JK2816C/2817B/2811D/2811C

LCR meter

OPERATION MANUAL

Company statement:

This specification may not describe all the contents of the instrument. The company has the right to improve and improve the performance, function, internal structure, appearance, accessories, packaging of the product without further explanation. If the instructions are inconsistent with the instrument, you can contact our company.

Chapter one   Ready to use

This chapter describes some of the checks that must be done when you receive the instrument and the conditions that must be understood and met before installing and using the instrument.

1.1 Open box examination

Thank you for purchasing and using our products. Before you use this instrument, please check and check it according to the random packing list. If there is any discrepancy, you can contact us as soon as possible to safeguard your interests.

1.2 Power requirements

（1）Power supply voltage range：198V～242V or　99V～121V。

（2）Frequency range of power supply：47.5 Hz～63 Hz。

（3）Power supply range：≤20VA。

（4）The power input phase line L, zero line N, ground wire E should correspond to the power plug of this instrument.

（5）This instrument has been carefully designed to reduce the clutter interference caused by AC power input. However, it should be used in low noise environment as far as possible. If unavoidable, install power filter.

Warning: In order to prevent leakage of electricity to the instrument or human damage, users must ensure that the power supply to the ground reliable connection.

1.3 Surrounding environment:

（1）Please do not use dust, vibration, direct sunlight and corrosive gases.

（2）The normal working temperature of the instrument should be between 0℃～40℃,relative humidity 75%, so please try to use the instrument under these conditions to ensure the accuracy of measurement.

（3）This instrument has been carefully designed to reduce clutter interference at the power end, but it should still be used in low noise environments as far as possible. If unavoidable, install a power filter.

（4）If the instrument is not used for a long time, please store it in the original packing box or similar box in the ventilation room with the temperature of 5℃～40℃ and the relative humidity of less than 85% RH. Air should not contain harmful impurities in the corrosion gauge, and direct sunlight should be avoided.

（5）Instruments, especially those connected with the tested parts, should be far away from strong electromagnetic fields, so as to avoid interference with measurement.

1.4 Use test fixture:

Please use the test fixtures or cables provided by our company, user-made or other company's test fixtures or test cables may result in incorrect measurement results.The

instrument test fixture or test cable should be kept clean, and the pins of the device under test should be kept clean to ensure good contact between the device under test and the fixture.Connect the test fixture or cable to Hcur, Hpot, Lcur and Lpot of the front panel of the instrument. For the tested parts with shielding shell,The shielding layer can be connected to the "⊥" of instrument.

1.5 Preheating and continuous working hours:
In order to ensure accurate measurement, the preheating time should not be less than 15 minutes, and the continuous working time should not be more than 16 hours.

1.6 Other characteristics of the instrument:
（1）Power consumption: power consumption≤20VA。
（2）Shape size（W*H*D）：310mm*110mm*310mm；
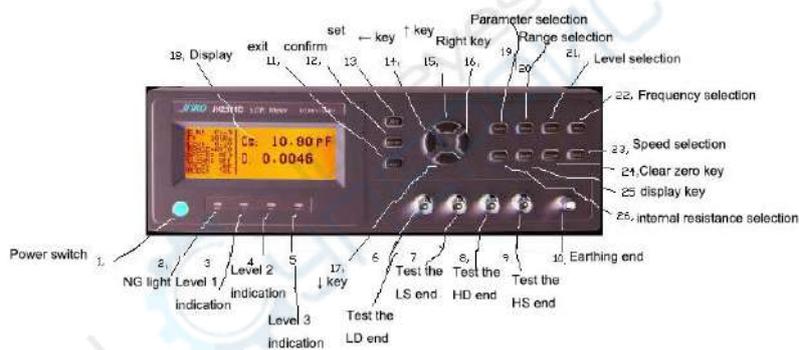（3）weight ：about　3.5kg；

chapter two　　panel explanation

Figure 4.1

(1)First level menu

The first class menu is shown in Figure 4.1, and the LCR meter display definition is as follows:

Display	Definition
FUN	Test parameters, optional parameters：Cs-D、Cp-D、Ls-Q、Lp-Q、Z-D、 R-Q Combination of six parameters
F	2816C Test frequency,Optional frequency has:50Hz,60Hz,80Hz, 100Hz,120Hz,200Hz,400Hz,500Hz,800Hz,1kHz,2kHz,4kHz,5kHz,8kHz, 10kHz,20kHz,25kHz,40kHz,50kHz,100kHz,200kHz Twenty-one test frequencies 2811DTest frequency:100Hz,120Hz,1kHz,10kHz,Four test frequencies 2811C Test frequency:100Hz,120Hz,1kHz,10kHz,Four test frequencies 2817B Test frequency:50Hz,60Hz,80Hz,100Hz,120Hz,200Hz, 400Hz,500Hz,800Hz,1kHz,2kHz,4kHz,5kHz,8kHz,10kHz20kHz,25kHz,40kHz, 50kHz,100kHz,Twentytest frequencies
LEVE	Test level, optional level:1V,0.3V,0.1V Three levels
RANGE	Test range, optional range: Auto (AUTO) and lock (HOLD).
SPEED	The test speed is fast (FAST), medium (MED), slow (SLOW) three test speed.
CLEAR	Clear
IN_R	Test internal resistance, optional internal resistance:30Ω and 100Ω
MODE	The display modes are: direct reading (TOL) and percentage (TOL%).

