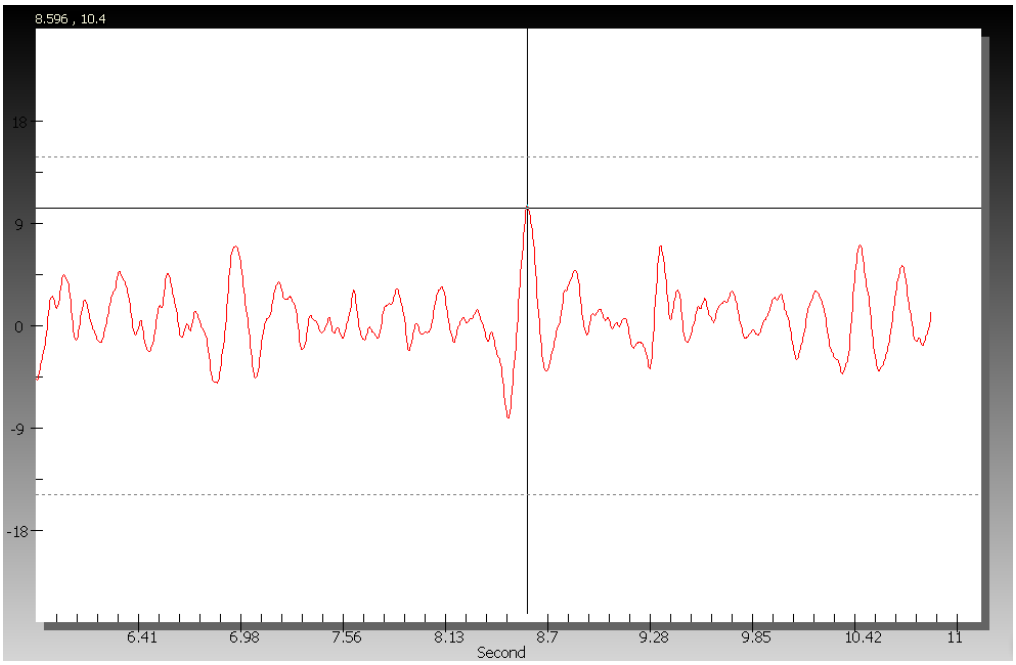


Figure 5.7

4) waveform returned

In any waveform analysis, you can return to the main interface as Figure 5.3 by click "  " shortcut button.

5) FFT analysis

Choose "analysis" menu under the "FFT" option, the system gives the FFT Select interface as shown in figure 5.8:

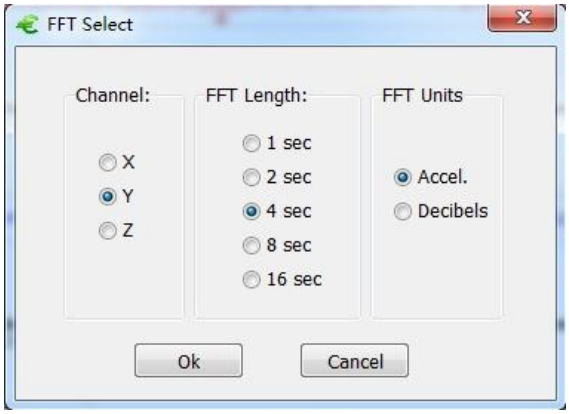


Figure 5.8

You can choose different channel, FFT length and FFT Units of FFT analysis.

Note: the default setting is FFT analysis from the beginning of the curve, you can change the beginning point before enter FFT select, the method is that, move the mouse to the beginning of the point of FFT analysis, when the mouse icon changed from "+" to "  ", left-click the mouse the mouse icon turns to a big cursor bar shown as Figure 5.9, and it is the new beginning point, then FFT is analysis from this point.

