KvTester
www.kvtester.com

ZC-701D Cable Identifier

User Manual V2.0



❖KVTESTER ELECTRONICS TECHNOLOGY CO.,LTD.❖

Welcome to use our products for you!

Please read this user manual carefully, especially the safety warnings and tips, before using this product.

The company is constantly improving the product, the equipment provided may differ from the contents of this manual, please pay attention to the random information.

There is no part of this product that can be repaired by customer, please do not disassemble the machine! If there is a fault, please contact us in time.

CONTENTS

Chapter I Overview 6

1.1 Overview 6

1.2 Functional Characteristics 6

1.3 Technical Index 7

1.4 Equipment Configuration 8

Chapter II Transmitting a Signal General Method 9

2.1 Direct Connection Method 9

2.1.1 Direct Output Cable Connection 9

2.1.2 Interface Introduction and pipeline Voltage Detection 10

2.1.3 Frequency Selection 11

2.1.4 Output Power Regulation 12

2.2 Caliper Coupling Method 12

2.2.1 Caliper Connection 12

2.2.2 Clamp Pipeline 13

2.2.3 Interface Introduction 13

2.2.4 Frequency Selection 13

2.2.5 Output Power Regulation 14

Chapter III Signal Transmission Method for Cable Identification 14

3.1 Outage Cable Signal Transmission Method 14

3.1.1 Basic wiring method: core wire-ground connection 14

3.1.2 Sheath-Earth Connection 16

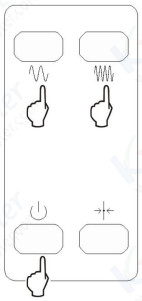
3.1.3 Phase- Sheath Connection 17
3.1.4 Transmitting Frequency Selection 18
3.2 Running Cable Signal Transmission Method 19
3.2.1 Caliper Coupling Method 19
Chapter IV Cable Identification 20
4.1 Choice of Signal Transmitting Method 20
4.2 Receive Flexible Caliper Connection 20
4.3 Interface Introduction 21
4.4 Calibration 22
4.5 Recognize 22
Chapter V Power Frequency Current Measurement 26
5.1 Interface Introduction 27
5.2 Position Error 27
Chapter VI Maintenance and Warranty 28
6.1 Charging 28
6.2 Quality Guarantee 29
Chapter VII Packing List 29

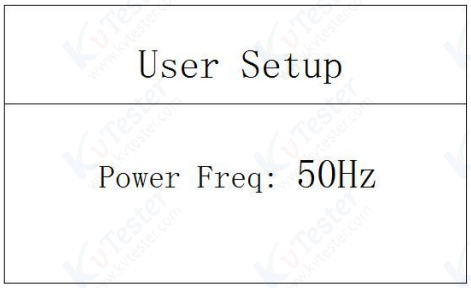
User setup before starting

This equipment is suitable for different countries and regions, in order to adapt to different power grid frequency, it is necessary to set the receiver before use.

1. If not specified when ordering, the factory default power frequency is 50Hz.

2. If you need to change it, as shown in the figure below on the left, in the shutdown state of the receiver, hold down the frequency reduction key and the frequency increase key at the same time, do not release, and then hold down the key, do not release, you can see that the receiver is started and the welcome interface is displayed. Do not release the three keys until the user setting interface is displayed about 1 second later, at which time you can release the keys. The user setting interface is shown below on the right:





3. Press the calibration key, you can set the Power Freq (power frequency) to 50Hz or 60Hz.

4. After the setting is complete, long press the key to shut down, the setting is complete.

5.This setting only needs to be done once, the setting content is not lost. If an error occurs in future use, it can be done again.

Chapter I Overview

1.1 Overview

Smart Cable identifier is a set of high-performance cable identifier, consisting of a signal transmitter and receiver, used to accurately identify the target cable in multiple cables, both live and unlive cables, live cables are only suitable for three-core armored cables. High recognition accuracy, easy to use.



1.2 Functional Characteristics

■ It is suitable for live and non-live cables. Live cables are only suitable for three-core armored cables.

■ Flexible calipers are easy to receive and use.

■ 50Hz/60Hz cable load current measurement function.

■ Multiple signal output modes: direct output, caliper coupling.

■ Transmitter high-power output, output multi-gear adjustable, automatic impedance matching, automatic protection.

■ Unique identification: clearly give the identification result.

■ Built-in large-capacity lithium-ion battery pack, automatic shutdown under voltage, automatic shutdown without operation for a long time.

■ Strong, light and portable case.

■ Full digital high-precision sampling and processing, receiving pass band is extremely narrow, strong anti-interference ability, can fully suppress the power frequency and harmonic interference of adjacent running cables and pipelines

1.3 Technical Index

Transmitter

■ Output mode: direct output, caliper coupling.

■ Output frequency: 640Hz(compound frequency), 1280Hz(compound frequency).

■ Output power: maximum 10W, 10 gear adjustable, automatic real-time impedance matching.

■ Direct connection output voltage: up to 150Vpp.

■ Overload and short circuit protection.

■ Man-machine interface: 320×240 lattice LCD display.

■ Built-in battery: 4pcs 18650 lithium-ion batteries, nominal 7.4V, 6.8Ah.

Receiver

■ Input mode: flexible caliper.

■ Receiving frequency: Active detection frequency: 640Hz, 1280Hz. Power frequency passive detection frequency: 50Hz/60Hz(user configurable).

■ Cable identification: intelligent identification of flexible calipers.

■ Power frequency measurement: range AC 1-1000A, accuracy ±3%.

■ Man-machine interface: 800x480 LCD display; The liquid crystal size is 121x76mm.

■ Built-in battery: 2pcs 18650 lithium-ion batteries, nominal 3.7V, 6.8Ah.

Others

■ Volume: transmitter 280×220×90mm, receiver 220×125×55mm.

■ Weight: transmitter 2.3kg, receiver 0.9kg.

■ Transmitter charger: Input AC100-240V, 50/60Hz, output DC8.4V/2A.

