HIOKI

8714-01/8715-01

POWER HiCORDER MEASUREMENT GUIDE

HIOKI E. E. CORPORATION

Introduction

The 8714-01/8715-01 POWER HiCORDER measurement guide describes some several measurement examples. Therefore, the settings may be different from those used in the actual measurements you perform. In this case, refer to the POWER HiCORDER's instruction manual and modify the appropriate settings accordingly before performing your measurements.
Also, be sure to read the POWER HiCORDER's instruction manual for information on cautions to take when connecting the device and performing measurements. Make sure you fully understand the contents before operating the device. HIOKI cannot be held liable for any accidents except for those caused by the product.

The following table of contents lists the several different measurement examples as well as their reference page numbers. All these examples assume only CH 1 is used in the measurements. Therefore, turn off the waveform display of all other channels. Also, measurement examples described in this measurement guide assume all other settings use the factory defaults. No attempt is made to describe settings not directly related to the measurements. For the information, refer to the 8714-01/8715-01 POWER HiCORDER's instruction manual.

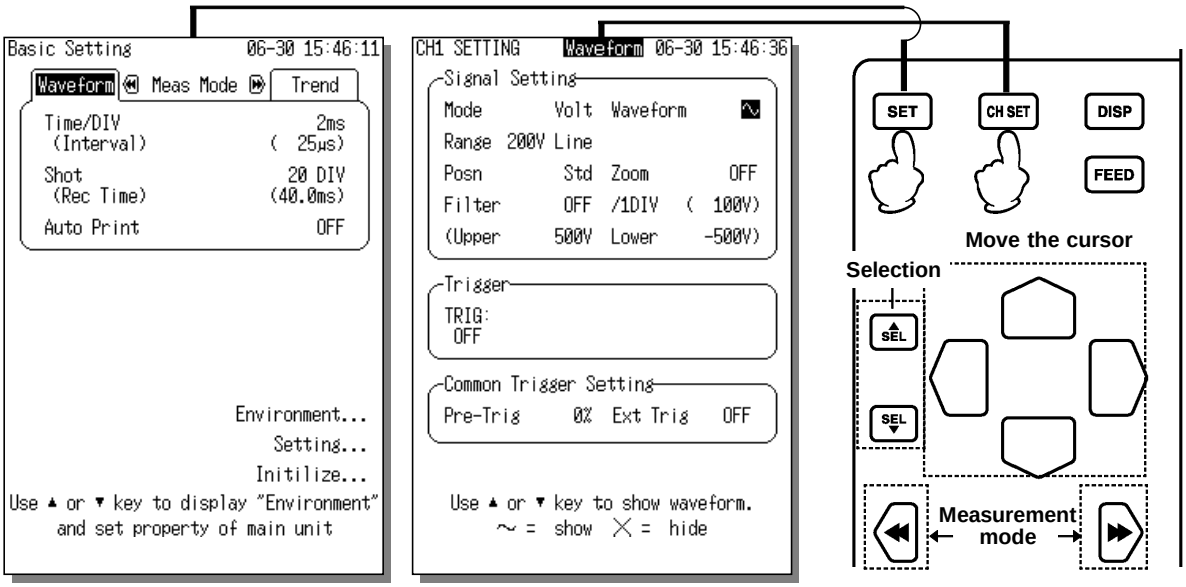
Viewing the Voltage Waveform of the 220 V Power Line

9197 CONNECTION CORD

9418-10 AC ADAPTER

To view the voltage waveform, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".

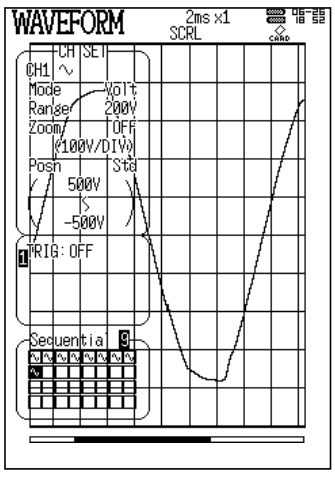
In the case of voltage waveform, after selecting "Volt" as the input mode, set the range to "200V Line".



Measurement Start

Make sure the power recorder's connecting cord is connected to the power terminal of the power source. Then, press the [START] key to start the measurement. A voltage waveform appears on the waveform display screen.

To stop the measurement, press the [STOP] key. After the measurement stops, the voltage waveform last captured appears on the screen.



When multiple waveforms are captured, they are displayed in the following way according to the sequential save.

To display the waveforms, press the channel select key (CH1). The displayed number indicates the block in the diagram which appears in reverse color. This block is the waveform currently displayed on the waveform display screen.

To change the display, move the flashing cursor to the number's position or directly to the block's position (), then press the ▲/▼ key to confirm.

If you start the measurement again, the previous waveform is discarded and recording starts from the first block.

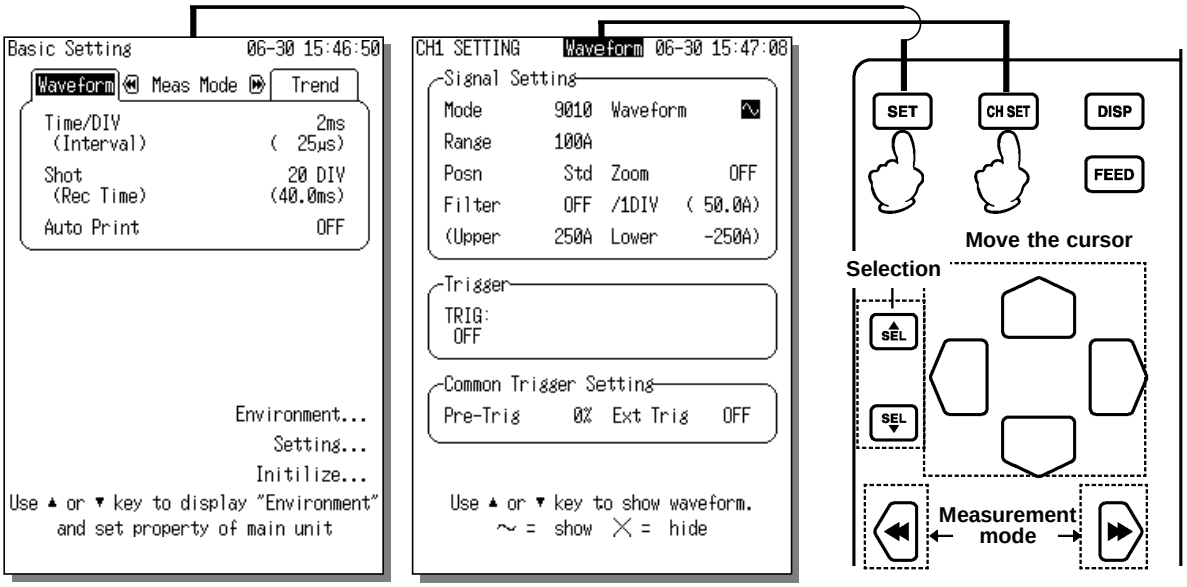
Viewing the Current Waveform of the Power Line

9418-10 AC ADAPTER

9010-10 CLAMP ON PROBE

To view the current waveform, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".

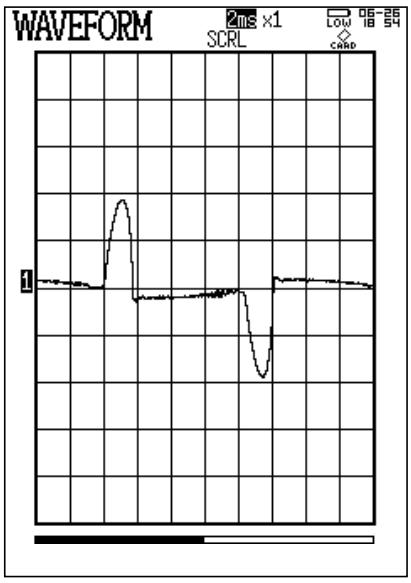
In the case of current waveform, after selecting "clamp sensor" as the input mode, select the range of the clamp. In this example, "9010" and "100A" are selected. Set the clamp sensor also to this range.



