

# UNI-T®

## UT171A/B/C



### Operating Manual



**Industrial True RMS  
Digital Multimeter**

P/N:110401105279X



## UT171A/B/C Instructions

**\* Low-voltage detection:**

If the internal VDD is lower than 7.3 V, under-voltage symbol of battery "⚡" will be displayed, indicating a requirement of battery replacement or charging for internal lithium battery (applicable to UT171B/C only) to ensure the measurement precision. If the low battery current is detected by the instrument, it will be forced into sleep mode.

**\* Charging internal lithium battery:** (see Figure 14) (applicable to UT171B/C only) connect the charging adapter provided for accessories in accordance with the figure, to charge the internal lithium battery. In the mode of charging, a red indicator alert will be emitted on top of the instrument, which turns green when the charging voltage reaches the full value, and then the instrument will automatically cut off the charging circuit as prompt for the completion of the charging.

**⚠ Caution:**

Upon the lead disconnection or failure of the lithium battery equipped in the instrument, consecutive red/ green light flashing will be emitted by indicator on the top (applicable to UT171B/C only).

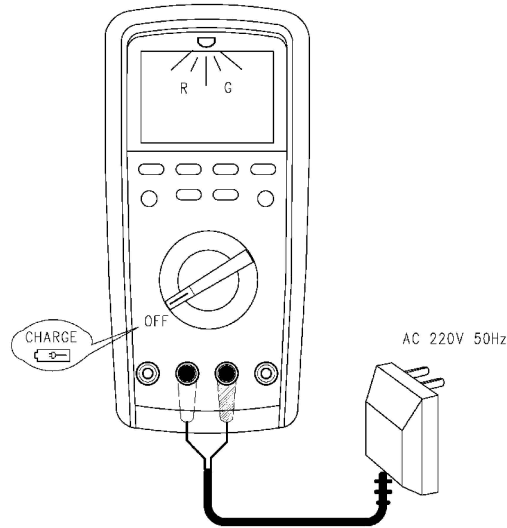


Figure 14

## UT171A/B/C Instructions

### X Technical Indexes

Accuracy:  $\pm (a\% \text{ of reading} + b \text{ counts})$ . Accuracy is guaranteed for 1 year. Ambient temperature:  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$  ( $73.4^{\circ}\text{F} \pm 9^{\circ}\text{F}$ ); relative humidity:  $\leq 75\%$

**⚠ Caution:**

\* For accuracy, the temperature condition shall be controlled within  $18^{\circ}\text{C} - 28^{\circ}\text{C}$ , while the fluctuation range of ambient temperature shall be stabilized within  $\pm 1^{\circ}\text{C}$ . If the temperature is lower than  $18^{\circ}\text{C}$  or greater than  $28^{\circ}\text{C}$ , the additional temperature coefficient error shall be  $0.1x (\text{specified accuracy}) / ^{\circ}\text{C}$

\* If the change of ambient temperature is within  $\pm 5^{\circ}\text{C}$ , the accuracy is applied after 2 hours; upon the completion of battery charging, the accuracy is also applied after 2 hours.

### 1. Measuring of DC voltage

Range		Resolution	Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$			
UT171A	UT171B/C		DC	Frequency Response	45Hz-1kHz	>1kz-20kHz
400.00mV*	600.00mV*	10 $\mu\text{V}$	$\pm(0.025\% + 5)$	AC+DC (UT171B/C)	$\pm(1.2\% + 40)$	$\pm(6.0\% + 40)$
4.0000V	6.0000V	100 $\mu\text{V}$				
40.000V	60.000V	1mV				
400.00V	600.00V	10mV	$\pm(0.03\% + 5)$	Undefined		
1000.0V	1000.0V	100mV	$\pm(0.03\% + 5)$			

**⚠ Input impedance:**

\* Range  $\geq 1\text{G}\Omega$ , input impedance for other ranges is 10M $\Omega$ . (For \*range, unstable digit may be displayed in open circuit, digits  $\leq \pm 5$  shall be stable after connecting up load).

\*AD+DC the specifications are defined for signal input > 10% of range

## UT171A/B/C Instructions

### 2. Measuring of AC voltage

Range		Resolution	Accuracy ±(a% of reading + b counts)			
UT171A	UT171B/C		45Hz-1kHz	>1kz-10kHz	>10kz-20kHz	>20kz-100kHz
400.00mV*	600.00mV*	10 μV	±(0.4%+40)	±(5.0%+40)	±(5.5%+40)	±(8.0%+40)
4.0000V	6.0000V	100 μV		±(1.2%+40)	±(3.0%+40)	±(8.0%+40)
40.000V	60.000V	1mV		±(1.2%+40)	±(3.0%+40)	±(6.0%+40)
400.00V	600.00V	10mV		±(3.0%+40)	Undefined	
1000.0V	1000.0V	100mV	±(0.6%+40)	±(3.5%+40)		
LoZ /1000~V		0.1V	±(2%+40)			
V.F.C 600V/1000V		0.01V/0.1V	±(4%+10) Frequency Response: 45 ~ 400Hz			

⚠ Input impedance: input impedance is about 10MΩ.

