Keysight U1583B Current Clamp
Operating Instructions

The U1583B current clamp is a dual range 40 A and 400 A clamp-on AC current clamp. This U1583B current clamp is designed for Keysight digital multimeter (DMM) and Keysight oscilloscope. A BNC-to-banana plug adapter is required when connecting the current clamp to a multimeter. For oscilloscope, connect the current clamp directly to the input terminal with the BNC connector.

Assistance

For technical assistance, contact your nearest Keysight Sales Office or visit the Keysight website at www.keysight.com/find/assist for further information.

Regulatory Markings

CE ICES/NMB-001 ISM GRP.1 CLASS A

The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives. If it was accompanied by a year, it indicates the year the design was approved. This ISM device complies with Canadian ICES-001.

Product contains restricted substance(s) above the maximum value, with 40 year Environmental Protection Use Period.

The CSA mark is a registered trademark of the Canadian Standards Association.

The C-tick mark is a registered trademark of the Spectrum Management Agency of Australia. This signifies compliance with the Australia EMC Framework regulations under the terms of the Radio Communication Act of 1992.

This instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affixed product label indicates that you must not discard this electrical/electronic product in domestic household waste.

Safety Information

Please use the Keysight U1583B current clamp only as specified in this manual. Otherwise, the protection provided may be impaired. A **WARNING** identifies conditions and actions that pose hazards to the user. A CAUTION identifies conditions and actions that may be damaging to the equipment under test. To avoid possible electric shock, personal injury or damage to this instrument, ensure that you use the current clamp safely, and refer to the guidelines below.

~	AC : Alternating Current		Range button in release mode. Range ~ 400 A, Output ~ 1 mV/A
	Caution, risk of danger (Refer to the user's and service guide for details)	⎓	DC : Direct Current
400A MAX	Maximum allowable current measurement is 400 A	⏚	Ground
CAT III 600V	Category III 600V over-voltage protection		Double Insulation
	Range button in lock mode. Range ~ 40 A, Output ~ 10 mV/A		Caution, risk of electric shock (Refer to the user's and service guide for detail)
	To be applied around or removed from un-insulated hazardous live conductors		

WARNING

- **Do not use the current clamp if it is damaged. Inspect the case before using the current clamp. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.**
- **Inspect the clamp jaw before each use. No cracks, missing, loosen or weaken parts shall be observed. Ensure there is insulation surrounding the jaw.**
- **Inspect the cable without exposing the metal to ensure insulation.**
- **Do not operate the current clamp around explosive gas, vapor, or dust.**
- **Do not exceed the rated voltage/current as marked on the current clamp. Use with extreme caution when working around bare conductors. Accidental contact with the exposed conductors could result in electric shock.**
- **Always keep your hand behind the finger guard of the clamp jaw.**
- **When servicing the current clamp, use only specified replacement parts.**
- **Use with caution when working above 30 V ac rms, 42 V peak, or 60 V dc. These voltages pose a shock hazard.**
- **Do not operate the current clamp if the cover is removed or loosened.**
- **Use individual protective equipment if working in installations with accessible hazardous live parts.**
- **If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired**
- **Do not operate the current clamp around flammable gases or fumes, vapor, or wet environments.**

CAUTION

- **Do not connect to the BNC output or the banana plug to any power sources.**
- **Use proper terminals, function, and range for your measurements.**

Standard Items Purchase Checklist

The following items are included when you make a purchase:

- U1583B current clamp
- BNC-to-banana plug adapter
- Operating Instructions (this sheet)

General Specifications

The current clamp is designed for indoor use.

Specification	Current Clamp	Specification	Current Clamp
Specified Current Range	1 A to 400 A ac	Load impedance	> 1 MΩ, < 100 pF
Usable Current Range	0.5 A to 400 A	Operating Temperature	–40 °C to 55 °C (–40 °F to 131 °F)
AC crest factor	< 3	Storage Temperature	–40 °C to 70 °C (–40 °F to 158 °F)
Bandwidth	10 kHz	Measurement Category	CAT III 600 V; Pollution degree II
Weight	294 g	Dimensions (HxWxL)	44 mm (H) x 92 mm (W) x 188 mm (L)
Cable length	1500 ± 20 mm	Maximum conductor size	30 mm
Maximum Jaw Opening	32 mm	Warm-up time	Immediately upon power on
Altitude	Up to 2000 m	Warranty	One year
Relative Humidity	Max 80% RH for temperature up to 35 °C, decrease linearly to 50% RH at 55 °C		
Pollution Degree	2		
Safety Compliance	Safety Compliance Certified by CSA (Canada & USA) for IEC/EN/UL 61010-1 2nd Edition & EN/IEC 61010-2-032		
EMC Compliance	Certified to IEC/EN 61326:2002, CISPR 11, and equivalents for Group 1, Class A		