■ Receiver charger: Input AC100-240V, 50/60Hz; Output DC5V/2A.

■ Operating conditions: Temperature :-10℃-40℃, humidity 5-90%RH, altitude <4500m.

1.4 Equipment Configuration

Transmitter



Figure 1-4-1 Overall transmitter

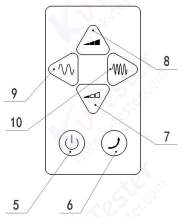


Figure 1-4-2 Transmitter keyboard

1. LCD display
2. Keyboard
3. Output socket
4. Charging socket

5.Power key

6. Re-output key

7/8.Output power reduction/increase key

9/10. Frequency decrease/increase key

Receiver



Figure 1-5-1 Overall Receiver

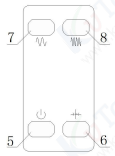


Figure 1-5-2 Receiver keyboard

1. LCD display
2. Keyboard
3. Output socket
4. Charging socket

4. Power key
5. Calibration key
6. Frequency reduction key
7. Frequency increase key

Chapter II Transmitting a Signal General Method

There are two methods for transmitters to transmit signals to cables: direct connection and caliper coupling. This chapter, as a general introduction to these methods, has its particularity for cable identification and is specifically introduced in Chapter 3.

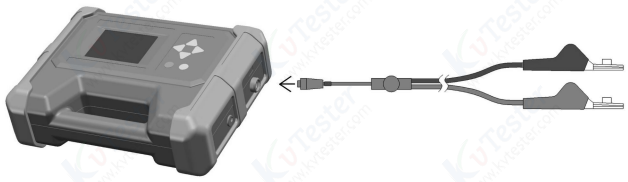
2.1 Direct Connection Method

The direct connection method is to connect the output line of the transmitter directly to the metal cable and inject the signal directly. The direct connection method is suitable for: communication cables, power cables, cathodic protection pipeline test points or other access points, and continuous metal structures with long line characteristics.

Compared with other methods, the direct connection method can get the maximum emission current, so if the conditions allow, the direct connection method should be used as far as possible.

2.1.1 Direct Output Cable Connection

Insert the 5-core red plug directly connected to the end of the output cable into the output socket of the transmitter.



2-1-1 Direct connection method connection

> Warning !
>
> The maximum output voltage of the transmitter is 150Vpp, do not directly touch the output clip and the target pipeline when working!

2.1.2 Interface Introduction and pipeline Voltage Detection

Press and hold the key to turn on the transmitter power.

When the transmitter is not connected to any accessories, the screen displays as follows:



Figure 2-1-2 Output prohibition screen

The transmitter automatically detects the connected accessories and works in the direct connection mode. In the direct connection state, the pipeline's own voltage will be measured first. The screen is shown as follows:

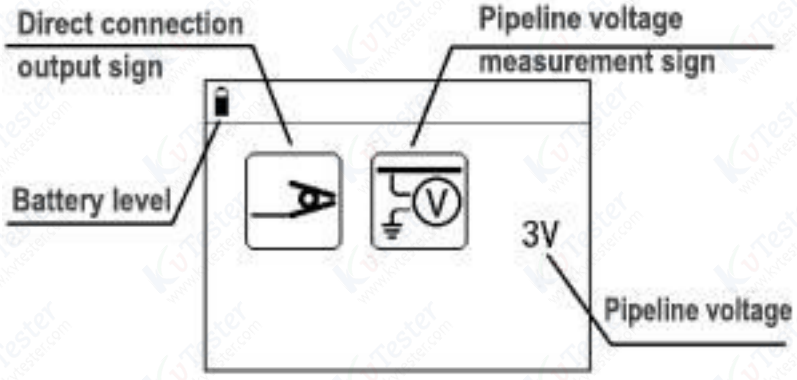


Figure 2-1-3 Pipeline voltage measurement interface

If the voltage of the pipeline itself exceeds the limit (50V), it stays at the voltage detection interface, and displays a warning sign, and does not output a signal to protect the instrument from damage, the screen is displayed as follows:

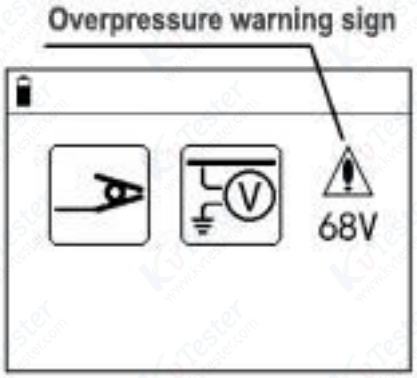


Figure 2-1-4 Pipeline voltage overvoltage warning page

If the voltage is normal, the automatic output signal after a few seconds, the screen is as follows:

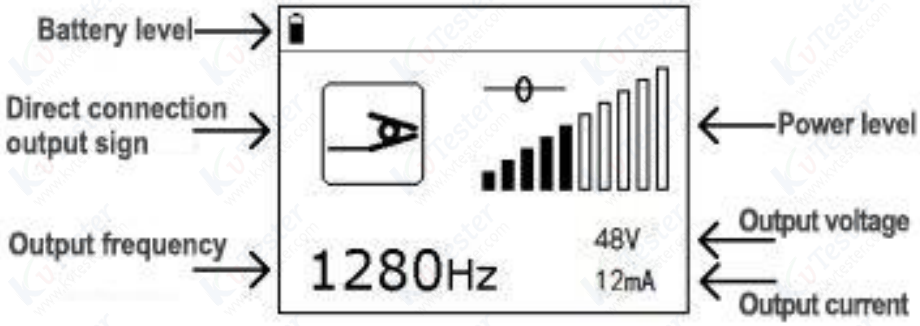


Figure 2-1-5 shows the direct connection output interface

2.1.3 Frequency Selection

Select the transmission frequency by frequency decrease key and frequency increase key. Two frequencies are available: 640Hz and 1280Hz. The default startup time is 1280 Hz.

