HIOKI

INSTRUCTION MANUAL

8203

MICRO HiCORDER

HIOKI E.E. CORPORATION

WARNING

This Instrument is designed to prevent accidental shock to the operator when properly used. However, no engineering design can render safe an instrument which is used carelessly. Therefore, this manual must be read carefully and completely before making any measurement. Failure to follow directions can result in a serious or fatal accident.

CONTENTS

1. FEATURES

(1) The Model 8203 features all the functional capabilities to make it an essential element of a power-line monitoring system. Voltage and current are measured and recorded using a time-sharing recording method, with result produce on a single strip of chart paper, or these functions can be performed for individual parameters.

(2) Voltage inputs are expanded to double the normal excursion for easy reading, and both voltage and current is RMS rectified for accurate reproduction of distorted waveforms.

(3) Recording dot speed is a fast 32 doto-per-second, and pen lock has been eliminated for extremely accurate recordings of input fluctuations.

(4) The 8203 uses the electric-discharge-recording method. It is both compact and light, and it need no ink. Measurements and recordings may be made when and where they are needed.

(5) The recording mechanism and head requires virtually no maintenance, and the paper is easy to change, makes clear copies, and has good preservation qualities.

2. SPECIFICATIONS

AC V : 100V Segmental (75~125V)
200V Segmental (150~250V)
400V Segmental (300~500V)

AC Current : 10 · 20 · 50 · 100 · 200 · 500A
(9010 clamp on probe)

Accuracy : V range—±2% F.S., A range—±3% F.S.

Input switching intervals : V/A range 4 sec. (print every 2 sec)

Input impedance : Voltage—1MΩ constant

Max. input : Voltage—1000V/1 min.
Current—1000V/1 min. (9010)

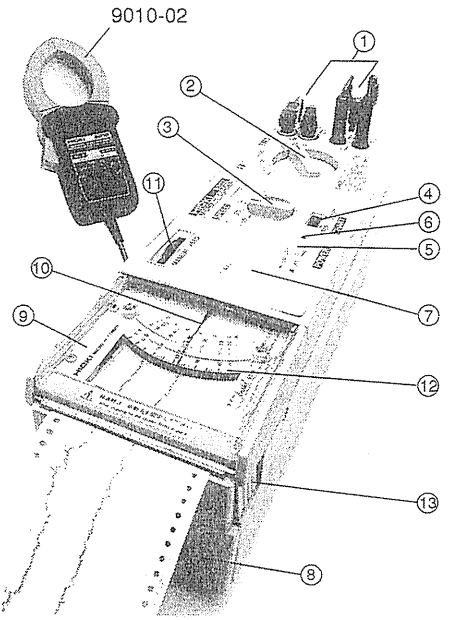
Rectifiers : RMS type
Chart paper : 70mm×15m rolled (9074)
Chart speeds : 50 · 20 · 10 · 5 · 2cm/hr.
Recoding width : 50mm arc recording
Operating system : Direct-acting dot recording
Chart drive : Pulse motor
Zero setting : Setting possible anywhere across entire recording width
Pen damping : At 1Hz, 70%
Max. common mode voltage: 1000V DC or peak AC
Temperature: 0~45℃
Power supply: 110~120V, 210~230V, 230~250V AC 50/60Hz (within 10VA)
〔DC power : 12V (approx. 7W)〕
Demensions, weight: 280W×96H×98D mm, approx. 1.7kg

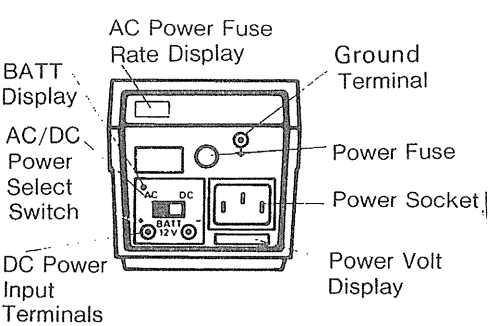
● **9010-02 clamp on probe**

Measuring range: 10 · 20 · 50 · 100 · 200 · 500A AC
Output voltage, accuracy: 200mVAC F.S. Within±3%
Frequency: : 50/60Hz
Max, input current: 1000A AC/1 min.
Max. input voltage: 600VAC
Dielectric strength: 1500 VAC
Max. dia. of DUT: 46mm
Cord length : 3m
Dimensions, weight : 80W×152H×33D mm, approx. 400g
Accesories:

9096 Input cord, 9074 Chart paper 1 roll (15m)
9010-02 Clamp on probe, 9086 Carrying case,
Two spare fuse (power supply, AC input) 1ea.,
Line card (AC/DC type) 1 ea.,
Instruction manual 1 ea.