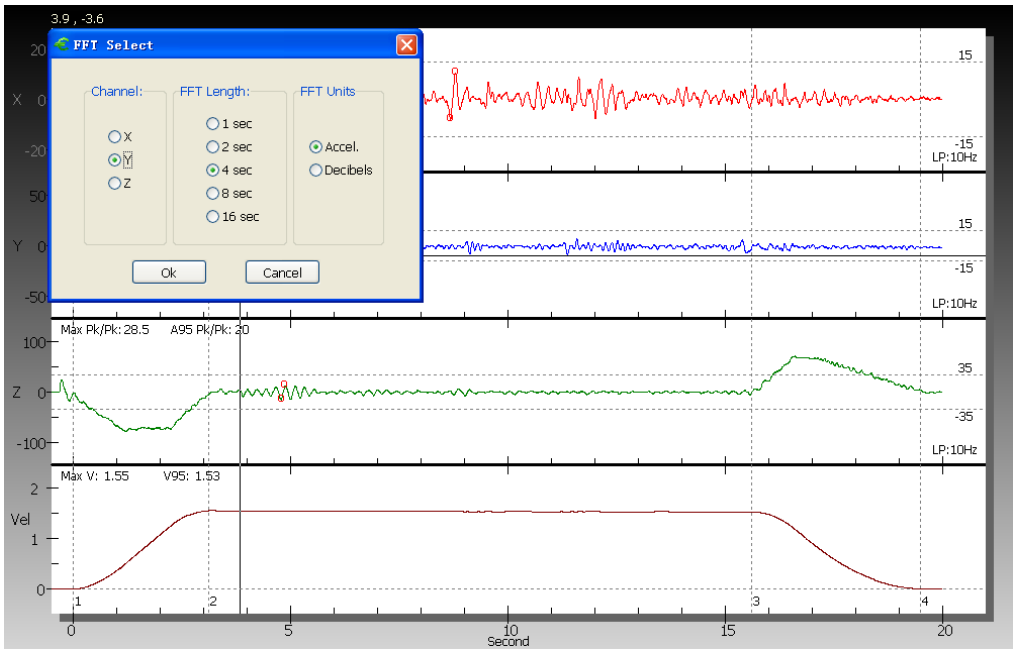


Figure 5.9

After complete FFT select, click OK on Figure 5.8 will pop-up an new interface as shown in Figure 5.10.

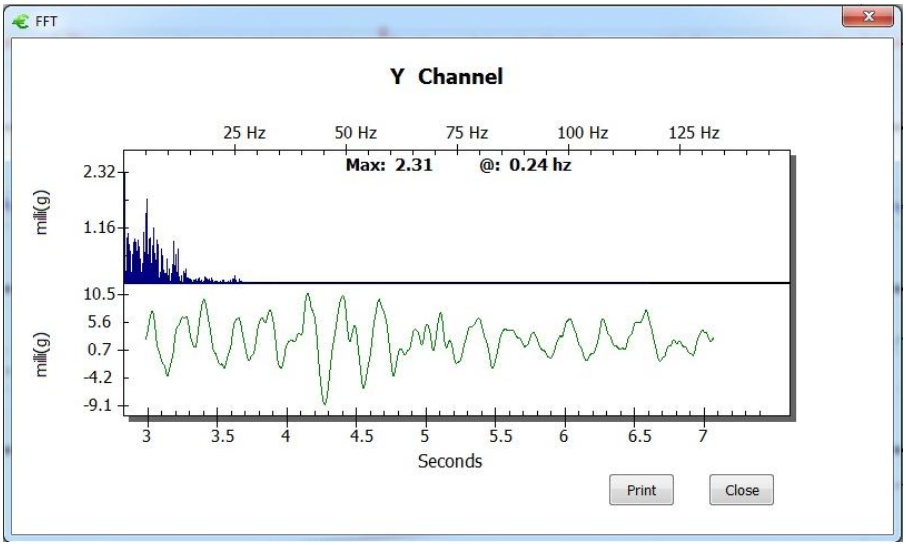


Figure 5.10

The top part is the FFT analysis of the setting channel, the bottom part is the acceleration curve of the setting channel. Move mouse to the top part, when the mouse cursor turns to "", the values of the point are displayed on the left top of the window, shown as in Figure 5.10. Also, when you left-click mouse to change the cursor from "" to big cursor bar, if you want to check any point value on the curve, you can move the big cursor bar to the point by press the ← or → key of the PC keyboard. The values are also displayed on the left top of the screen.