There is no standard for choosing which frequency, which can be flexibly selected according to the following principles and the actual receiving detection effect:

■ Generally, a well-grounded cable or pipeline can be used to complete most of the tests by starting the default 1280Hz.

■ Low frequency (640Hz) is recommended for tracking long distance pipelines. Low-frequency signals travel long distances and are not easily sensed on other pipelines.

2.1.4 Output Power Regulation

Press the output power reduction key or output power increase key to adjust the output level (signal size), a total of 10 levels, the lower right corner of the screen display output voltage and current.

The output level should be adjusted as needed:

■ A large current contributes to stable detection and accurate sounding.

■ Reducing the output power helps to extend battery life, but it should not be considered too much.

2.2 Caliper Coupling Method

The caliper coupling method is suitable for situations where the pipeline is exposed, but cannot (or is not allowed to) contact its metal part, and the two ends of the pipeline are grounded (especially for power cables).

The advantage of caliper coupling signal transmission is that it is easy to use, does not need to be electrically connected with the pipeline, does not have any impact on the normal operation of the pipeline, and can reduce the induction of other pipelines; The disadvantage is that the coupled current is less than the direct connection method, especially the two ends of the pipeline must be well grounded, and some pipelines can not meet this requirement.

2.2.1 Caliper Connection

Plug one end of the transmitter attachment connection cable (red 5-pin plug at both ends) into the transmitter caliper socket and the other end into the transmitter output socket

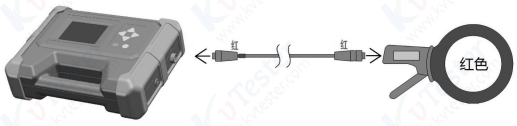


Figure 2-2-1 Calipers Connection

2.2.2 Clamp Pipeline

The caliper clamp the exposed part of the pipeline, as shown below:

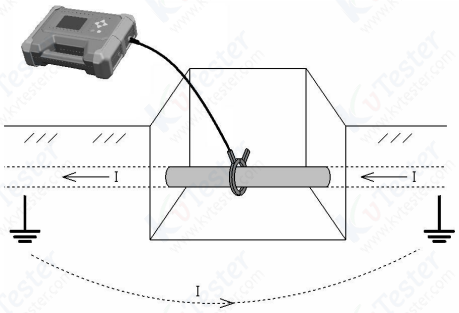


Figure 2-2-2 Caliper coupling method

2.2.3 Interface Introduction

When the transmitter is turned on, it automatically detects the connected accessories and works in caliper mode. The screen displays as follows:

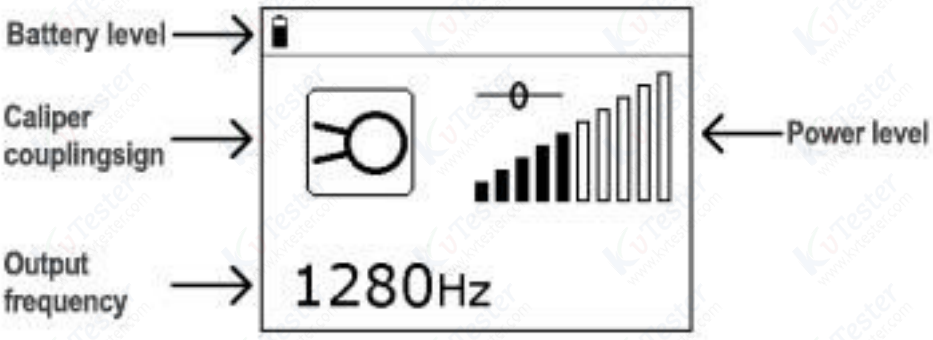


Figure 2-2-3 Caliper coupling output interface display

2.2.4 Frequency Selection

Select the transmission frequency by frequency decrease key and frequency increase key. Two frequencies are available: 640Hz and 1280Hz. The default startup time is 1280Hz. The

frequency selection method of caliper coupling method is the same as that of direct connection method.

2.2.5 Output Power Regulation

Press the output decrease key and output increase key to adjust the output level, a total of 10 levels.

The current coupled to the line using a caliper is much smaller than the direct connection method, and the maximum output level should be used as far as possible.

The caliper coupling method does not show the voltage and current coupled to the line.

Chapter III Signal Transmission Method for Cable Identification

Cable identification plays an important role in metal pipeline detection. Compared with the single continuous metal structure of the metal pipeline, the cable is composed of several core wires and metal armor. The difference in structure and use causes the difference in the signal application mode during identification. Therefore, this chapter describes the signal transmission mode of cable identification separately.

3.1 Outage Cable Signal Transmission Method

3.1.1 Basic wiring method: core wire-ground connection

Core-ground connection is the best way to identify offline cables (non-live cables that exit operation), which can give full play to the functions of the instrument and maximize anti-interference, as shown in the figure below:

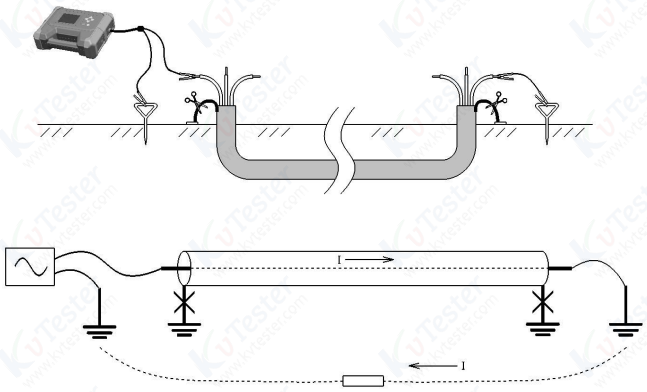


Figure 3-1-1 core cable-ground connection

Loosen the ground wires at both ends of the cable metal shield, the neutral wire of the low-voltage cable and the ground wire should also be loosened, and the red crocodile clip of the transmitter should hold a intact core wire, and the black crocodile clip should be held on the ground drill. At the opposite end of the cable, the corresponding core wire is connected to the ground drill.