Starting a measurement

Clamp the clamp-on sensor to the power line you want to measure.

100 A



Then, press the [START] key to start the measurement.
A current waveform appears on the waveform display screen.
To stop the measurement, press the [STOP] key. After the measurement stops, the current waveform last captured appears on the screen.

Recording the Passage Current Waveform

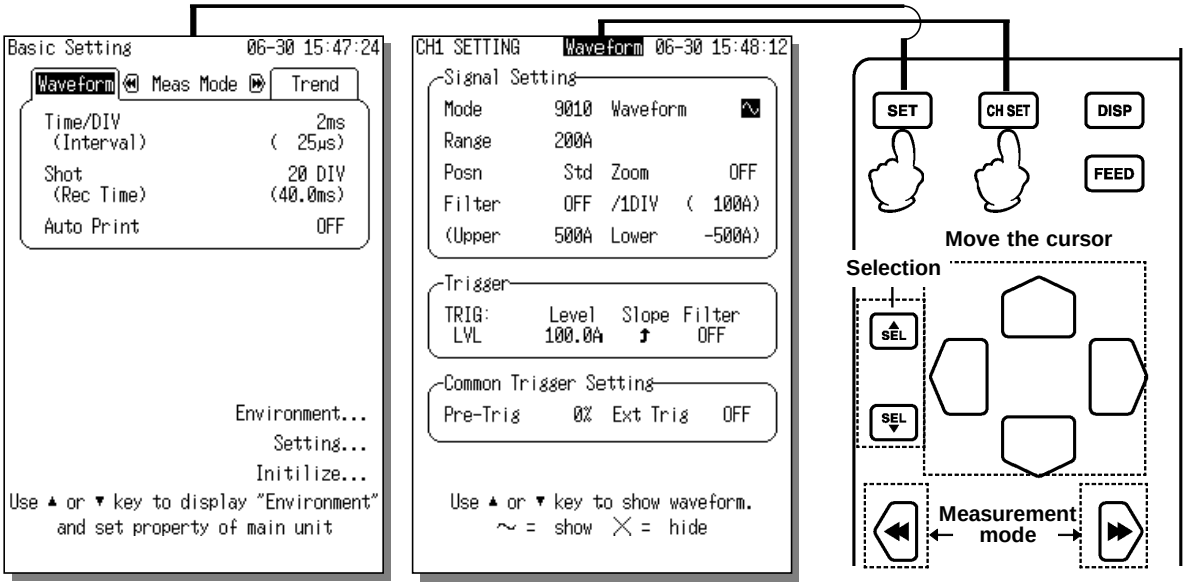
9418-10 AC ADAPTER

9010-10 CLAMP ON PROBE

To record the passage current waveform, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".

In the case of current waveform, after selecting "clamp sensor" as the input mode, select the range of the clamp. In this example, "9010" and "200A" are selected. Set the clamp sensor also to this range.

Set the trigger to "LVL", and then configure the trigger level. If you set the level to "100.0A" and "↑", when the current exceeds 100A the trigger activates and then the waveform is captured. Until the trigger activates, the state remains as "wait for trigger".

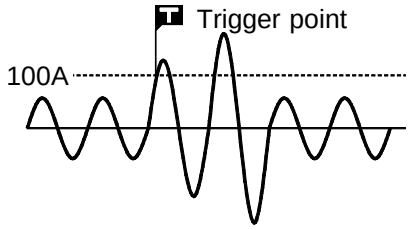


Starting a measurement

Clamp the clamp-on sensor to the power line you want to measure.

Then, press the [START] key to start the measu

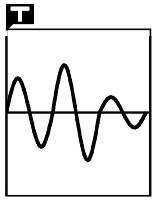
200 A



Trigger activates when the current exceeds 100A.

When the trigger activates, the current waveform appears on the waveform display screen. After the waveform equal to the recording length is captured, the state returns to "wait for trigger".

To stop the measurement, press the [STOP] key. After the measurement stops, the current waveform last captured appears on the screen.



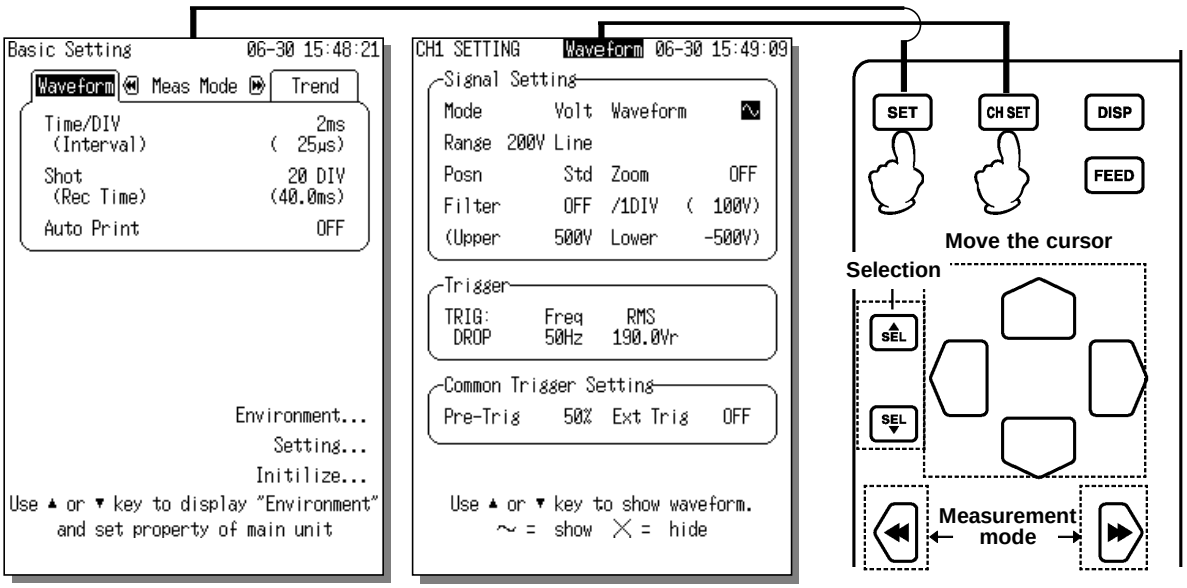
Capturing 20 DIV of waveform from the point where the trigger activates.

Recording the Instantaneous Stop Waveform of the 220 V Power Source

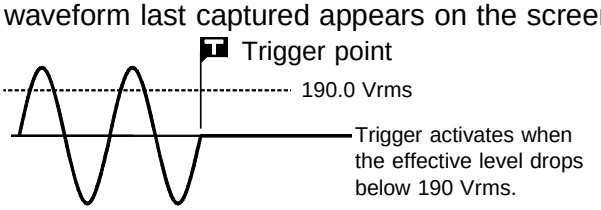
9197 CONNECTION CORD

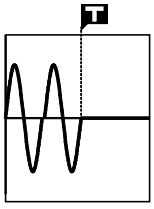
9418-10 AC ADAPTER

To record the instantaneous stop waveform of the power source, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".
In the case of voltage waveform, after selecting "Volt" as the input mode, set the range to "200V Line". If you set the range to "200V Line", then you can measure the 220V and the 240V power voltages.
Set the trigger to "DROP". For the measurement frequency, specify one which is suitable for the region you are located. For the level, set a RMS value so that when the effective power voltage drops below this value, the trigger will activate. In this example, it is set to "190.0Vr".
To see the waveform before the trigger point, try to set the trigger to "50%". Until the trigger activates, the state remains as "wait for trigger".



Measurement Start
Make sure the power recorder's connecting cord is connected to the power terminal of the power source.
Press the [START] key to start the measurement. When the trigger activates, the instantaneous stop waveform appears on the waveform display screen. After the waveform equal to the recording length is captured, the state returns to "wait for trigger" again.
To stop the measurement, press the [STOP] key. After the measurement stops, the voltage waveform last captured appears on the screen.





