Supplementary sheet（KEW6310Quick manual） (English)

Supports 2G / 4G / 8GB CF cards.

● **Operation check has completed**

Supplier	**2GB**	**4GB**	**8GB**
SanDisk Corp.	Ultra II 15MB/s CF 2GB SDCFH-002G	Ultra II 15MB/s CF 4GB SDCFH-004G	Ultra II 15MB/s CF 8GB SDCFH-008G

* This instrument supports FAT16 and cannot save data of 2GB or more if a card of 4GB or more is used.
(Identified as over capacity when the area of usage exceeds 2GB.)

● **Max possible recoding time**

Twice the recording time for 1GB

e.g. Demand measurement with an interval of 1 sec

1GB: 5 days, 2GB or more: 10 days

* Max number of file is 512 regardless of memory capacity.

Quick manual

POWER QUALITY ANALYZER

KEW 6310

KYORITSU ELECTRICAL
INSTRUMENTS WORKS, LTD.

●Preface

This Quick manual is a simplified version of the full instruction manual which can be found in the supplied CD-ROM. **This manual is intended only as a handy reference guide and should only be used after having read the full instruction manual which contains full details on each function of this instrument and the items contained in the package.**

●Safety Warning!

The instruction manual contains warnings and safety procedures which have to be observed to ensure safe operation of the instrument and maintain it in a safe condition. Thus, these operating instructions have to be read prior to using the instrument.

Contents

The latest software can be downloaded from our web site.
http://www.kew-ltd.co.jp

1 . Instrument Overview

Feature

This is a Clamp-type Power Quality Analyzer that can be used for various wiring systems. It can be used for simple measurements of instantaneous/ integration/ demand values, and also for monitoring waveforms and vectors, analyzing harmonics and measuring fluctuations in supply voltages and for the simulation of power factor correction with capacitor banks. Data can be saved either in the internal memory or a CF card, and can be transferred to a PC either via an USB lead or a CF Card reader.

Safety construction

Designed to meet the international safety standard IEC 61010-1 CAT.III 600V/ CAT.II 1000V

Wiring configuration

KEW6310 supports : Single-phase 2-wire, Single-phase 3-wire, Three-phase 3-wire, Three-phase 4-wire.

Measurement and calculation

KEW6310 measures voltage (RMS), current (RMS), and calculates active/reactive/apparent power, power factor, phase angle, frequency, neutral current and active/ reactive/ apparent electric energy. (RMS)

Demand measurment

Electricity consumption can be easily monitored so as not to exceed the target maximum demand values.

Waveform / Vector display

Voltage and current can be displayed by waveform or vector.

Harmonic analysis

Harmonic components of voltage and current can be measured and analyzed.

Power quality analysis

Measuring Swell/ Dip/ Int, Transient, Inrush current, Unbalance ratio and flicker*, moreover, simulating power factor correction with capacitor banks.

* Flicker measurement function is only available with ver.2.00 or later.

Saving data

KEW6310 is endowed with a logging function with a preset recording interval. Data can be saved by manual operation or at pre-set time & date. Screen data can be saved by using Print Screen function.

Dual power supply system

KEW6310 operates either with an AC power supply or with batteries. Both dry-cell batteries (alkaline) and rechargeable batteries (Ni-MH) can be used. Battery charge while rechargeable batteries installed in the instrument is possible. In the event of interruption, while operating with AC power supply, power to the instrument is automatically restored by the batteries in the instrument.

Large display

Color display with large screen

Light & compact design

Clamp sensor type, compact and light weight design

Application

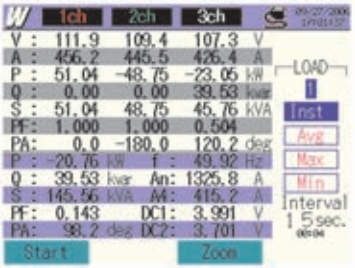
Data in the internal memory or CF card can be saved in a PC via a USB lead or a CF Card reader. As well supplied software facilitates setting, optional analysis software facilitates data analysis.

Input/output function

Analogue signals from thermometers or light sensors can be measured simultaneously with electrical power data via 2 analogue inputs (DC voltage); signals exceeding a preset threshold values at each range can be transmitted to alarms devices via 1 digital output.

Functional Overview

Instantaneous value measurement
Measures average/max/min values of instantaneous values of current, voltage and electric power.



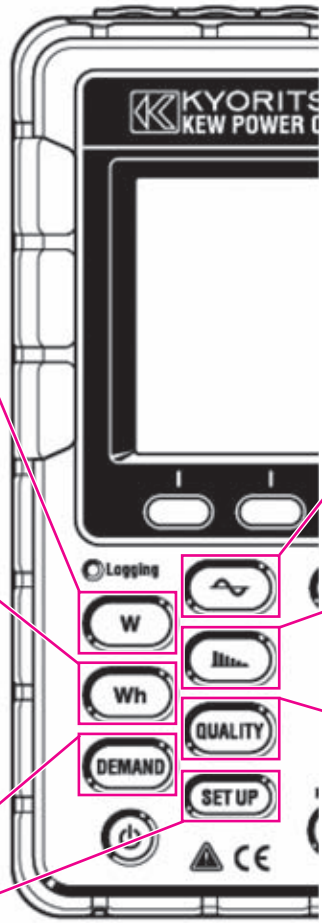
See **(Section 5) W Range** for further details.

Integration value measurement
Measures active/ apparent/ reactive powers on each CH.

See **(Section 6) Wh Range** for further details.

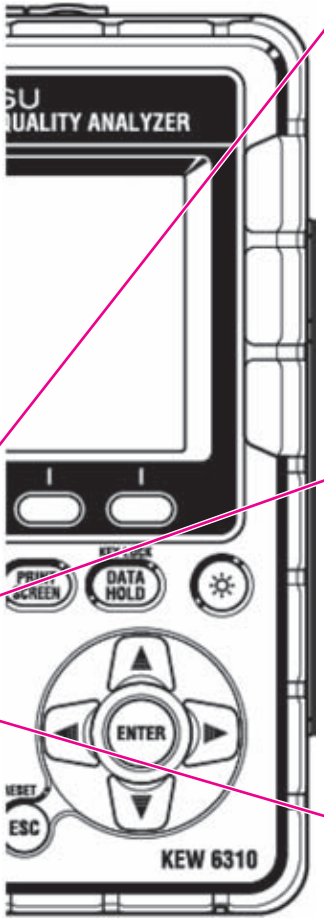
Demand measurement
Measures demand values based on the preset target values. Digital output signals alert the user that the predicted value may exceed the target value.

See **(Section 7) DEMAND Range** for further details.



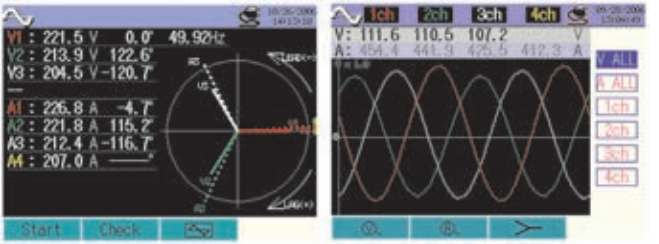
SET UP
Setting of KEW6310 or of measurements.

See **(Section 4) Setting** for further details.



Measurement at WAVE Range

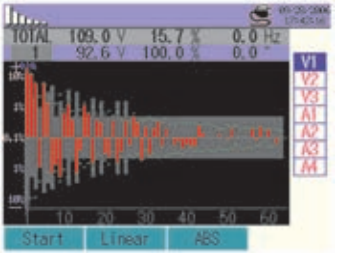
Displays vector / waveform of voltages and currents per CH



See **(Section 8) WAVE Range** for further details.

Harmonic measurement

Measures / analyzes harmonic components of current & voltages



See **(Section 9) Harmonic Analysis** for further details.

Power quality analysis

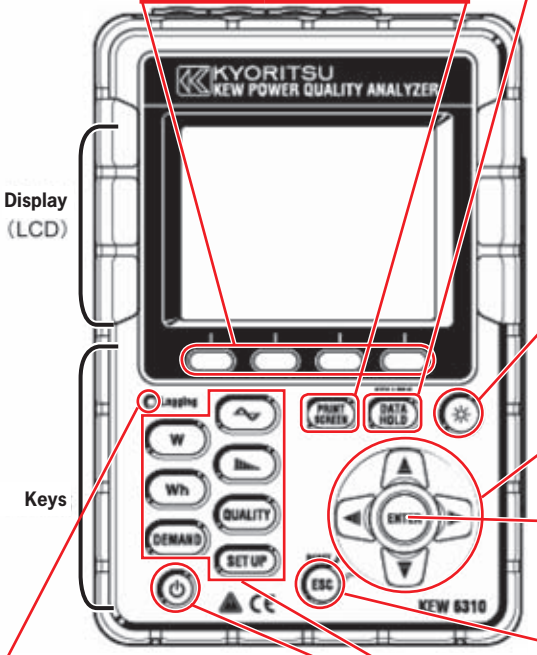
Measures swell, dip, int, transient, inrush current, unbalance ratio and flicker, and also simulates power factor correction with capacitor banks.

* Flicker measurement function is only available with ver.2.00 or later.

See **(Section 10) Power Quality** for further details.

2. Instrument Layout

Front view



Function Key

	Execute the displayed function

PRINT SCREEN Key

PRINT SCREEN	Save the displayed screen as BMP files

DATA HOLD / KEY LOCK Key

DATA HOLD	Hold the readings. * Measurement continues even if screen is frozen.
DATA HOLD	Long press (2 sec or more) disables all Keys to prevent operational error. Another long press (2 sec or more) is required to restore the disabled Keys.

