PXI7052
User's Manual

Beijing ART Technology Development Co., Ltd.

Contents

Chapter 1 Overview

Unpacking Checklist

Check the shipping carton for any damage. If the shipping carton and contents are damaged, notify the local dealer or sales for a replacement. Retain the shipping carton and packing material for inspection by the dealer.

Check for the following items in the package. If there are any missing items, contact your local dealer or sales.

- PXI7052 Card
- ART Disk
  a) user's manual (pdf)
  b) drive
  c) catalog
- Warranty Card

PARAMETER

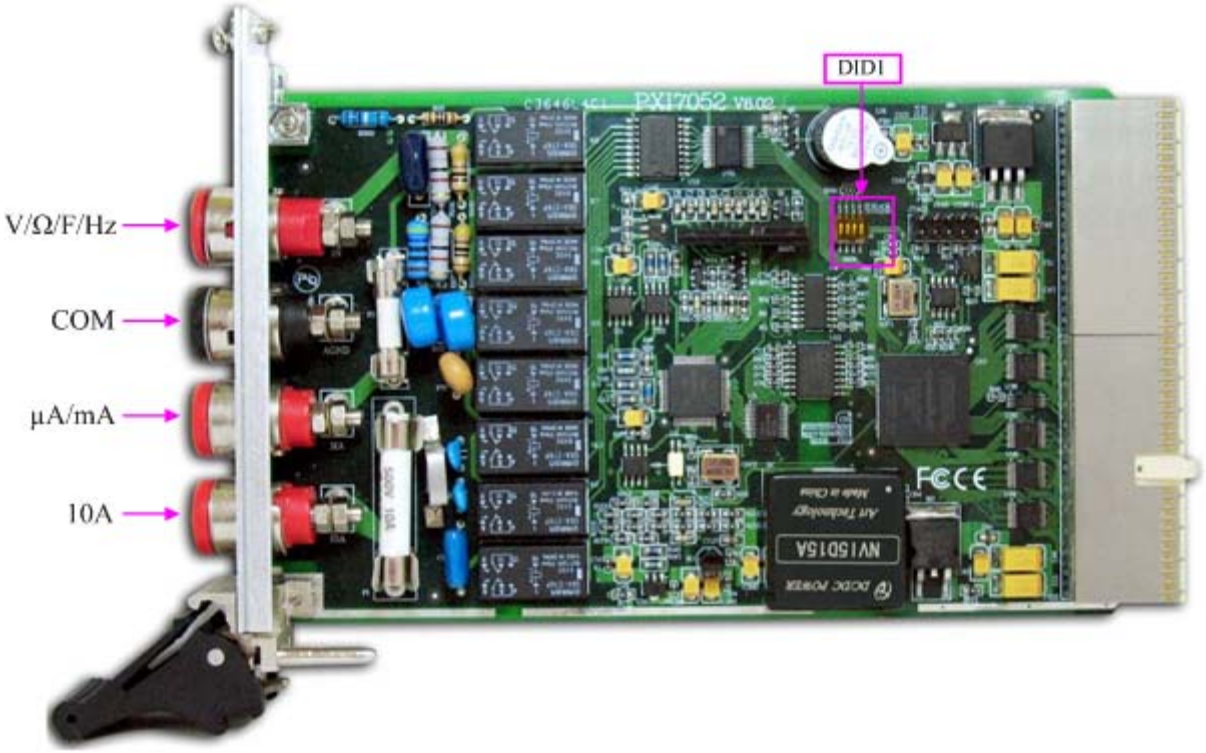
- 5000 counting measurement, max. display: 4999, that is $4^{4}/_{5}$ digits
- Auto/manual range, the basic sample rate is 2.5 times/sec.
- Measurement Type: AC voltage, DC voltage, current, resistance, capacitance, diode, frequency
- Measuring range: AC voltage: 5V, 50V, 500V, 1000V
  DC voltage: 50mV, 500mV, 5V, 50V, 500V, 1000V
  Current: 500μA, 5000μA, 50mA, 500mA, 5A, 10A
  Resistance: 500Ω, 5KΩ, 50KΩ, 500KΩ, 5MΩ, 50MΩ
  Capacitance: 500nF, 5μF, 50μF, 500μF
- ACV and DCV measurements up to 1000V
- AC true RMS measurement
- DC measurement accuracy is 0.03%
- 0.01Ω resistance resolution and the 1μV voltage resolution
- In the μA/mA measurement, the protection current is 0.64A
- Capacitance measurement from 0.01nF to 500μF
- Wirear frequency measurement, logic frequency/duty cycle measurement
- Over-range indicator OL
- Fuse 0.63A/500V (μA/mA side), 10A/500V (10A side)
- The max voltage between the measurement side and the earth is 1000V AC/DC. 1000V CAT II, pollution degree 2
- Operating Temperature: 5℃~ 30℃ (relative humidity 0~80%)
  31℃~ 41℃ (relative humidity 0~50%)
- Storage Temperature -20℃~ 60℃ (relative humidity ≤ 80%)