Note: Try to use the ground rod, rather than directly using the grounding net! At least the opposite end of the cable must use a ground rod. The ground rod must be a certain distance away from the grounding network. Otherwise, the ground cable will backflow on other cables, affecting the detection effect.

The current flows from the transmitter through the core wire, into the earth at the opposite end of the cable, and back to the transmitter at the near end. In this connection, the receiver can sense a strong signal during ground detection, and the signal characteristics are clear. The signal flows over the well-insulated core wire, does not flow to the adjacent line, especially does not flow to the crossed metal pipe, and is best suited for cable identification in complex environments. In addition, because the cable is grounded, the signal voltage flowing through the cable is very low, and it is not easy to produce capacitive coupling to the adjacent line, reducing interference.

Due to the distributed capacitance between the core wire and the earth, the current will gradually decrease with the increase of distance. However, if the ground is good and the capacitance current is small, it can be ignored.

The disadvantage of this method is that all the ground wires at both ends of the cable need to be untangled, which is slightly cumbersome.

3.1.2 Sheath-Earth Connection

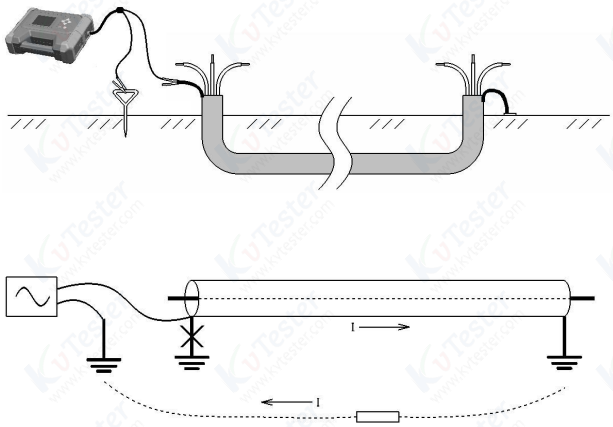


Figure 3-1-2 Sheath - earth connection method

As shown in the figure above, loosen the grounding cable of the protective layer at the near end of the cable. The neutral wire and ground cable of the low-voltage cable should also be ungrounded. The protective layer of the cable at the opposite end should be grounded. The signal should be added between the Sheath and the grounding rod (**the grounding network should not be used)**,Keep the cable phase in the air. The current flows from the transmitter through the sheath, into the earth at the opposite end of the cable, and back to the transmitter at the near end. This connection does not have shielding, so the signal generated on the ground is the strongest, and the signal characteristics are more clear. Similarly, the signal will gradually decay from near to far due to the presence of the shield-ground distribution capacitance.

Potential problems: If the insulation layer outside the Sheath is damaged, part of the current will flow into the ground from the damaged point, resulting in a sudden decrease in the current after the damaged point, and the reduction amplitude is related to the grounding resistance of the damaged point.

3.1.3 Phase- Sheath Connection

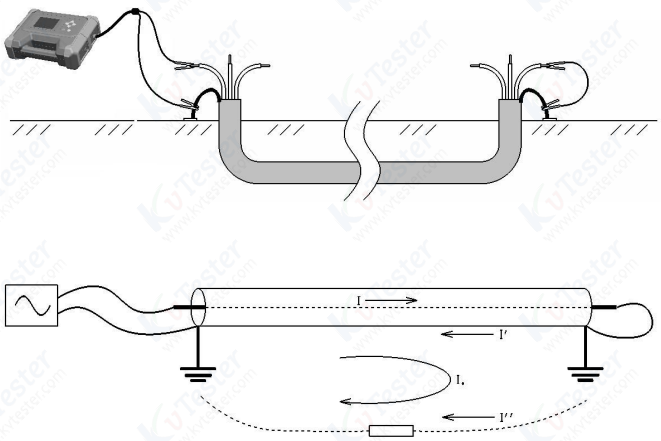


FIG. 3-1-3 phase - sheath connection

As shown in the figure above, the transmission signal is added between the cable phase and sheath, the terminal phase line and the sheath are short-circuited, and the two ends of the sheath are kept grounded.

If it is a single cable laying, the signal from the transmitter flows through the core wire, and then returns through the two loops of the sheath and the ground. Because the sheath (armor and copper shielding layer) is composed of continuous metal, the resistance is very small; Due to the existence of ground resistance at both ends of the earth circuit, coupled with soil resistance, the total resistance value is large, so most of the current will return through the sheath, and a small part of the current will return through the earth. Because the core current and the sheath current are reversed, the effective current that can generate the magnetic field signal at a certain distance outside is its difference, and the value is equal to the resistance current returned through the ground. In addition, due to the mutual inductance of core-sheath loop and sheath earth loop, induced current can also be generated in sheath earth loop through electromagnetic induction. The combined effect is that the effective current is equal to the vector sum of the resistance current and the induced current of the ground circuit (there is a phase difference between the two). Depending on the field conditions, the effective current may account for a few to a dozen percent of the total injection current.

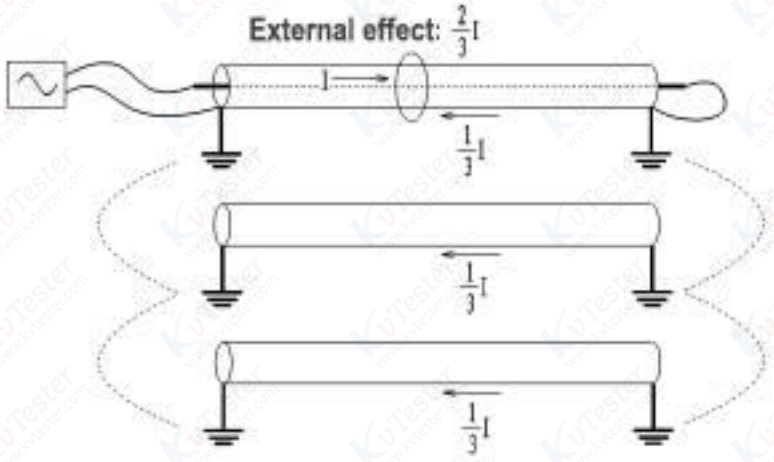


Figure 3-1-4 Shunt effect of parallel cable

If there are other cables laid in the same path (both ends are in the same position), the return current is mainly divided by the sheath of several cables, for example, three cables in the same path, then the sheath return current of the three cables accounts for 1/3. The effective current is forward, accounting for 2/3 of the injection value, and the adjacent current is reverse, accounting for 1/3. As shown in the picture on the below.

