Flexible Current Probe

CP9000(S/L)A Series

Shenzhen Zhiyong Electronics Co., Ltd

Standard coil size and schematic diagram:

Large Coil

Circumference: 600mm
Coil Diameter: D6: 8mm

Middle Coil

Circumference: 200mm
Coil Diameter: D4: 3.5mm
/D5: 4.5mm

Small Coil

Option 1

Circumference: 80mm
Coil Diameter/Dimensions:
D1: 1.6mm/ D2: 2.5mm*1.2mm
/D2A: 2.5mm*1.2mm (D2A: The temperature resistance of the coil is up to 150℃)

Option 2

Circumference: 100mm
Coil Diameter/Dimensions:
D3: 2.5mm
(Withstanding voltage of up to 2kVpk)

Note: coil size can be customized, please contact us if necessary.

Preface

First of all, thank you for purchasing our products, this instruction manual is the description about the function, usage, operation attention points, etc. Before use, please read the instructions carefully and use correctly.

Manual annotation will use the following symbols to distinguish.

This symbol means it is harmful to the machine and human body; you must strictly follow the instruction manual to operate.

Warning **In the case of wrong operation, the user risk injury. The content under this mark records the relevant matters needing attention to avoid such dangers.**

Notice **The user may suffer minor injuries and material damage with the wrong operation. To avoid such situation, the matters under this mark need attention.**

Note **This symbolizes important note about how to use the machine.**

To the safely use the device, you must abide by the following safety precautions strictly. The violation against the manual is likely to damage the protective function of the machine. In addition, the company is not responsible for any safety problem caused by violating matters needing attention in operation.

- **Make sure the BNC terminal is well grounded when BNC output cables connect to oscilloscope or other devices**
- **Make sure the circuit under test is turned off before it is accessed by the probe.**
- **Please check the probe skin before use. If there is any breakage, stop using it right away**
- The sharp edge of the circuit could damage the probe coil, please check carefully before access it.
- The operating voltage requirement has been marked on the coil; please make sure the probe is operating within safety range.
- **Select the standard adapter power supply of our product.**

Table of Content

1. Summary

CP9000(S/L)A series AC flexible current probe is designed specifically for the AC current signal measurement with high bandwidth and high precision (Typical value 2%). CP9000A series can achieve wide current measurement range, with frequency ranging from a few Hz to tens of MHz, current ranging from mA level to several KA level, and conquered many difficulties of current measurement.

The main features include:

- A handy flexible coil that can reach most corners bothering the hard probe; Minimized insertion loss of about a few pH that will cause little interference to the conductor under test.
- Standard BNC output connector that can adapt any oscilloscope, data collector or DVM to observe current waveform;
- Optional methods of power supply with a USB DC 5V power supply connector or four AA cells for customers' flexibility and convenience (**Optional accessories, non Chinese Mainland customers please purchase by themselves.**);
- More humanized sound and LED alarm function design;
- Coil and cable length can be customized according to customers' need to meet the test requirements of special applications.

CP9000SA Series: Has an extremely thin, clip-around Rogowski coil of typical coil diameter 2.5mm, 1.6mm, or dimensions of 2.5mm*1.2mm, and withstanding voltage of up to 2kVpk or 1kVpk correspondingly. **Among them, the coil of the D2A series current ring can withstand a temperature of 150 ℃.** It is very suitable for measurement including MOSFET, IGBT device pin current (TO-220, TO-47 package), capacitance ripple current and other small package device current.

CP9000A Series: Has a typical coil outer diameter of 3.5mm or 4.5mm and withstanding voltage of up to 2kVpk or 5kVpk correspondingly, its coil can reach any circuit in narrow space and measure large current conveniently.

CP9000LA Series: Has a coil typical outer diameter of 8mm and withstanding voltage of up to 10kVpk, it is designed for experiment measuring large current with high power.

2. Application

- Monitoring current form for semiconductor switches
- Development and servicing of power electronic equipment
- Monitoring high frequency sinusoidal currents
- Measuring fault currents or circuit breaker interruption currents
- Measuring pulses of current
- Measuring AC currents superimposed on large DC currents
- Measuring harmonic current components
- Measuring signal or earth leakage currents in 3-phase supply system

3. Electrical Specifications

Measuring conditions：23℃；60%RH；Conductor is central in the coil.