FEATURES

- Auto/manual range selection
- Computer display, record
- Overload protection
- Measurement signal digital isolation

Chapter 2 Component Layout Diagram and a Brief Description

2.1 The Main Component Layout Diagram



2.2 The Function Description for the Main Component

2.2.1 Signal Input and Output Connectors

V/Ω/F/Hz: except the current measurement, all the other measurements use it as the input port, connect with the red multimeter pen.

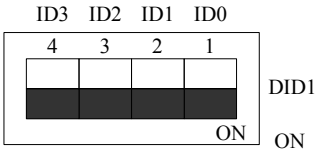
COM: the negative input of the all measurements, connect with the black multimeter pen.

μA / mA: it is the positive input when measuring current μA, mA, connect with the red multimeter pen.

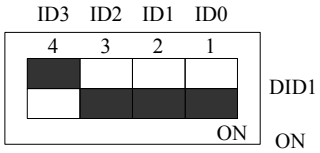
10A: it is the positive input when measuring current 0.5A~10A, connect with the red multimeter pen.

2.2.2 Physical ID of DIP Switch

DID1: Set physical ID number. When the PC is installed more than one PXI8191, you can use the DIP switch to set a physical ID number for each board, which makes it very convenient for users to distinguish and visit each board in the progress of the hardware configuration and software programming. The following four-bit number is expressed by the binary system: When DIP switch points to "ON", that means "1", and when it points to the other side, that means "0." As they are shown in the following diagrams: "ID3" is the high bit."ID0" is the low bit, and the black part in the diagram represents the location of the switch. (Test software of the company often uses the logic ID management equipments and at this moment the physical ID DIP switch is invalid. If you want to use more than one kind of the equipments in one and the same system at the same time, please use the physical ID as much as possible).



The above chart shows"1111", so it means that the physical ID is 15.



