LIST OF PRODUCTS

- ✶ Digital Multimeter
- ✶ AC Clamp Adaptor
- ✶ Thermo Anemometer
- ✶ Distance Meter
- ✶ Network Cable Tester
- ✶ Earth Resistance Tester
- ✶ DC Power Supplies
- ✶ Calibrators
- ✶ Frequency Counter
- ✶ Phasing Sticks
- ✶ Waterproof Pen Testers
- ✶ EMF Detector
- ✶ Digital AC & AC/DC Clampmeter
- ✶ AC/DC Current Adaptor
- ✶ Thermo Hygrometer
- ✶ Digital Lux Meter
- ✶ Power Factor Regulator
- ✶ Digital Panel Meters
- ✶ High Voltage Detector
- ✶ Gas Analysers
- ✶ Function Generator
- ✶ Battery Tester
- ✶ Solar Power Meter
- ✶ Wood, Paper & Grain Moisture Meter
- ✶ Transistorised Electronic Analog & Digital Insulation Resistance Testers(upto 10 KV)
- ✶ Digital Sound Level Meter & Sound Level Calibrator
- ✶ Digital contact & Non-contact Type Tachometer
- ✶ Digital Non-contact (infrared) Thermometer
- ✶ Maximum Demand Controller/Digital Power Meter
- ✶ Digital Hand Held Temperature Indicators

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KUSAM-MECO®

AN ISO 9001:2015 COMPANY

CABLE FAULT PRE-LOCATOR



MODEL - KM-CFPL-620

OPERATION MANUAL

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Chapter I Summary

1.Introduction

This completely automatic Cable Fault Locator is a successful high-tech product, which adopts ARM, FPGA and Dot Matrix Color LCD display technology. The pulse reflection testing(TDR) is suitable for measuring the exact fault location such as the broken line, cross faults, earthing. It is an effective tool to reduce troubleshooting time, improve work efficiency & reduce labor intensity of line maintenance staff. It also can be used in line projects acceptance and inspection of electrical cables.

2. Features

- Large color LCD Display (480 x 280 dot); humanized operation interface; six function keys and simple operation.
- Pulse reflection testing (TDR).
- Manual testing function is preserved.
- Full English Menu is easy to master and use.
- With USB Port, it is easy to upload testing data to computer
- With USB Port, it is easy to upload testing data to U-disk and you can analyze the data on computer.
- Rechargeable lithium battery, intelligent charging without duty.
- Small dimension, light weight and portable design.

3. SPECIFICATIONS

1) Pulse reflection testing (TDR)

- Max range: 8 km
- Dead Zone: 0 m
- Testing Accuracy: 1 m
- Pulse width: 40ns-10 μs with automatic adjustment
- Automatic impedance balance adjustment
- Automatic and manual gain adjustment
- Dimension : 220 x 160 x 90 (mm^3)
- Weight : 1kg.

4. Configuration

1) Panel setting

- **ON/OFF :** The switch of power supply.
- **Auto** : Press this key the instrument will do the testing automatically.
- **Pulse** : Under the pulse reflection testing, press this key & then the instrument will process manual pulse testing; under the bridge testing, press this key & then the instrument will enter the pulse reflection testing interface automatically; users can also complete the operations with the help of menu prompt.
- **Adjust** : Adjust testing parameters.
- ◄► Under the pulse reflection testing, it is used to move the cursor.
- **USB** : It is used to communicate with host computer.
- **Test** : It is used to insert & connect the testing lead lines.
- **Charge:** The socket for charging the instrument.

2) Testing line

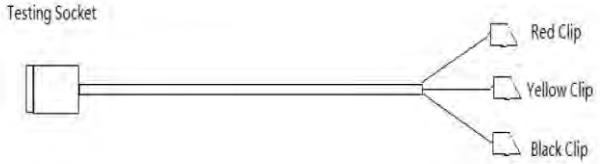


Figure 1.4.1

There are three clips at the end of testing lead line in total.

Under the pulse reflection testing, just to use the two lines with red clip and yellow clip; under the intelligent bridge testing, use the total three lines. The detailed usage method will be introduced in the following chapters.