3.1 CP9000SA Series

Model	Sensitivity (mV/A)	Peak		Noise max (mVp-p)	Droop typ. (%/ms)	LF bandwidth -3dB(Hz)	HF bandwidth -3dB(MHz)	Rise time	Accuracy typ.	Insulation voltage
		Current （kA）	di/dt (kA/μS)							
CP9003SA	200	0.03	2	20	80	116	30	≤11.6ns	2%	1kV
CP9006SA	100	0.06	4	20	65	67	30			
CP9012SA	50	0.12	8	15	35	34	30			
CP9030SA	20	0.3	20	15	9	9.2	30			
CP9060SA	10	0.6	40	10	6	6.2	30			
CP9120SA	5	1.2	70	10	3	3.2	30			
CP9300SA	2	3.0	70	5	2	2	30			
CP9600SA	1	6.0	70	5	2	2	30			
CP9121SA	0.5	12	70	5	2	2	30			
CP9301SA	0.2	30	70	5	2	2	30			

3.2 CP9000A Series

Model	Sensitivity (mV/A)	Peak		Noise max (mVp-p)	Droop typ. (%/ms)	LF bandwidth -3dB(Hz)	HF bandwidth -3dB(MHz)	Rise time	Accuracy typ.	Insulation voltage
		Current （kA）	di/dt (kA/μS)							
CP9012A	50	0.12	1	12	9.5	10	15	≤23.3ns	2%	2kV
CP9030A	20	0.3	2.5	12	4.5	4.8	15			
CP9060A	10	0.6	5.0	10	2.0	2.3	15			
CP9120A	5	1.2	10	10	1.3	1.5	15			
CP9300A	2	3.0	25	8	1.3	1.5	15			
CP9600A	1	6.0	40	7	1.3	1.5	15			
CP9121A	0.5	12	40	5	0.8	1	15			
CP9301A	0.2	30	40	5	0.8	1	15			
CP9601A	0.1	60	40	5	0.8	1	15			
CP9122A	0.05	120	40	5	0.8	1	15			

3.3 CP9000LA Series

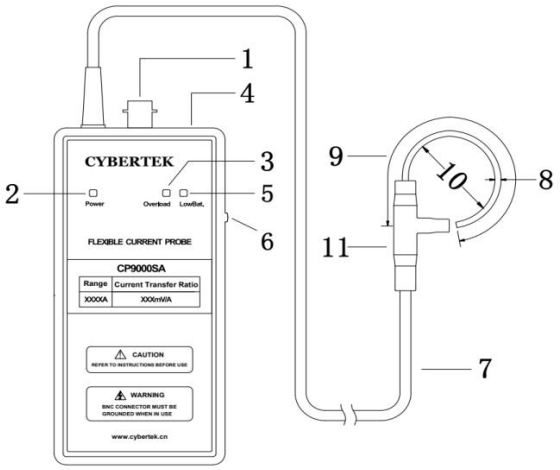
Model	Sensitivity (mV/A)	Peak		Noise max (mVp-p)	Droop typ. (%/ms)	LF bandwidth -3dB(Hz)	HF bandwidth -3dB(MHz)	Rise time	Accuracy typ.	Insulation voltage
		Current （kA）	di/dt (kA/μS)							
CP9012LA	50	0.12	0.8	7	70	80	10	≤35ns	1%	10kV
CP9030LA	20	0.3	2.0	3.5	40	50	10			
CP9060LA	10	0.6	4.0	8	2.0	2.1	10			
CP9120LA	5	1.2	8.0	8	2.0	2.1	10			
CP9300LA	2	3.0	20	7	1.1	1.2	10			
CP9600LA	1	6.0	40	5	1.1	1.2	10			
CP9121LA	0.5	12	40	3.5	1.1	1.2	10			
CP9301LA	0.2	30	40	3	0.35	0.5	10			
CP9601LA	0.1	60	40	3	0.35	0.5	10			
CP9122LA	0.05	120	40	3	0.35	0.5	10			
CP9302LA	0.02	300	40	3	0.35	0.5	10			
CP9602LA	0.01	600	40	3	0.35	0.5	10			
CP9123LA	0.005	1200	40	3	0.35	0.5	10			
CP9303LA	0.002	3000	40	3	0.35	0.5	10			