The advantage of the phase wire-sheath method is that the connection is simple and the ground wire does not need to be untangled. The disadvantage is that when multiple cables are laid in the same path, the signal difference of each cable is not large, and it is sometimes difficult to distinguish only by the signal amplitude; When a single line is laid, the effective current is greatly reduced, the signal is weak, and the effective current contains inductive current components, the induction signal phase of the target cable and the adjacent pipeline is the same, and it may not be able to eliminate the interference of the adjacent line according to the current direction when using the composite frequency detection.

3.1.4 Transmitting Frequency Selection

■ For common cable detection, the default 1280Hz frequency is recommended. Its frequency is low, the propagation distance is long, and it is not easy to sense other pipelines; Moreover, the receiver's receiving effect of 1280Hz signal is stronger than 640Hz, and the anti-interference ability is

stronger and easier to distinguish.

■ For long distance cables (longer than 2-3km), if the 1280Hz signal is used, there will be a large attenuation at a long distance, the signal is not easy to receive, and the phase will be offset. Therefore, it is recommended to use 640Hz transmission signal for detecting long-distance cables.

■ Both 640Hz and 1280Hz are composite frequency signals, and the receiver can judge the phase.

3.2 Running Cable Signal Transmission Method

3.2.1 Caliper Coupling Method

This is an ideal way to detect running cables, do not require any changes to the cable can be tested, and operate away from high voltage, very safe, there is a signal on the entire length of the cable, there is no distance limit.

Both ends of the cable sheath must be well grounded, otherwise the coupling current will decrease with the increase of the grounding resistance.

The two ends are not grounded, or the middle of the cable sheath is disconnected, and the caliper coupling method cannot be used.

Clamp cable body

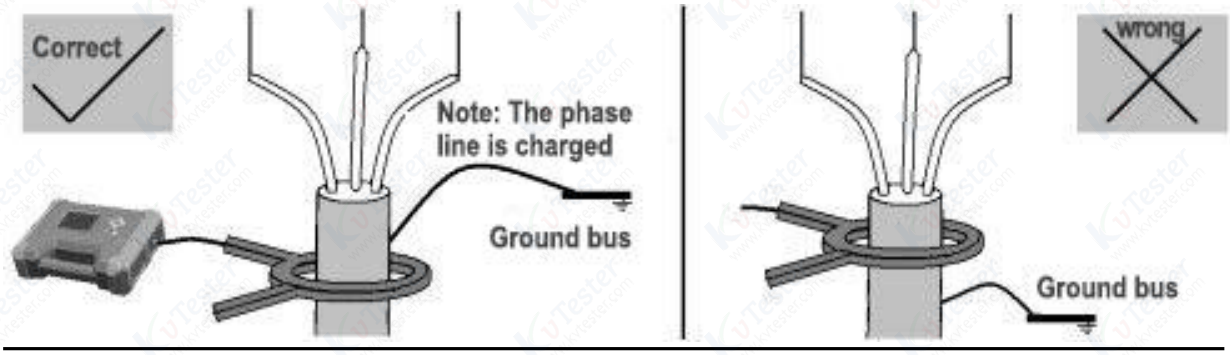


Figure 3-2-1 Running cable caliper coupling method 1 (stuck cable body)

As shown in the figure above, this method is suitable for the detection of ordinary three-phase turnkey operation cables. The transmitter output is connected to the caliper, the caliper is stuck on

the cable body (note that the above part of the grounding line can not be stuck), the caliper is equivalent to the primary of transformer, the cable metal sheathing - earth loop is equivalent to the secondary (single turn) of the transformer, the size of the secondary coupling current is closely related to the circuit resistance (mainly the grounding resistance at both ends), the smaller the resistance, the greater the current.

The current obtained by the cable coupling through the caliper is small, so in order to strengthen the detection effect, a larger output level should be selected.

Chapter IV Cable Identification

In power construction, the identification of the uniqueness of the cable is a very strict task because it involves facilities and personal safety.

Intelligent recognition of flexible calipers is a recognition method with the most definite result and the strongest anti-interference ability.

4.1 Choice of Signal Transmitting Method

■ The transmitter must be set to 1280Hz or 640Hz. Generally, the default 1280Hz is used. 1280Hz can meet most test requirements, and 640Hz can be selected for ultra-long cables.

■ For non-running cables, the direct connection method is used, and the core-earth connection method is preferred. If it is not convenient to connect, use phase wire-sheath connection, sheath - ground connection is not recommended.

■ The caliper coupling method is preferred for running cables.

4.2 Receive Flexible Caliper Connection

Plug the outlet of the flexible caliper into the receiver's accessory input socket.

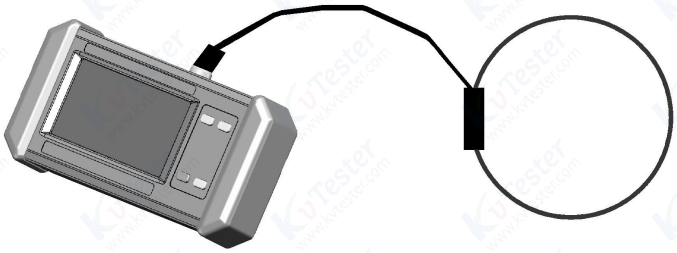


Figure 4-1-1 Receive flexible caliper connection

4.3 Interface Introduction

In the startup state, the receiver automatically recognizes the connected accessories, set to the caliper receiving mode, the interface is as follows:

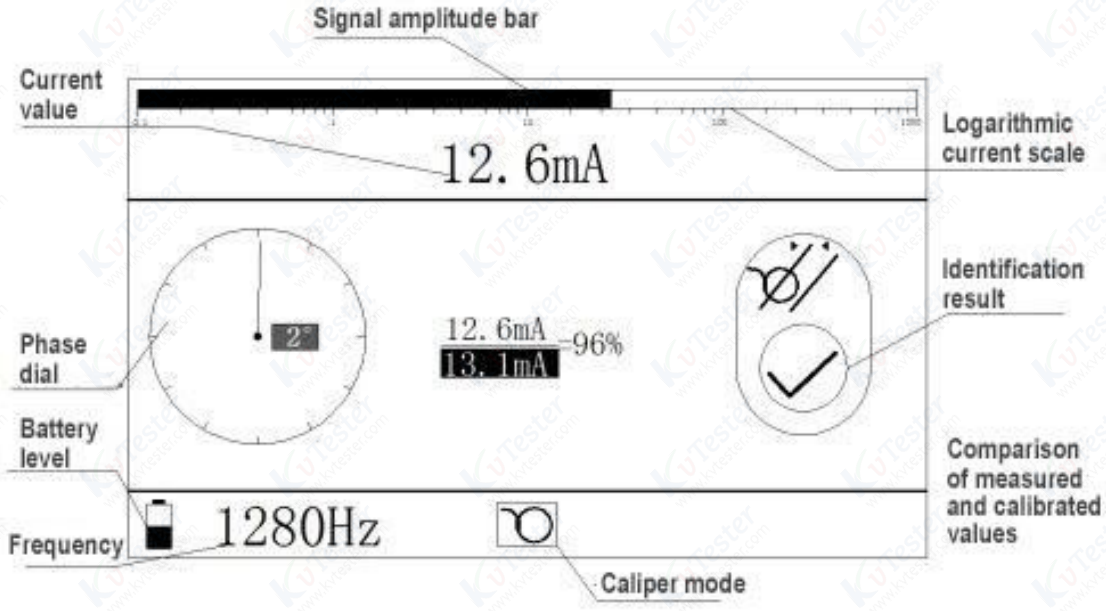


Figure 4-1-2 Flexible caliper identification interface

The receiver starts up at 1280Hz by default, and the frequency is set to be consistent with that of the transmitter. The current value is displayed directly in caliper mode, and the percentage is calculated compared with the calibrated current. Phase dial displays current phase; The recognition result displays the correct icon ✓ or the wrong icon ✗.

4.4 Calibration

Flexible caliper intelligent recognition requires the receiver to first measure its current intensity and phase at the known position of the target cable, as a benchmark for comparison, and compare the measurement results at unknown points with the benchmark to make a correct or wrong judgment. The process of measuring and recording the reference current and phase is called calibration.

Calibration is carried out in a position close to the transmitter that is guaranteed not to be interfered with. For a caliper coupled transmit signal, it should be at least 2m away from the transmit caliper. Clamp the receiving caliper on the target cable.

Note that the direction arrow of the caliper must point to the end of the cable.

Press the receiver calibration key, the lower right corner of the screen prompts ?, asking whether to calibrate the caliper, if you press other keys, the calibration operation will be canceled, if you press the calibration key again, the display will become !, indicating that the calibration is completed: The current phase returns to zero, the phase dial pointer points directly above, the Angle under the dial becomes 0°, and the current value is used as the denominator of the comparison calculation (reverse display), and the recognition result is displayed ✓.

Subsequent identification measurements are taken as the benchmark. Data shutdown is not lost after calibration.

When another cable is identified, it must be re-calibrated for the new target cable.

4.5 Recognize

Leave the mark point, reach the position that needs to be identified, and clamp the flexible caliper on the cable.

Keep the arrow of the flexible caliper pointing towards the end of the cable.

If the target cable is stuck, its current strength and phase should be little different from the measured results at the standard point, if the following criteria are met:

■ The current value is greater than 75% of the calibration value and less than 120%

■ Current phase difference does not exceed 45°

It indicates that it is the target pipeline, and the identification reference result is displayed ✓. If it does not meet the above criteria, it indicates that it is other nearby pipelines, and the identification reference result is displayed ✗.