5. Testing Steps

1) Diagnosis of fault characters

The characters of telecom cable faults can be simply divided into the following several kinds:

- **broken line:**

One or many cable core line are broken and the communication is interrupted. This kind of fault should be tested with the pulse testing.

- **crossed line:**

It can be divided into the earthing, self-crossed and other-crossed lines, which mean the core line to the lead cover, between the identical couple of core lines, the insulating layer between the different couple of lines and the core is destructed; the insulating resistance drops to the very low degree (below several hundred to several thousand ohms), even can cause short-circuits; the communication quality comes under serious influences. This kind of fault can firstly is used the pulse testing method. When the waveforms are difficult to distinguish, and then change it to the electric bridge testing.

2) Choose testing mode:

When the fault resistance is smaller than several hundred to several kilo ohms, we call it low resistance, otherwise, it is called the bad insulation or the high-resistance fault. High-resistance and low resistance have no explicit boundary.

The pulse testing is suitable for testing broken lines and low resistance crossed lines. Sometimes, the serious insulation can also use pulse testing. The pulse testing operation is direct-viewing, simple, no need the coordination of other end, it is should be firstly used when testing.

3) Fault range finder:

During testing, it should firstly cut off the lines or equipment on both sides of the cable to be tested. Perform testing firstly in the equipment to fix the smallest segment of fault, and then carry on the repeated testing on-the-spot to locate the precise fault point.

4) Fix cable fault:

You can locate the precise location of fault on the basis of the testing results and the comparison of map data. When the map material is not entire or contains errors, you can estimate the approximate position of fault according to the grasped cable situation.

Then you can combine with the around environment to analyze the fault reasons until find the cable fault. For example, there is a joint in the estimated range; it can approximately judge that the fault is in the joint. The further the range is, the bigger the testing errors are.

Chapter II Pulse Testing

Pulse testing is for testing broken lines and low-resistance fault.

1. Testing principles

Pulse testing is a kind of remote testing method; one can locate the fault point without testing on the field or testing with end-to-end coordination. The principle of the

theory is:

The instrument emits a pulse to the line, when the line has faults, the pulse reflection will change. If the come and back time can be measured, the location of the fault point can be detected.

Suppose the pulse transmission velocity in electric cable velocity is V, the come and back time that the pulse travels between the test point and the fault point is T, the fault distance is L, then:

$$\because \quad 2L = V\,T$$

$$\therefore \quad L = V\,T/2$$

For example, the sending end transmits a pulse to the cable, after 20 μs, the sending end get the reflection pulse. If the pulse transmission velocity in the electric cable is 201m/μs, the fault distance L is

$$L = 201 \times 20/2 = 2010\text{m}$$

2. Steps of locating fault point

Diagnosis of fault characters

To insure the accuracy of the testing of fault point, the testing personnel shall diagnose the fault characters correctly and then choose the most suitable testing mode. The characters of telecom cable faults can be simply divided into the following several kinds:

1) Broken line

One or many cable core line are broken.

2) Crossed line

The insulating resistance between the different couple of lines drops and causes the communication amplitude drops.

3) Earthing fault

The insulating resistance between the core line to the lead cover drops and causes low communication quality

4) Crosstalk noise

When the cable core insulation material is invaded by water or humidity, the insulating resistance will drop and cause low communication quality or even blocks.

5) Bad insulation

The insulating resistance between different couple of lines and the core drops to a very low level, the communication quality comes under serious influences.

Fault Testing

Cut off the cable to be tested both sides lines or equipment. Make sure the cable to be tested is free of voltage. Using this instrument to do intelligence testing first, if the fault cannot be detected and then you can change to manual testing.

Locating fault point

The tester will Judge the approximate location based on the testing result, then check the cable, cable gland, cross

boxes, etc., depending on the actual situation.

3. Intelligent Testing

Press "**on**", connect the testing lead line and fault cable line. Press "**Auto**" and then the instrument will show the testing result.

Note: The default setting wave velocity is 200m/μs, when you perform intelligence testing, the user shall check whether need to adjust the velocity (see "**Adjust wave velocity**" in the next section).

4. Manual Testing

The relevant setting and parameters will demonstrate on the underneath of the display screen. Press "**Adjust**" to adjust the setting and parameters.