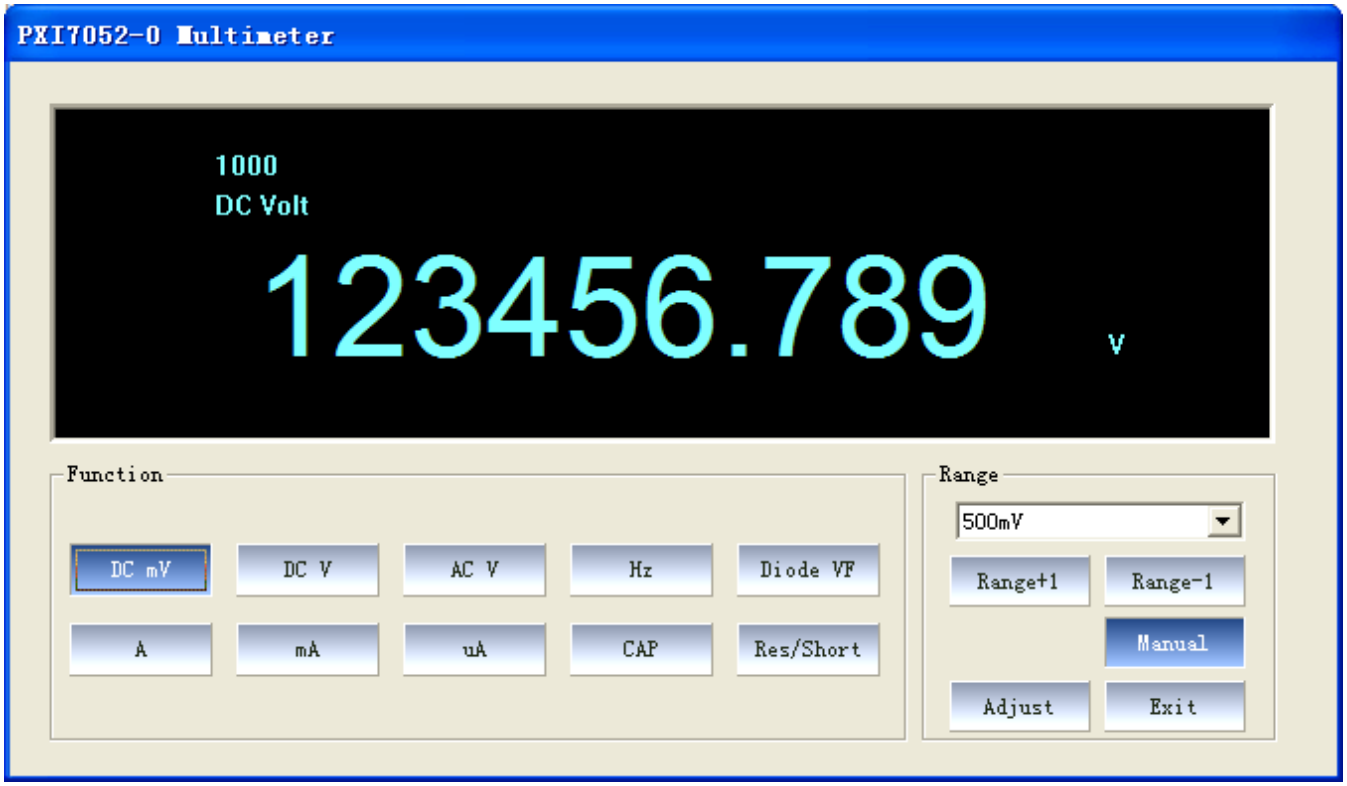
The above chart shows"0111", so it means that the physical ID is 7.

The above chart shows"0101", so it means that the physical ID is 5.

ID3	ID2	ID1	ID0	Physical ID (Hex)	Physical ID（Dec）
OFF（0）	OFF（0）	OFF（0）	OFF（0）	0	0
OFF（0）	OFF（0）	OFF（0）	ON（1）	1	1
OFF（0）	OFF（0）	ON（1）	OFF（0）	2	2
OFF（0）	OFF（0）	ON（1）	ON（1）	3	3
OFF（0）	ON（1）	OFF（0）	OFF（0）	4	4
OFF（0）	ON（1）	OFF（0）	ON（1）	5	5
OFF（0）	ON（1）	ON（1）	OFF（0）	6	6
OFF（0）	ON（1）	ON（1）	ON（1）	7	7
ON（1）	OFF（0）	OFF（0）	OFF（0）	8	8
ON（1）	OFF（0）	OFF（0）	ON（1）	9	9
ON（1）	OFF（0）	ON（1）	OFF（0）	A	10
ON（1）	OFF（0）	ON（1）	ON（1）	B	11
ON（1）	ON（1）	OFF（0）	OFF（0）	C	12
ON（1）	ON（1）	OFF（0）	ON（1）	D	13
ON（1）	ON（1）	ON（1）	OFF（0）	E	14
ON（1）	ON（1）	ON（1）	ON（1）	F	15

Chapter 3 Operation Method

Measurement software interface is shown as below, the following details are about the operation of the measurement method.



3.1 Voltage (AC V) Measurement

Measurement the voltage range AC 0.5V~1000V. Measurement method is as follows:

1, open the program, press the "AC V" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, before to measure, connect the other side of the red and black test wire to the both ends of the voltage that is measured.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", then the measurement range will be automatically selected based on the size of the measured signal.

5, read the measurement value from the display box. If display "OL", means the measurement voltage is over the instrument's range, the red and black test wire should be disconnected from the test circuit immediately.

Note: The measurement voltage should be not over 1000V.