Electrical Specifications

Range	Output Sensitivity	Accuracy ± (% of reading + as specified below) at 23 °C ± 5 °C, with relative humidity less than 80% RH			
		Span	48 Hz to 65 Hz	40 Hz to 48 Hz/ 65 Hz to 1 kHz[1]	1 kHz to 10 kHz[1]
40 A	10 mV/A	0.5 A ~ 40 A	2 % + 0.5 A	5 % + 0.5 A	10 % + 0.5 A
400 A	1 mV/A	5 A ~ 40 A	2.5 % + 0.5 A	4.5 % + 0.5 A	12.5 % + 0.5 A
		40 A ~ 200 A	2 % + 0.5 A	4 % + 0.5 A	12 % + 0.5 A
		200 A ~ 400 A	1.5 % + 0.5 A	3.5 % + 0.5 A	11.5 % + 0.5 A

[1] Typical accuracy applies across all frequency ranges above 440Hz.

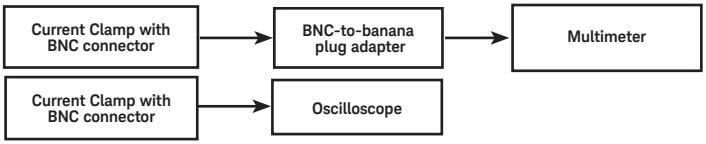

Figure 1: Connection Diagram

Alignment Marks

Put only one conductor within the jaws and align the conductor to the indicated marks as much as possible in order to meet the accuracy specifications. Make sure the current clamp is perpendicular to the conductor.

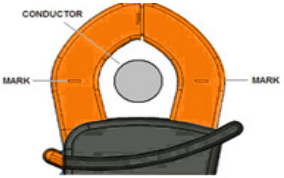

Figure 2: Allignment Marks

Current Range Selection

Release the yellow button for 40 A range and lock the button for 400 A range.

Button	Range	Output
Release	~ 40 A	~ 10 mV/A
Lock	~ 400 A	~ 1 mV/A

Operation

AC current can be measured without removing the conductor out of the circuit by following the procedure shown below:

1. Connect the current clamp to a multimeter or oscilloscope as shown in Figure 1.
2. Set the multimeter to measure ACV with measurement range greater than 400 mV full scale.
3. Position and align the jaw to a single conductor accordingly.
4. Ensure that the arrow marked on the clamp jaw points towards the load for phase measurements, or away from the load (toward the source) for neutral measurements.

Figure 3: Conductor Allignment Direction

5. Observe the AC value on the multimeter or the waveform on the oscilloscope which is proportional to the current.
6. Select a lower range on the current clamp and set the corresponding sensitivity (mV/A setting) on the oscilloscope if required.

Calibration Recommendation

The pre-calibration guidelines are shown as follows:
- Calibration should only be performed by a qualified personnel.
- The environment should be 23 °C ± 5 °C, and the relative humidity < 80% (RH).

The test equipment requirements listed in Table 1 or equivalents are required to perform the calibration and performance verification test procedures. Alternative equipment may be used as long as the accuracy is equal or better than the specifications listed.

Table 1: Test Equipment Requirements

Standard Source	Operating Range	Accuracy Required	Recommended Equipment
AC Current Calibrator	33 mA to 329.99 mA at 10 Hz to 3 kHz 0.33 A to 2.99999 A at 10 Hz to 3 kHz 3 A to 20.5 A at 10 Hz to 3 kHz	≤ ± 0.2 % ≤ ± 0.6 % ≤ ± 3.0 %	Fluke 5522A or equivalent
Multimeter	ACV > 400 mV full scale	≤ ± 1.5 %	Keysight 34450A or equivalent
50 Turns Current Coil	0.2 A to 20.5 A	Not applicable	Fluke 5500A/COIL or equivalent

NOTE A one-year interval is adequate for most applications. Accuracy specifications are warranted only if adjustment is made at regular calibration intervals. Accuracy specifications are not warranted beyond the one-year calibration interval. Keysight does not recommend extending calibration intervals beyond two years for any application.