(2) two level menu

NOMNAL:		[BIN]	[LOW]	[HIGH]
1.0000uF		1	-00.00%	00.00%
COMP:	ON	2	-00.00%	00.00%
ALARM:	ON	3	-00.00%	00.00%
TRIG:	INT	D	0.0000	0.0000
RS232:	ON			

chapter three   Operation description

JK2811D/2817B/2816C LCR digital bridge is an intelligent instrument for measuring inductance L, capacitance C, equivalent resistance R, loss tangent D, quality factor Q, impedance Z based on microprocessor technology.The instrument integrates practical functions, good performance and simple operation.It can be widely used in factories, colleges and other users to accurately measure component parameters.In order to ensure the accurate measurement of the instrument, the stray capacitance and lead resistance caused by the measuring clip can be removed by the "0" function of the instrument.

3.1: General operating instructions

3.1.1 Insert the power plug, press the front panel power switch to ON, the display window should be changed digital display, otherwise, please restart the instrument.

3.1.2 Preheat for more than 15 minutes, and achieve normal heat balance after standby,Carry out normal measurement.

3.1.3 According to the component under test, select the appropriate measuring fixture or measuring cable, the component under test should be clean, so that it keeps good contact with the measuring end.

3.1.4 Select the corresponding measurement conditions according to the requirements of the tested components.

3.2：First level menu operation method:（JK2811C No sorting alarm function, others with 2811D）

3.2.1 Parameter setting ：Change the measurement parameters according to the [parameter] keys. When the parameter key is pressed, the reverse color is displayed, and the color bar is cancelled after loosening.

3.2.2 Frequency setting: changing the measuring frequency according to the [frequency]key. The key can be pressed continuously to change the frequency.

3.2.3 Level setting: press the [level] key to change the measurement level. The key can be pressed continuously to change the level continuously.

3.2.4 Speed setting: Press the [speed] key to change the measuring speed. The instrument has three test speeds: fast, medium and slow, 10 times / sec, 6 times / sec, 2 times / sec, respectively.

3.2.5 Range setting:The range state is changed according to the[range] key. At this point, "RANGE" after the display parameter color display, show "HOLD" for "range locking", show "AUTO" for "range is not locked.

3.2.6 Clear setting:Clear zero state by pressing [zero] key.At this time, "CLEAR" after the display parameter color display, show "ON" for "zero open" and show "OFF" for "zero off".Turn off zero when changing parameters and frequency.

3.2.7 Internal resistance setting：Press the [internal resistance] key.Change the internal resistance of measurement.

3.2.8 Display setting: Press the [display] key to change the display state.At this point, "MODE" after the display parameter color display, "TOL%" for "percentage display" and "TOL" for "direct reading display".

(1) two level menu

```
NOMNAL:          [BIN]        [LOW]       [HIGH]
1.0000uF          1          -00.00%      00.00%
COMP:    ON       2          -00.00%      00.00%
ALARM:   ON       3          -00.00%      00.00%
TRIG:    INT      D           0.0000       0.0000
RS232:   ON
```

The two level menu is a function menu for setting the limit of the components when sorting.The file limit of component sorting must be set one by one.

Each limit should have two limits: upper limit and lower limit (upper limit (lower limit)).

Display	Definition
NOMNAL	Nominal value setting item
COMP	Sorting switch setting item
ALARM	Alarm switch setting item
TRIG	Trigger mode setting item (Option. This machine is not available.)
RS232	RS232 communication switch setting item(Option. This machine is not available.)
1	Gear 1 setting item
2	Gear 2 setting item
3	Gear 3 setting item
D/Q	Auxiliary parameter setting item

3.3：Auxiliary parameter setting ：

Press two times to enter the two level menu,press ⟨ϖ⟩ , ⟨ω⟩ and △ ▽move Inverse color display bit, make "D" reverse color display, Press the confirmation button again 1 time, At this point, "D" after the first digit anti-color display,   move the anti-color bit, △ ▽ set the current value of the anti-color bit.

After setting up the parameters, press the exit button to exit.The instrument automatically saves the present setting value.

3.4：File limit settings:

Press two times to enter the two level menu, press ⟨ϖ⟩ , ⟨ω⟩ and △ ▽move Inverse color display bit，Make "1" anti-color display, press confirm again, at this time "1" after the first digit anti-color display, move the anti-color bit, △ ▽set the current value of anti-color bit.