3.2 Voltage (DC mV) Measurement

Measurement the voltage range DC 1μV~500mV. Measurement method is as follows:

1, open the program, press the "DC mV" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, before to measure, connect the other side of the red test wire with the positive side of the measured voltage signal and the black test wire to the negative side of the measured voltage signal.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", then the measurement range will be automatically selected based on the size of the measured signal.

5, read the measurement value from the display box. If display "OL", means the measurement voltage is over the instrument's range, the red and black test wire should be disconnected from the test circuit immediately.

Note: when the test wire is floating, there may be display a stable reading caused by the the sense voltage in the test wire, but does not affect the measurement accuracy.

3.3 Voltage (DC V) Measurement

Measurement the voltage range DC 0.5V~1000V. Measurement method is as follows:

1, open the program, press the "DC V" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, before to measure, connect the other side of the red test wire with the positive side of the measured voltage signal and the black test wire to the negative side of the measured voltage signal.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", then the measurement range will be automatically selected based on the size of the measured signal.

5, read the measurement value from the display box. If display "OL", means the measurement voltage is over the instrument's range, the red and black test wire should be disconnected from the test circuit immediately.

Note: The measurement voltage should be not over 1000V.

3.4 Logic Frequency/Duty Cycle Measurement

Frequency range is 10Hz~1MHz (Vp 2.5~5V), duty cycle range is 10% ~ 90%. Measurement method is as follows:

1, open the program, press the "Hz" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, connect the red test wire with the logic high-level and the black test wire to the logic low-level.

4, the measured value read from the display.

5, this item is automatic range, "Manual"/"Auto" button is invalid.

Note: the signal frequency is lower or higher than the measuring range of the instrument, the reading value maybe not correct.

3.5 Diode Measurement (Diode VF)

The forward voltage drop of the diode is 0~2.5V. Measurement method is as follows:

1, open the program, press the "Diode VF" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, connect the red test wire with the anode of the diode, the black test wire to the cathode of the diode, the display will show the forward voltage drop of the diode.

4, connect the black test wire with the anode of the diode, the red test wire to the cathode of the diode, if the display shows “OL”, it means the reverse resistance is normal, otherwise, it means diode reverse leakage.

Note: If test the diode in the circuit board, we should power off and then measure. Because there may be other parallel circuit, the test value maybe not listed as the 3, 4 above.

3.6 Capacitance Measurement

Capacitance measurement range is 100nF~500μF. Measurement method is as follows:

1, open the program, press the "CAP" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, if the capacitance has voltage, shorted the capacitance to discharge.

4, connect the red and black test wire to the capacitance, if the capacitance is polarity, the red test wire should connect with the anode, the black test wire connect with the cathode.

5, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", then the measurement range will be automatically selected based on the size of the measured signal.

6, read the capacitance value from the display. If the capacitance value> 500μF, meter will display OL. If the capacitance <10nF, will display 0.

Note: when measure 50μF ~ 500μF capacitance, in order to ensure the measurement accuracy, the instrument will take a long time to discharge for the capacitance, so the measurement value is refreshed slowly.

Do not measure the capacitance on the circuit that has other components in parallel, because it will cause large error.

3.7 Resistance/ON-OFF Measurement

Resistance measurement range is 0.1Ω ~ 50MΩ. Measurement method is as follows:

1, open the program, press the "Res/Short" button.

2, connect one side of the red test wire to V/Ω/F/Hz side, and one side of the black test wire to the COM terminal.

3, click the "Res/Short" button to select "Resistance", the resistance measurement mode, and the "Short" is ON-OFF mode.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", then the measurement range will be automatically selected based on the size of the measured signal.

5, for the resistance measurement, connect the red and black test wires with the resistance, read the measurement value from the display box. In “Manual” mode, if it displays "OL", it means over the range and we should select the greater range to measure. If it displays "OL" in the maximum range, it means the resistance is greater than 50MΩ.

For ON-OFF measurement, connect the red and black test wires with the two measurement points, if the resistance between two points is less than 50Ω ~ 60Ω, the buzzer will sound, and the display box shows the resistance value, if display "OL", it means the resistance is greater than 500Ω.

Note: If test the ON-OFF in the circuit board, we should power off and then measure. Because there may be other parallel circuit, the test value maybe not the real value of the resistance.