3. INSTRUMENT NOMENCLATURE AND FUNCTION DESCRIPTION





Equipped to Operate on DC Power Also

① Input terminals

The 8203 is fitted with a red and black voltage input terminal (marked V) and a red and black current input terminal (marked A). The two A terminals are used to connect the 9010 clamp on probe.

② Range selector switch

This switch is used to select the recording mode and the proper range for the magnitude of the voltage input.

When the V or A range is selected, continuous recording are made of the voltage or current parameters respectively. Used in the V/A mode, the instrument alternates between the parameters to record in two channels. The figure marked in each range represents the mid-scale value for voltage input for that range.

③Recording speed selector switch

This switch is used to set the chart paper feed relative to a unit of time. Recording speed is variable in five steps, ranging from 50cm/hour to 2cm/hour.

④ Chart start-stop switch (STOP-START)

This switch is used to start and stop chart paper feed and recording operations.

⑤ Power switch (POWER)

This is a push-push switch used to apply power to, or turn off the instrument.

⑥ Power indicator

Illuminated when power is applied to the instrument.

⑦ Zero position adjustment (O ADJ)

This screwdriver adjustment is used to set the zero position of the stylus. Zero position may be set at any point within the chart paper width.

● Spare fuse

A spare fuse is located in the spare fuse holder on the bottom of the instrument.

⑧ Remaining paper confirmation window

This feature permits you to visually check the size of the chart paper roll to estimate the amount remaining on the roll.

⑨ **Cover**

The cover protects the recording mechanism from accidental damage. To remove it, simply slide it in the direction of paper feed.

⑩ **Stylus**

Electric-discharge recording type, functioning as the positive electroed in an electric-discharge circuit.

⑪ **Manual paper feed wheel (MANUAL FEED)**

This thumbwheel permits you to manually feed the chart paper when loading it, or to tear off a completed recording event.

Note: Do not manually operate feed wheel during recorder operation.

⑫ **Scale**

Used to visually check the reading of recording stylus movement.

⑬ **Chart paper cassette lock release buttons**

Depress the buttons on both sides to release the lock retaining the chart paper cassette. The cassette may then be withdrawn.

● **Ground terminal**

The ground terminal makes contact with the chart paper (negative electrode). These two elements are thus maintained at the same potential level.

● **Fuse**

AC power supply fuses should be midzet type, conforming to the ratings listed below.

Source Voltage	Fuse
AC 100~120V	0.2A/250V
AC 200~240V	0.1A/250V

● **DC power source terminals**

Connector terminals for the DC power source.

Note: If the instrument is connected backwards, the internal fuse will blow when the power is turned ON. Fuse replacement is accomplished by removing the four upper side panel screws to remove the case back. The fuse can located underneath the AC supply inlet. The replacement fuse may be a standard or glass tube

type midzet fuse, and must have a rating of 1A/250V. Always unplug the line cord prior to changing the fuse.

- **AC/DC power source selector switch**

This switch is used to transfer operations from AC to the DC source. The DC power source may remain permanently connected.

- **Battery low indicator (BATT LOW)**

This indicator illuminates when DC source voltage has dropped below a specified level.

Note : Instrument operation stops when BATT LOW illuminates. The power switch must be turned OFF to obtain reset, even after recharging or replacing battery.

4. OPERATING PREPARATIONS AND PRECAUTIONS

(1) Usage environment notes

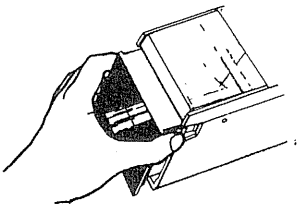
- The electric-discharge method of recording creates an arc across the electrode gap. The instrument is not constructed to be explosion-proof. Do not use it in an explosive atmosphere under any circumstances.
- The recording surface of the chart paper is conductive.