After setting up, press the [exit] key to exit settings, and the instrument automatically saves the present setting value.

Other "2" and "3" file settings are consistent with the above operations.

3.5：the nominal value setting:

Press two times to enter the two level menu,press ▭ , ▭ and △ ▽ move Inverse color display bit, Press confirm again, at this time "NOMNAL" under the first digit anti-color display, move the anti-color bit, △ ▽ set the value of the current anti-color bit.

After setting up, press the exit key to exit settings, and the instrument automatically saves the current present value.

3.6：Sorting setting：

Press two times to enter the two level menu, press ▭ , ▭ and △ ▽ move Inverse color display bit, Press Confirmation again, then the "COMP" display bit anti-color display, △ ▽ set the current value of anti-color bit.Shows that "ON" is "sorted open" and shows that "OFF" is "sorted off".

After setting up, press the exit key to exit settings, and the instrument automatically saves the current present value.

3.7：BEEP setting：

Press two times to enter the two level menu,press ▭ , ▭ and △ ▽ move Inverse color display bit , Make the "ALARM" anti-color display, press the confirmation again, at this time "ALARM" display bit anti-color display, △ ▽ set the current value of anti-color bit. Show "ON" to "open the BEEP " and show that "OFF" is "BEEP closed."

After setting up, press the exit key to exit settings, and the instrument automatically saves the current present value.

Chapter four   Basic performance indicators.

4.1Measurement parameters

Inductor L, capacitance C, resistance R, quality factor Q, loss tangent value D, impedance Z.

4.2 Measurement frequency:

Test signal is sine wave, accuracy: 2%

50Hz、60Hz、80Hz、100Hz、120Hz、200Hz、400Hz、500Hz、800Hz、1kHz、2kHz、4kHz、5kHz、8kHz、10kHz、20kHz、25kHz、40kHz、50kHz、100kHz、200kHz

4.3 Measurement parameter combination
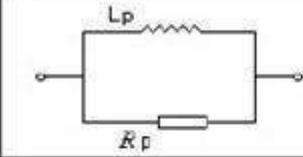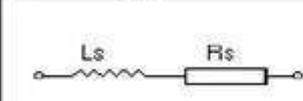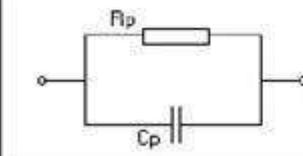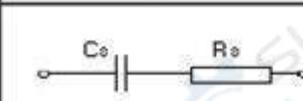
L-Q   C-D   R-Q   Z-Q

4.4 equivalent method: SER: series PAR: parallel connection.

Actual inductance, capacitance and resistance are not ideal pure reactance or resistance elements, but are presented as a complex impedance element in series or in parallel.

This instrument calculates the required value according to series or parallel equivalent circuit, and different equivalent circuit will get different results. The two equivalent circuits can be transformed by converting the formula listed in table 4-1 equivalent circuit. For both Q and D, the equivalent method is the same.

Table 4-1 Equivalent circuit transformation

	Circuit form	Loss D	Equivalent mode conversion
L	L_p R_p	$D=2\pi FL_p/R_p=1/Q$	$L_s=L_p/(1+D^2)$ $R_s=R_pD^2/(1+D^2)$
	L_s R_s	$D=R_s/2\pi FL_s=1/Q$	$L_p=(1+D^2)L_s$ $R_p=(1+D^2)R_s/D^2$
C	R_p C_p	$D=1/2\pi FC_pR_p=1/Q$	$C_s=(1+D^2)C_p$ $R_s=R_pD^2/(1+D^2)$
	C_s R_s	$D=2\pi FC_sR_s=1/Q$	$C_p=C_s/(1+D^2)$ $R_p=R_s(1+D^2)/D^2$

Q, D and Xs are defined as:$Q=X_s/R_s$，$D=R_s/X_s$，$X_s=1/2\pi FC_s=2\pi FL_s$

Note: in element parameters, the subscript s is equivalent to series, and P means parallel equivalence.

Generally, series equivalent circuits are used for low-value impedance elements (basically high-value capacitors and low-value inductors), whereas parallel equivalent circuits are used for high-value impedance elements (basically low-value capacitors and high-value inductors).

At the same time, the equivalent circuit must be determined according to the actual use of the components, such as capacitors.The series equivalent circuit is used for power filter.The parallel equivalent circuit is used in the LC oscillator circuit.

4.5 Range

JK2811D/2817B/2816C uses 5 ranges: 10Ω,100Ω,1kΩ,10kΩ , 100kΩ .

The range can be selected automatically or maintained. The test range is determined by the impedance value of the component under test and the effective measurement range of each range, regardless of the capacitance or inductance of the component under test.