3.4 CP9000(S/L)A Series

Max. output voltage	±6Vpk
Terminal load	≥100kΩ
Power supply	USB 5V/2A standard adaptor or four AA cells (Optional accessories, non Chinese Mainland customers please purchase by themselves.)
Safety standard	EN61010-1:2010
EMC standard	EN61326-1:2013;EN61000-3-2:2014;EN61000-3-3:2013

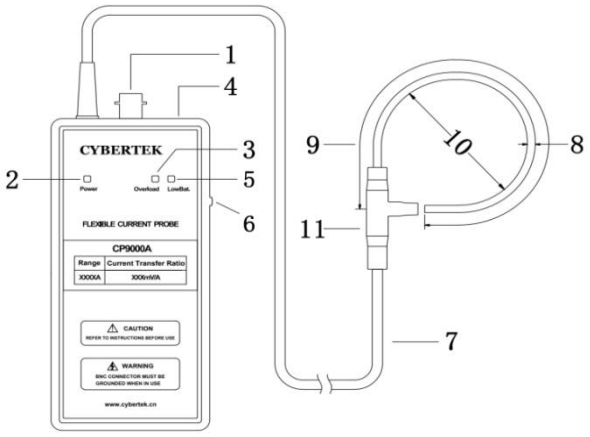
4. Products and Accessories

4.1.1 CP9000SA Series



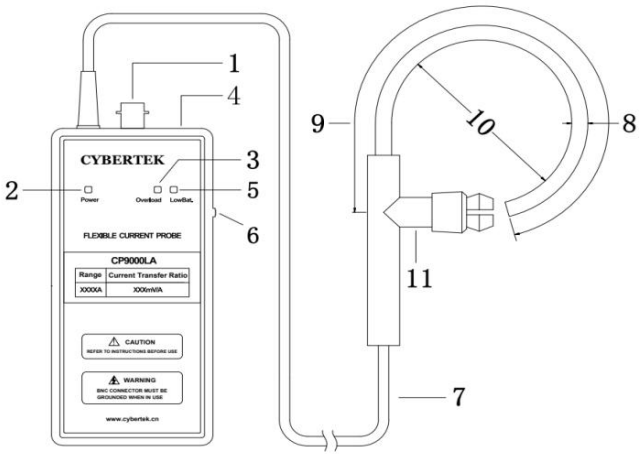
1. Signal output connector: Standard BNC connector that can adapt to oscilloscope of any brand with standard BNC cable.
2. Power supply indicator: Lighted green when the device is powered up.
3. Overload indicator: Lighted red and the buzzer alarms when the current overload.
4. USB 5V power supply connector: Standard USB (Type B) connector with standard USB power supply cable.
5. Low power alarm indicator: Lighted red when the battery voltage running low, please replace batteries in time.
6. Power supply switch: Used to switch on and off the device.
7. Connecting cable: Standard version is 1m, can be customized according to customers' need.
8. Rogowski Coil cross-sectional cable diameter/dimensions(size): Typical value D2.5mm, D1.6mm or 2.5mm*1.2mm.
9. Rogowski Coil circumference: Typical value 80mm for D1.6mm or 2.5mm*1.2mm version, and 100mm for D2.5mm version, can be customized according to customers' need.
10. Rogowski Coil loop diameter (minimum): 25mm and 30mm.
11. Current direction label: indicating the current direction, output is positive if the current direction complies, otherwise the output is negative.

4.1.2 CP9000A Series



1. Signal output connector: Standard BNC connector that can adapt to oscilloscope of any brand with standard BNC cable.
2. Power supply indicator: Lighted green when the device is powered up.
3. Overload indicator: Lighted red and the buzzer alarms when the current under test surpass the range.
4. USB 5V power supply connector: Standard USB (Type B) connector with standard USB power supply cable.
5. Low power alarm indicator: Lighted red when the battery voltage running low, please replace batteries in time.
6. Power supply switch: Used to switch on and off the device.
7. Connecting cable: Standard version is 2m, can be customized according to customers' need.
8. Rogowski Coil cross-sectional cable diameter: Typical value D3.5mm or D4.5mm.
9. Rogowski Coil circumference: Typical value 200mm, can be customized according to customers' need.
10. Rogowski Coil loop diameter (minimum): 55mm.
11. Current direction label: indicating the current direction, output is positive if the current direction complies, otherwise the output is negative.

