

# CLAMP-ON DC-AC CURRENT PROBE CL-22AD OPERATOR'S MANUAL

Thank you for your purchase of SANWA CLAMP-ON DC-AC CURRENT PROBE MODEL CL-22AD. The probe is designed for use to make the DC or AC current measurements on the low-voltage circuit. The probe, if connected to a 3-1/2-digit digital multimeter, allows DC or AC currents of 10 mA up to 200 A to be measured. When using this probe together with an analog tester, use the range 0.25 V or 0.3 V with a sensitivity of more than 10 k /V. To obtain the performance from the probe to the most for long time, operate it correctly as instructed.

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## 1. PRECAUTIONS WHEN OPERATING ⚠

- Use this probe only when measuring the current on a low-voltage circuit of less than 600 V.
- To avoid producing the errors during measuring, close the end of the probe iron core completely.
- Let the probe iron core clamp around only one conductor whose current-carrying capacity is to be measured, with the conductor positioned in the center of the iron core. Don't try to measure the current on more than two conductors at a time. If done so, incorrect measurements will result.
- In the place where intense magnetic field exists, the probe can cause an output before the conductor to be measured is clamped around with the probe iron core, and a measurement error equivalent to that output will be caused.
- A load resistance (on the multimeter) of more than 2.5 kΩ is needed to prevent the output voltage drop (or error).
- If the DC current overlapped on AC current of the AC current overlapped on DC current is measured, the output voltage will be also DC of the DC overlapped on AC or of the AC overlapped on DC, respectively.
- To prevent degraded indication characteristics, take care not to let the probe be exposed to strong vibrations, direct sunlight, nor high temperature with high humidity.
- When using the probe together with a 4-1/2-digit indication digital multimeter, use the 2 V range to avoid producing unsteady indication on the last digit.
- Don't make the measurement in the range that exceeds the specification specified for this probe. If done so, incorrect measurements will be produced.
- After measurement has been completed, always turn the Range Selecting Switch OFF to prevent dry cell consumption.
- Indoor use.

## 2. SPECIFICATIONS

### 1. Measurement Range and Output Voltage

Type of current	Measurement range	Load resistance and measurement range		Output voltage
		More than 1 MΩ	More than 2.5 kΩ	
DC current (DCA)	20 A	0- 40 A	0- 20 A	10 mV/A
	200 A	0-200 A	0-200 A	1 mV/A
AC current (ACA)	20 A	0- 35 A	0- 20 A	10 mV/A
	200 A	0-200 A	0-200 A	1 mV/A

### 2. Output Voltage Allowance

Range of current	Measuring current and output voltage		Output voltage allowance
	More than 1 MΩ	More than 2.5 kΩ	
20 A,DC	0- 40 A/0-400 mV	0- 20 A/0-200 mV	±1.5 % rdg±0.5 mV
200 A,DC	0- 200 A/0-200 mV	0- 200 A/0-200 mV	Same as above
20 A,AC	0- 35 A/0-350 mV	0- 20 A/0-200 mV	± 2 % rdg±0.5 mV
200 A,AC	0- 200 A/0-200 mV	0- 200 A/0-200 mV	Same as above

rdg: reading

#### Measuring conditions

- Operating temperature: 23° ±5 °C
- The probe iron core must clamp or snap around the conductor whose current-carrying capacity is to be measured, with the conductor positioned in the center of the iron core.
- When measuring the DCA range, the multimeter indication needs to be adjusted to the zero position by operating the OADJ on the probe.

- For the ACA ranges, the output voltage allowances apply only to the sine wave. (Frequency: up to 400 Hz)

- Output waveform: Almost same as the input waveform (a DC coupled-circuit is used.)
- Load resistance: See above subsections 1 and 2.
- Maximum diameter of the conductor the probe iron core can clamp around: 23 mm
- Operating circuit voltages: Low DC or AC voltage circuit of less than 600 V
- Withstand voltage: 2000 V AC between the iron core and rear case
- Allowable overload: 400 A, DC or AC
- Operating temperature and humidity range: 0° ~ 50 °C and 80 % RH, max. (no condensation)
- Storage temperature and humidity range: -10° ~ 60 °C and 70 % RH, max. (no condensation)
- Built-in battery\* Manganese batteries R03 (or AAA), 2 pcs.
- Service life of batteries: Abt. 75 hours, continuous
- When to replace the batteries: Replace when the LED goes off (when the voltage per battery is abt. 1.25 V).
- Connecting to the tester: Use the provided connecting cord (abt. 1.5 m long)that has connecting pins(diam. of pin: 4 mm).
- Dimensions and mass: 179(H)X56(W)X26.5(D)mm and 120 g
- Attachments: Portable case, 1 pc., operator's manual, one copy