4.6：Test port mode

Four terminal test:

Hcur：Current excitation high end;

Hpot：Voltage sampling high end

Lpot：Voltage sampling low end

Lcur：Current excitation low end

4.7 ：Test speed

Test frequency, integration time, component value, display mode, range mode and comparator all affect test speed.JK2811D/2817B/2816C provide FAST,MED and SLOW The 3 test speed is for users to choose. In general, the slower the test speed, the more stable and accurate the test result is.

FAST (FAST):   About 10 times/second. Medium speed (MED): about 5.1 times/second.

SLOW (SLOW): About 2.5 times /second

4.8：Selection of internal resistance of signal source

It can provide 30 Ω and 100 Ω and two kinds of signal source internal resistance for users to choose. Under the same test voltage, different Internal resistance of signal source will be selected, and different test currents will be obtained. When the tested parts are sensitive to the test current, the test results will be different. Provide two different kinds of signal source internal resistance, which is convenient for users to compare with other instrument manufacturers at home and abroad.

About test current (level)

Test signal level monitor:

Voltage ：   0VRMS ~ 1VRMS   ±(10%*reading value+10mV)

Current ：   0ARMS ~ 50MARMS   ±(10%* reading value +10uV)

To be precise, the measurement of inductors should use smalltest current   as possible (i.e. at a smaller test level). Because of the different signal currents of different instruments, different test results may be obtained when different instruments are used, which mainly depends on the internal resistance of the signal source of the output voltage of the instrument.
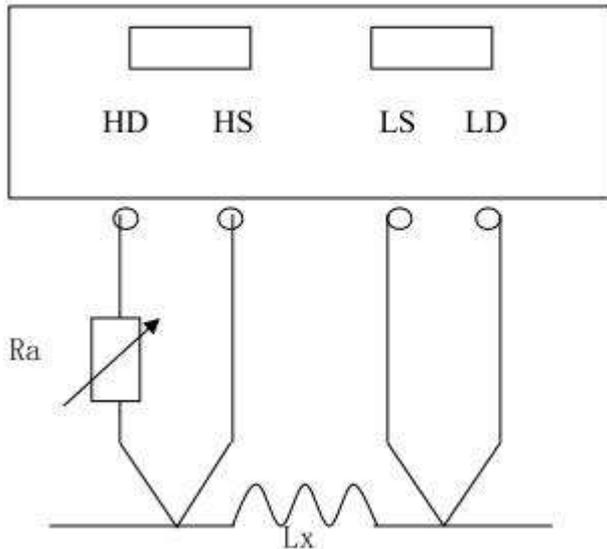
Fig. 7-3 schematic diagram of internal resistance regulation of signal source

When a high test signal is applied to the measuring inductor, It may not be accurately measured at certain frequencies. This is because the nonlinearity of the core material leads to the distortion of the signal current. In order to reduce the effect caused by the nonlinearity of the core material, the test signal level should be reduced.

4. 9：Select series or parallel mode

Selection of capacitance equivalent circuit

The small capacity corresponds to the high impedance value, and the influence of parallel resistance is greater than that of series resistance. At this point, the series resistance is negligible compared to the impedance of the capacitor. Therefore, the parallel equivalent method should be chosen for the measurement.

On the contrary, the large capacitance corresponds to the low impedance, and the parallel resistance is negligible compared with the capacitance impedance, while the series resistance has a greater influence on the capacitance impedance. Therefore, the series equivalent method should be selected for measurement.   Generally speaking, the capacitance equivalent circuit can be chosen according to the following rules.

When 〉 10kΩ, select the parallel mode.

When ＜10Ω ,，Select   series mode

Between the above impedance,a suitable equivalent circuit is used according to the recommendation of the component manufacturer.

Selection of equivalent circuit for inductors

The large inductance corresponds to the high impedance value, and the influence of parallel resistance is greater than that of series resistance. Therefore, it is more reasonable to choose parallel equivalent method for measuring.

On the contrary, the small inductance corresponds to the low impedance value, and the series resistance is more important to the inductance. Therefore, it is more appropriate to

measure in series. Generally speaking, the inductance equivalent circuit can be selected according to the following rules:

When 〉 10kΩ, select the parallel mode.

When ＜10Ω ,， Select series mode

Between the above impedance,a suitable equivalent circuit is used according to the recommendation of the component manufacturer.

4.10 ：Basic accuracy

C：0.1% (1+ C_x/C_{max}+ C_{min}/C_x)(1+D_x)(1+ks+kv+kf),

L：0.1% (1+ L_x/L_{max}+ L_{min}/L_x)(1+1/Q_x)(1+ks+kv+kf),

Z：0.1% (1+ Z_x/Z_{max}+ Z_{min}/Z_x)(1+ks+kv+kf),

R：0.1%(1+ R_x/R_{max}+ R_{min}/R_x)(1+Q_x)(1+ks+kv+kf),

D：± 0.0020(1+ Z_x/Z_{max}+ Z_{min}/Z_x)(1+D_x+D_x2)(1+ks+kv+kf),

Q：± 0.0020(1+ Z_x/Z_{max}+ Z_{min}/Z_x)(Q_x+1/Q_x)(1+ks+kv+kf),

Notes :

1、D and Q are absolute errors, and the rest are relative errors. $D_x=1/Q_x$；

2、 The subscript x is the measured value of the parameter. The subscript max is the maximum value and the Min is the minimum value.

