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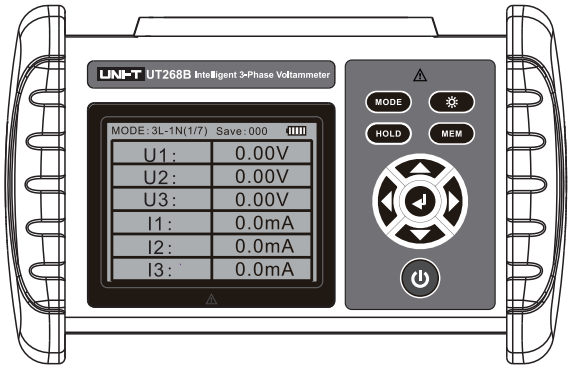


Intelligent 3-Phase Voltammeter

UT268B

Operating Manual

Contents

I. Safety Information

Thank you for purchasing the product. Before first use, please thoroughly read and strictly follow the safety information and precautions listed in the user manual, to avoid electric shock or personal injury.

◆ The product is used for live working, for the sake of your safety, please follow the national safe production regulations and safe operation procedures.

◆ Please pay attention to the labeled words and symbols at the front and rear panels.

◆ Check if the product and its accessories are complete. Do not use if damage, exposure or broken wire occurs. It is forbidden to use if rear cover and battery cover are not closed in place. Stop use if metal exposure (caused by cracking of casing or test lead) occurs during use.

◆ Do not measure voltage over 600V. Do not use under strong electromagnetic fields. It is forbidden to conduct test in places with inflammable and dangerous substances.

◆ Be sure that the plug of the lead connects with terminal tightly, and that the direction is correct when performing phase test. Remove the test lead from measured conductor before disconnecting the test lead with the voltammeter. Do not make contact with the terminal by hand, to avoid electric shock.

◆ Do not operate the product by wet hand. Avoid rain from dripping on the product. It is forbidden to use in damp state.

◆ Do not place or keep the product in environments with high temperature, high humidity, dew or direct sunlight for a long time.

◆ Keep the product surface clean and dry. Do not use clean the product by corrosives or coarse materials, please wipe the current clamp mildly by soft cloth (i.e. glasses cloth) dipped with rust-proof dehumidifying lubricant.

◆ Please refrain the voltammeter and the current clamps from impact and dropping.

◆ Use the product in specified measurement range and operating environments.

◆ Use, disassembly, calibration and maintenance must be performed by authorized qualified personnel.

◆ The safety warning symbol "  " in the user manual identifies that the operator must perform safe operation according to the instructions.

◆ The danger symbol "  " in the user manual identifies that the operator must strictly perform safe operation according to the instructions.

II. Introduction

The **Digital 3-Phase Voltammeter,** the latest product in clamp meter series, is a digitalized, multifunctional, high-precision and intelligent multi-parameter industrial-frequency measurement instrument. Designed with latest microprocessor technology and digital signal processing technology, UT268B can measure industrial-frequency parameters (i.e. voltage, RMS current, active/reactive power, apparent power, industrial frequency, power factor, phase relation, and others) in direct AC sampling method, identify transformer connection section and inductive and capacitive circuits, test secondary loop and bus differential protection system, display phase relations between current transformers under differential protection, and check if the wiring of electric energy meter is correct. By using clamp current transformer, this voltammeter can perform measurement without disconnecting from measured conductor, making it a safe, accurate and portable electric power meter.

Digital 3-Phase Voltammeter, also known as **intelligent 3-Phase Voltammeter**, **Multifunctional 3-Phase Voltammeter**, **Digital Clamp Voltammeter**, etc., is suitable for use in electric power, petrochemical industry, metallurgy, railway, industrial and mining enterprises, scientific and research institute, metrology service, electric energy charging system, relay protection system, and more.

III. Functions Introduction

1. Devised with large screen with high-brightness backlight, to clearly display working state and testing parameters.
2. The ability to measure 3-phase voltage, current, phase, frequency, active power, reactive power, apparent power, power factor, and overall power.
3. Can be used to measure grid frequency and phase sequence.
4. The function of phase measurement under small current of 5mA allows for checking wire connection without load.
5. Automatically identify transformer winding and capacitive and inductive loads; and identify wrong connection of 3P3W and 3P4W.
6. Static storage function to enable store 500 groups of data at most.