LCD ON / OFF Key

☼	Display / hide the indications on the LCD

Cursor Key

▲ ◀ ▶ ▼	Select setting,Switch screens

ENTER Key

ENTER	Confirms entries

ESC / RESET Key

ESC	Cancel setting changes, clear integration / demand data with Cursor Keys.

LED status indicator

Green	Light up: recording&measuring Flash: stand-by
Red	Flash: charging batteries

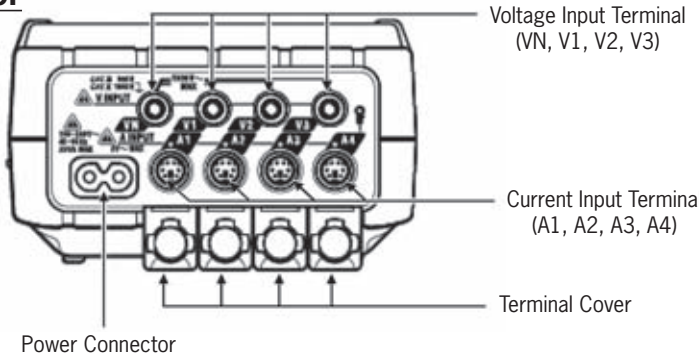
Power Key

⏻	Power ON / OFF

Menu Key

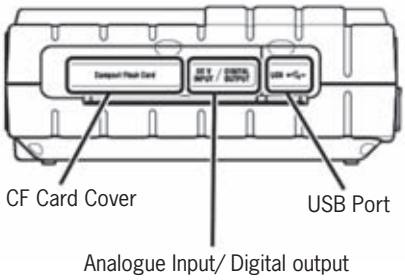
W	W	Measures inst values	∿	Waveform	Measures waveforms
Wh	Wh	Measures integration values	▁▃▅▇	Harmonic analysis	Analyzes harmonic components
DEMAND	DEMAND	Measures demand values	QUALTY	QUALITY	Records Swell/ Dip/ Int/ transient with time information.
			SET UP	SET UP	Basic/ Measurement/ Save/ Other settings

Connector

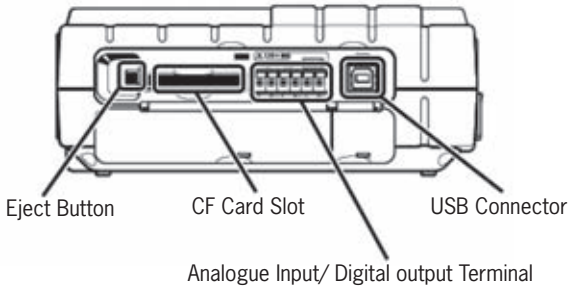


Side face

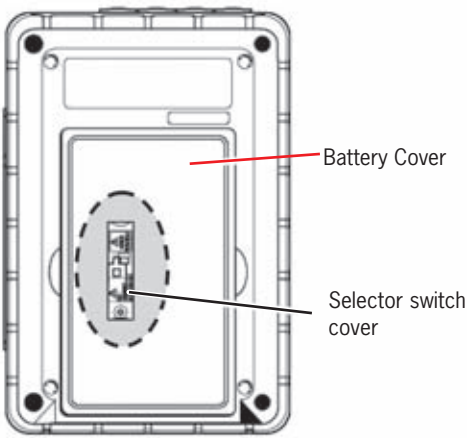
<When the Connector Cover is closed>

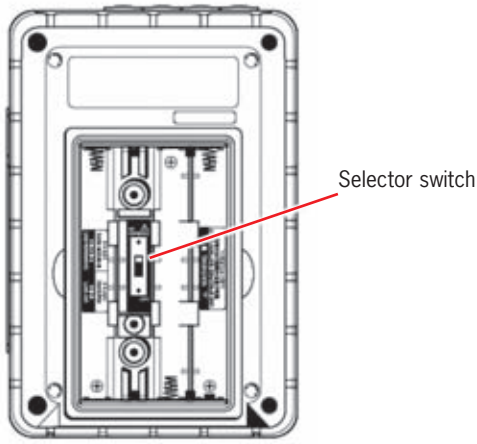


<When the Connector Cover is opened>



Battery Case



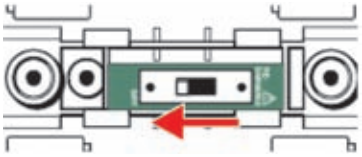
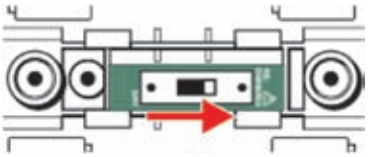


*Selector switch is under the Selector switch cover.

3. Getting Started

The KEW6310 operates with either an AC power supply or batteries. In the event of AC power interruption, power to the instrument is automatically restored by the batteries in the instrument. Dry-cell batteries (alkaline) and rechargeable ones (Ni-MH); can be both used. It is also possible to charge rechargeable batteries in the instrument.

Remove the Selector Switch Cover, and slide the Selector Switch to left or right depending on the batteries to be used.

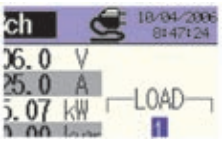
	DRY-CELL BATTERY	RECHARGEABLE BATTERY
Battery can be used	**Alkaline dry-cell battery(LR6)**	**Ni-MH Rechargeable battery (HR-15/51)**
Position of Selector switch		
	Slide the switch to the left (DRY)	**Slide the switch to the right (RE-CHARGEABLE)**
Selector switch cover		

If the AC supply is interrupted and the batteries haven't been installed, the instrument goes off and the measured data may be lost.

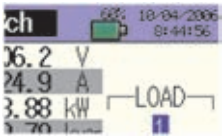
Battery Mark on the LCD / Battery Level

Battery Mark on the LCD

Powered by AC supply



Powered by Battery*



Battery Level

0 ~ 100% (count by 20%)	
100%	Possible continuous measurement - approx 2 hours* : with alkaline batteries - approx 5 hours* : with Ni-MH rechargeable batteries
0%	Battery is exhausted. (accuracy not guaranteed) Instrument operates as follows automatically.
W, ~, Hz	Measurement continues, Data save is ceased. (Measured data is saved.)
Wh, DEMAND, QUALTY	Data save (measurement) is ceased. (Measured data is saved.)

* mark flashes while charging batteries. * reference time when using the instrument with indications on the LCD hide.

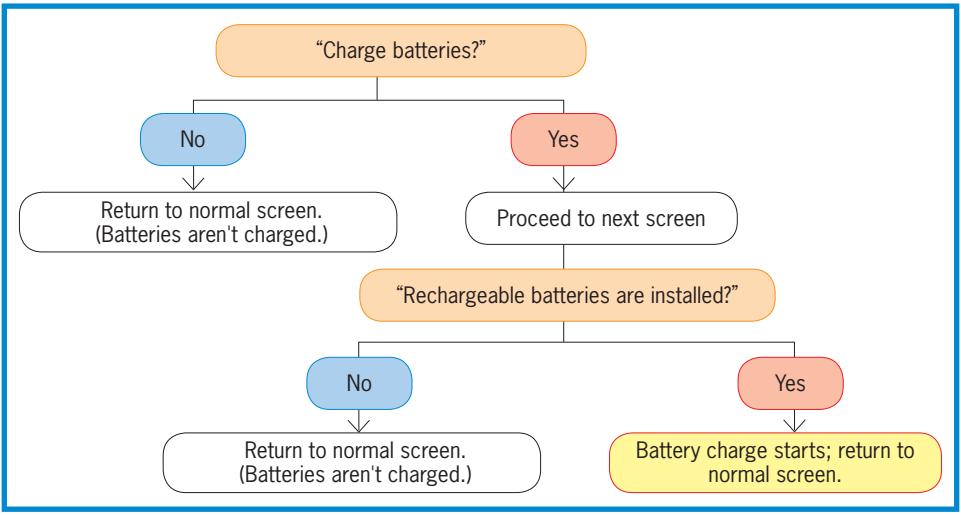
A continuous measurement with alkaline batteries is limited to 1 hour; use of an ac power supply is recommended. (batteries should be considered and used as a back-up)

Charging the rechargeable Ni-MH batteries

Following message to prompt battery charge appears on the LCD automatically when battery level is 40% or less at starting the instrument. Press the◄|| ||► Cursor Keys and ENTER Key according to the instructions displayed on the LCD.

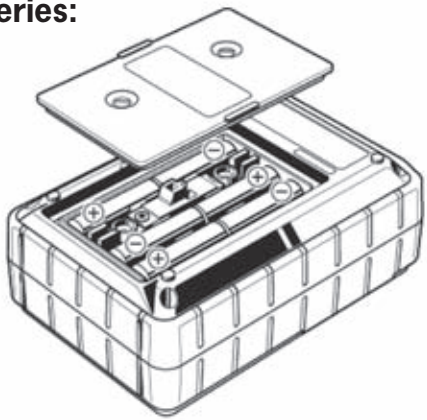
- Install rechargeable batteries (Ni-MH)
- Slide the Selector switch to the right (set to "RE-CHARGEABLE" position)
- Connect the AC Power cord and power on the instrument.

* Refer to **"(4.2.4.) Other Setting"** in the full instruction manual to initiate a battery charge anytime it is necessary.



Battery charge doesn't initiate only by installing rechargeable batteries and connecting an AC power cord. Above operation is required to start a battery charge.