3、KS is a velocity factor, kV is a voltage factor, and KF is a frequency factor.

4、 In order to ensure the measurement accuracy, When calibrating accuracy,the reliable open circuit short circuit cleaning "0" should be carried out under the current measurement conditions and measuring tools.

4.11 ：Product model

Model	Frequency	Parameter	Accuracy
JK2817B LCR Meter	50/60/80//100/120/200/400/500/800/1k/2k/4k/5k/8k/10k/20k/25k/40k/50k/100k	L C R D Q	0.1%
JK2811D LCR Meter	100Hz、 120Hz 1kHz 10kHz	L C R D Q	0.1%
JK2811C LCR Meter	100Hz、 120Hz 1kHz 10kHz	L C R D Q	0.2%
JK2816CLCR Meter	50/60/80//100/120/200/400/500/800/1k/2k/4k/5k/8k/10k/20k/25k/40k/50k/100k/200k	L C R D Q	0.1%

4.12：Display range

Parameter	Frequency	Measuring range
L	50Hz ~ 800Hz	1uH ~ 9999H
	1kHz	0.1uH ~ 999.9H
	10kHz ~ 200kHz	0.001uH ~ 99.99H
C	50Hz ~ 800Hz	1pF ~ 19999uF
	1kHz	0.1pF ~ 1999.9uF
	10kHz ~ 200kHz	0.001pF ~ 19.99uF

R		0.0001Ω~ 39.999MΩ
D		0.0000 ~ 9999
Q		0.0000 ~ 9999
Parameter	Display range	
L	0.001µH～99999H	
C	0.001pF～99999mF	
R/Z	0.0001Ω～99999MΩ	
Q	0.0001～99999	
D	0.0001～99999	

Chapter five : about testing accuracy:

5. 1、This instrument meets the accuracy of 2.2, but not all the accuracy requirements in the whole measuring range. The accuracy of the whole measuring range follows the following precision curve.
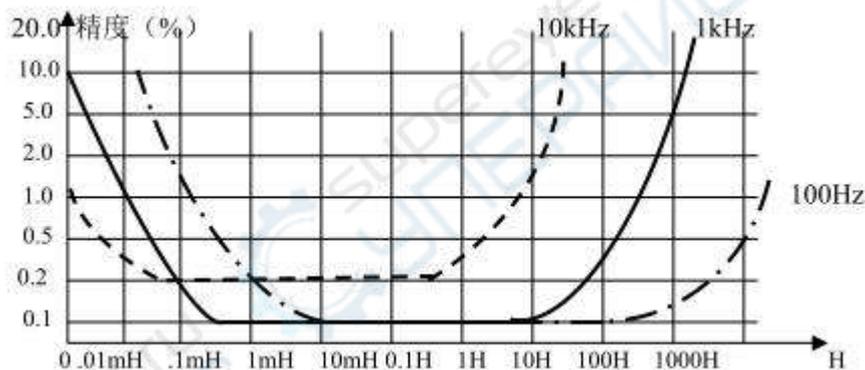
5.2、Quality factor full range measurement error : ±[0.030+0.2(1+Q)%]
5.3、Full range loss measurement error is as follows:±[0.0030+0.5D(1+D)%]

Chapter six: maintenance and precautions

6.1, the instrument should be reliably grounded.
6. 2. In the course of use, if there is data confusion or abnormal display, the following methods can be used to restore it to the original factory settings. (Turn off the power supply of the inductance measuring instrument, hold down any key, and turn on the power supply of the instrument at the same time. You need to turn off and turn on the power switch again.）
6. 3.Start-up let the instrument preheat about 10 minutes, make it work stably, do not use

in harsh environment, often keep the instrument clean, so as not to affect the performance and accuracy of the instrument.

6. 4. As far as batch measurement is concerned, the range locking function should be used as much as possible to improve the measurement speed.

6. 5. When the startup is abnormal or disturbed in use, the instrument can be shut down and restarted to normal.

6. 6. After the short circuit cleaning 0,try to keep the position of the test line as much as possible.Otherwise, the electromagnetic coupling between test lines will cause instability of test data or 0 data inaccuracy.

6. 7. When the instrument is abnormal, please contact with the enterprise or the seller.

Chapter seven: correct measurement of inductors.

For accurate and reliable measurement of inductors, please read the chapter carefully.