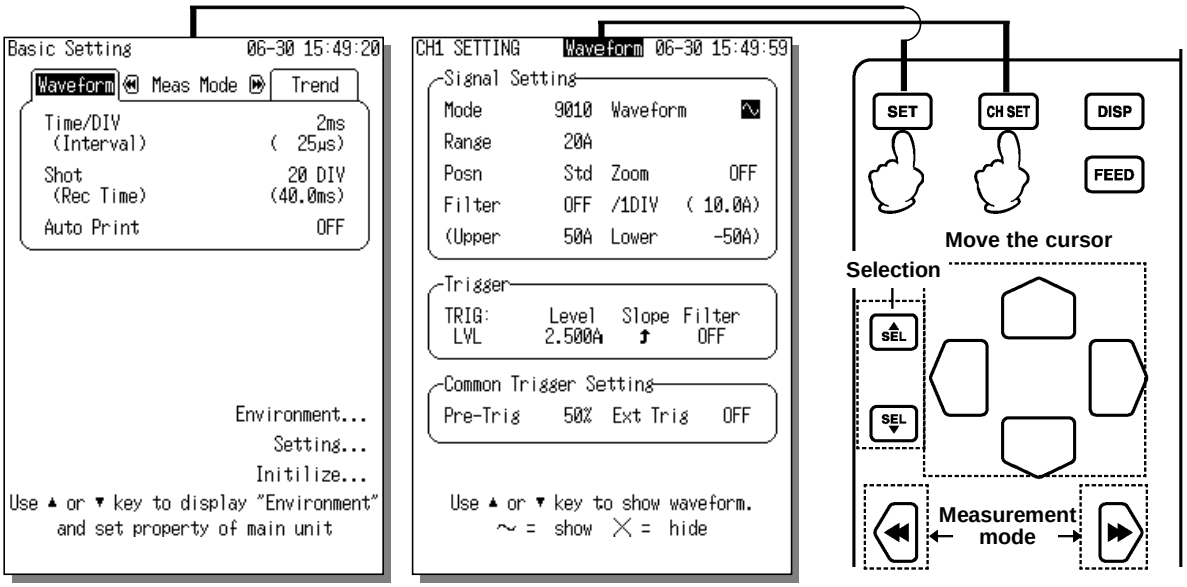
Because the recording length is set to "20 DIV" and the pre-trigger is 50%, 10 DIV of waveform before and after the trigger point are captured. For details on pre-trigger, see page 16.

Recording the Surge Current Waveform when Power is Supplied

9418-10 AC ADAPTER

9010-10 CLAMP ON PROBE

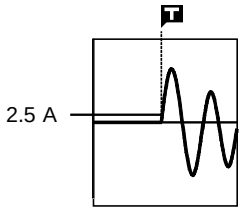
To record the waveform of the surge current, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV". In the case of current waveform, after selecting "clamp sensor" as the input mode, select the range of the clamp. In this example, "9010" and "20A" are selected. Set the clamp sensor also to this range.
Set the trigger to "LVL", and then configure the trigger level. If you set the level to "2.500A" and "↑", when the current exceeds 2.5 A the trigger activates and then the waveform is captured. To see the waveform before the trigger point, try to set the trigger to "50%". Until the trigger activates, the state remains as "wait for trigger".



Starting a measurement
Clamp the clamp-on sensor to the power line you want to measure.

20 A

Press the [START] key to start the measurement.
Turn on the power of the line you want to measure.
When the trigger activates, the current waveform appears on the waveform display screen.
After the waveform equal to the recording length is captured, the state returns to "wait for trigger".
To stop the measurement, press the [STOP] key.
After the measurement stops, the current waveform last captured appears on the screen.



Trigger activates when the current exceeds 2.5 A.

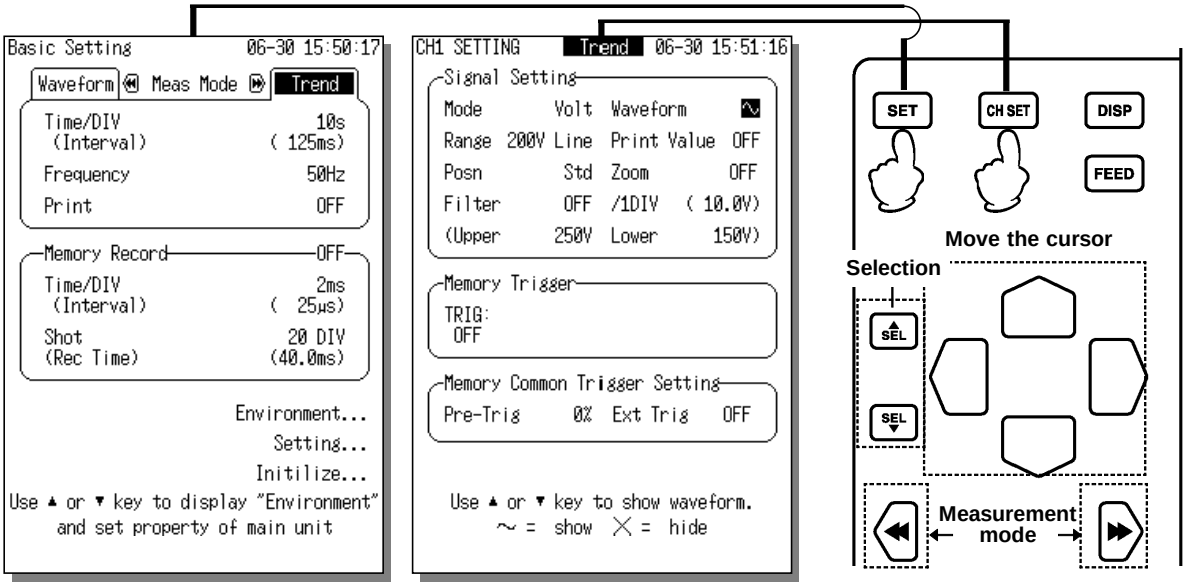
Because the recording length is set to "20 DIV" and the pre-trigger is 50%, 10 DIV of waveform before and after the trigger point are captured. For details on pre-trigger, see page 16.

Recording the RMS Value of the Voltage Variation of the 220 V Power Source

9197 CONNECTION CORD

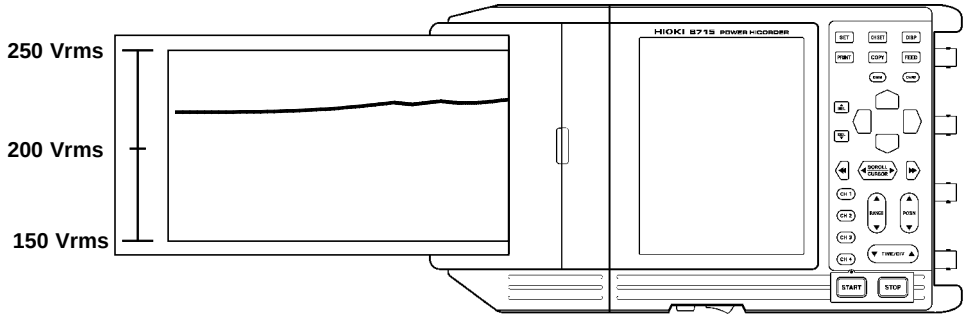
9418-10 AC ADAPTER

To record the voltage variation of the power source, set the measurement mode to "Trend". For the time axis setting, initially setting it to "10s" would be easy to understand.
For the measurement frequency, specify one which is suitable for the region you are located.
If print is set to "ON" as well, then printing begins as soon as the measurement starts.
In the case of voltage waveform, after selecting "Volt" as the input mode, set the range to "200V Line".



Measurement Start

Make sure the power recorder's connecting cord is connected to the power terminal of the power source.
Press the [START] key to start the measurement. When the measurement starts, the RMS waveform of the voltage also prints at the same time
To stop the measurement, press the [STOP] key.