4.1.3 CP9000LA Series



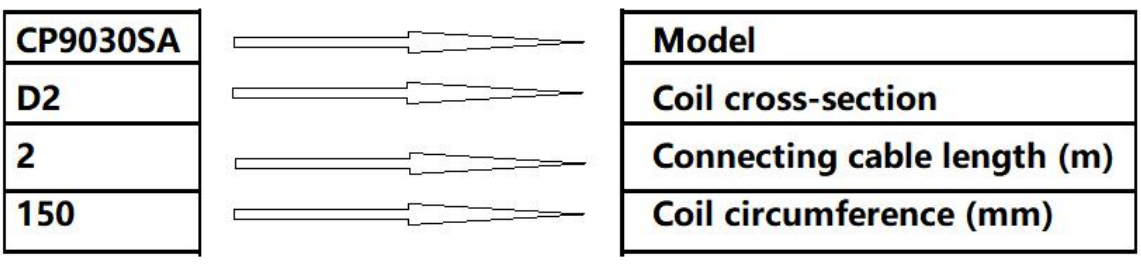
1. Signal output connector: Standard BNC connector that can adapt to oscilloscope of any brand with standard BNC cable.
2. Power supply indicator: Lighted green when the device is powered up.
3. Overload indicator: Lighted red and the buzzer alarms when the current under test surpass the range.
4. USB 5V power supply connector: Standard USB (Type B) connector with standard USB power supply cable.
5. Low power alarm indicator: Lighted red when the battery voltage running low, please replace batteries in time.
6. Power supply switch: Used to switch on and off the device.
7. Connecting cable: Standard version is 4m, can be customized according to customers' need.
8. Rogowski Coil cross-sectional cable diameter: Typical value D8mm.
9. Rogowski Coil circumference: Typical value 600mm, can be customized according to customers' need.
10. Rogowski Coil loop diameter (minimum): 150mm.
11. Current direction label: indicating the current direction, output is positive if the current direction complies, otherwise the output is negative.

4.1.4 CP9000(S/L)A Model Description

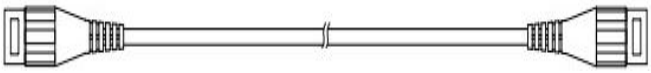
1）Standard Model Description

Model	Definition of Rogowski coil models with different wire diameters	Dn stands for the cable diameter of Rogowski coil	Connecting cable lengh (m)	Coil circumference (mm)
CP9000SA	CP9000SA/D1	D1: 1.6mm	1	80
	CP9000SA/D2	D2: 2.5mm*1.2mm	1	80
	CP9000SA/D2A	D2A: 2.5mm*1.2mm **The temperature resistance of the coil is up to 150℃**	1	80
	CP9000SA/D3	D3:2.5mm **Withstanding voltage of up to 2kVpk**	1	100
CP9000A	CP9000A/D4	D4: 3.5mm	2	200
	CP9000A/D5	D5: 4.5mm	2	200
CP9000LA	CP9000LA/D6	D6: 8mm	4	600

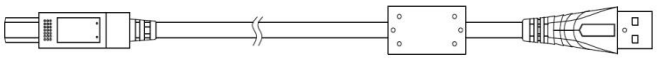
2）Customized Model Description: Take the CP9030SA/D2/2/150 model as example



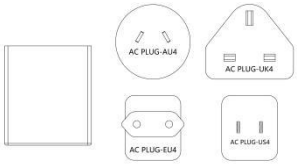
4.2 Accessories



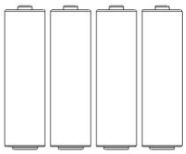
Coaxial output cable (CK-310: 1m)



USB cable (AM-BM, 1.5m)



Power supply adaptor
(USB output: DC5V/1000mA)



AA cells
(alkaline dry battery, 1.5V*4.
Optional accessories, non Chinese Mainland customers
please purchase by themselves. Battery life around 12 hours)