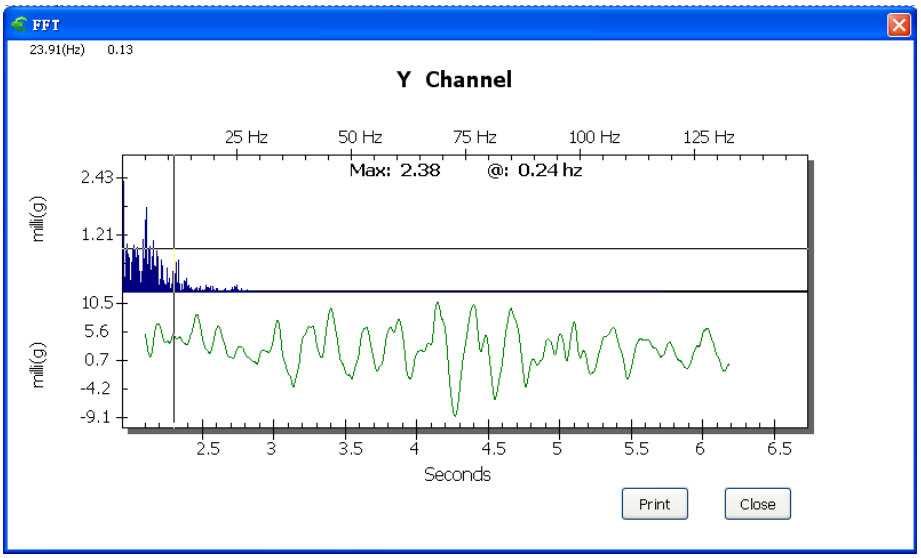
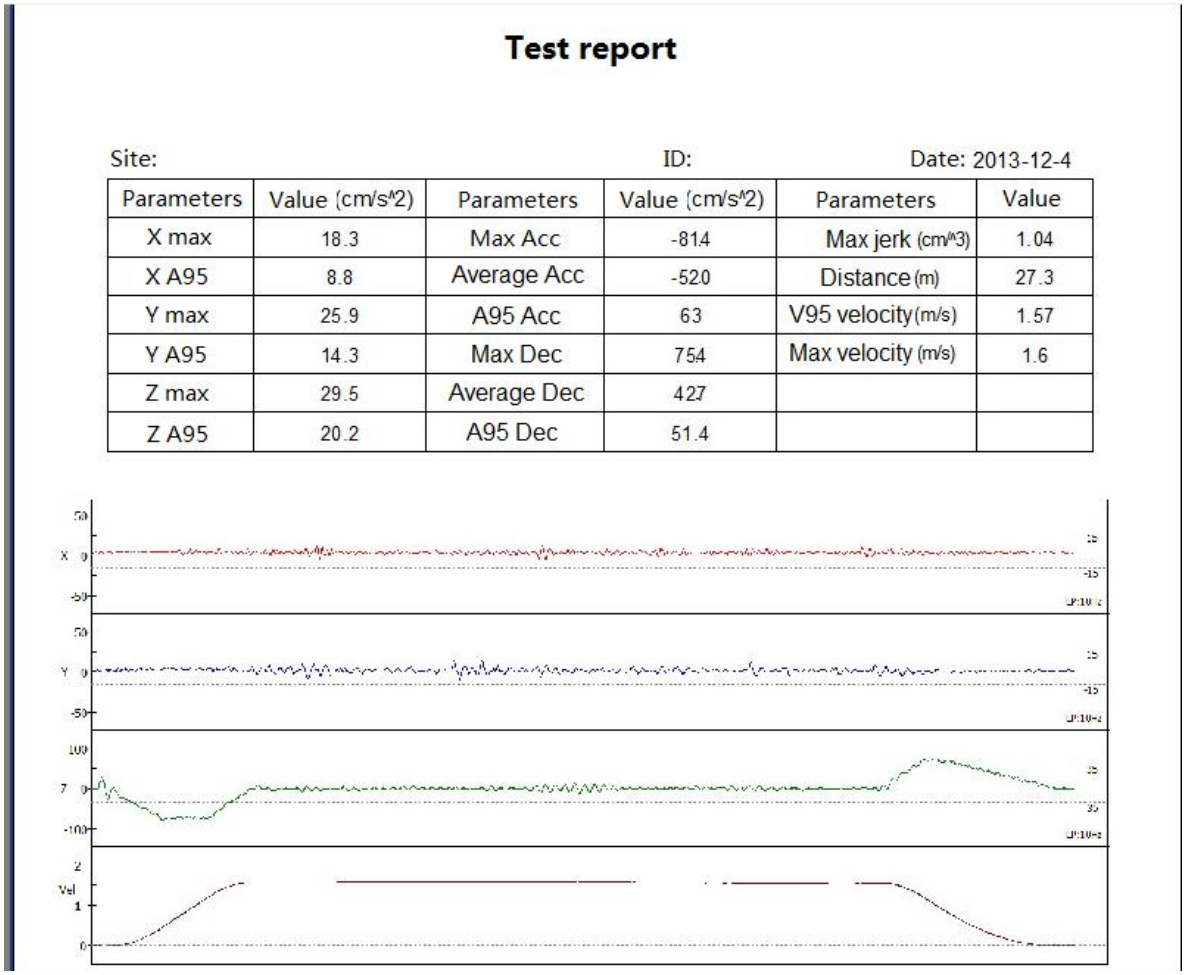


Figure 5.11

5.5. Print the report

You can use local printer attached to this computer or a network printer. The print report format is shown as in figure 5.12.