IV. Electrical Symbols

	Extremely dangerous! The operator must follow the safety information strictly, otherwise it may present a risk of electric shock, which can cause personal injury or death.
	Danger! The operator must follow the safety information strictly, otherwise it may present a risk of electric shock, which can cause personal injury or death.
	Warning! The operator must follow the safety information strictly, otherwise it can cause personal injury or product damage.

	Alternating Current (AC)
	Direct Current (DC)
	Double Insulated

V. Technical Specifications

1. Basic Operating Conditions

1) Ambient temperature: (23±5)°C
2) Ambient humidity: (45~75)% RH
3) Waveform of measured signal: Sinusoidal wave, =0.02
4) Frequency of measured signal: (50±0.2)HZ
5) Location of measured current-carrying conductor at the clamp jaws: At center
6) Current amplitude when measuring phase frequency, phase sequence, power and power factor: 5A±0.2A
7) Voltage amplitude when measuring phase frequency, phase sequence, power and power factor: 220V±20V
8) Electromagnetic interference to external-reference frequency: Shall be avoided.

2. Rated Operating Conditions

1) Ambient temperature: (-15~+45)°C
2) Ambient humidity: (0~90)% RH
3) Operating altitude: <1500 m
4) Waveform of measured signal: Sinusoidal wave, =0.05
5) Frequency of measured signal: 45~65HZ
6) Current amplitude when measuring phase frequency, phase sequence, power and power factor: 20mA~1000A
7) Voltage amplitude when measuring phase frequency, phase sequence, power and power factor: 20V~600V
8) Location of measured current-carrying conductor at the clamp jaws: Any location

3. General Specifications

Functions	Measure 3-phase AC voltage, current, phase between voltages, phase between currents, phase between voltage and current, frequency, phase sequence, active power, reactive power, apparent power, power factor, and current vector sum; identify transformer connection section, inductive circuit, and capacitive circuits; and test secondary loop and bus differential protection system, display the phase relation between differentially-protected CTs of each group, check if the wiring of electric energy meter is correct, repair equipment of measured line, etc.

Power supply	DC 3.7V large-capacity rechargeable lithium battery
Power consumption	250mA at most with backlight lit up (battery working duration: >5 hours)
Display mode	LCD display (71×52 mm)
Voltammeter dimensions	187*191*51 mm (Length*Width*Thickness)
Voltage range	AC 0.00V~600V
Current range	AC 0.0mA~1000A
Phase range	0.0°~360.0°
Frequency range	45.00Hz~65.00Hz
Active power range	0.0W~600Kw
Reactive power range	0.0W~600kVAR
Apparent power range	0.0W~600kVA
Power factor range	-1~+1
3-phase overall power	3-phase overall power, overall apparent power, overall reactive power and over power factor are displayed in the line “T”.
Current vector sum	0mA~3000A
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
	Current vector sum: 1mA
Phase sequence	If the phase sequence of “U1, U2 and U3” or “I1, I2 and I3” is positive, then the cursor flashes from left to right in order; if negative, then from right to left.
Testing rate	About 2 seconds per time
Data hold	When the button “HOLD” is pressed during test, the data will be held and the symbol “HOLD” is displayed.
Data storage	500 groups of data
USB port	Upload stored data to computer via USB port, so as to analyze and manage data.
Auto power off	To reduce power consumption, the voltammeter powers off automatically 15 minutes after it is powered on.
Backlight function	Used in dark environments and at night.
Voltage detection	If the battery voltage is lower than 3.0V, the low battery symbol is displayed to indicate charging in time.
Product weight	Voltammeter: 450 g (including battery)
	Large-caliber current clamp: 440 g × 3
	Test lead: 250 g

Length of test lead length	1.5 m
Length of current clamp lead	2 m
Operating temperature and humidity	-10°C~40°C; <80%RH
Storage temperature and humidity	-10°C~60°C; <70%RH
Input impedance	2 M (the input impedance of testing voltage)
Withstand voltage	Apply 1000V/50Hz sinusoidal AC voltage between voltammeter circuit and casing for one minute.
Insulation	100M (between voltammeter circuit and casing)
Structure	Double-insulated
Applicable safety regulations	IEC61010-1 CAT III 600V, IEC61010-031, IEC61326, Pollution Class 2