7.1, the characteristics of inductors

The inductor is composed of a magnetic core surrounded by wires.Its characteristics depend on the core material used. To make inductors, air can be said to be the simplest core material, but because the inductance is proportional to the permeability of the core used, the air permeability is very small, because of the volume efficiency relationship, is not conducive to the manufacture of inductors, usually using magnetic materials, Such as ferrite, high permeability alloy or pure iron body. The inductance of most inductors varies greatly with different measuring frequencies and signal levels. The inductance of an inductor with a core is affected by the permeability of the core material μ. The magnetic induction intensity of the core varies with the magnetic field intensity produced by the current flowing through the inductance coil, and the relationship is described by the magnetization curve.Figure 7-1 below is a typical magnetization curve of an inductance coil.

When a static magnetic field is applied to a magnetic material, the magnetic induction intensity (the magnitude of the current flowing through it) increases,Inductance L ,permeability μ,$B=\mu H$, Figure 7-2 below is the relationship curve of B, H and L.
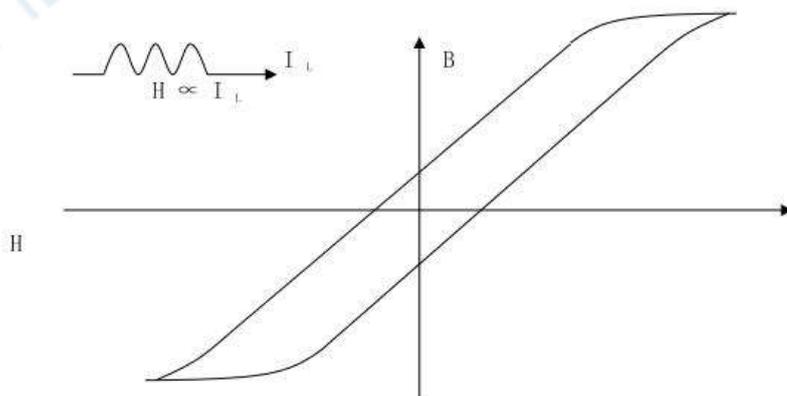
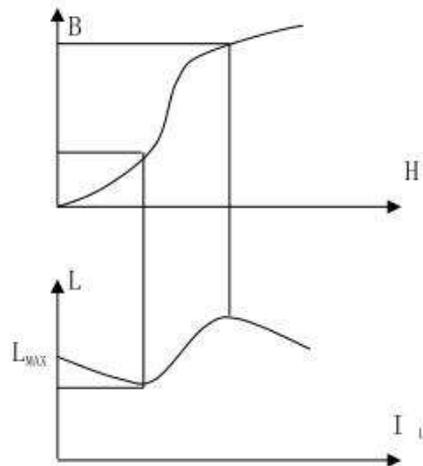Fig. 7-1 magnetization of magnetic core inductor

Fig. 7-2 correlation diagram of magnetic field strength and inductance

At the initial permeability region near the origin of the coordinate, the magnetic induction intensity increases slowly.When the inductor works in this region, the inductance is small, and then the inductance increases with the increase of current flowing through the inductor.When the inductor core exceeds the saturation point, the inductance decreases sharply with the increase of current. In this case, the test signal may have been distorted, the instrumental display reading stability becomes worse, and the runout number increases.On the other hand, the core loss will increase significantly in the high frequency region at a certain frequency, which is mainly determined by the material and structure of the inductor core.

In summary, the results of inductor measurement will vary greatly with the difference of test signal and frequency.

7.2、Correct use of test fixture

When the metal material is close to the inductor, the magnetic flux leakage from the inductor will produce eddy current in the metal material. The magnitude of eddy current is related to the size and shape of the test fixture, and the measurement results will be different if the magnitude of eddy current is different. When the inductor is accurately measured, the parts should be kept away from the metal parts as far as possible.

7.3、Accuracy of Q value measurement

Generally speaking, the Q value of inductance measuring instrument using V/I (voltage/current) method is not very accurate, especially when measuring high Q value, Instrument Q is calculated, such as $Q = X / R = 1 / D$, if Q value is 100, R value in the device impedance accounted for a small proportion, then the small change of R will cause a larger change in Q, If R changes 0.1% ,D changes 0.001, the Q value will change from 100 to 91 or 111.

7.4. Measurement of external DC bias current

In general, DC bias current is applied to the measurement of inductors and transformers. Special DC magnetizing power supply and DC bias current can be used. If no magnetizing power supply is available, You can use the method shown in Figure 7-4.Add magnetizing current to the inductor or transformer.

Similarly, to avoid the influence of external circuits on measurement,after DC current should be adjusted to 0 A short circuit/open circuit "0", and then to the required current for measurement.Figure: Lx: inductor E X: external DC power supply

C1、C4：Isolation capacitor C1≥1/(10лF),F is the test frequency.，withstand voltage >E x

C2、C3：Isolation capacitor C2=1µF,withstand voltage >Ex

V6、V7、V9、V11：1N40/5007 V1、V2、V3、V4、V5、V8：47V，1W

When in use, an ammeter should be connected in series with a DC power supply circuit to regulate the DC voltage to the desired bias current, and then the ammeter can be removed.