Touching the paper to bare wire could consequently cause the person holding it to be shocked, or it could shortcircuit any device in contact with the paper.

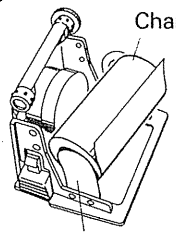
- The operating temperature/humidity range of the instrument is 0~45℃/20~80% RH. However, quick temperature changes (even with this range) can result in condensation forming on the metal parts of the unit. The instrument should not be used when condensation is present.
- The instrument should be placed on a flat, level surface. Using it tilted degrades the accuracy of the instrument severely, and should be avoided.
- Do not use this instrument in the presence of volatile solvents (such as lacquer thinner), or in an atmosphere containing fumes of such chemicals. Use over a long period of time under such conditions causes the silicone grease used in the meter movement and rotary switch to solidify, resulting in a malfunction.
- The recording stylus is electrically charged during recorder operations. Keep your finger away from it.

  Caution : To avoid shock and fire hazard, always ascertain the safety of the atmosphere and environment, and do not use the instrument when condesation is present.
- The 8203 also uses a sensitive meter, and should be handled carefully to avoid shocks or excessive vibrations which can damage or destroy the meter.
- Only Hioki 9074 chart paper should be used with the instrument. Other paper can result in improper operation or damage the instrument.

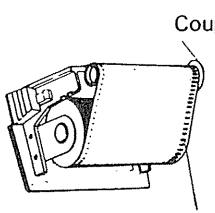
(2) Fitting the Paper



- Push the right and left chart paper cassette release buttons and pull the cassette out.

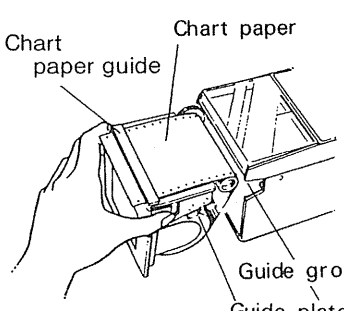


- Now push the chart paper into the holder. To make sure that the direction is correct, make sure that the side of the paper with the long guide holes which is in the side of Coupling gear.
- Steady the roll and set the chart paper. over the sprockets
- Place the chart paper cassette in the guide slots, and push it in carefully.



CAUTION:

If it is cocked in relation to the guide plate when it is pushed home, the chart paper suppression spring located underneath the scale may be damaged by the cas sette coupling gear, disabling the recorder.



- Once the paper roll has been put into the cassette in the above manner, use the manual feed control to make sure that the paper is feeding through correctly.
- Be sure to pass the recording chart paper under the paper guide.

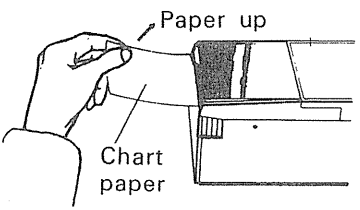
CAUTION

Do not use the manual feed controll to send the chart paper through while the MICRO Hi CORDER is actually use. This may damage the gears in the mechanism.

This type of cassette cannot be used with other units.

● **How to cut off the Chart paper:**

Pull the paper up, as shown in the illustration, tearing off along the perforations.



(3) **Power source notes**

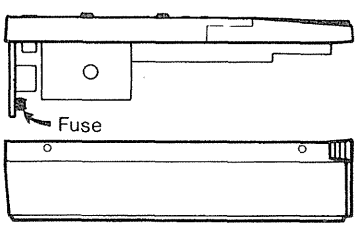
① **AC power source**

- Always check to make sure the line voltage selector matches the AC line voltage you intend to operate the instrument on.
- The instrument may be operated at 50 or 60Hz.
- When the instrument is operated using a 2-prong plug line cord, always ground the instrument using the ground terminal. This can protect the operator from being shocked by the chart paper in case the insulation between it and the input circuit or AC source

should fail.

- Using a 3-prong plug line cord should provide protection against accidental shocks, however, make certain that the ground wire of the cord actually leads to a ground. If not, ground the instrument with the ground terminal.