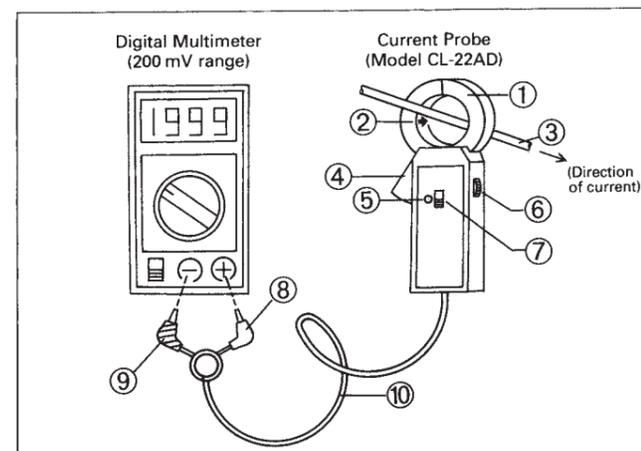
Note: To improve the probe performance, the specifications on this sheet of instructions are subject to change without notice.

## 3. NOTE ON THE INSTRUCTIONS

The following instructs how to operate the probe together with a 3-1/2-digit indication(1999) type digital multimeter. The instructions however can be applied also when using the probe together with a digital multimeter of the 3-1/2 digit indication (of 3000-5000) type, or with an analog tester (with the range 0.25 V or 0.3 V)that has a sensitivity of more than 10 k Ω/V. The resolution for the digital multimeter will be one tenth(1/10) but a measuring by using the range 2 V or 5 V is also allowed. The output waveform is almost same as the input waveform and the probe thus can be used also together with an oscilloscope to observe the waveform or can be used together with a recorder to record the waveform.

## 4. PREPARING FOR MEASURING

- Make the following settings on the digital multimeter (abbreviated "multimeter"):
  - To measure the DCA: Set to the DC 200 mV range.
  - To measure the ACA: Set to the AC 200 mV range.
- Connect the extension cord (provided for this probe) to the multimeter as follows:
  - Connect the RED plug to ⊕ (positive) measurement terminal.
  - Connect the BLACK plug to ⊖ (negative) measurement terminal.
- Turn the multimeter power switch ON.
- Depending on how large the current to be measured is, set the current range to 20 A or 200 A by operating the Range Selecting knob on the probe (if set, the LED lights up).



- Iron core
- The mark for direction of current (arrow)
- Conductor whose current-carrying capacity needs to be measured.
- PUSH
- LED light
- Zero adjusting knob
- Power switch serving also as range selecting knob
- Red plug
- Black plug
- Connecting cord

#### Note:

When adjusting the zero on the multimeter, take care not to bring the probe iron core close to a foreign iron or steel part because if done so the zero indication will vary.

## 5. MEASURING DC CURRENT (DCA)

- Zero adjust the multimeter as follows:
 

The zero point varies when the DCA is measured, so be sure to check that the multimeter indicates zero. If not zero, adjust the indication to the zero point by turning the Zero Adjusting knob(OADJ).
- Operate the probe PUSH to open the iron core, then let the iron core clamp around the conductor whose current-carrying capacity is measured, with the conductor positioned in the center of the iron core. At this time, align the direction of the current on the conductor with the direction of the arrow marked on the iron core inside. If the direction of current is reverse, the polarity on the output voltage indication will also be reverse (-).
- Read the multimeter as follows:
  - For range 20 A: Multiply the indicated value by a scale factor of 0.1, then read in unit "A".
  - For range 200 A: Read the indicated value as is and in unit "A".(A: ampere)

## 6. MEASURING AC CURRENT (ACA)

- Operate the probe PUSH to open the iron core, then let the iron core clamp around the conductor whose current-carrying capacity is measured, with the conductor positioned in the center of the iron-core.
- To read the multimeter, do as follows:
  - For 20 A range: Multiply the indicated value by a scale factor of 0.1, then read in unit "A".
  - For 200 A range: Read the indicated value as is and in unit "A".

#### Ref.1

No zero adjusting is needed for the multimeter when measuring the ACA current and such adjustment is impossible to make by operating the OADJ on the probe.

#### Ref.2

The output waveform is almost same as the input waveform.

## 7. WHEN TO REPLACE BATTERIES

When the batteries in the probe work normally, the LED light goes on if the probe power switch is turned ON. When the voltage on either one of the batteries becomes less than 1.25 V however, the LED light goes off, even if the power switch is turned ON, thereby indicating that the batteries need to be replaced with new ones. Replacing the batteries early is recommended to avoid producing erroneous measurements.

#### \*Factory-preinstalled built-in battery

A battery for monitoring is preinstalled before shipping, therefore it may run down sooner than the battery life specified in the instruction manual.

The "battery for monitoring" is a battery to inspect the functions and specifications of the product.

## 8. REPLACING BATTERIES

By pushing the battery cover in the direction of the head of delta (Δ) marked on it, remove the cover from the rear of probe. Remove the two batteries and replace both two batteries with new ones. The probe contains two manganese batteries R03 (or AAA) as standard. If a service life of the battery that is longer than that of the standard battery is desired, replace with the alkaline manganese battery LR03. (Obtain two pcs.)