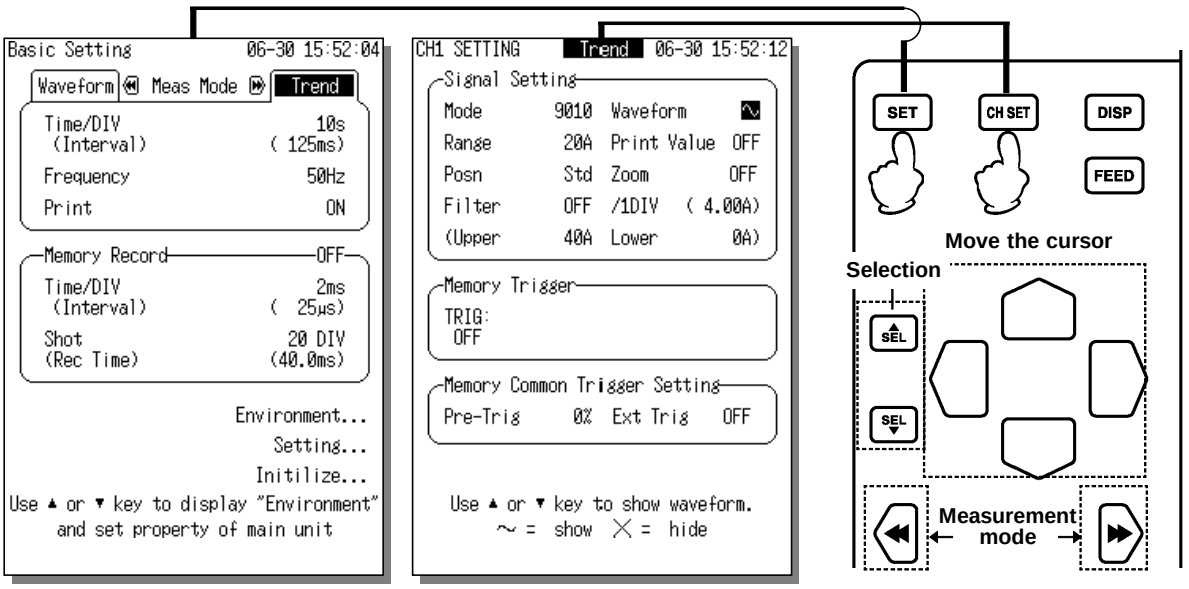


If the range is "200V Line", the center of the screen (recording paper) becomes 200 Vrms.

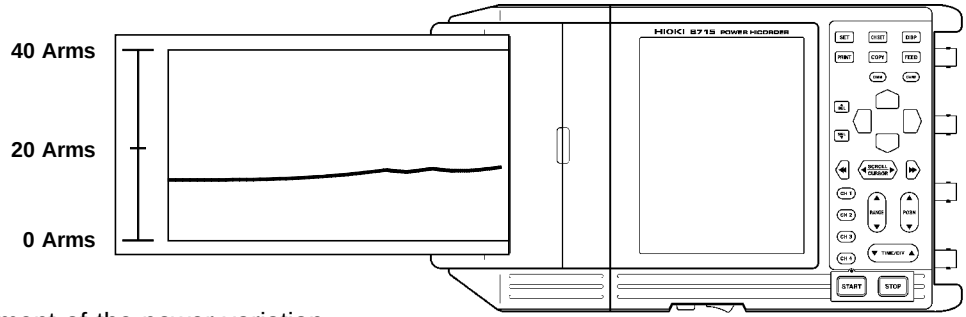
Recording the RMS value of the Load Variation of the Power Source

9418-10 AC ADAPTER　　9010-10 CLAMP ON PROBE

To record the load (current) variation of the power source, set the measurement mode to "Trend". For the time axis setting, initially setting it to "10s" would be easy to understand.
For the measurement frequency, specify one which is suitable for the region you are located.
If print is set to "ON" as well, then printing begins as soon as the measurement starts.
In the case of current waveform, after selecting "clamp sensor" as the input mode, select the range of the clamp. In this example, "9010" and "20A" are selected. Set the clamp sensor also to this range.



Starting a measurement
Clamp the clamp-on sensor to the power line you want to measure.
Press the [START] key to start the measurement. When the measurement starts, the RMS waveform of the current also prints at the same time
To stop the measurement, press the [STOP] key.

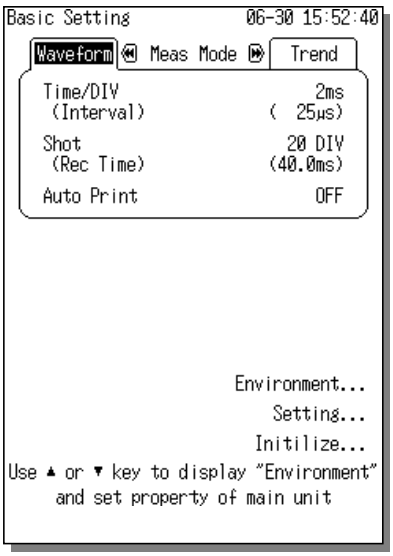


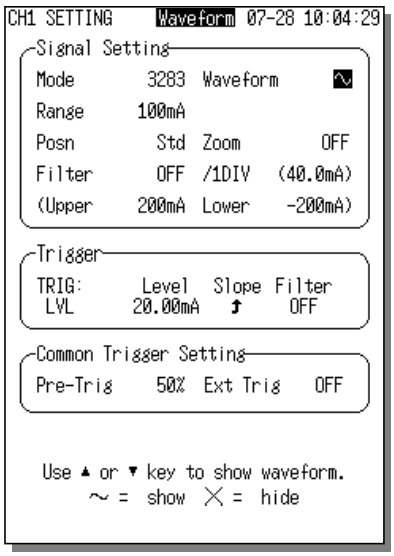
For current measurement of the power variation,
the lowest part of the screen (recording paper) becomes 0A.

Monitoring the Leak Current Waveform

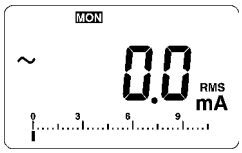
3283 CLAMP ON LEAK PROBE

To record the leak current waveform, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".
In the case of leak current waveform, after selecting "3283" as the input mode, select range of 3283. Because it is a leak current, set the range to "100mA".
Set the trigger to "LVL", and then configure the trigger level. If you set the level to "20.00mA" and "⎍", when the current exceeds 20 mA the trigger activates and then the leak current waveform is captured. To see the waveform before the trigger point, try to set the trigger to "50%". Until the trigger activates, the state remains as "wait for trigger".



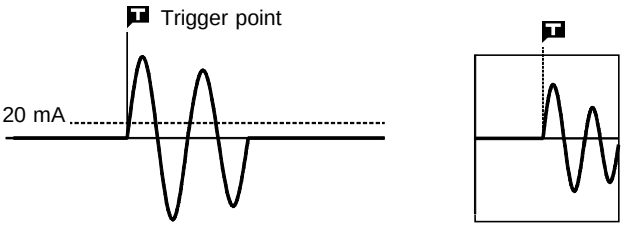


3283 setting
Press the RANGE key of 3283 to set the range to 100mA. Next, press the OUTPUT key to display MON (waveform output: AC).
If the measurement is going to take a long time, always use the AC adapter.



3283 LCD

Starting a measurement
Clamp the 3283 to the location where you want to measure the leak current.
Press the [START] key to start the measurement. When the trigger activates, the leak current waveform appears on the waveform display screen.
After the waveform equal to the recording length is captured, the state returns to "wait for trigger". To stop the measurement, press the [STOP] key. After the measurement stops, the current waveform last captured appears on the screen.