3.8 Current (A) Measurement

Current measurement range is DC 0.1mA ~ 10A, AC 0.5A ~ 10A. Measurement method is as follows:

1, open the program, press the "A" button.

2, connect one side of the red test wire to10A side, and one side of the black test wire to the COM terminal.

3, click the "A" button to select "DC Current" for the DC measurement mode, or select "AC Current" for the AC measurement mode.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", in this mode, Range selection box is invalid.

5, turn off the power of the circuit, access the red and black test wire to the test circuit in series mode, and then turn on the power of the test circuit under.

6, read the measurement value the from the display box. In DC mode, if it displays positive, means the current is from the red test wire to the instrument. If it displays negative, means the current is from the black test wire to the instrument. If display "OL", means the current over-range.

Note: pre-estimated the measurement current, and the A table should be not over fuse current value (0.63A).

3.9 Current (mA) Measurement

Current measurement range is DC 1μA~500mA， AC 5mA~500mA. Measurement method is as follows:

1, open the program, press the "mA" button.

2, connect one side of the red test wire to μA/mA side, and one side of the black test wire to the COM terminal.

3, click the "A" button to select "DC Current" for the DC measurement mode, or select "AC Current" for the AC measurement mode.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", in this mode, Range selection box is invalid.

5, turn off the power of the circuit, access the red and black test wire to the test circuit in series mode, and then turn on the power of the test circuit under.

6, read the measurement value the from the display box. In DC mode, if it displays positive, means the current is from the red test wire to the instrument. If it displays negative, means the current is from the black test wire to the instrument. If display "OL", means the current over-range.

Note: pre-estimated the measurement current, and the A table should be not over fuse current value (0.63A).

3.10 Current (μA) Measurement

Current measurement range is DC 0.01μA~5000μA， AC 5μA~5000μA. Measurement method is as follows:

1, open the program, press the "μA" button.

2, connect one side of the red test wire to μA/mA side, and one side of the black test wire to the COM terminal.

3, click the "A" button to select "DC Current" for the DC measurement mode, or select "AC Current" for the AC measurement mode.

4, when measurement, the "Manual" button is Manual selection range, we can manually select the range in the range selection box. And we also can press the "Manual" button to switch to the "Auto", automatically select range, the display box will show "AUTO", in this mode, Range selection box is invalid.

5, turn off the power of the circuit, access the red and black test wire to the test circuit in series mode, and then turn on the power of the test circuit under.

6, read the measurement value the from the display box. In DC mode, if it displays positive, means the current is from the red test wire to the instrument. If it displays negative, means the current is from the black test wire to the instrument. If display "OL", means the current over-range.

Note: pre-estimated the measurement current, and the A table should be not over fuse current value (0.63A).

3.11 The Range Addition/Subtraction Selection

For various measurements, there are two shortcut keys: "Range +1" and "Range-1" corresponding to range addition and subtraction.

3.11.1 Range Addition

When select a range measurement, it displays "OL", means the measurement value is over the setting range, should choose a greater range to measure, this time, click on "Range +1" to select the greater range.

However, if it displays "OL" in the maximum range, click "Range +1" button to return to select the smallest range.

3.11.2 Range Subtraction

When select a measurement range, click the "Range-1" button to select a small range by descending.

However, if in the minimum range to click the "Range +1" button, it will return to select the maximum range.

3.12 Calibration

The card has been calibrated before leave the factory, only after use a period of time, it needs to be calibrated. In the calibration, we should use the multimeter and signal source that the accuracy is higher than the card.

The function that can be calibrated shown as the follwoing: voltage (AC), current (AC) (use 10KHz AC signal source for calibration--default), DC mV, V, DC μA, DC mA, DC A, and the resistance.

Click the "Adjust" button, the calibration dialog box will pop up, then we can do zero-point calibration, full-scale calibration, and clear the calibration value.

