

UNI-T®



Operating Manual



Intelligent Three Clamp Phase Voltammeter

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⚠ Warnings

Thank you for purchasing our product UT267B intelligent three-phase digital phase volt-ampere meter (also known as three-phase digital volt-ampere meter). In order to use the product properly, please follow instructions below:

- — — **Please read user manual carefully**
- — — **Strictly follow safety rules and notes mentioned in this manual**
- ◆ Please use the meter carefully under any circumstance.
- ◆ Pay attention to word labels and symbols on front and back panels.
- ◆ Please check there is no missing, damaged or exposed parts before use.
- ◆ Do not test voltage higher than 600V.
- ◆ Do not use the meter if back and battery covers are not well placed.
- ◆ Please ensure test leads are firmly connected.
- ◆ Do not use the meter or change the battery if it is moisture-affected.

- ◆ It is prohibited to test on inflammable and dangerous sites
- ◆ Remove test wires away from measured objects before disconnection with the meter; do not touch input terminals in case of electric shock.
- ◆ Keep the meter away from strong electromagnetic environment to ensure normal operation.
- ◆ The operation will be invalid if simultaneously press two buttons or more.
- ◆ Stop using the meter if the shell or test wire is found with any fracture and metal exposure.
- ◆ Do not place and store the meter on sites with high temperature, moisture, dew and strong sunlight.
- ◆ The meter and current jaw should be regularly maintained and keep clean; any corrosive or rough cloth is not allowed to clean the jaw.
- ◆ To avoid electric shock happens to current clamp, especially its adjoining surface

- ◆ The meter is designed with auto power off function.
- ◆ Remove away the battery if not used in long period and ensure right polarity when changing battery.
- ◆ Please know well specified measuring scope and working environment of the meter
- ◆ Only authorized personnel can use, discharge, calibrate and repair the meter.
- ◆ Stop using the meter and pack immediately for the authorized treatment if further operation will cause any potential risks
- ◆ “” is safety warning symbol, requiring users to strictly follow safety instructions in the manual.
- ◆ “” is a caution mark, requiring full attention should be paid to the safe operation.

I. Overview

UT267 intelligent three-phase digital phase volt-ampere meter (three-phase digital phase volt-ampere meter) comes out from hard efforts of our developers and is a fully automatic, multi-purpose, digital and intelligent meter specially designed for on-site measurement and with following features: high accuracy, high stability, low power consumption and easy operation. Without cutting off measured circuits, it can measure three-phase AC voltage and current, phase angles between voltages, currents or both, frequency, phase sequence, active, reactive and apparent power, power factor, sum of current vector; it is able to identify wiring groups of transformers, inductive and capacitive circuits as well as secondary circuits and bus differential protection system measurement; it also can read out differential protection phase between CT units, check and ensure correct wiring of kilowatt-hour meter, good conditions of wiring equipments, ect, which all together turn this kind of




meter a safe, accurate and convenient new electric instrument offered for electric inspectors.




The meter, designed with latest materials for shell pattern and anti-vibration, anti-skidding, high-insulation protection jacket, can offer 240dots×160dots and dynamic display together with vector diagram indication, thus presenting users luxurious and elegant exterior structure. It is equipped with RS232 and available for data storage of 500 sets which transferred into PC through system software for further online real-time monitoring, history lookup, dynamic display, data readout, save, report and printing, ect.

This kind of meter is also known as three-phase digital phase volt-ampere meter, multi-purpose three-phase digital phase volt-ampere meter, automatic phase volt-ampere meter, tri-clamp digital phase volt-ampere meter, phase volt-ampere meter, three-phase electrical parameter tester. It can fully enjoy functions from intelligent dual-clamp phase volt-ampere meter and general machinery dual-clamp digital phase volt-ampere meter, which is applied in

electric power, petrochemical, metallurgy, railway, factories and mining, R&D institutes, metrological department. It is particularly needed in electric charging and relay protection system, electric power calculation, check and monitoring from power supply remarketing departments as well as electric installment, relay protection, differential inspection, start-up testing, power transformation check, electrical training, skill competition performed by technical department.

II. Electrical Symbols

	Extreme danger! The operator must strictly observe safety rules to avoid electric shock, personal injury or accidents
	Danger! The operator must follow safety rules to avoid electric shock, personal injury or accidents.
	Warning! Strictly adhere to safety rules to avoid any personal injury or equipment damage.