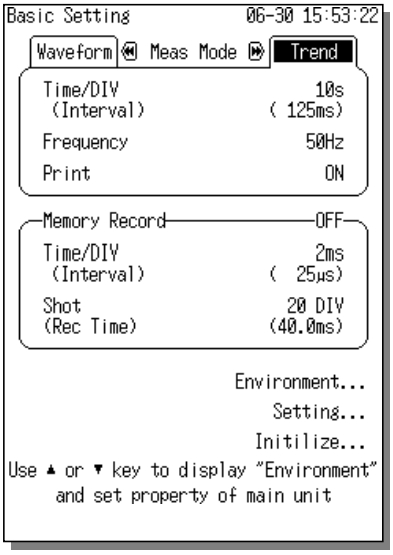


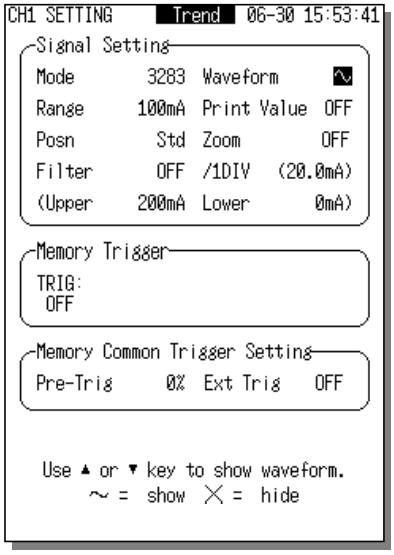
Trigger activates when the current exceeds 20 mA.

Because the recording length is set to "20 DIV" and the pre-trigger is 50%, 10 DIV of waveform before and after the trigger point are captured. For details on pre-trigger, see page 16.

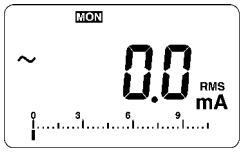
Recording the RMS Value of the Leak Current

To record the RMS value of the leak current variation, set the measurement mode to "Trend". For the time axis setting, initially setting it to "10s" would be easy to understand. For the measurement frequency, specify one which is suitable for the region you are located. If print is set to "ON" as well, then printing begins as soon as the measurement starts.
In the case of leak current waveform, after selecting "3283" as the input mode, select range of 3283. Because it is a leak current, set the range to "100mA".



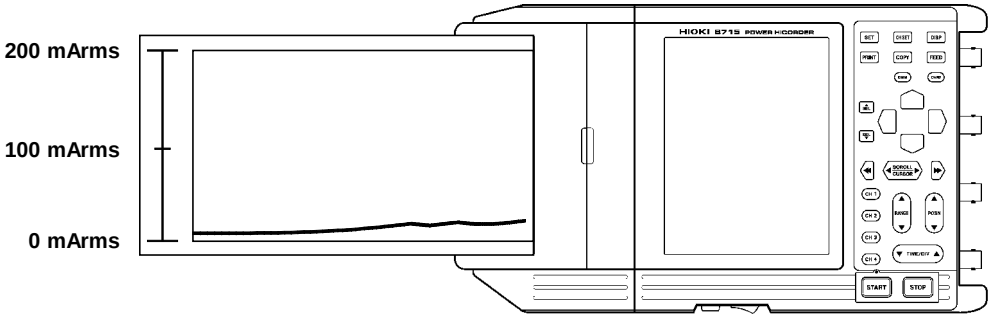


3283 setting
Press the RANGE key of 3283 to set the range to 100mA. Next, press the OUTPUT key to display MON (waveform output: AC).
If the measurement is going to take a long time, always use the AC adapter.



3283 LCD

Starting a measurement
Clamp the 3283 to the location where you want to measure the leak current.
Press the [START] key to start the measurement. When the measurement starts, the RMS waveform of the leak current also prints at the same time
To stop the measurement, press the [STOP] key.



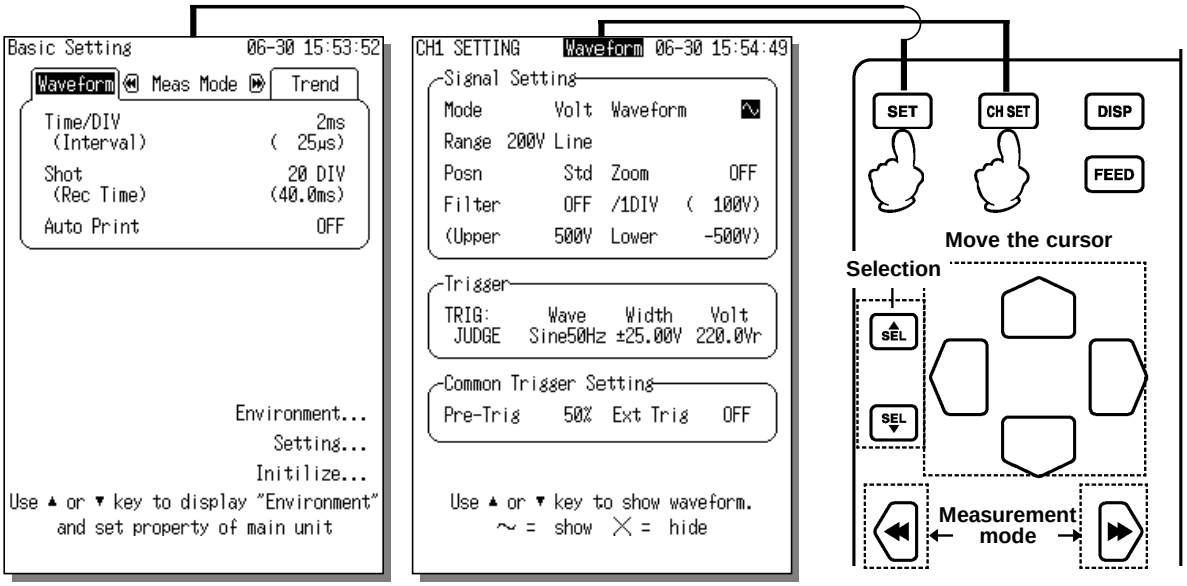
For current measurement of the power variation, the lowest part of the screen (recording paper) becomes 0A.

Viewing the Waveform of Power Surge/Noise at the 220 V Power Line

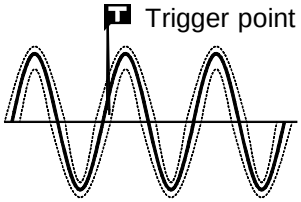
9197 CONNECTION CORD

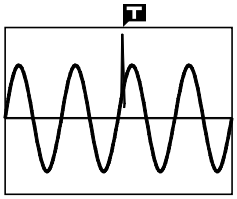
9418-10 AC ADAPTER

To record the waveform of power surge/noise, set the measurement mode to "Waveform". For the time axis setting, "2ms" would be quite satisfactory. Set the recording length to "20 DIV".
In the case of voltage waveform, after selecting "Volt" as the input mode, set the range to "200V Line".
For the trigger, set it to "JUDGE". Next, set the reference waveform and the control width. In this example, the reference waveform is set to "Sine50Hz" and the control range to "±25.00V". The reference voltage is set to "220.0Vr" for the 220V power line.
To see the waveform before the trigger point, try to set the trigger to "50%". Until the trigger activates, the state remains as "wait for trigger".



Measurement Start
Make sure the power recorder's connecting cord is connected to the power terminal of the power source.
Press the [START] key to start the measurement. When the width exceeds the control range, the trigger activates and the abnormal waveform appears on the waveform display screen. After the waveform equal to the recording length is captured, the state returns to "wait for trigger" again. To stop the measurement, press the [STOP] key.



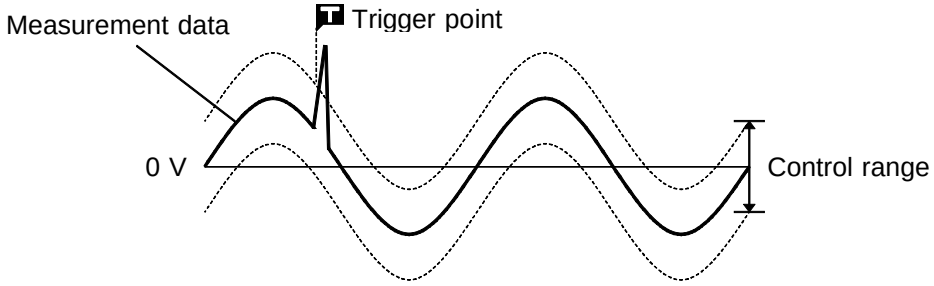


Because the recording length is set to "20 DIV" and the pre-trigger is 50%, 10 DIV of waveform before and after the trigger point are captured. For details on pre-trigger, see page 16.