In the diagram, HS and LD lines should be as short as possible, and each test line, especially HS and LD, should use shielded wire (bold part of the lead in the diagram).
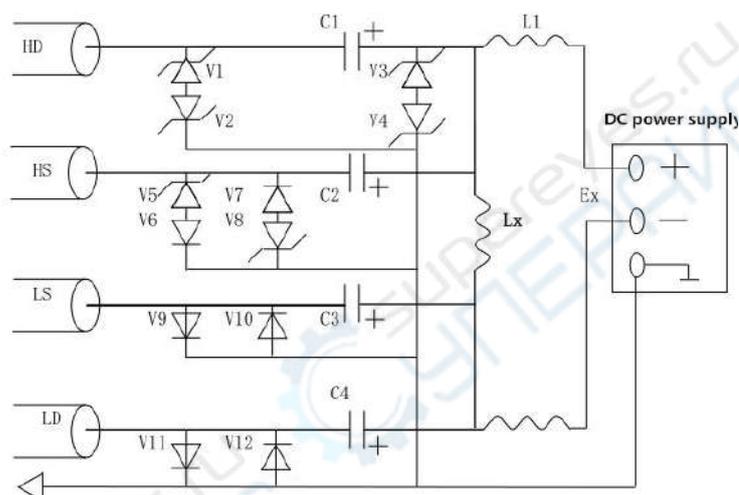
Fig. 7-4 external DC bias current circuit diagram

JK2618B Capacitance measuring instrument

JK2775/JK2776 Inductance measuring instrument

Display	Definition
FUN	2618BMeasuring parameters of capacitance tester:Cs-D、Cp-D、 Z-D、 R-Q 2775 Measuring parameters of inductance measuring instrument Lp-Q、Ls-Q、 Z-D、 R-Q 2776 Measuring parameters of inductance measuring instrument Lp-Q、Ls-Q、 Z-D、 R-Q
F	2618B/2775 Test frequency:100Hz120Hz 、 1kHz 、 10kHz 、 Four test frequencies
	2776 Test frequency:50Hz、60Hz、80Hz、100Hz、120Hz、200Hz、400Hz、500Hz、800Hz、1kHz、2kHz、4kHz、5kHz、8kHz、10kHz、20kHz、25kHz、

	40kHz、50kHz、100kHz、Twenty test frequencies
LEVE	Test level, Optional level is: 1V、0.3V、0.1V Three levels
RANGE	Test range, Optional ranges : auto (AUTO) and lock (HOLD).
SPEED	Test speed: fast（FAST）、med(MED)、 slow(SLOW) Three test speeds
CLEAR	CLEAR
IN_R	Test IR，Optional internal resistance :30Ω and 100Ω
MODE	Display mode，direct reading (TOL) and percentage (TOL%).

Display range

Parameter	Frequency	measuring range
L	50Hz ~ 800Hz	1uH ~ 9999H
	1kHz	0.1uH ~ 999.9H
	10kHz ~ 200kHz	0.01uH ~ 99.99H
C	50Hz ~ 800Hz	1pF ~ 19999uF
	1kHz	0.1pF ~ 1999.9uF
	10kHz ~ 200kHz	0.01pF ~ 19.99uF
R		0.001Ω~ 39.999MΩ
D		0.0000 ~ 9999
Q		0.0000 ~ 9999
Parameter	Display range	
L	0.0001μH～99999H	
C	0.0001pF～99999mF	
R/Z	0.0001mΩ～99999MΩ	
Q	0.0001～99999	
D	0.0001～99999	

The two level menu is a function menu for setting the limit of the BIN when sorting. The BIN limit of component sorting must be set one by one.Each BIN limit should have two

limits: upper limit and lower limit (upper limit > lower limit).

Display	Definition
NOMNAL	Nominal value setting item
COMP	Sorting switch setting item
ALARM	BEEP switch setting item
TRIG	Trigger mode setting item (option, this instrument does not have this)
RS232	RS232 Communication switch settings (option, this instrument does not have this)
1	BIN 1 Setting item
2	BIN 2 Setting item
3	BIN 3 Setting item
D/Q	Auxiliary parameters Setting item

Equivalent method: refer to eighth pages 4.4 items.

Sorting settings: refer to sixth pages three.6 items.

The software runs in the environment of WIN95, WIN98 or WINNT. The main frequency requires more than 300 MHz, at least 500 M hard disk space. In addition, OFFICE2000 must be installed in the computer to process data in the database.

RS-232C standard asynchronous serial communication bus interface is used to communicate with external control equipment. The transmission baud rate is fixed at 9600bit, the logic level of the signal is +12V, and the maximum transmission distance is 15m. Serial interface uses direct communication, using only TXD (transmission), RXD (acceptance), GND (ground) three signal lines, using a nine-core standard interface socket.

The basic format of sending data by host computer is:

AB+ command word + data and decimal point + unit + data and decimal point + unit + AF

A total of 19 data （DB0－DB18）

Any instruction sent by the computer starts with AB and ends with AF, sending 11 data altogether.