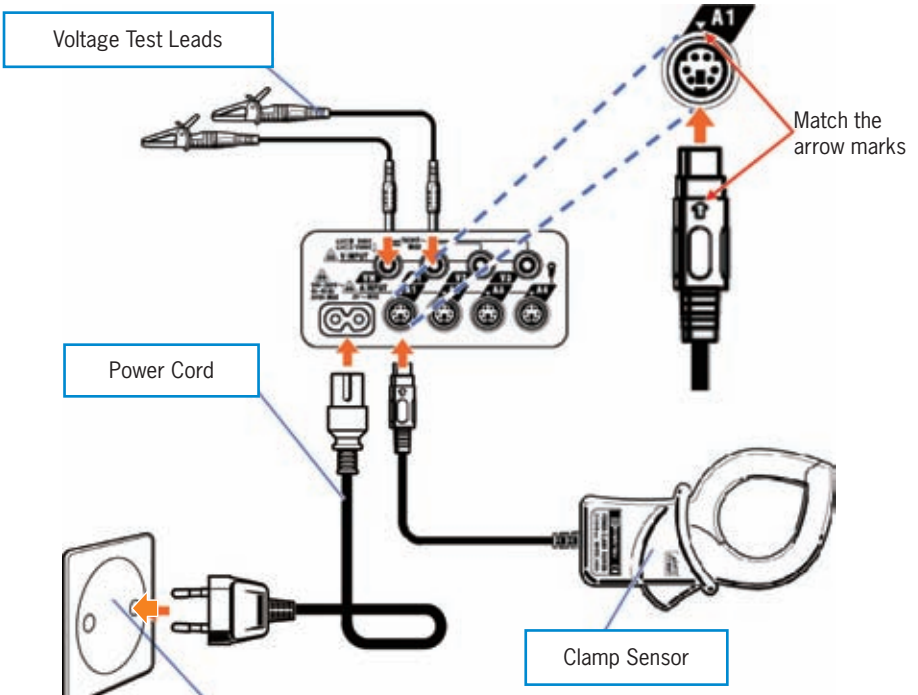
How to install batteries:



Install batteries in correct polarity as marked inside.

Battery power is consumed even if the instrument is being off. Remove all the batteries if the instrument is to be stored and will not be in use for a long period.

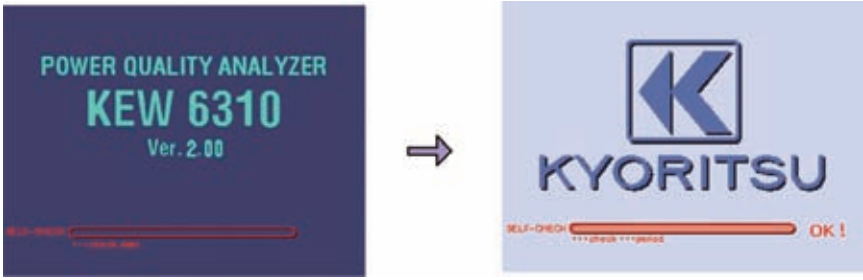
Cord Connection



Rated supply voltage	:	100 ~ 240VAC (±10%)
Rated supply frequency	:	45 ~ 65Hz
Max power consumption	:	20VAmax

Start-up Screen

Model name and software version will be displayed upon powering on the instrument, and self-check routine initiates automatically. The KEW logo will appear. Stop using the instrument if error messages appear on the LCD after the self-check and refer to **(Section 15) Troubleshooting** in the full instruction manual.



4. Setting SET UP

The "SET UP" consists of following 4 settings.

Basic Setting : Setting of the items common to all measurements

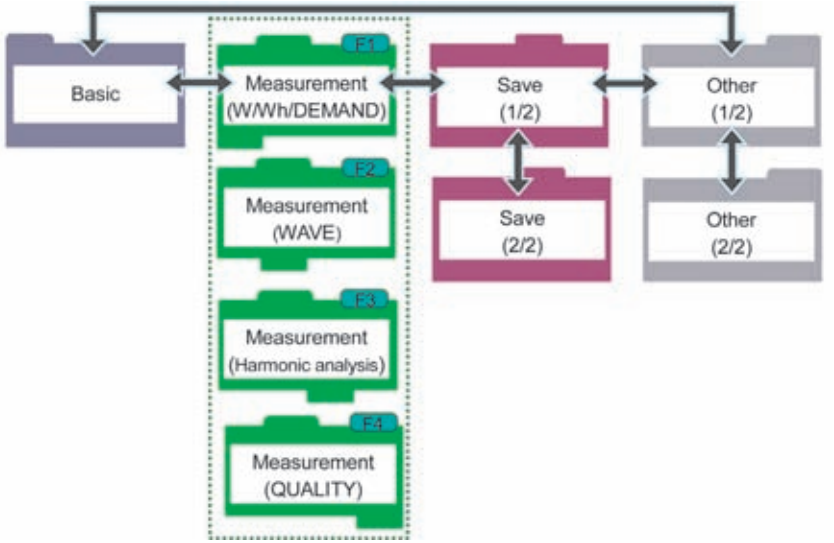
Measurement Setting : Setting of each measurement

Save Setting : Setting of data save methods

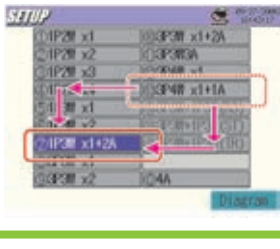
Other Setting : Environmental setting

Each setting

Press the ◄||| |||► Cursor Keys to browse through setting items.



Select any desirable items with ▲▼◄||| |||► Cursor Keys and confirm it with ENTER Key. Using the ESC Key cancels the setting change. Following is an example to select the wiring to be tested at basic setting.

1. Select a setting item – Wiring	2. Select a proper wiring configuration	3. Confirm the selected wiring configuration
		
Move the cursor to "Wiring", and press the ENTER Key.	Move the cursor to the wiring configuration to be tested, and press the ENTER Key.	Setting completes.

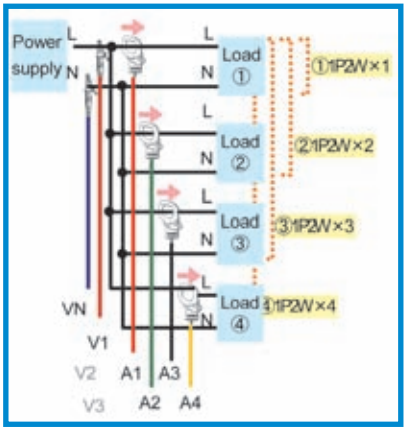
* Cursor will move onto any of the red parameters.

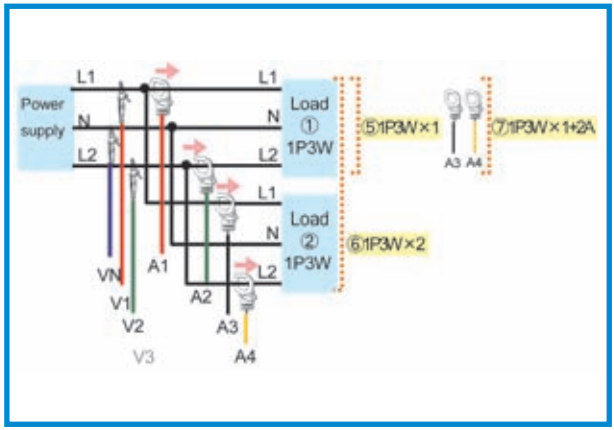
Basic Setting

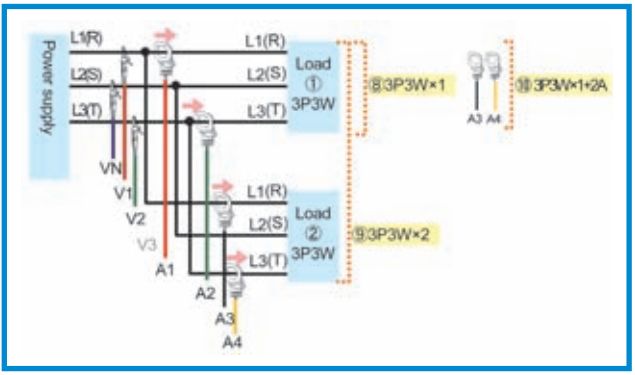
Setting item	Details of Setting		
Wiring	①1P2W×1	②1P2W×2	③1P2W×3
	④1P2W×4	⑤1P3W×1	⑥1P3W×2
	⑦1P3W×1＋2A	⑧3P3W×1	⑨3P3W×2
	⑩3P3W×1+2A	⑪3P3W3A	⑫3P4W×1
	⑬3P4W×1+1A		
	⓪4A		
Voltage Range	150V／**300V**／600V／1000V		
VT Ratio	0.01~9999.99（**1.00**）		
Clamp / Current Range	8128：1／5／10／20／50A／AUTO 8127：10／20／50／100A／AUTO 8126：20／50／100／200A／AUTO **8125**：50／100／**200**／500A／AUTO 8124：100／200／500／1000A／AUTO 8129：300／1000／3000A		Power Clamp sensor
	8141： 8142： 8143：	100／500mA／1A／AUTO	Leakage Clamp sensor
	8146： 8147： 8148：	500mA／1／5／10A／AUTO	
CT Ratio	0.01~9999.99（**1.00**）		
Filter	8141／42／43／46／47／48：ON／OFF 8128／27／26／**25**／24／29：--------		
DC V	50mV／500mV／**5V**		
Frequency	**50Hz**／60Hz		

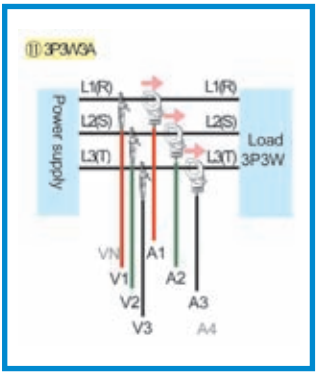
* Default values are highlighted in gray
* Leakage Clamp sensors cannot be used for power measurements but can be used on wiring configurations: ⑦, ⑩, ⑬ and ⓪.