Waveform Detection Trigger

The waveform detection trigger function compares the measured signal with a pre-defined control waveform range, and triggers if the signal deviates from the control range voltage. The control range consists of a positive and negative amplitude offset from either a standard sine wave or the previous input cycle.

The settable standard voltage and control range are limited by the voltage range setting.



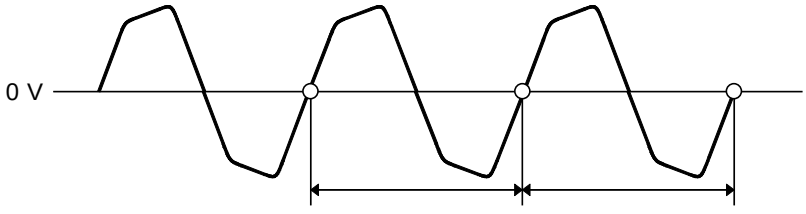
For the waveform (whether it is a sine wave or a previous waveform) functioning as the reference waveform used in creating the control range, it is a cycle of waveform starting where the cycle begins from the time 0V is raised and then cut horizontally (raise 0 close).

(1) Sine Wave

The control range is based on a sine wave (with RMS value voltage) at the mains frequency.

(2) Previous Cycle

Set the control range to the waveform of the input waveform in the previous cycle and then compare it with the input waveform. Use it if you do not want to set up a trigger for the warped portion when measuring the waveform of the warped power source.



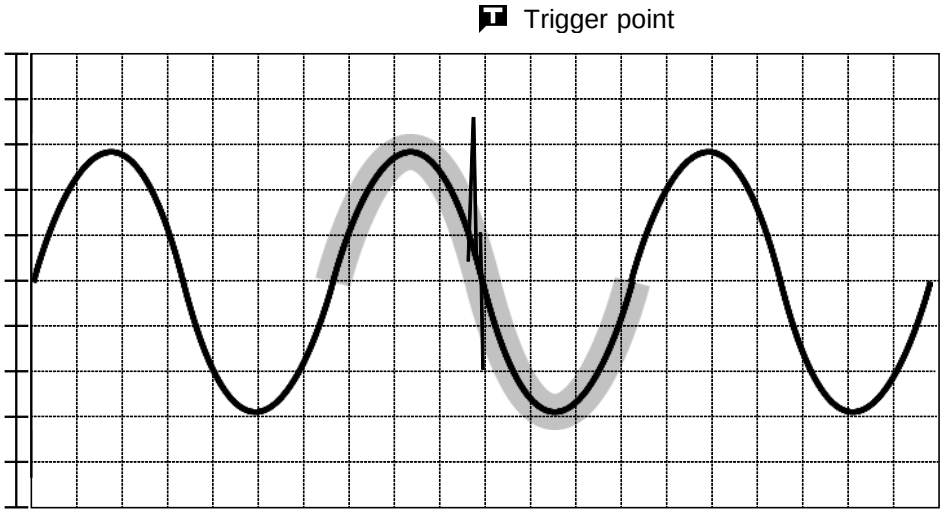
Previous Cycle (one cycle)
The control range is applied to this cycle's waveform

Input Waveform (one cycle)
This cycle is compared with the previous cycle for detection

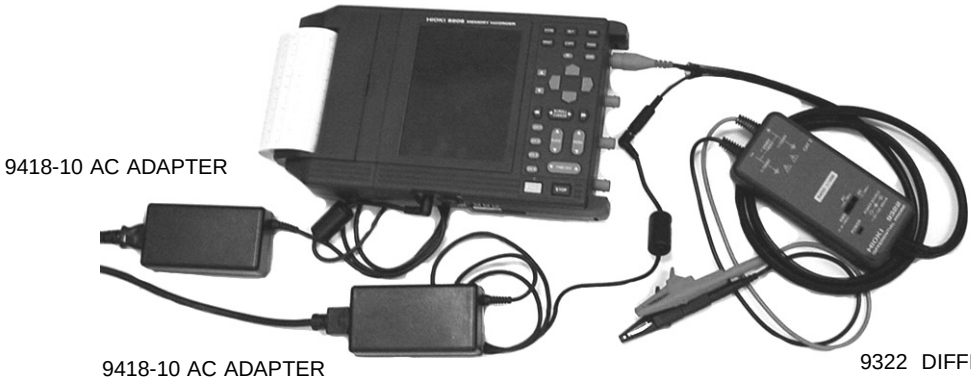
Control range for printing

If the reference waveform used for creating the control range is a sine wave (50/60 Hz), when the waveform judgement trigger activates and printout results, one cycle of the control range (gray part) is also printed at the same time as the abnormal waveform.

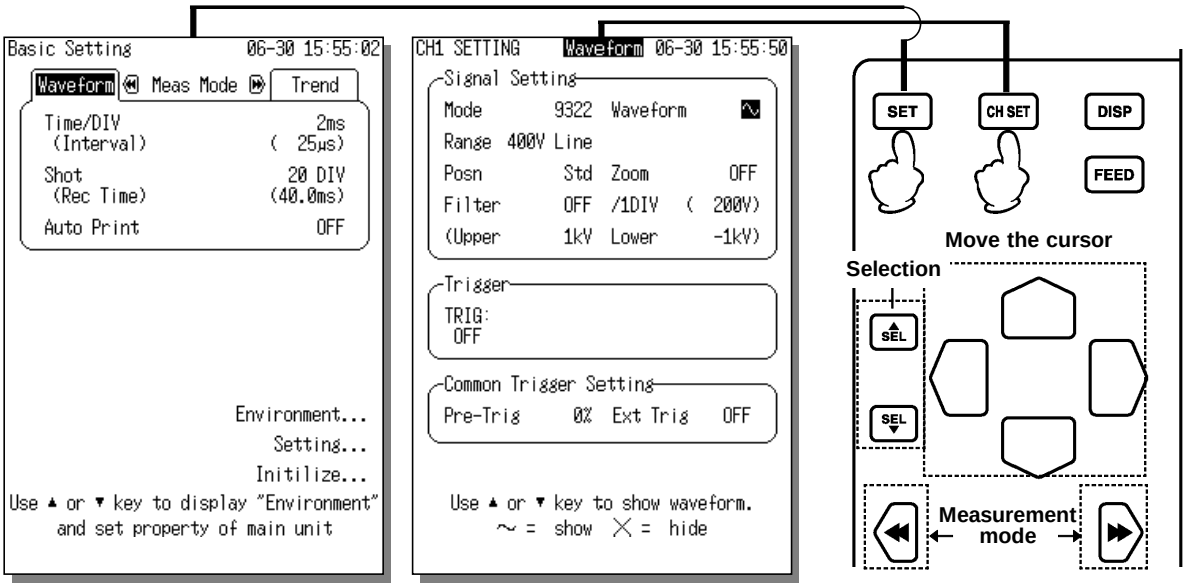
This is useful when you want to find out how much the deviation from the control range is.



Viewing the Voltage Waveform of the 440 V Power Line

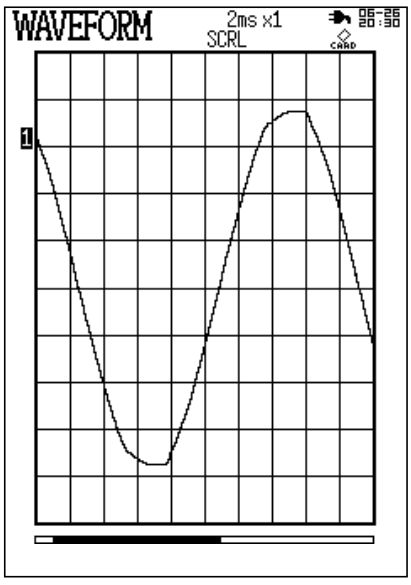


The voltage waveform of the 440 V power line can be measured by using the 9322 DIFFERENTIAL PROBE. Set the measurement mode to "Waveform". For the time axis setting, set it to "2ms". Set the recording length to "20 DIV".
When the 9322 is used, after selecting "9322" as the input mode, set the range to "400V Line". Set the output switch of the 9322 main unit to "DC".