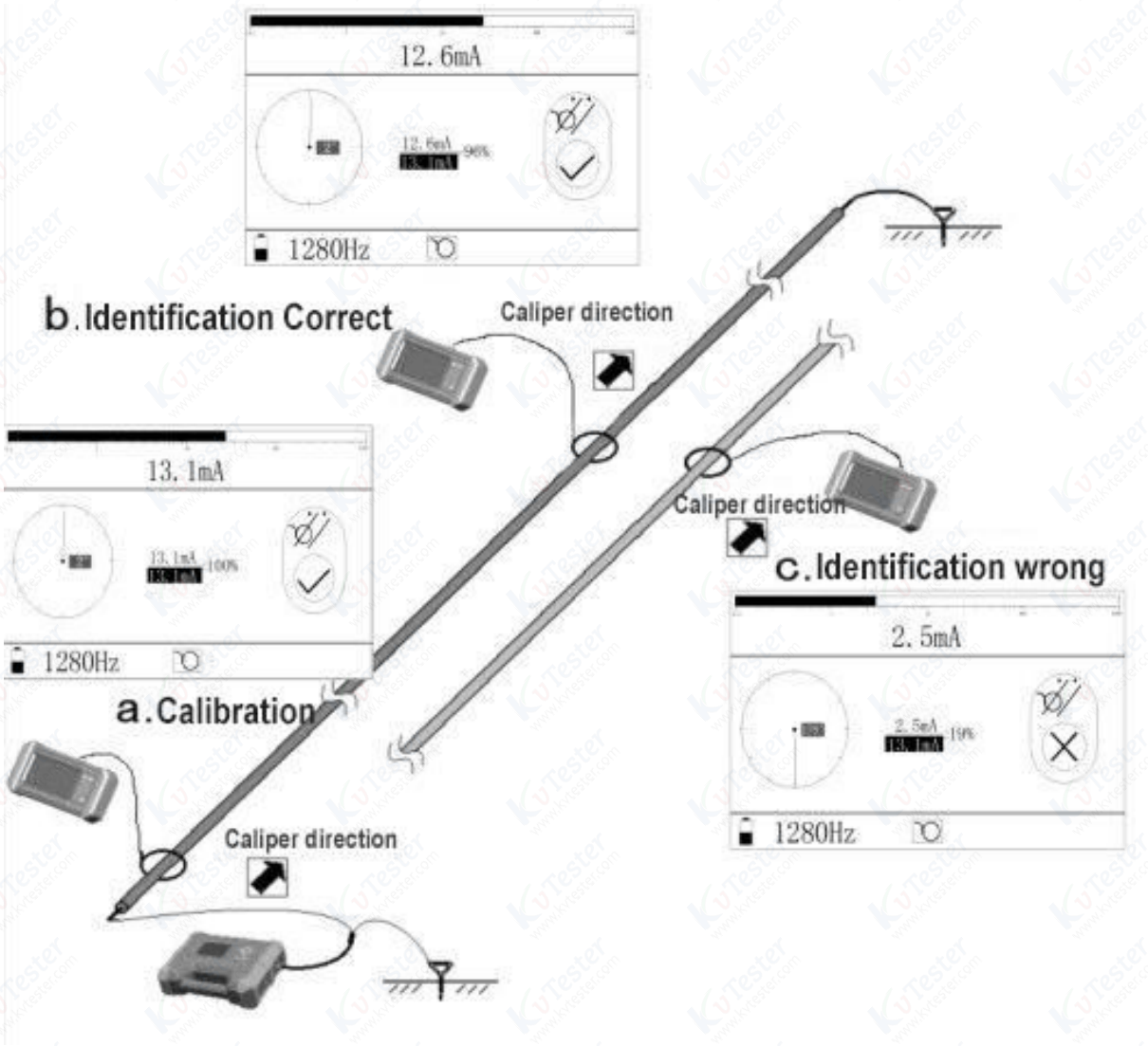


Figure 4-1-3 Intelligent identification process of calipers

Note:

■ During calibration and identification, the direction arrow of the receiving caliper must point to the

end of the cable, and ensure that the caliper is properly closed.

■ The core-earth connection method is more complicated to use, but the effective current on the target cable is the largest, and it is not easy to be interfered by nearby cables, so it should be preferred. Example: If the current of the target cable is I and the phase is near 0°, the identification is correct. The adjacent line current is much less than I, and the phase is close to 180° or unstable, indicating an identification error.

■ When the signal is transmitted by the phase wire-sheath connection method, the effective current will be smaller if there is no parallel cable laid on the same route (that is, the same path and the same positions at both ends); If there are cables along the same path, the current of the target cable is approximately equal to the sum of the current of other cables.

➢Example 1: Three cables are in the same path (including the target cable), and the measurement result is as follows: The current of the target cable is I, and the phase is near 0°, indicating that the identification is correct; The current of the two adjacent lines is I/2 respectively, and the phase is near 180°, indicating an identification error (see Figure 3-1-4 shunt effect of parallel cables).

➢Example 2: Two cables are in the same path (including the target cable), and the measurement result is as follows: The current of the target cable is I and the phase is near 0°, indicating that the identification is correct; The current of the other adjacent line is also I, and the phase is near 180°, indicating an identification error. In this case, because the current strength is basically the same, it can only be distinguished by phase, and special attention is needed to the direction of the caliper.

➢Example 3: The path of other parallel cables and the target cable is different (generally the end is in different positions), the measurement result is: the target cable current is I, but the value is much smaller than the transmitter injection value, and the phase is near 0°, indicating that the identification is correct; The adjacent line current is close to 0, and the phase is close to 180° or unstable, indicating an identification error (see Figure 3-1-3 phase line-sheath connection).

■ If the sheath-earth connection method is used to transmit signals, the current after the damaged grounding of the sheath-insulation will decrease, which may affect the use of the current intensity criterion, so it is not recommended.

■ If the caliper method is used to transmit signals to the running cable, because the transmitting

caliper will radiate signals to the space to interfere with the reception, it must be ensured that the distance between the transmitting and receiving calipers is 2 ~ 5m during calibration. The method of judging whether it is disturbed: calibrate first, and then in the same position, leave the caliper from the cable, only close in the air, observe the measured current value, if the current is far less than the current at the time of calibration and close to 0, indicating that the distance left is enough; Otherwise, the distance between the two should continue to increase.

■ If the caliper method is used to transmit signals to the running cable, it must be ensured that the two ends of the cable are well grounded to form a large coupling current. If the current is small, it should be noted and checked, including confirming that the jammed cable is the target cable.

■ This method is not suitable for identifying ultra-high voltage single-core running cables. Because the power frequency current flowing through the single-core cable core is very strong, and there is no three-phase counteracting effect of the three-core cable (external performance is relatively small zero sequence current), if the caliper is stuck in the cable body, it is easy to cause magnetic saturation of the caliper, and it is unable to correctly receive high-frequency signals.

Safety warning!

1. Cable identification involves personal and facility safety, and must be excluded based on the results given by the instrument, first according to a variety of field information (such as cable diameter, etc.), and the rest should fully analyze the difference between the current strength and phase of each parallel cable, and finally make a judgment.

2. The correct judgment of the instrument is based on the correct operation. Please be sure to ensure the correctness of the wiring method and calibration operation.

3. If two or several cables are displayed correctly, or all are displayed incorrectly, and the current value and phase are not very different, you must pay special attention, do not easily conclude, this situation is likely to be the transmitter wiring method is wrong, the following errors should be checked first:

a) Forget to calibrate or calibrate incorrectly.

b) The caliper direction is inverted.

c) There is no card target cable in the identification, but only a few adjacent lines are stuck.

d) Improper selection of signal transmission methods.

e) There is dirt at the mouth of the caliper, and it should be re-calibrated and identified after being wiped clean.