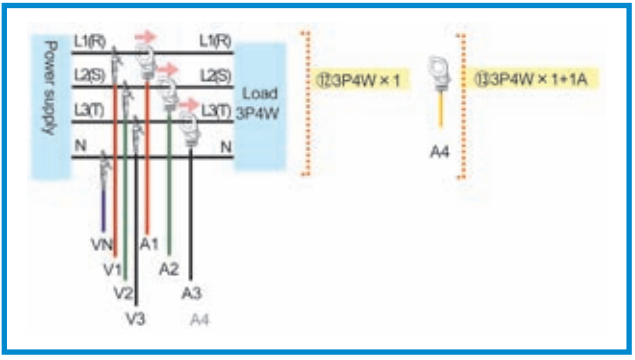
Wiring Configuration

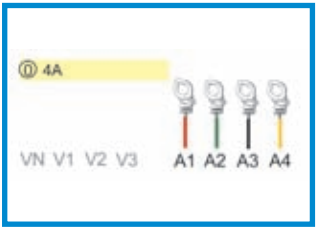




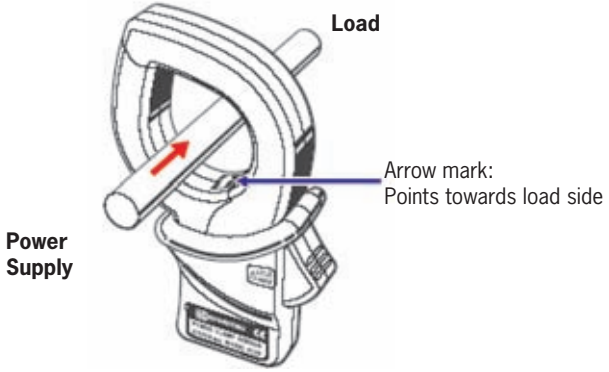








Orientation of Clamp sensor



Reverse clamping switches the symbols (+/-) for active power.

Measurement Setting

Setting Item				Details of Setting			
W／Wh／DEMAND*	W	Instantaneous/avg/max/min values		**ON**／OFF			
	Wh	Detailes					
	Target demand			1.000mW~999.9TW（**300.0kW**）			
	Demand inspection cycle			Shorter than intervals, 3 different cycles are available.（**10 min**）			
WAVE Range*	Save item	V		**ON**／OFF			
		A					
Harmonic Analysis*	THD (total harmonic distortion) caluculation			**THD-F (fundamental wave basis)** / THD-R (total RMS basis)			
	Allowable range			**Default value**／Customization			
	MAX HOLD			**ON**／OFF			
	Save item	V		**ON**／OFF			
		A					
QUALITY	Swell/ Dip/ Int measurment	V_Reference		70~1000V（**100V**）			
		Transient		Selectable ranges for threshold vary depending on the selected reference voltages.			
			V_Reference	70~150V	151~300V	301~600V	601~1000V
			Transient (selectable range)	50~310 Vpeak(**210**)	90~630 Vpeak	170~1270 Vpeak	340~2000 Vpeak
		Swell		100~200% against reference voltage（**110%**）			
		Dip		5~100% against reference voltage（**90%**）			
		Int		5~98% against reference voltage（**10%**）			
		Hysteresis		1~10% against reference voltage（**5%**）			
		Trigger point		Past:0~200, Next:200~0（**100** each）			
	Transient measurement	Voltage range		150V	300V	600V	**1000V**
		Threshold value (selectable range)		50~310 Vpeak	90~630 Vpeak	170~1270 Vpeak	340~2000 Vpeak（**1415**）
		Hysteresis		1~10% against Voltage Range（**5%**）			
		Trigger point		Past:0~200, Next:200~0（**100** each）			
	Inrush current measurement	Clamp		8128／8127／8126／**8125**／8124／8129／8146／8147／8148／8141／8142／8143			
		A Range		100.0m／500.0m／1／5／10／20／50／100／**200**／300／500／1000／3000／AUTO			
		Reference current (selectable range)		Selectable within 10%~100% of Current Ranges（**200A**）			
		Filter		ON／**OFF**			
		Threshold value		100~200% against reference current（**110%**）			
		Hysteresis		1~10% against reference current（**5%**）			
		Data trigger point		Past:0~200, Next:200~0（**100** each）			
	Unbalance ratio	Output threshold		1~20%（**3%**）			
	Flicker	V Range		150V	**300V**	600V	
		Filter coefficient		**230V lamp**	120V lamp		
		Output item		**Pst（1min）**／Pst／Plt			
		Output Threshold		0.8~20.0（**1.0**）			
	Capacitance	Target power factor		0.5~1（**1.000**）			

* Default values are highlighted in gray .

Measurement Setting

Setting Item	Details of Setting
Interval	1sec／2sec／5sec／10sec／15sec／20sec／30sec／ 1min／2min／5min／10min／15min／20min／**30min**／1hour

* Interval can be selected at W, Wh, DEMAND, WAVE, Harmonic analysis, Swell/ Dip/ Int, Transient, Inrush current, Unbalance ratio and Capacitance Ranges. At WAVE Range and Harmonic analysis, available intervals depend on the number of save items. At Harmonic analysis, 1 sec tool is not available.

Save Setting

Setting Item	Details of Setting
Recording method	Manual／**Timer**
Recording starts	Year / Month / Date Hour : Minute : Second
Recording ends	(0000/ 00 / 00 00 : 00 : 00)
Destination to save data	CF Card / Internal Memory
Destination to save screenshot	(**CF Card, if it has been inserted**)
Formatting CF Card	Format the CF Card.
Deleting data in the CF Card	Delete the data in the CF Card.
Formatting internal memory	Format the internal memory.
Deleting data in the internal memory	Delete the data in the internal memory.
Data transfer	Transfer the data in the internal memory to the CF Card.
Load setting	Load the pre-set setting.
Save setting	Save the settings to the CF Card or the internal memory.

Other Setting

Setting Item	Details of Setting
Language*	日本語/ English / 中文 / Francais / Espanol
Date format	YYYY/MM/DD／**MM/DD/YYYY**／DD/MM/YYYY
Time and date*	yyyy/mm/dd hh:mm:ss
Buzzer	**ON**／OFF
CSV File	Decimal point／Separator **. ／ ,** . ／ ; , ／ ;
ID number	00-001 ～ 99-999(**00-001**)
LCD contrast	Light⇔**Standard**⇔Dark 10 ⇔ 0 ⇔ 10
CH Color*	Default value ／ Customization
Auto-power-off	**ON**／OFF
LCD auto-off	**ON**／OFF
Battery charge	ON／**OFF**
System reset	Reset the system.

* Items listed with "*" mark won't restore to default after system reset.

5. Instantaneous (Inst) value measurement (W)

Steps for measurement

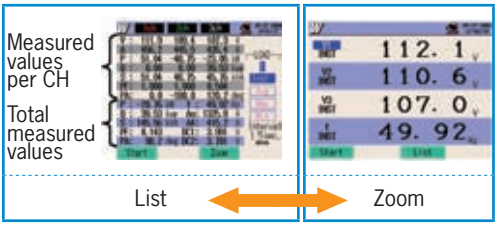
Ensuring your safety
↓
Preparation for measurement
↓
Setting ←
↓
Wiring
↓
Inst value measurement ← (W) Range

(SET UP) Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	Save item (W)	Recording start
VT Ratio	• Inst value	Recording termination
Clamp Sensor	• Avg value	Destination to save data
A Range	• Max value	Destination to save screen shot
CT Ratio	• Min value	
Filter		
DC V		
Frequency		

Symbol displayed on the LCD												
V	Voltage	A	Current			P	Active Power	+	consumption	Q	Reactive Power	+	lagging
								−	regenerating			−	leading
S	Apparent Power	PF	Power Factor	+	lagging	PA	Phase Angle	+	lagging	f	Frequency		
				−	leading			−	leading				
An	Neutral current	DC1	Analogue input voltage at 1ch			DC2	Analogue input voltage at 2ch						

Switching Screens / Zoom

	Select a system		◀‖▶ Cursor Key
↕	Select an item		▲▼ Cursor Key
↕	Check setting details		ENTER Key



* Press F3 Key to switch the Zoom and List display.
Refer to **"(Section 6) Instantaneous (Inst) value measurement"** for explanation on customizing the Zoom display.

Save data

File ID : 6310-01						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h : mm : ss	h : mm : ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$			

e.g. 1.234E+02=1.234x10^{2}=123.4

Header of the saved data

AVG_A1[A]_1

① ② ③ ④ ⑤

①	INST	:	Instantaneous value
	AVG	:	Average value
	MAX	:	Max value
	MIN	:	Min value
②	V	:	Voltage per phase
	A	:	Current per phase
	f	:	Frequency
	P	:	Active power
	Q	:	Reactive power
	S	:	Apparent power
	PF	:	Power factor
	PA	:	Phase angle
	DC	:	Analogue input voltage
③	CH number	:	* 1 ～ 4
④	Unit		
⑤	System		

* Saved data with no number at this space contains the sum of the measured values.

Saving instantaneous values

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫ File name for saving data is displayed. ▼ Data saving starts.

≪Timer≫ File name for saving data is displayed. ▼ WAIT appears and flashes. Status indicator LED flashes. ▼ Stand-by until preset time comes.