4. Performance Specifications

Type	Range	Resolution	Basic error
Voltage	AC 0.00V~9.99V	0.01V	± (1.5%rdg+3dgt)
	AC 10.0V~99.9V	0.1V	± (1.5%rdg+3dgt)
	AC 100V~600V	1V	± (1.5%rdg+3dgt)
Current	AC 0.0mA~9.9mA	0.1mA	± (1.5%rdg+3dgt)
	AC 10.0mA ~99.9mA	0.1mA	± (1.5%rdg+3dgt)
	AC 100mA ~999mA	1mA	± (1.5%rdg+3dgt)
	1.00A~10.00A	10mA	± (1.5%rdg+3dgt)
	10.0A~100.0A	0.1A	± (1.5%rdg+3dgt)
	100A~1000A	1A	± (1.5%rdg+3dgt)
Phase	0.0°~360°	0.1°	±1°
Frequency	45Hz~65Hz	0.01Hz	±0.1Hz
Power factor	-1~+1	0.001	±0.03

Note 1: The phase error is ±3° under operating condition (For current amplitude below 30mA, the phase error will be doubled).

<Active Power> P: W = (V × A × COS φ)

Current		Voltage range	
		10.0V~100.0V	**100V~600V**
Current range	**10.0mA~99.9mA**	0.0100 KW	0.0600 KW
	100mA~999mA	0.1000 KW	0.6000 KW
	1A~9.99A	1.0000 KW	6.0000 KW
	10A~99.9A	10.000 KW	60.000 KW
	100A~1000A	100.000 KW	600.000 KW
Accuracy:		± (3%+3dgt)	
Resolution:		<10.000 KW: 0.0001 KW 10.000 KW: 0.001 KW	

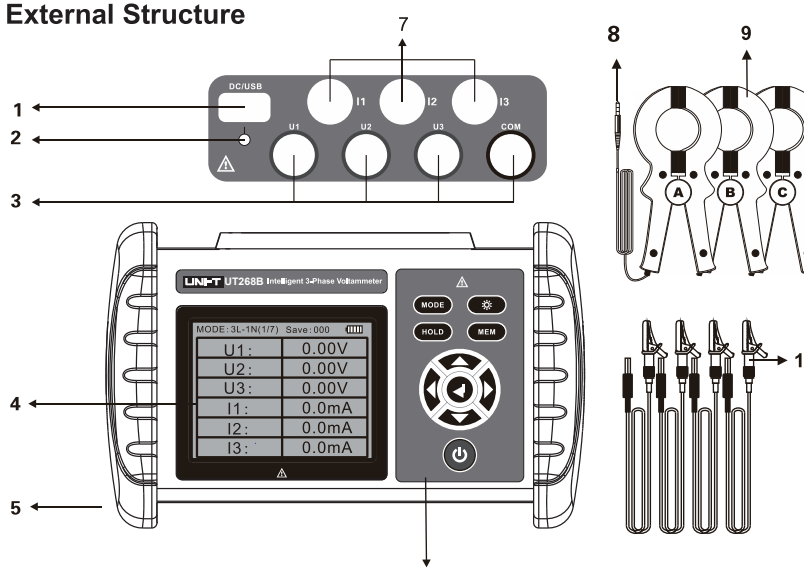
<Reactive Power> Q: VAR = (V × A × sin φ)

Current		Voltage range	
		10.0V~100.0V	100V~600V
Current range	10.0mA~99.9mA	0.0100 KVAR	0.0600 KVAR
	100mA~999mA	0.1000 KVAR	0.6000 KVAR
	1A~9.99A	1.0000 KVAR	6.0000 KVAR
	10A~99.9A	10.000 KVAR	60.000 KVAR
	100A~1000A	100.000 KVAR	600.000 KVAR
Accuracy:		± (3%+3dgt)	
Resolution:		<10.000 KVAR: 0.0001 KVAR 10.000 KVAR: 0.001 KVAR	

<Apparent Power> S: VA = (V × A)

Current		Voltage range	
		10.0V~100.0V	100V~600V
Current range	10.0mA~99.9mA	0.0100 KVA	0.0600 KVA
	100mA~999mA	0.1000 KVA	0.6000 KVA
	1A~9.99A	1.0000 KVA	6.0000 KVA
	10A~99.9A	10.000 KVA	60.000 KVA
	100A~1000A	100.000 KVA	600.000 KVA
Accuracy:		± (3%+3dgt)	
Resolution:		<10.000 KVA: 0.0001 KVA 10.000 KVA: 0.001 KVA	

VI. External Structure



1. USB transfer/charging port
2. Charging indicator light
3. 3-phase voltage input ports
4. LCD display
5. Rubber-insulated protective cover
6. Functional buttons
7. 3-phase current input ports
8. Plug of current clamp
9. Large-caliber current clamps
10. Test leads of voltage input

VII. Operating Instructions

⚠	**Please check if any component of the voltammeter is damaged, do not use in case any damage is found.**
	It is forbidden to use the voltammeter in dangerous places.