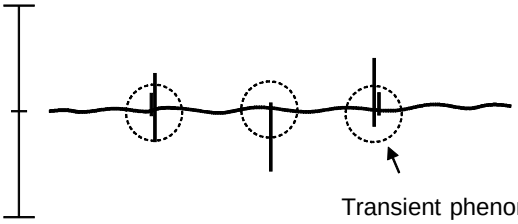
Measurement Start

Make sure the power recorder's connecting cord is connected to the power terminal of the power source. Then, press the [START] key to start the measurement. A voltage waveform appears on the waveform display screen.
To stop the measurement, press the [STOP] key. After the measurement stops, the voltage waveform last captured appears on the screen.



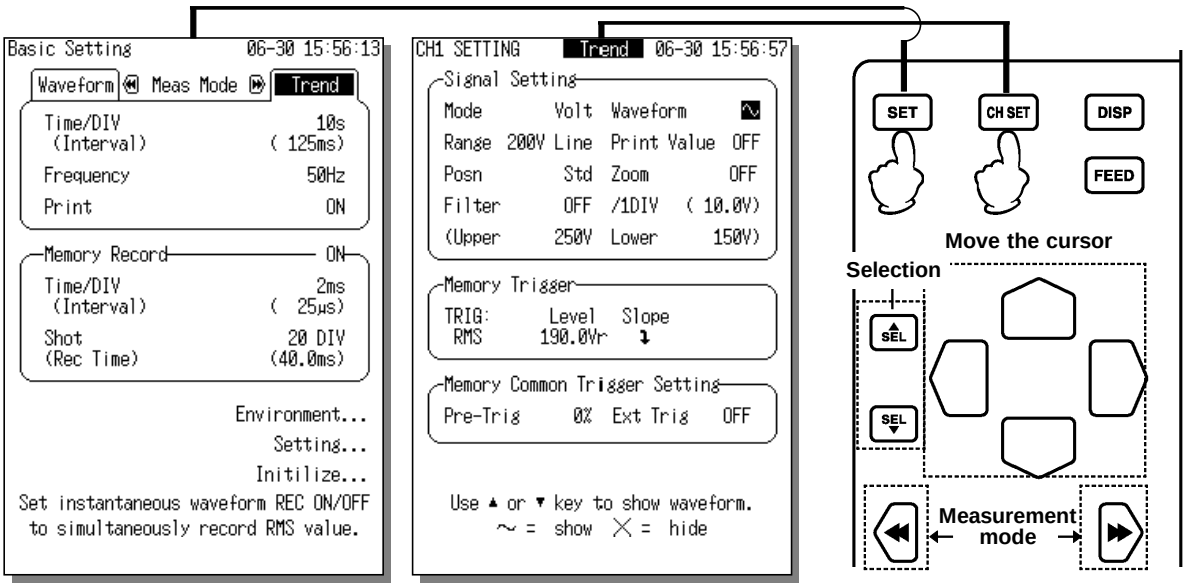
Recording the Abnormal Waveform while Recording the Power Variation (Instantaneous Waveform Recording)

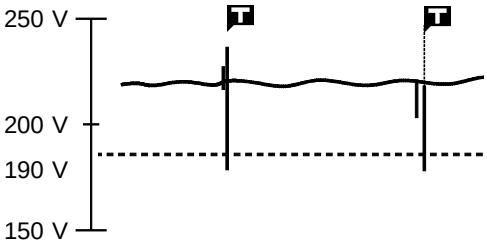
During the instantaneous waveform recording in the power variation mode, transient phenomenon which occurs during the actual value recording of the power variation (voltage or current) can be recorded at high speed using the waveform level.



Transient phenomenon

In the Basic Setting screen of the RMS Trend Measurement mode, if the instantaneous waveform recording (Memory Record) is set to "ON", the time axis and recording length settings become available. The recording length (recording time) determines the number of instantaneous waveforms to capture.
In this example, the time is set to "2ms" and recording length to "20 DIV". The input setting is set to "Volt", the input range to "200V Line", and the display position to "Std".
When the instantaneous waveform recording is ON, the instantaneous waveform trigger can be set at the CH SETTING screen. In this example, the RMS level trigger is used. The trigger activates when the voltage drops below the voltage set; and the instantaneous waveform is captured. The RMS value level is set to "190.0 Vr", and the slope to "↴: falling edge".





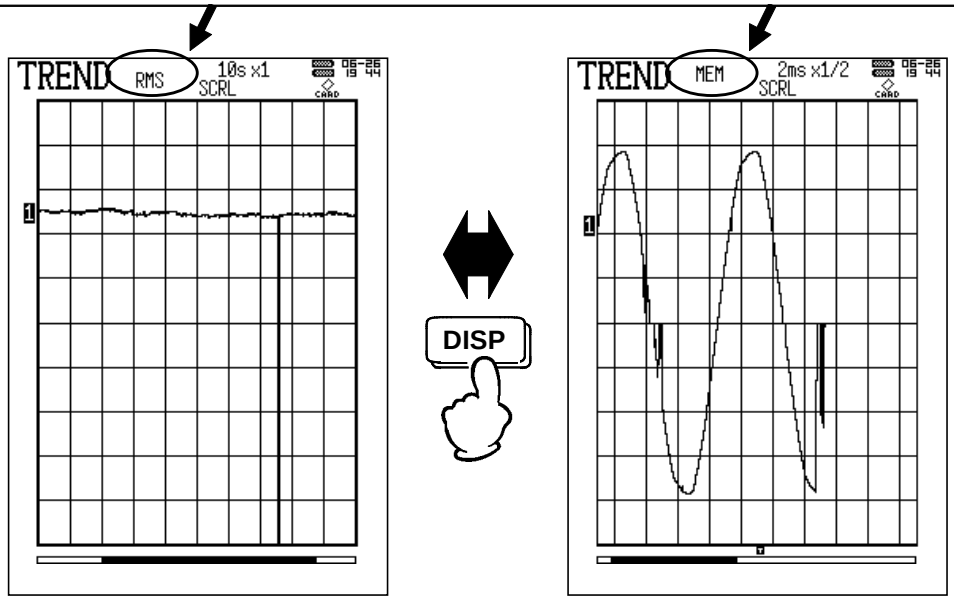
Starting the measurement
Press the [START] key to start the RMS Trend recording of the power variation. While recording, the trigger activates when the RMS value drops by 190V.
Because the instantaneous waveform recording length is set to "20 DIV", when the trigger activates, the waveform data equal to "20 DIV" is captured, starting from the trigger point.
If the recording length is 20 DIV, 16 phenomena of instantaneous waveform data can be captured.
If there are more than 16 phenomena, then data cannot be captured even if the trigger activates.

Displaying the instantaneous waveform

Press the [STOP] key to end the measurement.

If the instantaneous waveform recording is ON, then when you press the [DISP] key in the waveform display screen of the RMS Trend Measurement mode, the screen switches between RMS screen and MEM screen.

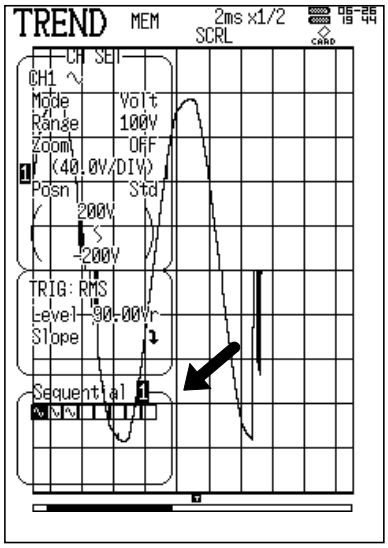
The voltage waveform last captured appears on the instantaneous waveform screen.