2 Preset start time comes.

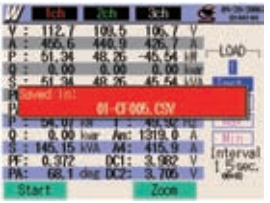
Saving

Status indicator LED is ON. REC flashes and CF or MEM is displayed. (flashes in red according to the preset interval)

No setting change can be made during data saving.

3

Stop



Press **Stop**. ▼ File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

Preset termination time comes. ▼ File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

6. Integration value measurement Wh

Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting
↓
Wiring
↓
Integration value measurement

SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	Save item (Wh)	Recording start
VT Ratio	• Inst value	Recording termination
Clamp Sensor	• Avg value	Destination to save data
A Range	• Max value	Destination to save screen shot
CT Ratio	• Min value	
Filter	• Details	
DC V		
Frequency		

Wh Range

* Readings are displayed right after the recording of integration value measurement starts.

Symbol displayed on the LCD					
WP+	Active electric energy (consumption)	WS+	Apparent electric energy (consumption)	WQi+	Reactive electric energy (lagging)
WP-	Active electric energy (regenerating)	WS-	Apparent electric energy (regenerating)	WQc+	Reactive electric energy (leading)

Switching displays / Viewing W Range

Select a system	LOAD 1 2 3 4 Σ	◀|||▶ Cursor Key
Select a channel	Σ 1ch 2ch 3ch	▲ ▼ Cursor Key

Display for Wh Range

Display for W Range

* Press F2 Key to switch on the displays for Wh Range and W Range.

Save data

File ID : 6310-02					
Saved time & date		ELAPSED TIME	Active Power energy (consumption / regenerating)	Apparent Power energy (consumption / regenerating)	Reactive Power energy (consumption / regenerating)
DATE	TIME	ELAPSED TIME	INTEG_WP	INTEG_WS	INTEG_WQ
yyyy/mm/dd	h : mm : ss	h : mm : ss	(±)x.xxxxxE±nn		
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$		

* Reactive power (consumption :+ / regenerating :-) will be recorded with phase information: lagging (i) or leading (c).
* At Wh Range, data measured at W Range and above measurement data are recorded at the same time.

Header of the saved data

INTEG_WP+[Wh]_1

① ② ③ ④

①	INTEG	:	Integration value
②	WP+	:	Active power energy (consumption)
	WP-	:	Active power energy (regenerating)
	WS+	:	Apparent power energy (consumption)
	WS-	:	Apparent power energy (regenerating)
	WQi+	:	Reactive power energy (consumption) : lagging
	WQc+	:	Reactive power energy (consumption) : leading
	WQi-	:	Reactive power energy (regenerating): lagging
	WQc-	:	Reactive power energy (regenerating): leading
③	Unit		
④	System		

Saving integration values

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫

File name for saving data is displayed.

Data saving starts.

≪Timer≫

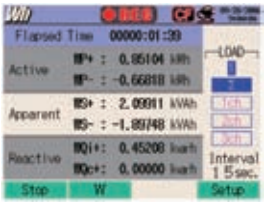
File name for saving data is displayed.

WAIT appears and flashes

Status indicator LED flashes.

Stand-by until preset time comes.

2 **Saving**



Preset start time comes.

Status indicator LED is ON.

REC flashes and CF or MEM is displayed.

(flashes in red according to the preset interval)

No setting change can be made during data saving.

3 **Stop**

Press **Stop**.

Preset termination time comes.

File name for saving data is displayed.

Status indicator LED goes off.

REC and CF or MEM goes off.

7. Demand measurement DEMAND

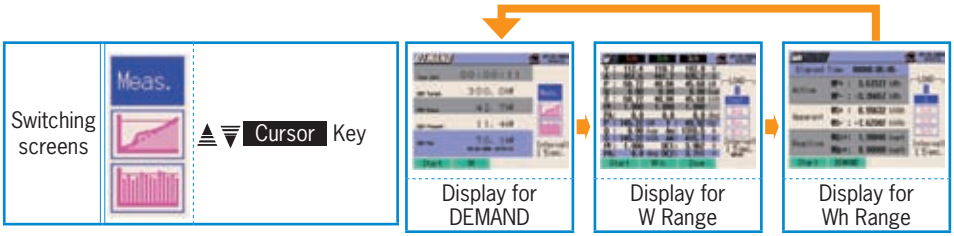
Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting ← SET UP Range
↓
Wiring
↓
Demand measurement ← DEMAND Range

SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	Save item (W)	Recording start
VT Ratio	• Inst value	Recording termination
Clamp Sensor	• Avg value	Destination to save data
A Range	• Max value	Destination to save screen shot
CT Ratio	• Min value	
Filter	• Details	
DC V	Target demand	
Frequency	Demand inspection cycle	

* Readings are displayed right after the recording of demand measurement starts.

Switching displays / Viewing W Range and Wh Range



* Press F2 Key to switch the displays for DEMAND, Wh Range and W Range.

Save data

File ID : 6310-03								
Saved time & date		ELAPSED TIME		Active power energy (consumption/ regenerating)	Apparent power energy (consumption/ regenerating)	Reactive power energy (consumption/ regenerating)	DEMAND	TARGET
DATE	TIME	ELAPSED TIME	Integration	INTEG_WP	INTEG_WS	INTEG_WQ	DEM	TARGET
			Variation in interval	INTVL_WP	INTVL_WS	INTVL_WQ		
yyyy/mm/dd	h:mm:ss	h:mm:ss		(±)x.xxxxxE±nn			(±)x.xxxE±nn	
year/month/ date	hour:min:sec	hour:min:sec		(±) value x $10^{±n}$				

* At DEMAND Range, data measured at W Range and above measurement data are recorded at the same time.

Header of the saved data

INTVL_WP+[Wh]_1

① ② ③ ④

①	INTEG	:	Integration value
	INTVL	:	Variation in interval
	DEM	:	Sum of demand value
	TARGET	:	Target value
②	WP+	:	Active power energy (consumption)
	WP-	:	Active power energy (regenerating)
	WS+	:	Apparent power energy (consumption)
	WS-	:	Apparent power energy (regenerating)
	WQi+	:	Reactive power energy (consumption) : lagging
	WQc+	:	Reactive power energy (consumption) : leading
	WQi-	:	Reactive power energy (regenerating): lagging
	WQc-	:	Reactive power energy (regenerating): leading
③	Unit		
④	System		

* ②,③,④ will be blank if ① is DEM or TARGET.

Saving of demand values

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫
File name for saving data is displayed.
▼
Data saving starts.

≪Timer≫
▼
WAIT appears and flashes.
Status indicator LED flashes.
▼
Stand-by until preset time comes.
▼

2 **Saving**

Preset start time comes.
▼
Status indicator LED is ON.
REC flashes and CF or MEM is displayed.
(flashes in red according to the preset interval)

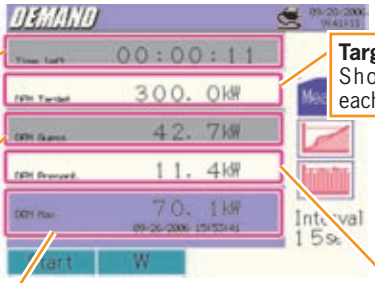
No setting change can be made during data saving.

3 **Stop**

▼
Press **Stop**.
▼
File name for saving data is displayed.
Status indicator LED goes off.
REC and CF or MEM goes off.

Preset termination time comes.
▼

Measurement Screen



Remaining time (Time left)
Demand interval is counted down.

Predicted value
Predicted demand value when preset demand interval elapses under present load.

$$\frac{\text{(Present value)} \times \text{(preset interval)}}{\text{(elapsed time)}}$$

* Integration and calculations are done as time elapses.

Target value
Should be set for each measurement.

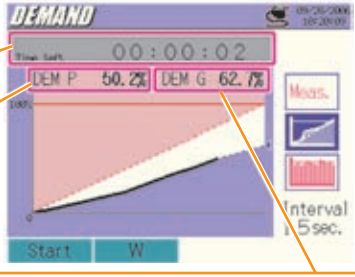
Measured max demand with time & date information
Max demand recorded in a measuring period is displayed. Displayed value will be refreshed if any higher demand is detected.

Present value
Demand value (average power) within a demand interval.

$$\frac{\text{(WP+)} \times \text{(1 hour)}}{\text{(interval)}}$$

* Integration and calculations are done as time elapses.

Shifts in specific period



Remaining time (Time left)
Demand interval is counted down.

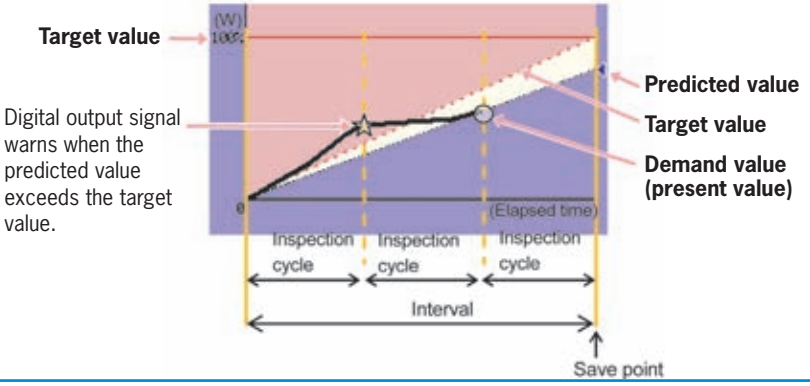
Load factor
Percentage of the present value against the target value.

$$\frac{\text{(present value)}}{\text{(target value)}}$$

Prediction
Percentage of the predicted value against the target value.

$$\frac{\text{(predicted value)}}{\text{(target value)}}$$

Arrow mark on the graph (◀) is blue while the value is within the target demand, and becomes red when the target value is exceeded.