The above sheet shows the test parameter values, followed by curves. The curves are the same as displayed when you select the analysis method and open the file.



Test report

Site: ID: Date: 2013-12-4

Parameters	Value (cm/s^2)	Parameters	Value (cm/s^2)	Parameters	Value
X max	18.3	Max Acc	-814	Max jerk (cm/^3)	1.04
X A95	8.8	Average Acc	-520	Distance (m)	27.3
Y max	25.9	A95 Acc	63	V95 velocity (m/s)	1.57
Y A95	14.3	Max Dec	754	Max velocity (m/s)	1.6
Z max	29.5	Average Dec	427		
Z A95	20.2	A95 Dec	51.4		

Figure 5.12

5.6. Rapid analysis

All files inside a selected directory can be exported to a txt file automatically by using this function.

The detail method:

Move mouse cursor to the “File” menu at the top menu bar, left-click the mouse to open a pull-down menu, Click on “Rapid analysis” will pop-up dialog box, shown as Figure 5.13.

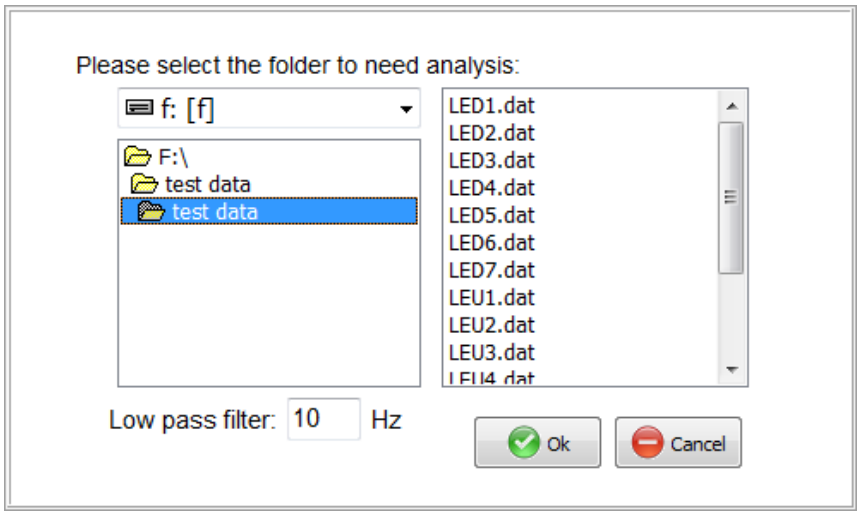


Figure 5.13

Select the file directory, double-click it, then left-click “ok” will start to analysis. Wait for a while, the system will a text file, the default text file named "temp.txt", the analysis results of all files inside the directory have been exported to the temp.txt.

Appendix A: instrument parameter interpretation

The parameter name	The meaning of parameters
Max acceleration	Accelerate the maximum acceleration process
Average acceleration	Accelerating the process of the average acceleration
A95 acceleration	To accelerate the process of A95 acceleration
Max deceleration	Accelerate the maximum deceleration process
Average deceleration	Decelerating the process of the average acceleration
A95 deceleration	To accelerate the process of A95 deceleration
X max	The X directions of the maximum peak to peak vibration
X A95	X A95 peak to peak vibration
Y max	The Y directions of the maximum peak to peak vibration
Y A95	Y A95 peak to peak vibration
Z max	The Z directions of the maximum peak to peak vibration
Z A95	Z A95 peak to peak vibration
Max jerk	The biggest jerk
Max distance	The maximum displacement
V95 velocity	V95 speed
Max velocity	Maximum speed

Appendix two: the main technical index of the instrument

1, The measurement range: vertical ± 1g, ± 0.1g level;

2,The measurement accuracy: 0.0001g;

3, The sampling frequency: 256 times per second;

4, Display: 7 Inch Touch Screen lcd;

5, Memory: 2G;

6, Communication: USB port or U disk copy;

7, Power: 7.4V, 2.2Ah lithium battery;

8, Working hours: 3 hours of continuous work;

9, The charging device: 8.4V, 1A;;

10, Volume: 210mm*140mm*32mm;

11, Weight:0.86kg;

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