② DC power source



- The instrument may be operated from a battery having a voltage of from 9.5 to 14 volts and a permissible current drain of approximately 600mA.
- Connect the battery source to the DC power source terminals and switch the AC/DC power source selector switch over to the DC side.
- When the battery voltage drops below proper operating voltage, the BATT LOW indicator will illuminate, and recoder operations will stop. When this occurs, either the power switch must be turned OFF or the battery must be disconnected to obtain reset. Simply recharging the battery while connected (or the normal rise in voltage occurring after resting the battery) will not reset the instrument.
- Make certais that the DC power source terminals are not connected

in reverse. Reversing polarity will cause the power source fuse to blow, but the meter circuitry will be protected.

- The power source fuse is a 1A/250V glass-tube midzet type fuse. Always replace it with one of the same type and rating.
- When the BATT LOW indicator illuminates during DC source operations, wait at least 10 seconds after turning the power switch OFF before turning it back ON. The battery voltage detector circuit must be manually reset to prevent chatter in its operation. This cannot be done while the capacitors are still discharging, and if the power switch is turned back ON during this interval, the circuit sometimes will still be "tripped off".

5. OPERATING PROCEDURE

(1) Measurement preparations

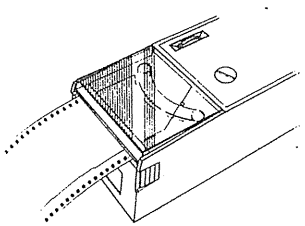
Caution:

A junction type fuse holder is installed in the voltage test lead. This fuse serves to protect the operator from electrical shock, and to prevent the input leads from burning out should they accidently become shortcircuited. Do not disable this safety precaution by replacing the fuse with a wire or wrapping it with foil under any

circumstances.

Perform the following preliminary checks.

1. Make sure the range selector switch is set to ZERO.
2. Make sure the chart start-stop switch is set to STOP. This protects the circuit against excessive input loads, and also prevents wasting paper.



- Connect the power source line cord and turn the power switch ON.
- Leaving the range selector at ZERO, set the speed selector switch to the desired speed.
- Now reposition the chart start-stop switch to START. This will start the chart paper feed, and the zero position may be set using O ADJ. Since the instrument records the AC voltage and current levels, the bottom edge of the chart paper should normally be used for the zero position.
- The zero position adjustment should be made about 10 minutes after the power switch was turned ON. Otherwise it may change as the internal circuits and components warm up.

NOTE

1. The zero position adjustment should be made by matching the

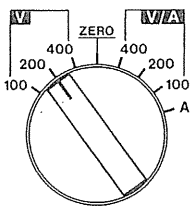
line drawn by the stylus up with one of the horizontal chart graduations. Setting the zero position by observing the stylus position on the scale will not always result in an accurate position on the chart paper.

2. During recorder operations, the stylus is electrically charged. Do not touch it.
3. Since the chart paper surface it aluminized,aluminum dust particles will occasionally collect on the stylus. When this happens, place the chart start-stop switch to the STOP position and clean the stylus with a brush.

- As the end of the chart paper roll approaches, an end mark will appear on the elongated hole side of the paper, indicating that the paper should be changed.
  If left as is, the chart paper will automatically stop when it runs out.

(2) Voltage measurements (continuous recording)

Voltage measurements indicate RMS values, and are segmented to two times their normal excursion.
Consequently, the measurement range is ±25% of the value marked on each range switch setting.



Note:

The zero position sets the lower limit of stylus travel and will not allow voltages lower than −25% of the range value to be recorded. For example, in the AC 200V range, voltages lower than AC 150V will not be recorded.

- connect the voltage input test leads to the red and black input terminals marked V. The test leads may then be connected to the circuit under test.

Note:

The input ends of the test leads are terminated with hooded banana plugs, however, for safety sake, always plug the test leads into the instrument prior to making the circuit connection.

- Select the proper measurement range for the circuit under test using the V side of the range selector switch.
- Set the chart start-stop switch to the START position.

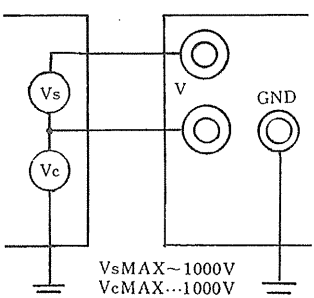
  This starts paper feed, and the voltage value of the circuit will recorded continuously.