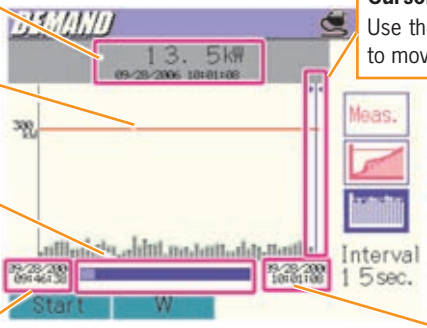
Demand change

Measured max demand with time & date information
Demand value is displayed with recorded time & date info where cursor is placed.

Target demand

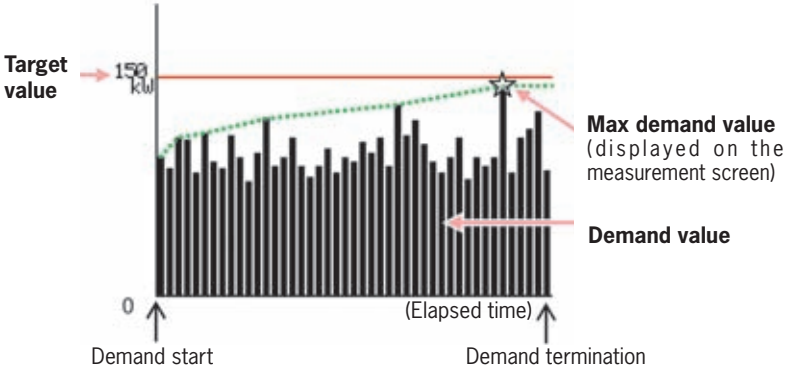
Bar graph
White bar : Percentage of hidden area
Blue bar: Percentage of the present displayed area

Cursor
Use the ◄|||► **Cursor** Key to move the cursors.



Recording start time

Most recent recorded time



Max demand value (displayed on the measurement screen)

Demand value

8. WAVE Range

Steps for measurement

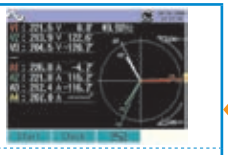
Ensuring your safety
↓
Preparation for measurement
↓
Setting
↓
Wiring
↓
Measurement

SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	Save item	Recording start
VT Ratio		Recording termination
Clamp Sensor		Destination to save data
A Range		Destination to save screen shot
CT Ratio		
Filter		
DC V		
Frequency		

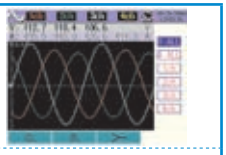
Range

Symbol displayed on the LCD			
V	Voltage	A	Current

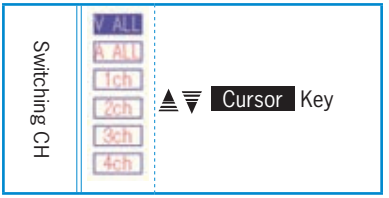
Switching displays : Vector / Waveform (switching CH)



Vector Display



Waveform Display



* Press the F3 Key to switch the Waveform and Vector display.
* Press the F2 Key to check whether the wiring configuration is correct or not.
* Pressing the F1 or F2 Keys at Waveform display changes the magnification of vertical axis (voltage/current).

Save data

File ID : 6310-04 (Waveform data)					
Saved time & date		ELAPSED TIME	Channel	Instantaneous value	
DATE	TIME	ELAPSED TIME	CH	* Line 1/Line 2	1／128 ～ 129／256
yyyy/mm/dd	h：mm：ss	h：mm：ss	Ai／Vi	(±)x.xxxE±nn	
year/month/ date	hour:min:sec	hour:min:sec	A ／ V	(±) value x $10^{\pm n}$	

*1st ~ 128th measured instantaneous values are saved to Line 1, 129th ~ 256th are to Line 2.

File ID : 6310-05 (Vector data)						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h：mm：ss	h：mm：ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$			

Header of the saved data

File ID : 6310-04 (Waveform data)

5/133

① ②

①	1 ～ 128	:	Sampling sequence
②	129 ～ 256	:	ditto (① + 128)

File ID : 6310-05 (Vector data)

INST_A1[deg]

① ② ③ ④

①	INST	:	Instantaneous value
	AVG	:	Average value
	MAX	:	Max value
	MIN	:	Min value
②	V	:	Voltage per phase
	A	:	Current per phase
③	CH No.	:	1 ～ 4
④			Unit

* when [deg] is displayed at space ④, it means phase angle

Saving at WAVE Range

1

Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫

File name for saving data is displayed

▼

Data saving starts.

≪Timer≫

File name for saving data is displayed

▼

WAIT appears and flashes.
Status indicator LED flashes.

▼

Stand-by until preset time comes.

▼

2

Saving

Preset start time comes.

▼

Status indicator LED is ON.
REC flashes and CF or MEM is displayed.
(flashes in red according to the preset interval)

No setting change can be made during data saving.

3

Stop

Press **Stop**.

▼

Preset termination time comes.

▼

File name for saving data is displayed.
Status indicator LED goes off.
REC and CF or MEM goes off.

9. Harmonic Analysis

Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting
↓
Wiring
↓
Harmonic Analysis

SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	THD calculation	Recording start
VT Ratio	Allowable range	Recording termination
Clamp Sensor	MAX HOLD	Destination to save data
A Range	Save item	Destination to save screen shot
CT Ratio		
Filter		
DC V		
Frequency		

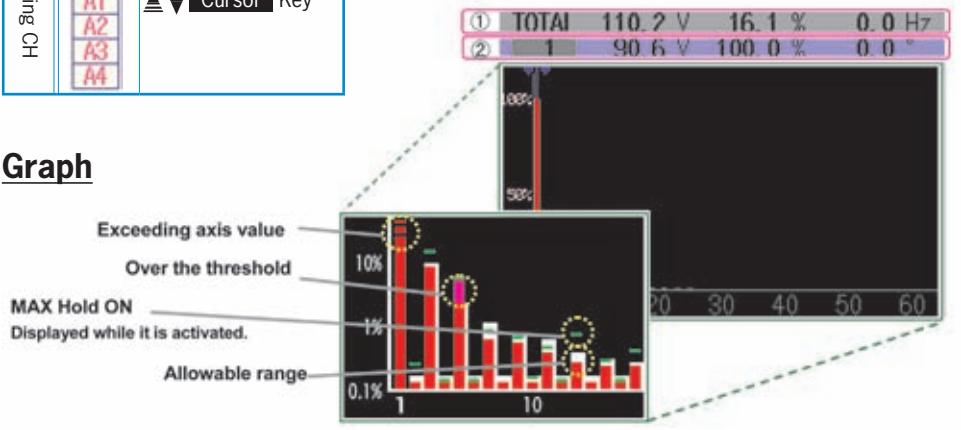
Harmonic Analysis Range

Switching displays

Switching CH: V1 V2 V3 A1 A2 A3 A4

▲▼ Cursor Key

Graph



① Measured value					
TOTAL	sum	V／A	RMS value per CH	%	THD per CH

② Measured value (values of each order pointed by cursor)							
1 ～ 63	Harmonic order	V／A	RMS	%	Percentage of the fundamental wave (1st)	°	Phase angle

Save data

File ID : 6310-06							
Saved time & date		ELAPSED TIME	Channel	RMS	Total THD	Inst at each order	
DATE	TIME	ELAPSED TIME	CH	TOTAL	THD	1_[V/A] ～ 63_[V/A]	1_[deg] ～ 63_[deg]
yyyy/mm/dd	h:mm:ss	h:mm:ss	Vi ／ Ai	(±)x.xxxxE ± nn			
year/month/ date	hour:min:sec	hour:min:sec	V ／ A	(±) value x $10^{\pm n}$			

Header of the saved data

1 _ [V/A]

① ②

①	1 ～ 63	:	Order
②	V/A	:	Voltage / Current
	deg	:	Phase angle

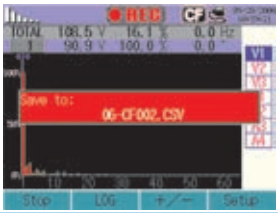
Saving Harmonic analysis results

1

Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start



≪Manual≫

File name for saving data is displayed.

Data saving starts.

≪Timer≫

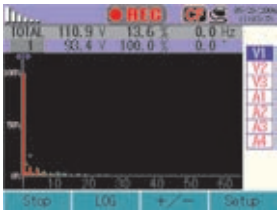
File name for saving data is displayed.

WAIT appears and flashes.
Status indicator LED flashes.

Stand-by until preset time comes.

2

Saving



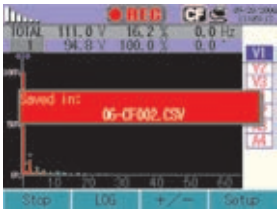
Preset start time comes.

Status indicator LED is ON.
REC flashes and CF or MEM is displayed.
(flashes in red according to the preset interval)

No setting change can be made during data saving.

3

Stop



Press **Stop**.

Preset termination time comes.

File name for saving data is displayed.
Status indicator LED goes off.
REC and CF or MEM goes off.

10. Power Quality QUALTY

Swell / Dip / Int measurement

Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting ← SET UP Range
↓
Wiring
↓
Swell / Dip / Int Measurement ← QUALTY Range

SET UP Range	
Measurement setting	Save Setting
Swell / Dip / Int Measurement	Recording method
Interval	Recording start
Reference voltage	Recording termination
Transient	Destination to save data
Swell	Destination to save screen shot
Dip	
Int	
Hysteresis	
Trigger point	

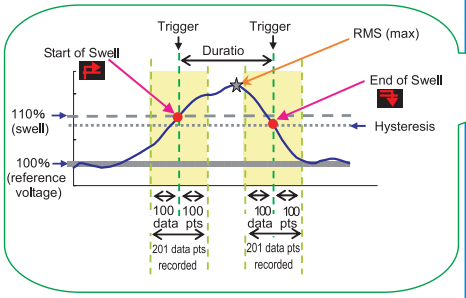
* Readings are displayed right after the recording of swell/ dip/ int measurement starts.