	Alternate Current(AC)
	direct Current(DC)
	Dual Insulation

III. Technical Specifications

1. Reference and Operating Conditions

Impact factors	Reference conditions	Operating Conditions	Notes
Ambient Temperature	23℃±1℃	0℃~40℃	-----
Ambient Humidity	40%~60%	<80%	-----
Waveform	Sine wave	Sine wave	β =0.01
Frequency	50HZ±1HZ	45HZ~65HZ	-----
Working Voltage	9V±0.1V	9V±1.5V	-----

Current Amplitude When measuring frequency phase sequence	200mA±3mA	10mA~20A	----
Voltage Amplitude when measuring frequency phase sequence	100V±10V	10V~600V	----
Current Amplitude when measuring power factor	200mA±3mA	20mA~20A	----
Voltage Amplitude when measuring power factor	100V±10V	10V~600V	----
Exterior Electromagnetic Field	Avoided		
Measured Test lead Location	Placed on geometric center of the jaw		

2. General Specifications

Functions	To measure three-phase AC voltage, current, phase between two voltages, currents or both, frequency, phase sequence, active and reactive power, apparent power, power factor, sum of current vector; to differentiate wiring groups of transformer, inductive and capacitive circuits; to test secondary circuits and bus differential protection system, to read out differential protection relation between CT units; to check and ensure correct wiring and good conditions of wiring equipments.
Power	DC9V Alkaline Dry Battery (1.5V AA×6)
Range (Fully Automatic)	Voltage: AC 0.00V~600V
	Current: AC 0.0mA~20.0A
	Phase Angle: 0.0° ~360.0°

	Frequency: 45.00Hz~65.00Hz
	Active Power: 0.0W~12kW
	Reactive Power: 0.0VAR~12kVAR
	Apparent Power: 0.0VA~12kVA
	Power Factor: -1~+1
	Sum of Current Vector: 0mA~60.0A
Jaw Size	Sharp current clamp: 7.5mm×13mm
Resolution	Voltage: AC 0.01V
	Current: AC 0.1mA
	Phase: 0.1°
	Frequency: 0.01Hz
	Active Power: 0.1W
	Reactive Power: 0.1VAR
	Apparent Power: 0.1VA

	Power Factor: 0.001
	Sum of Current Vector: 1mA
Phase Sequence	Normal: U1,U2,U3 or I1,I2,I3 cursor flashes from left to right Reverse: U1,U2,U3 or I1,I2,I3 Cursor flashes from right to left
Data Storage	500 sets
Rs232 Interface	With RS232, all data transferred into PC for further data management and analysis
Connection line	RS232 connection line, 1.8 meters long
Power Consumption	Max 80mA consumed with backlight on, 10 hours for battery life
	50mA with backlight off, 16 hours for battery life
Display Mode	LCD display, 240dots×160dots
Meter Size	Long × Wide × Thick: 196mm×92mm×54mm
Backlight	Available, used in dark site and at night

Measuring Speed Rate	About 2 seconds per time
Data Hold	Press HOLD button to maintain data , indicated by HD symbol
*Auto Power Off	Auto power off to reduce power loss 15mins later after power on
Voltage Measurement	Low battery icon displays when voltage under 7.2 V , to remind changing battery.
	The meter: 550g (battery included)
Quality	Sharp Current Clamp: 170g×3
	Test Wire: 250g
Testing Wire Length	1.5m
Clamp Wire Length	2m× ϕ 5mm

Working Temperature and Humidity	0℃~40℃; <80%Rh
Storage Temperature and Humidity	-10℃~60℃; <70%Rh
Input Impedance	Input impedance for measuring voltage: 2M Ω
Withstand Voltage	meter circuits and shell, able to withstand AC voltage1000V/50Hz for 1mins when input Sine wave
Insulation	For circuits and protected shell \geq 100M Ω
Structure	Double Insulation, coupled with vibration-proof insulation jacket
Applicable Safety Rules	IEC61010-1 CAT III 600V, IEC61010-031, IEC61326, Pollution Class2

* The meter flashes before automatically power off and continues to work with “ON” button pressed down.(15 minutes as a working period)

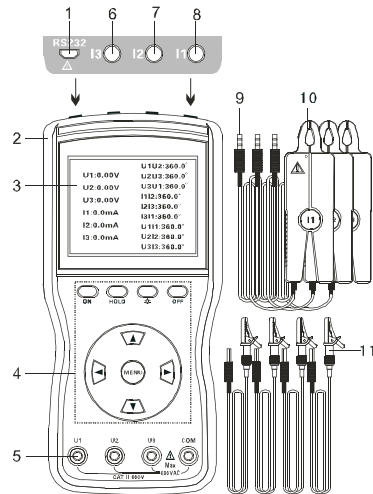
3. General Differences and Performance Indexes under Reference Conditions.