Note:

Power-line measurements usually involve high voltages and are very dangerous. Always check to make certain condensation is not pres-

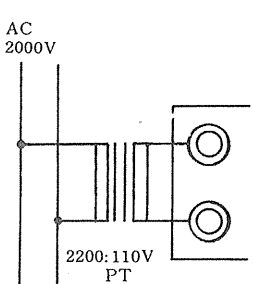
ent on the instrument and that it is in proper working order.

- Maximum input for the voltage range is AC 1000V.
  Exceeding this limit exposes the operator to shock danger, or can destroy the instrument.
- The maximum in-phase input for the instrument is 1000VDC or 1000 VAC, peak value. When a signal source is measured having a high potential relative to ground, always ground the instrument (using the ground terminal) for safety considerations.
- The input impedance of the V input terminals is 1MΩ, and line frequency may be either 50 or 60Hz. Using a power transformer also permits measurements of circuit voltages exceeding basic specifications.

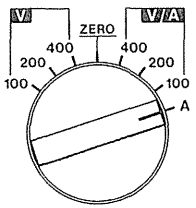


Example:

To record fluctuations occurring in an AC 2000V circuit, the power transformer shown in the diagram may be used in the 100V range, resulting in a recording width of 1500 ~ 2500V. However, note that the rating of the power transformer (2200V in this case) should not be exceeded.

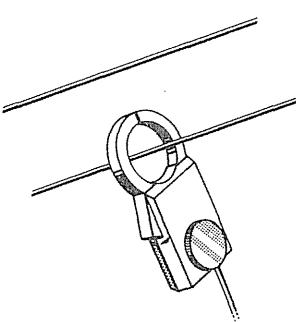


(3) Current measurements (continuous recording)



Current measurements for the 8203 are made using the 9010 clamp on probe as a sensor. Consequently, the recording range value is determined by the measurement range specifications for 9010. For example, 0 to 10A. 0 to 100A etc. becomes the recording range.

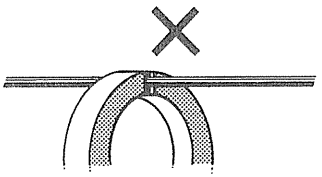
- Connect the 9010 clamp on probe test leads to the red and black current (A) input terminals.
- Place the range selector switch to the A range position.
- When the zero position adjustment is made with the range selector switch in the A position, 9010 should be plugged into the input terminals, or these terminals should be shorted together using some other means. This is to prevent noise induced errors.
- Set the range selector switch on the 9010 probe to a value approximating the current of the circuit under test. When circuit current is unknown, set the clamp on probe to it's highest range (500A) and move it to the proper range after the measurement has commenced.
- Clamp the jaws of the probe over one of the circuit conductors.
- Set the chart start-stop switch to the START position.



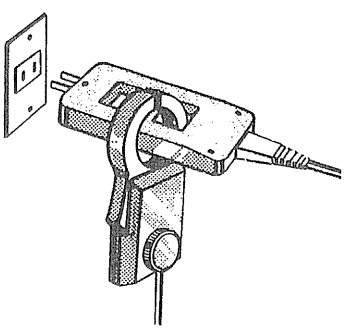
This starts the chart paper feed, and current values are recorded continuously.

Note:

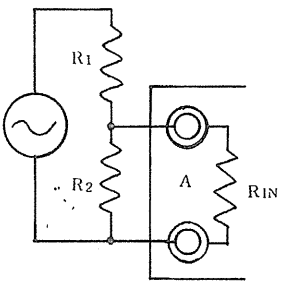
The clamp on probe should be positioned over the conductor as shown in the accompanying diagram. Do not pinch the conductor between the core gap, and always make certain that the jaws are securely closed prior to starting the measurement.