1. Power On/Off

Press "⏻" to power on/off the voltammeter. The voltammeter powers off automatically 15 minutes after it is powered on.

2. Data Hold/Cancellation/Storage

When the button "HOLD" is pressed under testing mode, the displayed data is held and the symbol "HOLD" is displayed. Press HOLD to disable data hold. When the voltammeter holds data, it performs automatic numbering, stores the data held currently, and displays the numbering of groups (i.e. "Save: 002"). 500 groups of data can be stored at most, the symbol "FULL" appears if storage is full.

3. Data Viewing/Exit

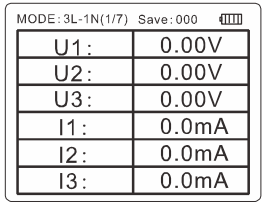
When the button "MEM" is pressed, the voltammeter enters data viewing mode and displays the symbol "Read". Start reading data from Group "Save: 001". Press " " to read data at an increment of 1, long press " " to read data at an increment of 10. Press " " to read data at a decrement of 1, long press " " to read data at a decrement of 10. Press " " and " " to cycle through voltage/current and phase, active power, reactive power, apparent power, power factor, frequency, and storage. Press "MEM" to exit data viewing mode and return to testing mode.

4. Data Deletion

Under data viewing mode or testing mode, long press "HOLD" to enter data deletion mode, press " " to select "YES" or " " to select "NO", then return to testing mode after selected.

5. Testing Modes Switching

Power on the voltammeter to enter voltage and current testing mode (Figure 1). Press “MODE” to switch between “3P3W” and “3P4W” modes. Press “ ” and “ ” to switch testing modes between phase, active power, reactive power, apparent power, power factor, frequency, phase sequence, and vector diagram (Figure 2, 3, 4, 5, 6 and 7). Active power, reactive power, apparent power and power factor shown in Figure 4 and 5 are corresponding powers and power factor of U1I1, U2I2 and U3I3.



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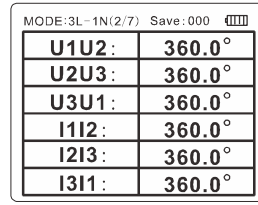

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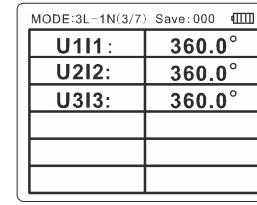

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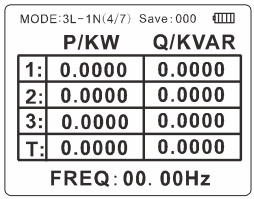

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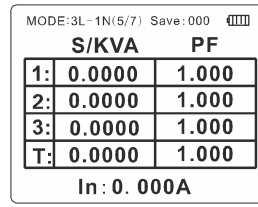

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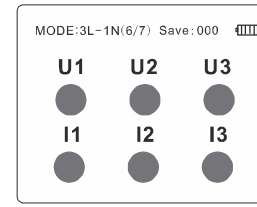

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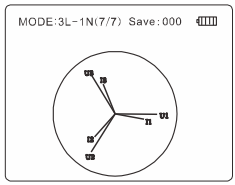


(7)

6. Testing

	Electrified! Danger! The operation must be performed by authorized trained personnel. The operator must follow the instructions strictly, otherwise it can pose a risk of electric shock, which may cause personal injury or equipment damage.

	Danger! Do not measure voltage line over 600V, otherwise it can pose a risk of electric shock, which may cause personal injury or equipment damage.
	Danger! Do not measure any line over 1000A, otherwise it may cause equipment damage.

⚠	**Please perform wiring strictly according to the user manual. Do not connect I1, I2 and I3 inversely.**
	Please remove the test leads from measured line before disconnecting the test leads with the voltammeter.

⚠	**The phase relations of the voltammeter is: U1U2, U2U3, U3U1, I1I2, I2I3, I3I1, U1I1, U2I2 and U3I3, the previous signals exceed the next ones for all the phases.**
	The U1, U2 and U3 terminals and the right arrows at the corresponding current clamps are the same-polarity ends.
	For phase testing, the direction of current flowing into the clamp shall be consistent with the direction of arrow at the clamp.