Timing of data recording

Measured data will be saved when an event occur or at the preset interval during measurement.

Recording at event occurrence

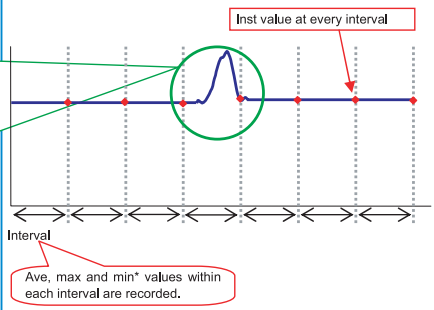
File ID : 6310-07



Setting Example		
	Swell	110%
	Hysteresis	1%
	Trigger point	Before: 100 After: 100

Recording at every interval

File ID : 6310-13



Setting Example		
	Interval	30min

Inst value : Avg of 100 data (@50Hz) obtained 1 sec before the preset interval comes (rms)
Avg value : Avg of rms values obtained in the preset inst interval
Max value : Max rms values obtained in the preset inst interval
Min value : Min rms values obtained in the preset inst interval

Save data

File ID : 6310-07								
Saved time & date		Item			Start / End		
DATE	TIME	ITEM*			I/O		
yyyy/mm/dd	h : mm : ss.ss	SWELL	DIP	INT	1	0	1/0
year/ month/ date	hour:min:sec	swell	dip	short-interruption	start	end	Start to end

Duration		Max / Min		Data
DURATION		MAX/MIN		201
-:-:-.-	h:mm:ss.ss	(±)x.xxxE±nn		
start	end	max(Swell)	min(Dip/Int)	(±) value x $10^{\pm 10}$

File ID : 6310-13						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h:mm:ss	h:mm:ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$			

Header of the saved data

50 ～ 1_1 ～ 150
①

e.g. Trigger point is set to Past: 50 / Next: 150.

①	201 data in total	:	Data No.

Saving Swell / Dip / Int

1

Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫

File name for saving data is displayed.

▼

Data saving starts.

≪Timer≫

File name for saving data is displayed.

▼

appears and flashes.

Status indicator LED flashes.

▼

Stand-by until preset time comes.

▼

2

Saving

Preset start time comes.

▼

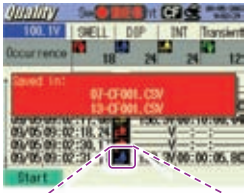
Status indicator LED is ON.

REC flashes and CF or MEM is displayed.

No setting change can be made during data saving.

3

Stop



Press **Stop**.

Preset termination time comes.

▼

File name for saving data is displayed.

Status indicator LED goes off.

REC and CF or MEM goes off.

	Start to End	Start	End	
Swell				(Red)
Dip				(Blue)
Int				(Yellow)
Transient				(Green)

Transient measurement

Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting ←
↓
Wiring
↓
Transient Measurement ← QUALTY Range

SET UP Range	
Measurement setting	Save Setting
Transient measurement	Recording method
Interval	Recording start
V Range	Recording termination
Threshold value	Destination to save data
Hysteresis	Destination to save screen shot
Trigger point	

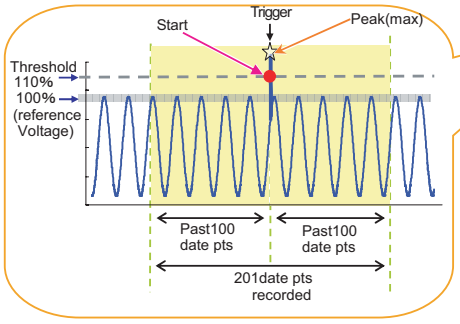
* Readings are displayed right after the recording of Transient measurement starts.

Timing of data recording

Measured data will be saved when an event occur or at the preset interval during measurement.

Recording at event occurrence

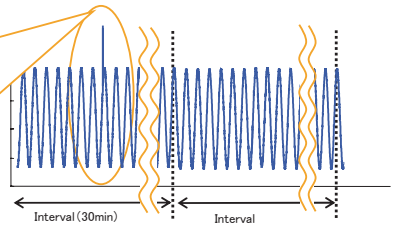
File ID : 6310-08



Setting Example		
	Threshold Value	110%
	Hysteresis	1%
	Trigger point	Before: 100 After: 100

Recording at every interval

File ID : 6310-14



Ave, max and min* values within each interval are recorded.

Setting Example		
	Interval	30min

Inst value : max value of 10,000 data obtained at 100us 1sec before the preset interval comes
Avg value : Avg of inst values obtained in the preset inst interval
Max value : Max inst values obtained in the preset inst interval
Min value : Min inst values obtained in the preset inst interval

Save data

File ID : 6310-08			
Saved time & date		Max	Data
DATE	TIME	MAX	201 data
yyyy/mm/dd	h : mm : ss.ss	(±)x.xxxE±nn	
year/month/ date	hour:min:sec	Max (Peak)	(±) value x $10^{\pm n}$

File ID : 6310-14						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h:mm:ss	h:mm:ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$			

Header of the saved data

50 ～ 1_1 ～ 150

①

e.g. Trigger point is set to Past: 50 / Next: 150.

①	201 data in total	:	Data No.

Saving Transient Measurement

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫ File name for saving data is displayed. ▼ Data saving starts.

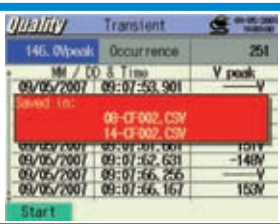
≪Timer≫ File name for saving data is displayed. ▼ WAIT appears and flashes. Status indicator LED flashes. ▼ Stand-by until preset time comes.

2 **Saving**

Preset start time comes. ▼ Status indicator LED is ON. REC flashes and CF or MEM is displayed.

No setting change can be made during data saving.

3 **Stop**



Press **Stop**. ▼ File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

Preset termination time comes. ▼ File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

Inrush Current Measurement

Steps for measurement

Ensuring your safety
↓
Preparation for measurement
↓
Setting ← SET UP Range
↓
Wiring
↓
Inrush Current Measurement ← QUALTY Range

SET UP Range	
Measurement setting	Save Setting
Inrush Current Measurement	Recording method
Interval	Recording start
Clamp sensor	Recording termination
A Range	Destination to save data
Reference current	Destination to save screen shot
Filter	
Threshold value	
Hysteresis	
Trigger point	

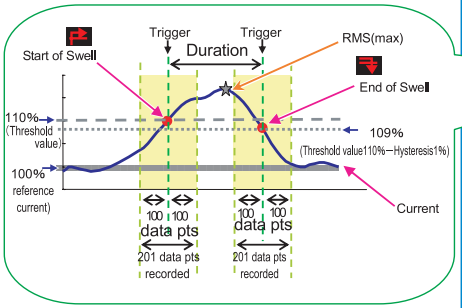
* Readings are displayed right after the inrush current measurement starts.

Timing of data recording

Measured data will be saved when an event occur or at the preset interval during measurement.

Recording at event occurrence

File ID : 6310-09

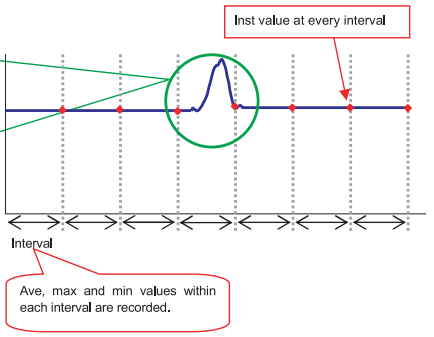


Setting Example

Reference current	100A
Threshold value	110%
Hysteresis	1%
Trigger point	Before: 100 After: 100

Recording at every interval

File ID : 6310-15



Setting Example

Interval	30min

Inst value : Avg of 100 data (@50Hz) obtained 1 sec before the preset interval comes (rms)
Avg value : Avg of rms values obtained in the preset inst interval
Max value : Max rms values obtained in the preset inst interval
Min value : Min rms values obtained in the preset inst interval

Save data

File ID : 6310-09								
Saved time & date		Start / End			Duration		Max / Min	Data
DATE	TIME	I/O			DURATION		MAX/MIN	201 data
yyyy/mm/dd	h:mm:ss.ss	1	0	1/0	- : - : -.-	h:mm:ss.ss	(±)x.xxxE±nn	
year/month/ date	hour:min:sec	Start	End	Start to End	Start	End	Max / Min	(±) value x $10^{±n}$

File ID : 6310-15						
Saved time & date		ELAPSED TIME	Instantaneous	Avarage	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h:mm:ss	h:mm:ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x 10±n			

Header of the saved data

50 ~ 1_1 ~ 150

① 201 data in total : Data No.

e.g. Trigger point is set to Past: 50 / Next: 150.

Saving Inrush Current Measurement

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

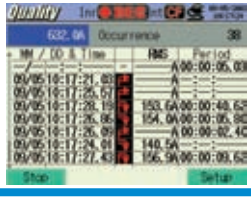
Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫ File name for saving data is displayed. ▼ Data saving starts.

≪Timer≫ File name for saving data is displayed. ▼ WAIT appears and flashes. Status indicator LED flashes. ▼ Stand-by until preset time comes.

2 Saving



Preset start time comes. ▼ Status indicator LED is ON. REC flashes and CF or MEM is displayed.