Serial number		instruction function	instruction data	format / remarks
data format is: 6 bit data +1 bit decimal bit + unit (no unit is 00H complement digit).				
D data format is: 0X．XXXX0 0X 29H XXXX0				
Q data format is: 0XXX.XX0 0XXX 29H XX0				
The BIN setting data format is 0XX．XXX0 0XX 29H XXX0				
The nominal value setting data format is:XXX．XXX+ unit XXX 29H XXX+ unit				
Example: D 0.12345 ABH 1BH 00H 2EH 01H 02H 03H 04H 05H 00H AFH				
Example: percentage data upper limit 12.34% ABH 1DH 00H 01H 02H 2EH 03H 04H 00H 04H AFH				
1	Setting parameters	10H	ABH 10H Cp (20H)、Rp (40H)、Z（060H）、Lp（00H） Cs (0A0H)、Rs (0C0H)、 Ls（80H）AFH	

2	Setting frequency	11H	ABH 11H 50Hz (02H)、60Hz (03H)、80Hz (04H)、100Hz (05H)、120Hz (06H)、200Hz (07H)、400Hz (08H)、500Hz (09H)、800Hz (0AH)、1kHz (0BH)、2kHz (0CH)、4kHz (0DH)、5kHz (0EH)、8kHz (0FH)、10kHz (10H)、20kHz (11H)、25kHz (12H)、40kHz (13H)、50kHz (14H)、100kHz (15H)
3	Set level	12H	ABH 12H 0.1V (06H)、0.3V (05H)、1V (03H) AFH
4	Set display	13H	ABH 13H % (40H), Direct reading (00H) AFH
5	Set range	14H	ABH 14H LOCK(80H),AUTO (00H) AFH
6	Set up zero	15H	ABH 15H ON (08H),OFF (00H) AFH
7	Set BEEP	16H	ABH 16H OFF（00H）, PASS (01H) AFH
8	Set IR	17H	ABH 17H 100 (40H),30 (00H) AFH
9	Set up sorting	18H	ABH 18H ON (01H), OFF（00H） AFH
10	set speed	19H	ABH 19H slow (10H), Medium(08H),fast(00H) AFH
11	Set D/Q	1BH	ABH 1 Upper limit + lower limit AFH
12	Set BIN one	1CH	ABH 1CH Upper limit + lower limit AFH
13	Set BIN two	1DH	ABH 1DH Upper limit + lower limit AFH
14	Set BIN three	1EH	ABH 1EH Upper limit + lower limit AFH
15	Set nominal value	20H	ABH 20H Data + decimal point + unit AFH

multiplying power			
mF	03H	MΩ H	03H
uF	02H	kΩ mH	02H
nF	01H	Ω uH	01H
pF	00H	mΩ nH	00H

The basic format of receiving data is:

ABH+ Parameter command word (1)+ Main parameter data and decimal point (6)+ unit (1)+ Auxiliary parameter data and decimal point (6)+ Sorting result (1)+ State of measurement (1)+ AFH

Any measurement packet received by the computer begins with AB and ends with AF. A total of 18 data packets are received as one packet.

(this data is output from the lower computer only when testing).

Parameter command word	
Cp-D	20H
Rp-Q	40H
Z-Q	60H
Lp-Q	0H
Cs-D	A0H
Rs-Q	C0H
Ls-Q	80H

Measurement data (6 main parameters, 5 Auxiliary parameters)	
Dark	0BH
-	C0H
Decimal point	A0H
Data	0－9
Measurement state	
Direct reading	00H
Percentage	40H

multiplying power					
u	02H	K	05H		
n	01H		04H		
p	00H	m	03H	M	06H

Sorting results (1 bits)	
P1	04H
P2	08H
P3	10H
NG	20H
NO	00H

In order to keep the instrument and software synchronized after booting, please open the instrument first, and then open the software.

At this point, the software sends the last saved initialization data to the instrument. The specific data are as follows.

The initialization data sends 1 packets in the same format as the sending instructions above, sending 19 bytes. The initialization command is.

55H

The first data packet is:

ABH 55H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H AFH

Parameters, Frequency, Level, Display, Range, Clearing, BEEP, Internal Resistance, Sorting, Speed, Trigger

The following is the current status command word for the parameter. The instrument receives these States and initializes the instrument to keep the data of the upper and lower computer consistent.

Chapter eight . Complete sets of instruments and warranty

8.1 Instrument accessories

When the instrument is out of factory, it should have the following contents:

1. instrument   one
2. Measuring cable   one
3. Power cord   one
4. Product user manual   one
5. Certificate   one
6. Survey report   one

8.2 warranty

Warranty period: from the date of purchase of the instrument, the warranty period is two years. During the warranty period, The repair cost is borne by the user due to improper operation of the instrument.

The instrument is maintained by our company throughout life.