Items	Range	Resolution	General Difference
Voltage	AC 0.00V~600V	0.01V	$\pm(1.5\%rdg+3dgt)$
Current	AC 0.0mA~20.0A	0.1mA	$\pm(1.5\%rdg+3dgt)$
Phase Angle	0.0° ~360°	0.1°	$\pm 1^\circ$
Active Power	0.0W~12kW	0.1W	$\pm(3\%rdg+3dgt)$
Reactive Power	0.0VAR~12kVAR	0.1VAR	$\pm(3\%rdg+3dgt)$
Apparent Power	0.0VA~12kVA	0.1VA	$\pm(3\%rdg+3dgt)$
Frequency	45HZ~65HZ	0.01HZ	$\pm(2\%rdg+3dgt)$
Power Factor	-1~+1	0.001	± 0.03

Notes1: Phase angle differences should be less than $\pm 3^\circ$ under the working conditions, $\pm 6^\circ$ is for phase angle tolerance between 5mA~10mA

IV. Structure of Meter

1. USB-RS232 Interface
2. Vibration-Proof Insulation Jacket
3. LCD Display
4. Functional Button Zone
5. Three-Phase Voltage Input Terminals
6. Current Input Terminal I3
7. Current Input Terminal I2
8. Current Input Terminal I1
9. Current Clamp Output Plug
10. Sharp Current Jaw
11. Voltage Input Testing Cables



V. Operating Instructions

⚠ Note:

- Please carefully check if there are damaged parts or not before safe use.
- Do not use the meter on dangerous sites.
- Install the battery according to the manual.
- Do not simultaneously press 2 buttons or more in case of invalid operation.

1. Power On/Off

Press **[ON]** to power on and LCD displays. Press **[OFF]** button to power off, the meter will automatically power off 15 minutes later after power on.

2. Backlight Control

Press **[Light]** button after power on to control the backlight, which is suitable in dark sites and at night.

3. Data Hold and Storage

Press **[HOLD]** button to maintain displayed data under measuring status,

indicated by “HD” icon, press again to cancel the operation. The meter will automatically save and number current data while maintaining the data, indicated by group serial number such as S: 001. Max 500 sets of data is available for the meter, displayed by “FULL” if the number is achieved.

4. Data Access and Exit

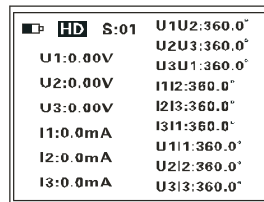
Press **[MENU]** to enter into data access status during measurement, indicated by “RD” icon, then data lookup starts from “R: 001” press **[Up]** button to increment by 1, **[Down]** button to decrement by 10 and **[Left]** to exit this status and return to measuring mode.

5. Data Delete

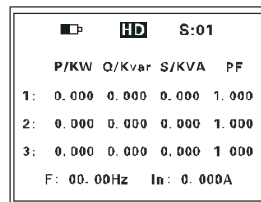
Press **[Right]** button when still under data access data to enter into data delete option, then **[Left]** or **[Right]** button to move the cursor to select “YES” or “NO”, next **[MENU]** button for confirmation or exit, finally returning to measuring mode.

6. Display Mode Switchover

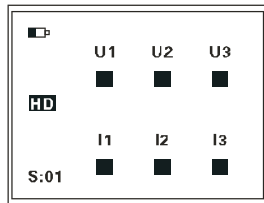
The meter will automatically enter into voltage, current, phase display measuring modes (Figure A) after power on; then press **Down** button to go into display modes of active and reactive power, apparent power, power factor, frequency, three-phase current vector measurement (Figure B); or **Right** button to access phase sequence status (Figure C); **Left** button to display vector gram (Figure D); or **Up** button to back to voltage, current, phase measuring mode. Particularly to mention is that three-phase power and power factor in figure B correspond to those of U1I1, U2I2, U3I3.