Display: true virtual value; range of accuracy guarantee: 10-100% of range (the 1000V range is 20~100%); it is allowed to have residual readings < 50 digits in short circuit.

AC wave peak factor: can reach 3.0 in full-range value (excluding 750V range which is 1.5 in full-range value)

Non-sinusoidal waveform: the accuracy shall be increased by 3.0% if the wave peak factor is within 1.0-2.0

The accuracy shall be increased by 5.0% if the wave peak factor is within 2.0-2.5

The accuracy shall be increased by 7.0% if the wave peak factor is within 2.5-3.0

## UT171A/B/C Instructions

### 3. Measuring of DC current

Range		Resolution	Accuracy ±(a% of reading + b counts)			
UT171A	UT171B/C		DC	Frequency Response	45Hz-1kHz	>1kHz-10kHz
400.00μA	600.00μA	0.01 μA	AC+DC (UT171B/C)	±(0.25%+20)	±(1.5%+20)	±(2.0%+40)
4000.0μA	6000.0μA	0.1 μA			±(1.5%+20)	±(2.0%+40)
40.000mA	60.000mA	1 μA			±(1.5%+20)	±(2.0%+40)
400.00mA	600.00mA	10 μA			±(1.5%+20)	±(3.0%+40)
4.0000A	6.0000A	100 μA			±(2.0%+20)	±(6.0%+40)
10.000A	10.000A	1mA			±(1.5%+10)	±(5.0%+10)
% (4-20mA)		0.01%	±(0.5%+2) (Applicable to UT171B/C only)			

\*AD+DC the specifications are defined for signal input > 10% of range

### 4. Measuring of AC current

Range		Resolution	Accuracy ±(a% of reading + b counts)		
UT171A	UT171B/C		45Hz-1kHz	>1kz-20kHz	>20kz-100kHz
400.00μA	600.00μA	0.01 μA	±(0.75%+20)	±(1.2%+40)	±(6.0%+40)
4000.0μA	6000.0μA	0.1 μA	±(0.75%+20)	±(1.2%+40)	±(3.0%+40)
40.000mA	60.000mA	1 μA	±(0.75%+20)	±(1.2%+40)	±(9.0%+40)
400.00mA	600.00mA	10 μA	±(0.75%+20)	±(1.5%+10)	±(4.0%+40)
4.0000A	6.0000A	100 μA	±(1.5%+20)	±(6.0%+40)	Undefined
10.000A	10.000A	1mA	±(1.5%+5)	±(5.0%+10)	

### UT171A/B/C Instructions

Display: true virtual value; range of accuracy guarantee: 10-100% of range; it is allowed to have residual readings < 50 digits in short circuit.

AC wave peak factor: can reach 3.0 in full-range value

Non-sinusoidal waveform: the accuracy shall be increased by 3.0% if the wave peak factor is within 1.0-2.0

The accuracy shall be increased by 5.0% if the wave peak factor is within 2.0-2.5

The accuracy shall be increased by 7.0% if the wave peak factor is within 2.5-3.0

#### 5. Measuring of resistance/ conductance (applicable to UT171B/C only)

Range		Resolution	Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$
UT171A	UT171B/C		
400.00 $\Omega$	600.00 $\Omega$	0.01 $\Omega$	$\pm(0.05\% + 10)$
4.0000k $\Omega$	6.0000k $\Omega$	0.1 $\Omega$	$\pm(0.05\% + 2)$
40.000k $\Omega$	60.000k $\Omega$	1 $\Omega$	$\pm(0.05\% + 2)$
400.00k $\Omega$	600.00k $\Omega$	10 $\Omega$	$\pm(0.05\% + 2)$
4.0000M $\Omega$	6.0000M $\Omega$	100 $\Omega$	$\pm(0.15\% + 5)$
40.000M $\Omega$	60.000M $\Omega$	1k $\Omega$	$\pm(3\% + 2)$
	60.00nS	0.01nS	$\pm(1\% + 10)$

### UT171A/B/C Instructions

#### 6. Measuring of capacitance

Range		Resolution	Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$
UT171A	UT171B/C		
4.000nF	6.000nF	1pF	$\pm(3.0\% + 30)$
40.00nF~400.0 $\mu$ F	60.00nF~600.0 $\mu$ F	10pF~100nF	$\pm(2.5\% + 5)$
4.000mF~40.00mF	6.000mF~60.00mF	1 $\mu$ F~10 $\mu$ F	$\pm 10\%$

#### 7. Measuring of frequency/duty ratio/cycle

Range	Resolution	Accuracy $\pm(a\% \text{ of reading} + b \text{ counts})$
60.000Hz~10.000MHz	0.001Hz~0.001MHz	$\pm(0.01\% + 5)$
1.0%~99.0%	0.1%	$\pm(3.0\% + 40)$
100.0mS~0.100 $\mu$ S	0.1mS~0.001 $\mu$ S	$\pm(0.1\% + 5)$

1) Input range a:

$\leq 100\text{kHz}$ : 500mVrms  $\leq a \leq 30\text{Vrms}$

$> 100\text{kHz}$ -1MHz: 600mVrms  $\leq a \leq 30\text{Vrms}$

$> 1\text{MHz}$ : 1Vrms  $\leq a \leq 30\text{Vrms}$

2) Duty ratio % is applicable to measuring  $\leq 100\text{kHz}$  only

3) During AC voltage or AC current measuring, when frequency or duty ratio is required to be read online, the following requirements must be met:

a. frequency response:  $\leq 100\text{kHz}$

## UT171A/B/C Instructions

- b. AC voltage: input range for 400.00mV or 600mV  $\geq$  range $\times$ 10%  
 input range for 4.0000V/ 40.000V/ 400.00V  $\geq$  range $\times$ 10%  
 input range for 6.0000V/ 60.000V/ 600.00V  $\geq$  range $\times$ 10%  
 input range for 1000.0V  $\geq$  range $\times$ 30%
- c. AC current: input range for 4000.0 $\mu$ A/ 400.00mA  $\geq$  range $\times$ 10%  
 input range for 400.00 $\mu$ A/ 40.000mA/ 4.0000A  $\geq$  range $\times$ 10%  
 input range for 6000.0 $\mu$ A/ 600.00mA  $\geq$  range $\times$ 10%  
 input range for 600.00 $\mu$ A/ 60.000mA/ 6.0000A  $\geq$  range $\times$ 10%  
 input range for 10.000A  $\geq$  range $\times$ 30%

### 8. Measuring of temperature (applicable to UT171B/C only)

Range		Resolution	Accuracy
°C	-40~1000°C	0.1°C	-40~0°C $\pm(2\%+3^\circ\text{C})$
			>0~100°C $\pm(1.0\%+3^\circ\text{C})$
			>100~1000°C $\pm(2.5\%)$
°F	-40~1832°F	0.1°F	-40~32°F $\pm(2.5\%+5^\circ\text{F})$
			>32~212°F $\pm(1.5\%+5^\circ\text{F})$
			>212~1832°F $\pm(2.5\%+5^\circ\text{F})$

#### ⚠ Caution:

Point K-type (nickel-chromium-nickel silicon) thermocouple configured in accessory is applicable to measuring temperature below 230°C/446°F only!

## UT171A/B/C Instructions

### 9. Measuring with current caliper (UT171C only)

Range	Resolution	Accuracy $\pm(a\%$ of reading + b counts)
60A/600A DC	0.001A/0.01A	$\pm(1.0\%+30)$
60A/600A AC	0.001A/0.01A	$\pm(1.2\%+30)$

#### ⚠ Caution:

\* When the outer caliper head is used for current measuring, the corresponding relationship between its input range and adaptive conversion ratio is (60A; 10mV/A) or (600A; 1mV/A).

\* The frequency response range is not defined under ACA mode and it can be determined according to the frequency response of caliper.

\* These specifications are defined for signal input > 10% of range

### 10. Square-wave output(UT171C only)

Range	Resolution	Accuracy $\pm(a\%$ of reading + b counts)
Frequency	0.5Hz-4800Hz (0.1Hz is the stepping level)	$\pm(0.01\%+5)$
Duty ratio %	0%-100% (0.1% is the stepping level)	$\pm(0.5\%)$
Amplitude	about 0.8Vp	$\pm 0.2Vp$

#### ⚠ Caution:

1) The maximum square-wave output impedance is 50 $\Omega$ .

2) The positive or negative pulse width during adjusting the duty ratio must be more than 50 $\mu$ s.

## XI. Maintenance and Repair

### ⚠ Warning:

Before opening rear cover of instrument, it is necessary to power off; the probe has been off input terminal and circuit under test.

#### 1. General maintenance and repair

\* During maintenance, please use wet cloth and mild detergent to clean the shell of the instrument. Do not use abrasant or solvent.

\* In case of abnormality in instrument, it shall be necessary to suspend for repair.

\* If instrument is required for calibration or repair, it is advised to assign qualified professional maintenance personnel or specific maintenance department for repair.

#### 2. Replacement of battery or fuse tube (see Figure 15)

### ⚠ Operating steps:

\* Set power switch to "Off" position, to replace UT171 diagram, remove the probe from input jack and unload protective jacket.

\* Unscrew a screw fixed on the support with a screwdriver, to remove the rear cover of battery and support, replace the used under-voltage battery (applicable to UT171A only) and blown fuse F1/F2.

\* Upon the low voltage displayed on UT171B/C, connect the power adapter for charging (DC 10V, 500mA).

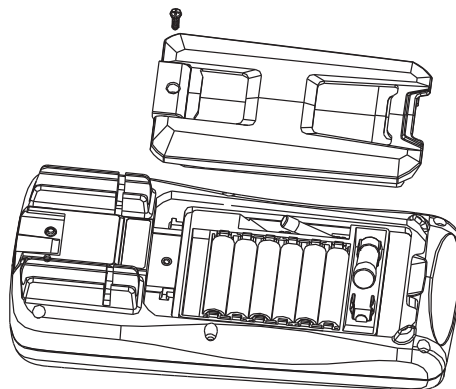


Figure 15

Instructions are subject to change without prior notice.