1) Gain

Press "**Adjust**", until "**Gain××**" shows reverse color display. Then press "◀" or "▶" to adjust the amplitude (1~99 adjustable), Press "**Pulse**", the screen will display the wave after gain adjustment.

2) Range

During manual testing, **Range** decides the maximum testing distance of the instrument, so the range value shall be chose as longer than actual length of the cable to be tested. To adjust the Range, repeatedly press "**Range**", until "**Range××**" shows reverse color display. Press "◄" or "►" to adjust the Range.

3) VOP

The precision of the wave velocity, directly affect the precision of the testing result. So the wave velocity shall be calibrated according to the cable characters. Press "**Adjust**", until "**VOP××**" shows reverse color display. Then, press "◄" or "►" to adjust the wave velocity.

Adjust the **Range** and **Wave Velocity** according to the characters and estimated length of the cable to be tested. Appropriately adjust the wave amplitude to make the waveforms on the display screen to be observed easily. Move the cursor to inflection of the reflected waveform. The fault distance will demonstrate on the underneath of the display screen.

4) Zoom in and Zoom out

Users can zoom in or out the waveform when zoom value is not "1". Continuously press "**Adjust**" till Zoom is selected. Then the prompt box will display "press ◄ or ► to zoom the wave"; users can zoom the wave by

pressing "◄" or "►". Press "**PULSE**" when zoom to the proper size, and then users can move the cursor to fix position; press "**PULSE**" to the original state.

5) Save Waveform to RAM

The waveform should be saved to RAM when comparing the fault line and good line under manual testing. Continuously press "**Adjust**" key till **SAVE** is selected; and then "press ◄ or ► to save wave" will be displayed in the prompt box. Users can save the current waveform by pressing "◄" or "►".

6) Compare Current Wave with stored Wave in RAM

Users can compare the current waveform with the already stored waveform in RAM. Continuously press "**Adjust**" till **Both** is selected; "press ◄ or ► to both display" will be displayed in the prompt box. Press "◄" or "►" to display two waveform at the same time. The current waveform is yellow, and the already stored waveform is green.

Notice: the button can not be selected under certain state and it means in such state, you can not do this operation. See the detailed operation on screen.

5. Save File

Press "Adjust" until "Press ◄ or ► to do file management" appears. Now press "◄" or "►" to enter into save file mode. And then you can not only save and test the current file but also check and analyze the previous wave files.

1) Save File

When you choose "Current Test", press "Auto" to test the current cable. Press "Adjust" to save the current file and "Press ◄ to quit file mode, press ► to save current wave" will display.

Under this condition, press ◄ to quit to the file mode; press ► to save the current file to U disk.

2) Check and Analyze the previous wave files

Press "Adjust" until "Press ◄ or ► to do file management" appears. Now press "◄" or "►" to enter into save file mode. And then you can check the previous wave files. When you are interested in any wave files, you can press "Auto"" to analyze the current wave file.

Under this mode, you can do some operation of the saved file. And the operation method is same as cable operation method. For detailed operation steps, you can refer to the manual testing chapter.

Chapter IV Charge

Current battery power is showed at the top-right of the screen. If the battery power is inadequate, please use the instrument charger to charge it.

The indicator light of the charge adapter will be red when charging; and it will turn green after it's fully charged.

The charge time shall be no longer than four hours.

Chapter V Notes

- Keep display screen away from direct sunlight. The contrast ratio of LCD will drop when temperature higher than 60ºC and it will return to normal when temperature is lower than 60ºC.
- Before testing, better measure the voltage of fault cable to be tested, in order to avoid test errors or damage the instrument
- Do not hit LCD screen.

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MUMBAI

TEST CERTIFICATE

CABLE FAULT PRE-LOCATOR

This Test Certificate warrantees that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. **KM-CFPL-620**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
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WARRANTY

Each “KUSAM-MECO” product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a “KUSAM-MECO” authorized dealer.

This warranty does not apply for damaged Ic’s, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in “KUSAM-MECO’s” opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

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“KUSAM-MECO’s” warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a “KUSAM-MECO” authorized service center within the warranty period.

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