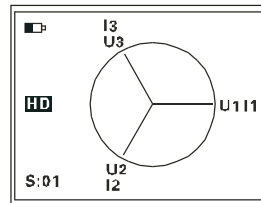
(A)



(B)






(C)



(D)

7. Measurement

	Electric Shock, Danger! Only trained and authorized staff is allowed to operate and should strictly observe safety rules, to avoid any damage to the meter or personal injury in case of electric shock.
	Danger! Do not measure voltage above 600V, to avoid any damage to the meter or personal injury in case of electric shock
	Danger! Do not measure current above 20A which may damage the meter!
	Connect wires as indicated in the manual and avoid wrong insert between I1, I2 and I3
	Disconnect test wires with measured circuits before pulling them out of the meter after measurement.
	Phase measuring relations: U1U2, U2U3, U3U1, I1I2, I2I3, I3I1, U1I1, U2I2, U3I3, the former phase of signal always precedes the latter.

	Voltage terminals U1, U2, U3 are named the same with red marks on current clamps.
	The Current clamping direction should accord with those of red marks during phase measuring

This meter can measure three-phase voltage and current, phase angle between voltages, currents and both, frequency, active and reactive power, apparent power, power factor, three-phase sum of current vector, and also differentiate phase sequence, inductive and capacitive circuits, ect.

Testing wire connection is shown as below:

1. Single Phase Measuring:

Connect measured voltage lines L, N to yellow U1 and black COM terminals, then current clamp I1 grasping L line. It also works by choosing Green U2, black COM, I2 or red U3, black COM and I3.

2. Three-Phase Four-Wire Measuring:

Connect yellow UA, green UB, red UC and black N correspondingly to terminals yellow U1, green U2, red U3 and black COM on the meter, then get current clamps I1, I2, I3 grasp measured IA, IB, IC.

3. Three-Phase Three-Wire Measuring:

Connect measured voltage lines to yellow UA, red UC and Green UB correspondingly to terminals of the meter yellow U1, red U3 and black COM, then get current clamps I1, I3 grasp measured IA and IC. Reference connection figure shown as below.

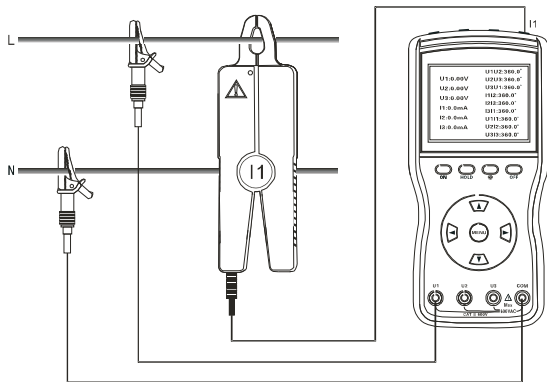
It is possible to differentiate among inductive and capacitive load, phase sequence and the polarity during measuring. If U1I1 phase angle is displayed ranging from $0^{\circ} \sim 90^{\circ}$, it measured load will be diagnosed as inductive; it is capacitive load with scope from $270^{\circ} \sim 360^{\circ}$; it is positive phase sequence and has the same polarity with phase angles all close to 120° ; otherwise positive phase sequence and reverse polarity is obtained with phase angle

close to 120° and 300° (it may caused by wrong current clamping or wiring connection), other conditions will be identified as reverse phase sequence (absence of phase not considered).

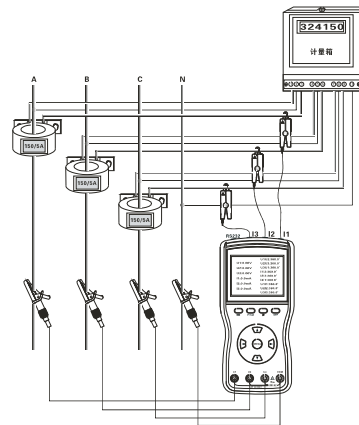
Under phase sequence measuring mode, U1, U2, U3 or I1, I2, I3 are considered as positive phase sequence with cursor flashing from left to right side; and if the other way, U1, U2, U3 or I1, I2, I3 cursor move from right to left side. If corresponding cursor does not flash, it is likely that phase may be absent or signal amplitude is too low.