Performance Verification Test

Range	5522A Output	Reference Value (5522A Output * 50 turns current coil)	Frequency	LCOMP	Error limits (from nominal 1 year)
40 A	0.01 A	0.5 A	48 Hz	OFF	±0.51 A
			65 Hz	OFF	±0.51 A
	0.72 A	36 A	40 Hz	ON	±2.30 A
			48 Hz	ON	±1.22 A
			65 Hz	ON	±1.22 A
			440 Hz	ON	±2.30 A
400 A	0.1 A	5 A	48 Hz	OFF	±0.625 A
			65 Hz	OFF	±0.625 A
	0.8 A	40 A	40 Hz	ON	±2.1 A
			48 Hz	ON	±1.3 A
			65 Hz	ON	±1.3 A
			440 Hz	ON	±2.10 A
	2.99999 A	150 A	40 Hz	ON	±6.49 A
	4 A	200 A	48 Hz	ON	±3.5 A
			65 Hz	ON	±3.5 A
			440 Hz	ON	±7.5 A
	7.2 A	360 A	48 Hz	ON	±5.9 A
			65 Hz	ON	±5.9 A
			440 Hz	ON	±13.1 A

Adjustment Procedures

AC 40 A range

1. Lock the RANGE button of the U1583B current clamp to 40 A.
2. Connect the current clamp to a multimeter as shown in Figure 1.
3. Set the multimeter to measure ACV with range > 400 mV full scale.
4. Open the jaws of the current clamp and align to the 50 turns coil.
5. Connect calibrator AUX terminals to 50 turns coil. Configure calibrator to generate a current of 0.4 A with a 55 Hz frequency (equivalent to 20 A, 55 Hz with 50 turns coil) for the adjustment of the current clamp.
6. Remove two Phillips screws on the back of the current clamp and proceed to adjust VR1 using a cermanic trimmer until the display on the multimeter indicates AC 200 mV ± 0.2 mV. Refer to Figure 4 for the position of VR1.

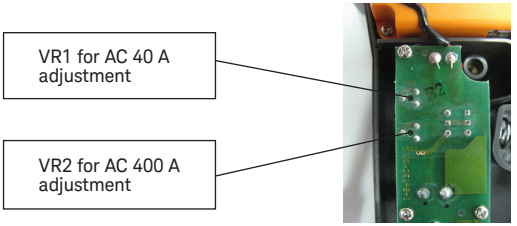

Figure 4: U1583B Current Clamp Circuit Board Diagram

AC 400 A range

1. Release the Range button of the U1583B current clamp to 400 A.
2. Connect the output BNC of the U1583B to a BNC-to-dual banana converter plug and proceed to connect it to the output of the V (HI) and COM (LO) terminals of the multimeter.
3. Set the multimeter to AC 500.0 mV or 1000.0 mV.
4. Open the jaws of the current clamp and align to the 50 turns coil.
5. Connect calibrator 20 A and AUX LO terminal to 50 turns coil. Configure calibrator to generate a current of 4 A with a 55 Hz frequency (equivalent to 200 A, 55 Hz with 50 turns coil) for the adjustment of the current clamp.
6. Remove two Phillips screws on the back of the current clamp and proceed to adjust VR2 until the display on the multimeter indicates AC 200 mV ± 0.2 mV. Refer to Figure 4 for the position of VR2.

NOTE Remember to replace the screws to their original position after performing the calibration adjustments.

Maintenance

Repair or service should only be performed by a qualified personnel.

WARNING **To avoid electrical shock or damage to the current clamp, do not allow moisture to get inside the case and remove all connections before opening the case.**

Cleaning

- Periodically wipe the case with a damp cloth and mild detergent. Do not use cleaners or solvents.
- Open the jaws and wipe the metal areas of the jaws with a lightly oiled cloth, and then wipe the oil with a dry cloth. Do not allow rust or corrosion to form on the metal surface of the jaws.

Troubleshooting

If the current clamp does not perform properly, follow the steps below to identify the problem:

1. Inspect the mating surface of the jaws for cleanliness. The presence of foreign material may prevent the jaws from closing properly and affects the measurement results.
2. Verify and ensure the current clamp range is appropriate.
3. Verify and ensure the function and range selection on the multimeter or oscilloscope are appropriate.

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