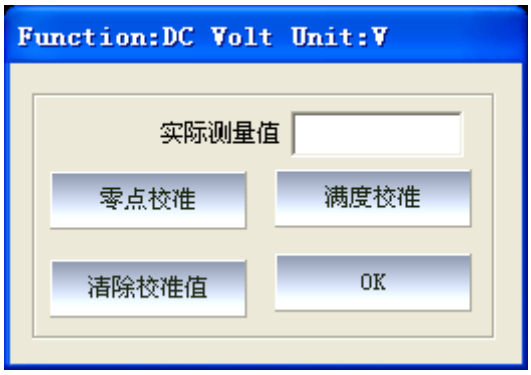
3.12.1 Zero-point Calibration

Connect the red and black test wire of the card, short the red and black table, click on the "zero calibration" button, then wait for the screen to prompt the zero-point calibration is completed, advanced program will record zero code value.

If not shorted the table, it will pop-up dialog box "Please confirm whether connect the positive and negative port of the table", then connected the table to complete the zero-point calibration.

3.12.2 Full-scale Calibration

Only after the zero-point calibration, we can do the full-scale calibration. Access the signal source that is about the full-range of the PXI7052 to the PXI7052 card, use the multimeter which accuracy is higher than the PXI7052 to measure the true value, then write the actual measurement value into the " actual measurement value" dialog box, last click "full-scale calibration" button to complete the full-scale calibration. Click "OK" to exit calibration.



Special Note: the AC signal only need to do full-scale calibration.

Operation Method: after the zero-point calibration, click "Clear calibration value" button, then wire the actual standard measurement value to “actual measurement value" dialog, last click the "full-scale calibration" to complete the full-scale calibration.

Chapter4 Range and Accuracy

Following range is the instrument calibrated within one year, under normal use, the basic conditions for the working temperature is 18℃~ 28℃, relative humidity less than 80%. The accuracy is: ± (% of reading ** + low number).

4.1 DC Measurement

Voltage DC

Range	Resolution	Accuracy
50mV	0.001mV	±（0.05%＋15）
500mV	0.01mV	±（0.05%＋10）
5V	0.1mV	±（0.05%＋10）
50V	1mV	±（0.05%＋10）
500V	10mV	±（0.05%＋10）
1000V	0.1V	±（0.05%＋10）

Note: The above accuracy can be guaranteed within the all ranges.

Current DC

Range	Resolution	Accuracy	Voltage Drop
500μA	0.01μA	±（0.25%＋15）	102μV/μA
5000μA	0.1μA	±（0.25%＋10）	
50mA	1μA	±（0.25%＋10）	1.5mV/mA
500mA	10μA	±（0.25%＋10）	
5A	0.1mA	±（0.5%＋10）	30mV/A
10A	1mA	±（0.5%＋10）	

Note: The above accuracy can be guaranteed within the all ranges.

4.2 AC Measurement

Voltage AC

Range	Resolution	Accuracy		
		20Hz~1KHz	1KHz~10KHz	10KHz~20KHz
5V	0.1mV	±（2.5%＋40）	±（1%＋40）	±（2.5%＋40）
50V	1mV	±（2.5%＋40）	±（1%＋40）	±（2.5%＋40）
500V	10mV	±（2.5%＋40）	reserved	reserved
1000V	0.1V	±（2.5%＋40）	reserved	reserved

Note: The above accuracy can be guaranteed within the 10% ~100% of the full range.

Current AC

Range	Resolution	Accuracy			Voltage Drop
		20Hz~100Hz	100Hz~500Hz	500Hz~1KHz	
500μA	0.01μA	±（2%＋20）	±（0.75%＋20）	±（2%＋20）	102μV/μA
5000μA	0.1μA	±（2%＋10）	±（0.75%＋10）	±（2 %＋10）	
50mA	1μA	±（2%＋20）	±（0.75%＋20）	±（2%＋20）	1.5mV/mA

500mA	10μA	±（2% + 10）	±（0.1% + 10）	±（2% + 10）	
5A	0.1mA	±（2% + 20）	±（0.75% + 20）	±（2% + 20）	30mV/A

Note: The above accuracy can be guaranteed within the 10% ~100% of the full range.

4.3 Other Measurement

Resistance

Range	Resolution	Accuracy
500Ω	0.01Ω	±（0.5% + 10）
5KΩ	0. 1Ω	±（0.5% + 5）
50KΩ	1Ω	±（0.5% +5）
500KΩ	10Ω	±（0.5% + 5）
5MΩ	100Ω	±（0.5% + 10）
50MΩ	1KΩ	±（1% + 10）

Note: The above accuracy can be guaranteed within the all ranges.