5. Typical Mechanical Specifications

Type	CP9000SA			CP9000A		CP9000LA
Coil circumference (customizable)	80mm		100mm	200mm		600mm
Cross-sectional cable diameter	2.5mm* 1.2mm	D1.6mm	D2.5mm	D3.5mm	D4.5mm	D8mm
Coil diameter (customizable)	25mm		30mm	55mm		150mm
Cable length (customizable)	1m			2m		4m
BNC cable	1m(standard), 2m(optional)					
Integrator box dimension	Around 150*70*26mm					
USB power cable（AM-BM）	1.5m					
USB adaptor	59mm*30mm*20mm					
Probe weight	186g			219g		456.7g

6. Environment Specifications

Operating temperature	Coil and cable	-20℃～100℃
	The coils of CP9000SA/D2A series	**-20℃～150℃**
	Integrator box	0℃～50℃
Storage temperature	-30℃～70℃	
Operating humidity	≤85%RH	
Storage humidity	≤90%RH	

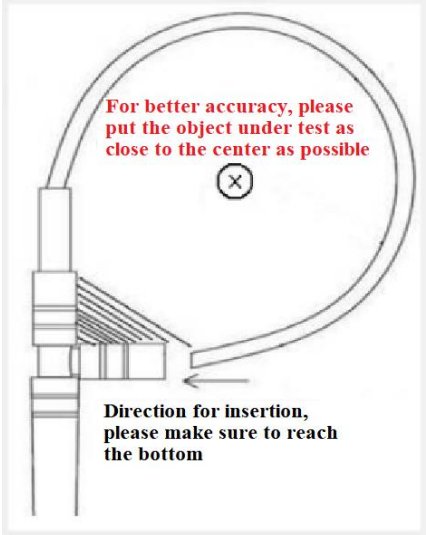
7.Measurement Procedure

1. When the probe is connecting to the oscilloscope or other measuring devices, these devices need to have reference ground and input impedance set up to 1MΩ(or≥100kΩ); Users will need to set up the oscilloscope attenuation ratio according to the probe sensitivity index. For instance, the sensitivity of CP9012A is 50mV/A, thus the oscilloscope need to be set to 20X; If the sensitivity of CP9600A is 1mV/A, the oscilloscope need to be set to 1000X.
2. Connect the USB adaptor to the probe or install four AA cells, switch on, and the green power indicator will be lighted up.
3. Insert the wire under test into the coil and ensure the plug of current inductive coil is inserted to the bottom. The wire under test need to be central of the coil, or the accuracy cannot be guaranteed. CP9000LA series contain an extra rotary knob to lock the probe.
4. Power up the circuit.
5. After measurement, disconnect the measured signal first and unplug the probe coil later.
6. Switch off the power supply and preserve the probe.

8. Attentions

- To ensure the measurement accuracy, the wire under test should be through the center of the probe coil.
- The measurement error will be maximized if the wire was in the junction shadow area of coil shown below. Please avoid this area.
- Ensure the plug of current inductive coil is inserted to the bottom or the result won't be accurate.
- Avoid any strong magnetic field interference source (e.g. magnetic field radiation source composed of multiple coils) during measurement, or the result won't be accurate.
- Avoid any high-voltage signal interference source with high-speed change (such as signals above 100V / us) or interference source with frequency above MHz, or the result won't be accurate.
- To determine if any strong interference source is around, users can put the coil near the wire under test to determine the interference intensity.

The shadow region has the maximum measurement error, please avoid this zone.



9. Maintenance

- Keep product surfaces clean and dry.
- When cleaning the probe, do not use chemical agent. Instead, please clean it with soft and dry cloth.
- Be careful to avoid damaging the insulation surface while taking measurements.
- When probe is not needed, please put it in the packaging, placed in a cool, clean and dry place.
- When transporting the probe, please put it in the shockproof packaging of our company
- Do not pull the input lines and output lines, avoid excessive twisting, bending or not.

10. Service Strategy

Please refer to the instruction on warranty card

11. Packing List

Packing List	
PROBE	1
USB 5V/1A adapter (CK-605A)	1
USB cable（AM-BM， 1.5m）	1
Alkali batteries(AA 1.5V)	4
BNC output cable(CK-310)	1
Instruction Manual	1
Warranty Card	1
Calibration Report	1

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