The voltammeter measure 3-phase AC voltage and current, phase between voltages, phase between currents, phase between voltage and current, frequency, active power, reactive power, apparent power, power factor, 3-phase current vector sum, and identify phase sequence, inductive and capacitive circuits, etc.

Wiring of tests:

Single-phase testing: Connect the measured voltage lines L and N with U1 YELLOW and COM BLACK terminals correspondingly, then the current clamp I1 clamps the measured line L. “U2 GREEN, COM BLACK and I2” or “U3 RED, COM BLACK and I3” can also be connected.

3-phase 4-wire testing: Connect the measured voltage lines UA YELLOW, UB GREEN, UC RED and N BLACK with U1 YELLOW, U2 GREEN, U3 RED and COM BLACK terminals correspondingly, then the current clamps I1, I2 and I3 clamp the measured lines IA, IB and IC correspondingly.

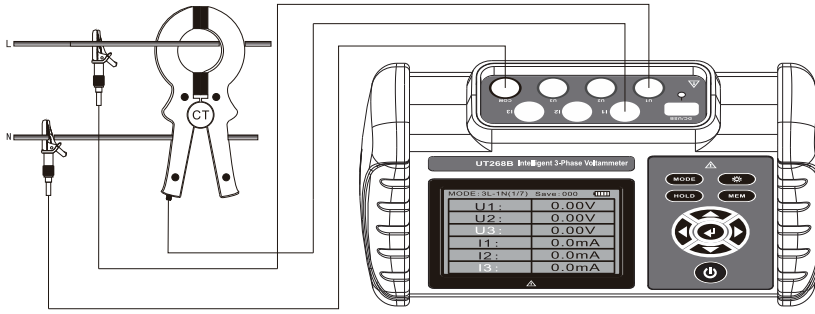
3-phase 3-wire testing: Connect the measured voltage lines UA YELLOW, UC RED and UB GREEN with U1 YELLOW, U3 RED and COM BLACK terminals, then the current clamps I1 and I3 clamp the measured lines IA and IC correspondingly. See “Reference wiring diagrams”.

Inductive and capacitive loads, phase sequence and polarity can be identified according to the phase relations. If the phase of U1I1 is between 0.0 and 90.0, then the measured load is inductive; if between 270.0 and 360.0, then capacitive. If the phase is approximate to 120.0, then the phase sequence is positive and the polarity is same; if approximate to 120.0 and 300.0, then positive and opposite (the current clamp may be in reverse direction or the measured line may be connected inversely); the phase sequence is negative for other phase values (phase loss is not considered).

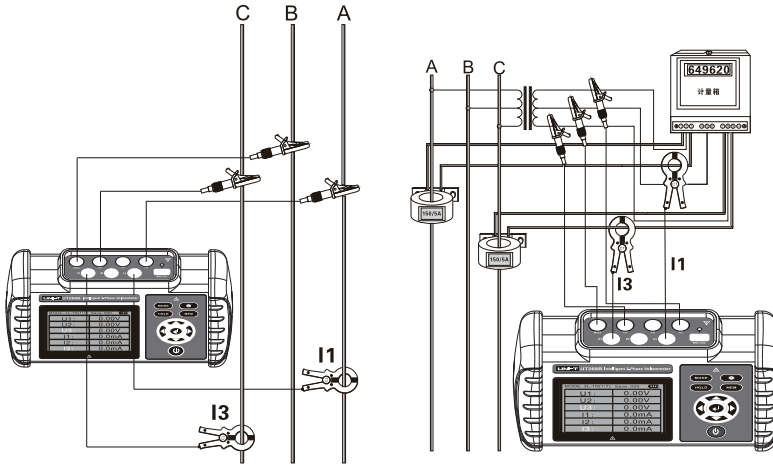
Under phase sequence testing mode, if the phase sequence of “U1, U2 and U3” or “I1, I2 and I3” is positive, then the cursor flashes from left to right in order; if negative, then from right to left; if the corresponding cursor of “U1, U2 and U3” or “I1, I2 and I3” is not lit up, phase loss may occur or the signal amplitude may be too low.