TREND RMS screen

TREND MEM screen

Switching the instantaneous waveform



TREND MEM screen

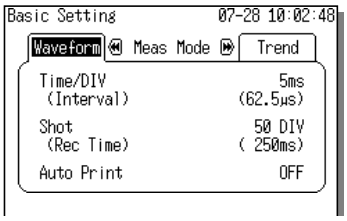
At the RMS Trend Measurement mode's instantaneous recording screen, press the channel select key (CH1). When multiple waveforms are captured, they are displayed in the following way according to the sequential save.

The displayed number indicates the block in the diagram which appears in reverse color. This block is the waveform currently displayed on the waveform display screen.

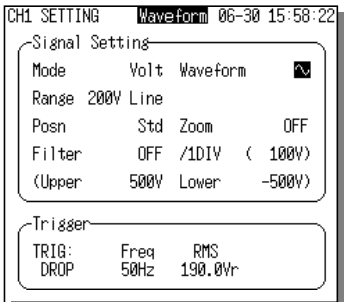
To change the display, move the flashing cursor to the number's position or directly to the block's position (), then press the ▲/▼ key to confirm.

Application Examples on 220 V Line Power Monitoring

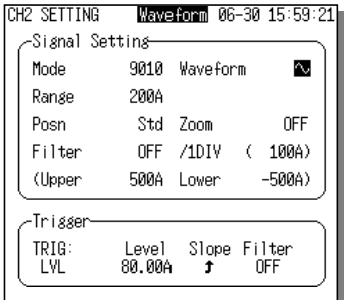
In this example, the 220 V line's voltage waveform, current waveform, and leak current waveform are monitored simultaneously; when abnormal situation arises they are measured at the same time. This example uses CH1 to measure the voltage waveform, CH2 the current waveform and CH3 the leak current waveform.



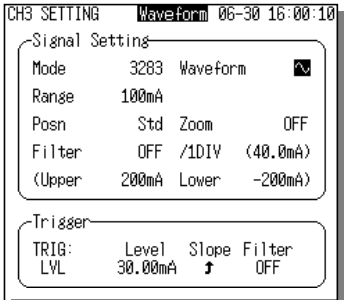
First, press the SET key to display the Basic Setting screen.
Use the ◀◀ key to set the measurement mode to Waveform Measurement.
Use the cursor key and the ▲/▼ key to set the time axis to "5ms" and the recording length to "50 DIV".



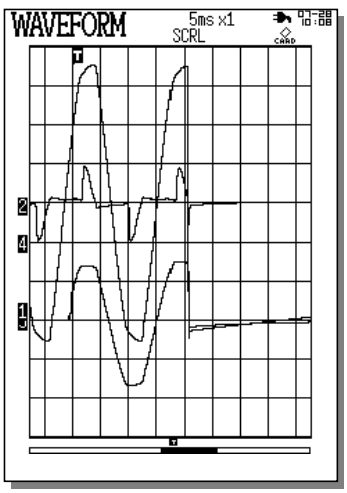
CH1 SETTING
Use the CH SET or CH1 key to display the CH1 SETTING screen. Next, use the cursor key to move the flashing cursor and then use the ▲/▼ key to change the settings to the ones shown in the illustration.
CH1 Trigger Setting
Use the voltage drop trigger and change the setting so that when the voltage drop below 190Vrms the trigger activates.



CH2 SETTING
Use the CH SET or CH2 key to display the CH2 SETTING screen. Next, use the cursor key to move the flashing cursor and then use the ▲/▼ key to change the settings to the ones shown in the illustration.
CH2 Trigger Setting
Use the level trigger and change the setting so that when the current exceeds 80A the trigger activates.



CH3 SETTING
Use the CH SET or CH3 key to display the CH3 SETTING screen. Next, use the cursor key to move the flashing cursor and then use the ▲/▼ key to change the settings to the ones shown in the illustration.
CH3 Trigger Setting
Use the level trigger and change the setting so that when the leak current exceeds 30 mA the trigger activates.

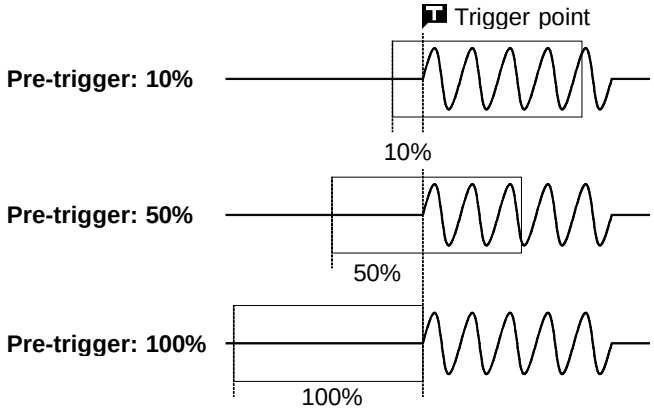


Press the [START] key to start the measurement.
If even one of the three channels meets the trigger conditions, the trigger activates and the waveform is captured.

After the waveform equal to the recording length (20 DIV) is captured, the state returns to "wait for trigger".

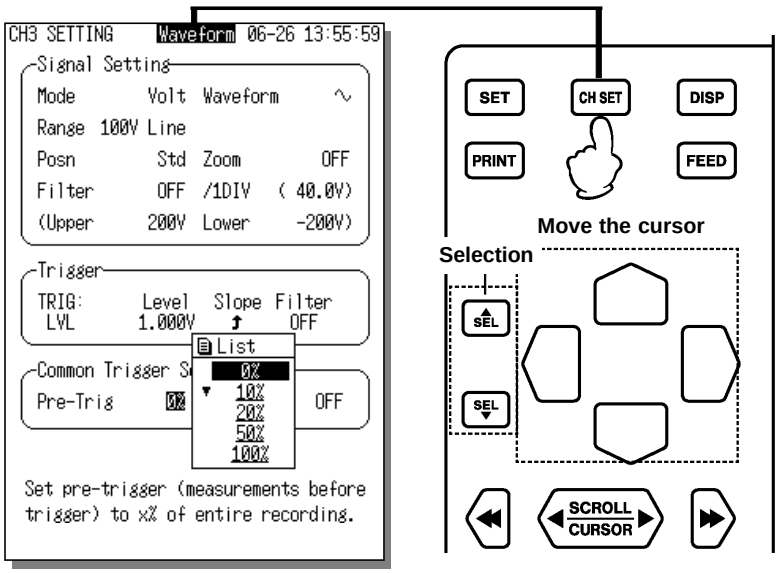
Viewing the Waveform before the Trigger Point (Pre-Trigger)

The pre-trigger function serves to record the waveform not only after but also before triggering has occurred.
In the Waveform measurement mode, using the recording start point as 0% and the recording end point as 100%, the trigger point can be specified in percent. When all trigger sources are set to OFF, the pre-trigger setting is invalid.



- In Waveform measurement mode, when the pre-trigger is set, the trigger will not be registered for a certain period after the start of measurement. (During this interval, Pre-trig wait is shown on the Waveform display screen.)
- When the trigger can be registered, the indication Wait for trig is shown on the waveform display screen.

If the recording length is 20DIV, pre-trigger 10% = 2 DIV and pre-trigger 50% = 10 DIV.



HIOKI 8714-01/8715-01 POWER HiCORDER

Measurement Guide

Publication date: August 2000 Edition 1

Edited and published by HIOKI E.E. CORPORATION
Technical Support Section

All inquiries to Sales and Marketing International Department
81 Koizumi, Ueda, Nagano, 386-1192, Japan
TEL: +81-268-28-0562 / FAX: +81-268-28-0568
E-mail: os-com@hioki.co.jp
URL http://www.hioki.co.jp/

Printed in Japan 8714A983-00

HIOKI

HIOKI E. E. CORPORATION

HEAD OFFICE
81 Koizumi, Ueda, Nagano 386-1192, Japan
TEL +81-268-28-0562 / FAX +81-268-28-0568
E-mail: os-com@hioki.co.jp
URL http://www.hioki.co.jp/

HIOKI USA CORPORATION
6 Corporate Drive, Cranbury, NJ 08512, USA
TEL +1-609-409-9109 / FAX +1-609-409-9108

8714A983-00 00-08-H

Printed on recycled paper