Connection Figures shown as below:

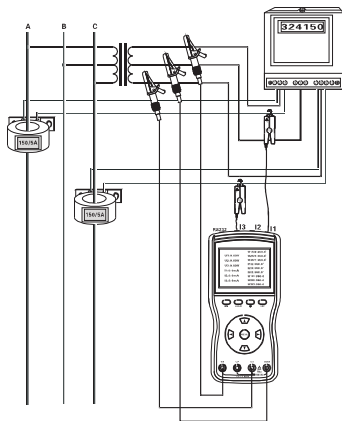
1. Single --Phase Voltage, Current, Phase Angle, Frequency, Power Measurement:



2. Three-phase Four-Wire Voltage, Current, Phase Angle and Sequence, Frequency, Power and Power Factor Measurement:



3. Three-Phase Three-Wire Voltage, Current, Phase Angle, Phase Sequence, Frequency, Power and Power Factor Measurement:



8. Data Transmission to PC

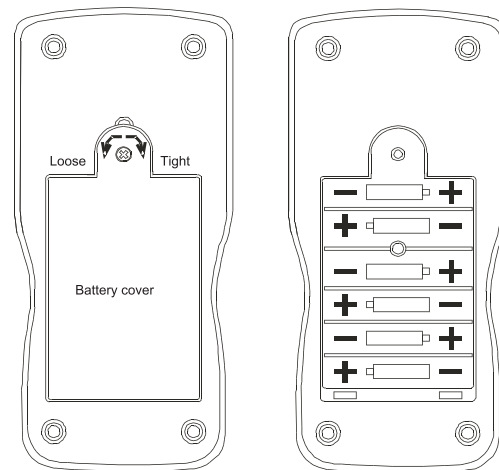
The accessory RS232 connection line is used for communication of the meter with PC. With the meter power on and the software running, several following operations such as history lookup, data recall, save, report sheet, history printing can all be performed. The more data the meter saves, more time it will take to read out. History data can be saved in Txt or Excel format.

VI. Battery Replacement

⚠ Note:

- Please ensure correct polarity when installing the battery, otherwise it causes damage to the meter
- It is prohibited to change batteries on dangerous sites
- You must use Qualified alkaline dry battery (1.5V AA×6)
- New and old batteries are not allowed to combine for use

1. Low battery icon will be displayed with power supply below 7.2V, please timely change batteries and do as below:
2. Press **[OFF]** button to power off.
3. Use cross-shaped screwdriver to loosen one bolt away from the battery cover and open it.
4. Replace old batteries with new ones and ensure right polarity is selected.
5. Close the battery cover and tighten the bolt.
6. Press **[ON]** button to check if the battery is successfully replaced, if not, repeat operations from the second step.
7. Take the battery out if the meter is not in use for long time.



VII. Other Items and Notes:

1. Exclusiveness of Current Clamps

There are three current clamps attached to every meter, which can not be exchanged for the other meters. Current clamps should be prevented from any crush and kept clean in order to ensure reliability when closing up to measure.

2. Maintenance of Current Clamps

Please clean up clamp jaw surface after measurement, soft cloth coupled with lubricant (eg: WD-40 lubricant) instead of rough cloth or the corrosive are expected to use for the clearing. Please clean again just before use.

3. The meter can be used to measure secondary circuits and low voltage loop, however, not suggested to measure current in high-voltage circuits in case of electric shock.

4. Three-Phase Four-Wire (phase angle under three-phase load balance)

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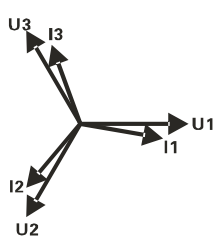
Phase Relations	Phase Value	Phase Relations	Phase Value
Ua-Ub	120°	Ia-Ib	120°
Ub-Uc	120°	Ib-Ic	120°
Uc-Ua	120°	Ic-Ia	120°

5. Three-phase Three-Wire (phase angle under three-phase load balance):

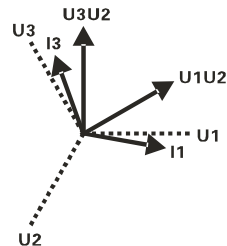
Phase Relations	Phase Value	Phase Relations	Phase Value
Uab-Ucb	300°	Ia-Ic	240°
Uab-Ia	30°	Ucb-Ic	330°

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6. Three-Phase Four-Wire and Three-Phase Three-Wire Vectorgrams



Three-Phase Four-Wire
Vectorgram



Three-Phase Three-Wire
Vectorgram



Note:

If current clamps or current wires are incorrectly attached, the displayed phase difference will be 180° , that is to increment by 180° based on reference values above.

VIII. Product Checklist

The Meter	1
Giftbox	1
Current Clamps	3
System Software Disk	1
RS232 Cable	1 (1.8 meters)
Test leads	4 (one for each type: yellow, green, red, black)
Battery	6 PCS (Alkaline dry battery: 1.5V AA)
User Manual, Warranty Card, Product Certificate	1

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The manual information is subject to changes without prior notice.