Reference wiring diagrams:

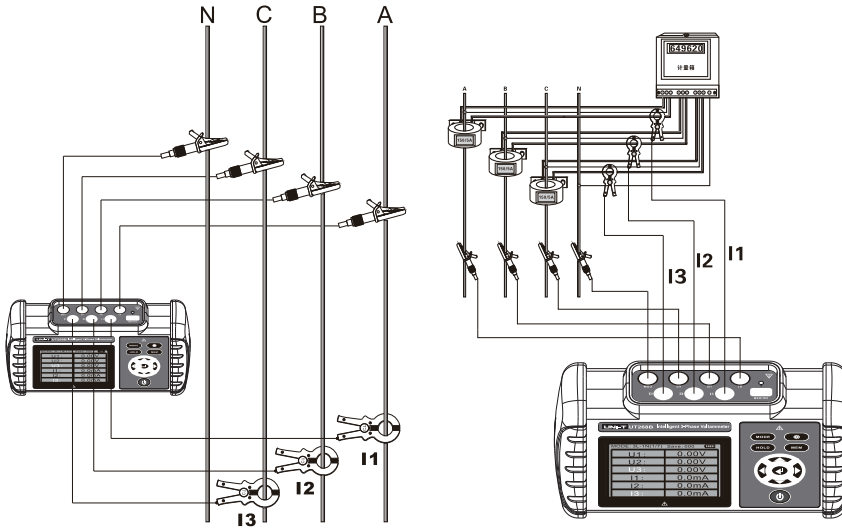
Measure single-phase voltage, current, phase, frequency, power, etc.



Measure 3-phase 3-wire voltage, current, phase, phase sequence, frequency, power, power factor, etc.



Measure 3-phase 4-wire voltage, current, phase, phase sequence, frequency, power, power factor, etc.



VIII. Battery Charging

⚠	**Use the original 5V charger only, do not use other high-voltage chargers, otherwise it may damage the voltammeter.**
	Please charge the voltammeter once a month if it is not used for a long time.

1. If the power voltage of the voltammeter is lower than 3V, the symbol "▭" appears to indicate low battery, in such case, please charge the battery immediately (the indicator light is lit up green if the battery is fully charged).

IX. Others

1. Dedicated current clamps

The three current clamps are only used for the voltammeter supplied, do not apply them with other voltammeters. Do not reverse the sequence of the three current clamps, otherwise error will be increased. Prevent the current clamp from dropping and impact. Keep the clamp jaws clean. Be sure the clamp jaws close in place.

2. The maintenance of current clamps

Clear dust at the clamp jaws after use, do not clean with coarse materials or corrosives. Please mildly wipe the clamp jaws by using soft cloth and lubricant (i.e. WD-40 lubricant). Please also perform cleaning before testing.

3. The voltammeter is used to test secondary and low-voltage loops (Do not measure current of high-voltage line to prevent electric shock).

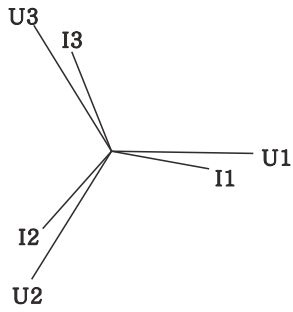
4. 3-phase 4-wire (phase with 3-phase load balanced)

Phase relation	Phase value	Phase relation	Phase value
Ua-Ub	120°	Ia-Ib	120°
Ub-Uc	120°	Ib-Ic	120°
Uc-Ua	120°	Ic-Ia	120°

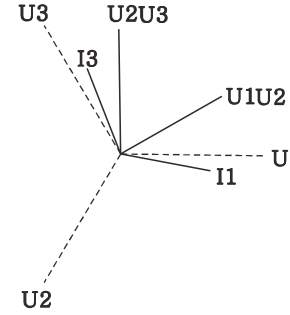
5. 3-phase 3-wire (phase with 3-phase load balanced)

Phase relation	Phase value	Phase relation	Phase value
Uab-Ucb	300°	Ia-Ic	240°
Uab-Ia	30°	Ucb-Ic	330°

6. 3-phase 4-wire vector diagram and 3-phase 3-wire vector diagram:



3-phase 4-wire vector diagram



3-phase 3-wire vector diagram

⚠	**If the current clamp is in reverse direction or the current line is connected reversely, there will be a difference of 180° with the displayed phase value, that is, 180° is added to the standard values shown above.**

X. Packing List

Voltammeter	1 pcs
Carrying box	1 pcs
Current clamp	3 pcs
Test lead	4 pcs (1 pc for yellow, green, red and black respectively)
Charger + USB cable	1 set
User manual	1 pcs

The content of this user manual cannot be used as a reason for using the product for special purposes.

The company is not responsible for other losses caused by use.

The company reserves the right to modify the contents of the user manual. If there are changes, no further notice will be given.