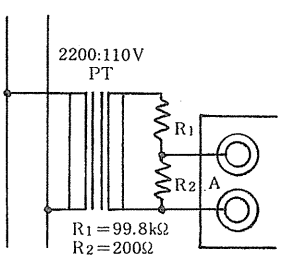
9010 Range	Maximum Rating (for 1 min.)
10A	150A
20A	200A
50A	350A
100A	500A
200A	700A
500A	1000A



- Center the conductor within the clamp jaws as close as possible. Measurement accuracy decreases if the conductor is closer to one of the cores than the other.
- Rating specifications for the 9010 clamp on probe are shown in the accompanying table. When used on circuits carrying electric motors or other equipment daring a high rush current at start-up, that fact must be taken into account when selecting the range. Also, any circuit having a peak loading period where current values are much higher over a short duration of time must be considered both time and value-wise. Note however, that rush currents driving the recorder stylus overscale will not damage the instrument.



Example 1.:



Example 2:

(4) Voltage/current measurement (alternating recording)

- Maximum line voltage that the 9010 may be used with is 600V. Do not use it on circuits exceeding this value.
- To measure current drawn by equipment using a 2-prong plug line cord, the probe may be clamped over CT-101A line splitter (optionally available) as shown in the accompanying diagram.
- Full-scale input voltage at the A terminal is AC 0.2V, with an input impedance of 1MΩ. Frequency response is 10Hz to 30kHz (-3dB). All current measurements are input through these terminals.

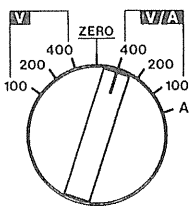
Example 1

Measurement/recording range: 0 to 50V (AC) f.s.. Connect a 49.8kΩ and 200Ω resistor in series. Each end of the 200Ω resistor is then connected to each A terminal. Accuracy is determined by the precision of the two resistors. Measurement/recording range: 0 to 2000V (AC) f.s..

Example 2

Use a 2200V:110V power transformer and connect a 99.8kΩ and 200 Ω resistor in series across the output of the PT. Each end of the 200 Ω resistor is then connected to the A terminals.

- Connect the voltage input test leads to the red and black V terminals. After the test leads are plugged into the instrument, connect them to the circuit conductors.



- Connect the test leads from the 9010 clamp on probe to the red and black A terminals.
- Using the range selector switch on 9010, select a current range approximating the current value of the circuit under test. Where current is unknown, set the 9010 range selector to it's highest range (500A). Turn the range selector switch on the recorder to A, then start the measurement and move the 9010 range selector to the proper range.
- Next, turn the range selector on the recorder to the V/A range corresponding to the voltage of the circuit under test.
- Set the chart start-stop switch to the START position.
- The recorder cycles through the voltage and current parameter every four seconds, recording for two seconds in each parameter.
- The recorder can be switch to the continuous recording mode (for individual parameters) by switching the range selector to one of the V ranges, or to A.
- Note that setting paper feed to faster ranges (e.g., 50cm/hr.) widens the gap between recording events, making it harder to read.
- For notes and precautions regarding system operation, refer to sections (2) Voltage measurements, and (3) Current measurements.

6. CHART PAPER NOTES

The 8203 uses electric-discharge type chart paper designed for use by an electric-discharge type recorder. Notes and precautions regarding the use and storage of the chart paper are listed below.

- The recording surface of the paper is electrically conductive. Be particularly careful while handling it, and do not allow it to come in contact with a bare wire. This could shock the person holding it, or short-circuit any device it is touching or installed in.
- Each roll of chart paper is sealed in a gas-tight envelope. Do not break the seal until it is ready for use.
- If the chart paper is not used within a relatively short period of time after breaking the seal, reseal it in a plastic bag and make sure it is not exposed to excessively high humidity, and do not allow condesation to form on it's surface.

STORING THE RECORDED PAPER

- Glueing or taping the chart paper to logs etc. can cause the portion in contact with the adhesive to turn black over a period of time. (This also depends on the composition of the adhesive.) For best results however, make copies for filing purposes.
- The chart paper may be stored for several years in files and notebooks with plastic insert type pages.
  This method, or copies are recommended.

7. MAINTENANCE PROCEDURES

The 8203 will normally require any inspection or maintenance. However, observing the following notes and precautions will assure it's long life and trouble-free operation.

- After using the instrument, clean all aluminum dust particles and other foreign matter from the stylus.
- Remove the plastic gear attached to the chart paper cassette tractor and clean it.

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