Capacitance

Range	Resolution	Accuracy
500nF	0. 1nF	±（1% + 15）
5μF	1nF	±（1% + 10）
50μF	10nF	±（1% + 10）
500μF	0.1μF	±（10% + 10）

Diode

Range	Resolution	Accuracy
2.5V	0.1mV	±（1% + 5）

Note: The test current is about 0.7mA.

Logical Frequency

Frequency Range	Input Range	Resolution	Accuracy
10Hz~1MHz	Vp 2~5VSquare wave	2Hz	±（0.06% + 4）

Duty Cycle

Frequency Range	Duty Cycle Range	Resolution	Accuracy
10Hz~500KHz	10%~90%	0.01%	±（0.06% + 4）

Chapter5 Notes, Calibration and Warranty Policy

5.1 Notes

In our products' packing, user can find a user manual, a PXI7052 module and a quality guarantee card. Users must keep quality guarantee card carefully, if the products have some problems and need repairing, please send products together with quality guarantee card to ART, we will provide good after-sale service and solve the problem as quickly as we can.

When using PXI7052, in order to prevent the IC (chip) from electrostatic harm, please do not touch IC (chip) in the front panel of PXI7052 module.

5.2 Fault Diagnosis

1. If the multimeter card does not read, we can press the "Ctrl + R" of the keyboard to reset the chip of the multimeter.
2. If the measured value is higher than the selection range, it will display "OL", please select the right range.

5.3 Warranty Policy

Thank you for choosing ART. To understand your rights and enjoy all the after-sales services we offer, please read the following carefully.

1. Before using ART's products please read the user manual and follow the instructions exactly. When sending in damaged products for repair, please attach an RMA application form which can be downloaded from: www.art-control.com.

2. All ART products come with a limited two-year warranty:

- The warranty period starts on the day the product is shipped from ART's factory
- For products containing storage devices (hard drives, flash cards, etc.), please back up your data before sending them for repair. ART is not responsible for any loss of data.
- Please ensure the use of properly licensed software with our systems. ART does not condone the use of pirated software and will not service systems using such software. ART will not be held legally responsible for products shipped with unlicensed software installed by the user.

3. Our repair service is not covered by ART's guarantee in the following situations:

- Damage caused by not following instructions in the User's Manual.
- Damage caused by carelessness on the user's part during product transportation.
- Damage caused by unsuitable storage environments (i.e. high temperatures, high humidity, or volatile chemicals).
- Damage from improper repair by unauthorized ART technicians.
- Products with altered and/or damaged serial numbers are not entitled to our service.

4. Customers are responsible for shipping costs to transport damaged products to our company or sales office.

5. To ensure the speed and quality of product repair, please download an RMA application form from our company website.

Products Rapid Installation and Self-check

Rapid Installation

Product-driven procedure is the operating system adaptive installation mode. After inserting the disc, you can select the appropriate board type on the pop-up interface, click the button【driver installation】or select CD-ROM drive in Resource Explorer, locate the product catalog and enter into the APP folder, and implement Setup.exe file. After the installation, pop-up CD-ROM, shut off your computer, insert the PCI card. If it is a USB product, it can be directly inserted into the device. When the system prompts that it finds a new hardware, you do not specify a drive path, the operating system can automatically look up it from the system directory, and then you can complete the installation.

Self-check

At this moment, there should be installation information of the installed device in the Device Manager (when the device does not work, you can check this item.). Open "Start -> Programs -> ART Demonstration Monitoring and Control System -> Corresponding Board -> Advanced Testing Presentation System", the program is a standard testing procedure. Based on the specification of Pin definition, connect the signal acquisition data and test whether AD is normal or not. Connect the input pins to the corresponding output pins and use the testing procedure to test whether the switch is normal or not.

Delete Wrong Installation

When you select the wrong drive, or viruses lead to driver error, you can carry out the following operations: In Resource Explorer, open CD-ROM drive, run Others-> SUPPORT-> PCI.bat procedures, and delete the hardware information that relevant to our boards, and then carry out the process of section I all over again, we can complete the new installation.