4. If you can't judge, please use other methods to further identify!

Chapter V Power Frequency Current Measurement

Power frequency current measurement is widely used in power, communication, railway, oil field, construction, measurement, industrial and mining enterprises and other fields. The main function is to measure on-site AC high current, leakage current and so on.

Flexible caliper coil part without any bare metal conductor, non-contact measurement, safe and fast, its small size, light weight, high measurement accuracy, strong reliability, wide response frequency band, Especially suitable for narrow environment and line dense places, transformer wall

ground core current test, coarse wire cable test, relay protection, SCR rectifier, speed change frequency modulation signal serious distortion of the industrial environment current test.

5.1 Interface Introduction

Under the startup state, the receiver automatically identifies the connected accessories and sets the caliper receiving mode. Press the frequency reduction key or frequency increase key to enter the power frequency current measurement interface. After the flexible caliper is correctly connected, the current measurement can be carried out.

5.2 Position Error

The measured wire should be in the center of the flexible caliper as far as possible, not close to the opening and closing mouth, and the test error at the opening and closing mouth will be doubled or more.

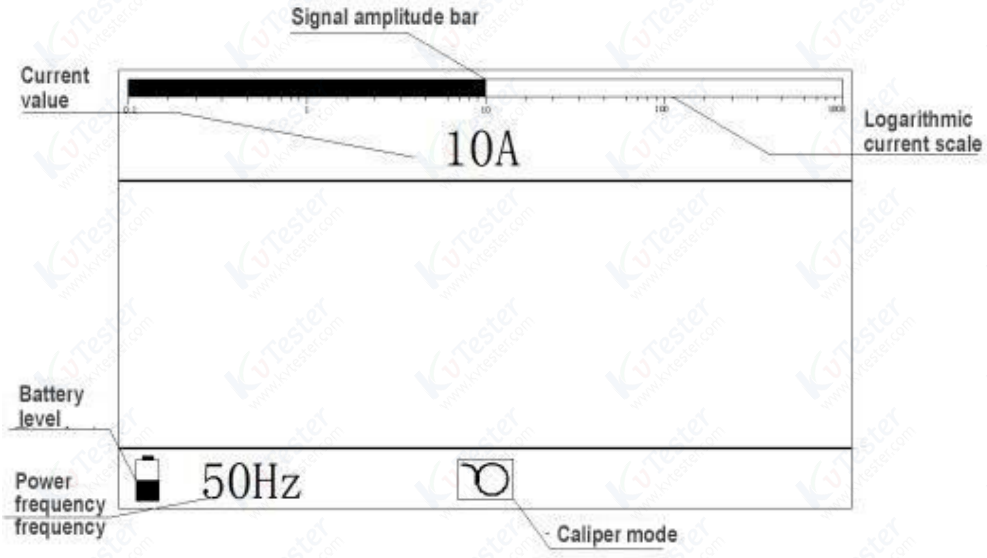


Figure 5-1-1 Power frequency current measurement interface

Chapter VI Maintenance and Warranty

6.1 Charging

The instrument has a built-in lithium battery pack, and the continuous working time is different with the output level, but it can generally meet the needs of 8 hours of work a day.

In use, the battery level icon is displayed at the bottom left of the screen, in the transmitter: the black part of the icon is the battery level, all black represents the full power, all empty and blinking indicates the battery undervoltage, the battery symbol shows a cross , indicating that the power is used up, and will automatically shut down after a few seconds; In the receiver: the colored part of the icon is the battery level, all green represents the full power, all empty indicates the battery undervoltage, and the receiver will automatically shut down after 2 seconds when the buzzer prompts.

When it is necessary to charge, connect the plug of the charger to the "charging" socket of the transmitter/receiver, and the AC plug of the charger to the 220V/110V mains socket.

The indicator light of the charger indicates that it is charging, and the green indicator indicates that the charging is complete. Keeping the indicator light green after a period of time helps to charge more electricity.

In the off state, it takes about 3-4 hours for the transmitter to be fully charged from the undervoltage state. The receiver takes about 2-3 hours.

Depending on the use and maintenance conditions, the battery pack can generally carry out 300-500 charge and discharge cycles. With the increase of the number of charge and discharge, the battery capacity will gradually decrease, and the working time of the instrument will be shortened accordingly, and when it is too short to be acceptable, the battery needs to be replaced. The battery is 18650 lithium battery, the capacity is better than 3400mAh, the recommended model is Panasonic NCR18650B (capacity is 3400mAh), or a larger capacity model. The transmitter requires four batteries and the receiver requires two batteries.

Warning: Be sure to pay attention to the positive and negative battery direction when replacing!

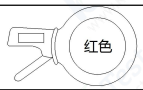
6.2 Quality Guarantee

Instrument host one year warranty. When the time limit is exceeded, only the cost of replacing the device will be charged during maintenance. If the damage caused by improper use (including the warranty period), or product quality problems occur beyond the warranty period, our company is responsible for maintenance, maintenance only charge the cost of replacing the device.

If there is automatic shutdown, do not turn on, immediately shut down after turning on and other phenomena, it may be insufficient battery power, please try to charge before use.

If there are other problems, please do not attempt to repair by yourself, so as not to expand the fault, please contact the company for timely maintenance and service.

Chapter VII Packing List

S/N	Name	Remark	Qty
1	Cable identification transmitter		1
2	Cable identification receiver		1
3	Transmitter direct connection output cable		1
4	Ground rod		2
5	charger	Two as standard, separate charging of transmitter and receiver	2
6	Transmitter accessory output cable	 (Red 5-pin plug)	1
7	Transmit caliper		1
8	Receive flexible calipers		1
9	Ground extension cord		1

KVTESTER ELECTRONICS TECHNOLOGY CO.,LTD.

Website:www.kvtester.com

Address:No.120,GuangguRoad,EastLakeNewHigh-techDevelopmentZone, Wuhan,China

Email:sales@kvtester.com

Tel:0086-27-81778799

Fax:0086-27-81778799

Mobile:0086-18302705967

Whatsapp:008618302705967