No setting change can be made during data saving.

3 Stop

Press **Stop**. Preset termination time comes. ▼ File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

Unbalance Ratio

Steps for measurement

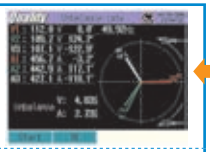
Ensuring your safety
↓
Preparation for measurement
↓
Setting ← SET UP Range
↓
Wiring
↓
Unbalance Ratio ← QUALTY Range

SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Unbalance Ratio	Recording method
V Range	Interval	Recording start
VT Ratio	Output threshold	Recording termination
Clamp		Destination to save data
A Range		Destination to save screen shot
CT Ratio		
Filter		
DC V		
Frequency		

* Measurements can be made with any of wiring configurations: ⑪, ⑫, ⑬.

Symbol displayed on the LCD												
V	Voltage	A	Current			P	Active Power	+ consumption	Q	Reactive Power	+ lagging
								– regenerating			– leading
S	Apparent Power	PF	Power Factor	+	lagging	PA	Phase angle		f	Frequency	
				–	leading						
An	Neutral current	DC1	Analogue input Voltage at 1ch			DC2	Analogue input Voltage at 2ch				

Switching displays / Viewing Vector W Range display



Vector Display

W Range Display

Select a system	LOAD 1	◀▮▮▶ Cursor Key
Select an item	Inst Avg Max Min	▲▼ Cursor Key

Press the F2 Key to switch the Vector and W Range displays.

Save data

File ID : 6310-10						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h : mm : ss	h : mm : ss	(±)x.xxxE±nn			
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{\pm n}$			

Header of the saved data

AVG_A1[A]_1

① ② ③ ④ ⑤

①	INST	:	Instantaneous value
	AVG	:	Average value
	MAX	:	Max value
	MIN	:	Min value
②	UV	:	Voltage unbalance ratio
	UA	:	Current unbalance ratio
	V	:	Voltage of each phase
	A	:	Current of each phase
	f	:	Frequency
	P	:	Active power
	Q	:	Reactive power
	S	:	Apparent power
	PF	:	Power factor
	PA	:	Phase angle
	DC	:	Analogue input voltage
③	CH number	:	*1 ～ 4
④	Unit		
⑤	System		

*Saved data with no number at this space contains the sum of the measured values.

Saving PFC calculation results

1

Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫

File name for saving data is displayed.

▼

Data saving starts.

≪Timer≫

File name for saving data is displayed.

▼

WAIT appears and flashes.
Status indicator LED flashes.

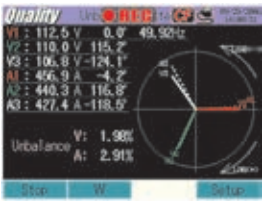
▼

Stand-by until preset time comes.

▼

2

Saving



Preset start time comes.

▼

Status indicator LED is ON.
REC flashes and CF or MEM is displayed.
(flashes in red according to the preset interval)

No setting change can be made during data saving.

3

Stop

Press **Stop**.

▼

File name for saving data is displayed.
Status indicator LED goes off.
REC and CF or MEM goes off.

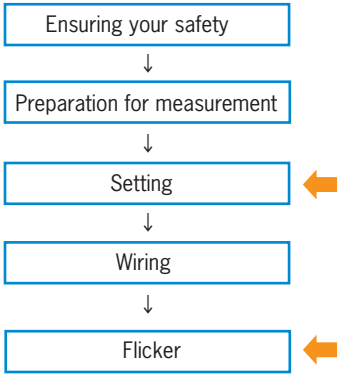
Preset termination time comes.

▼

Flicker

* An optional voltage sensor KEW8325F is required for Flicker measurement.

Steps for measurement



SET UP Range	
Measurement setting	Save Setting
Flicker	Recording method
V Range	Recording start
Filter	Recording termination
Output item	Destination to save data
Output Threshold	Destination to save screen shot

QUALTY Range

* Preliminary measurement (for 10 sec) will be done automatically prior to Flicker measurement.

Save data

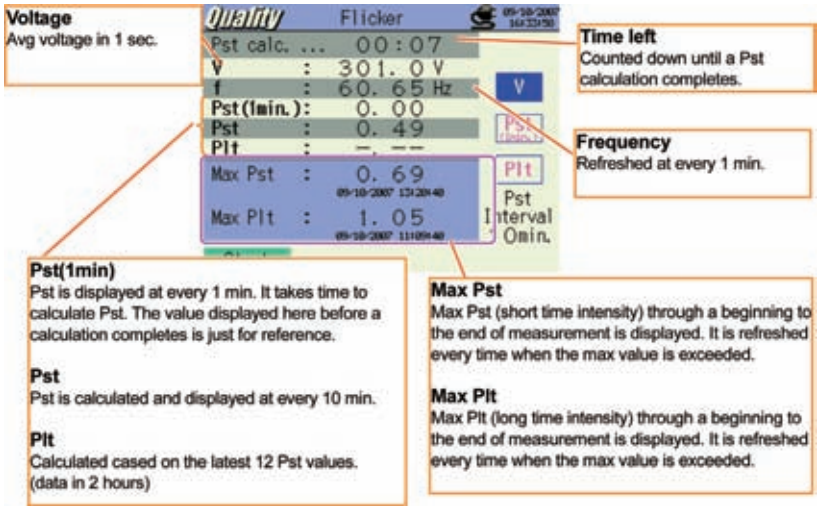
File ID : 6310-12									
Saved time & date		ELAPSED TIME	Frequency	Voltage			Short time intensity (for 1 min)	Short time intensity	Long time intensity
				Average	Max	Min			
DATE	TIME	ELAPSED TIME	f	AVG_V	MAX_V	MIN_V	Pst (1min)	Pst	Plt
yyyy/mm/dd	h:mm:ss	h:mm:ss	(±)x.xxxE±nn	(±)x.xxxxxE±nn			(±)x.xxxE±nn		
year/month/ date	hour:min:sec	hour:min:sec	(±) value x $10^{±n}$						

* Data is saved at every 1 min, but Pst is saved at every 10 min and Plt is at every 10 min in 2 hours later.

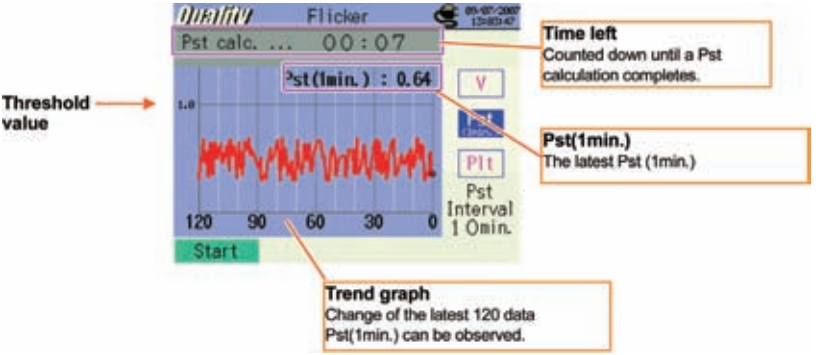
Saving Flicker data

The saving procedure is same to the one for the other measurements. See the previous corresponding pages.

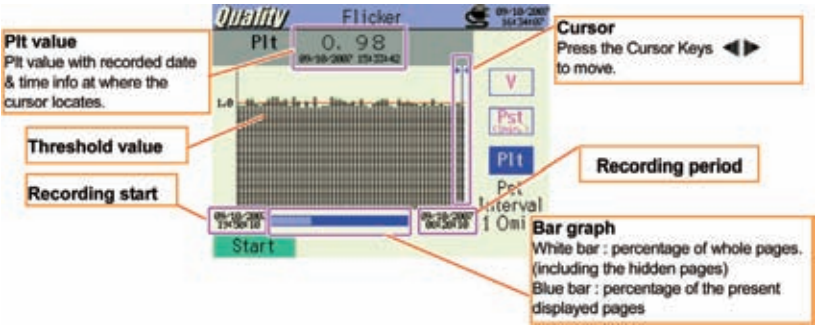
V



Pst (1min)



Plt



Capacitance Calculation - Sizing of capacitor banks for Power factor correction (PFC)

Steps for measurement

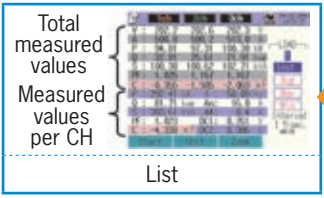
Ensuring your safety
↓
Preparation for measurement
↓
Setting ← SET UP Range
↓
Wiring
↓
Capacitance calculation ← QUALTY Range

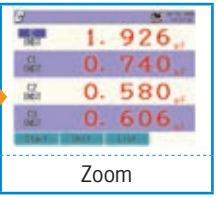
SET UP Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Capacitance	Recording method
V Range	Interval	Recording start
VT Ratio	Target power factor	Recording termination
Clamp sensor		Destination to save data
A Range		Destination to save screen shot
CT Ratio		
Filter		
DC V		
Frequency		

Symbol displayed on the LCD											
V	Voltage	A	Current			P	Active Power	+ consumption	Q	Reactive Power	+ lagging
								– regenerating			– leading
S	Apparent Power	PF	Power Factor	+	lagging	C	Capacitance		f	Frequency	
				–	leading						
An	Neutral current	DC1	Analogue input Voltage at 1ch			DC2	Analogue input Voltage at 2ch				

Switching displays / Zoom

Select a system	LOAD 1-2-3-4	◀▮▮▶ Cursor Key
Select an item	Inst Avg Max Min	▲▼ Cursor Key





* Press F3 Key to switch on the Zoom and List display. Refer to **"(Section 6) Instantaneous measurement"** for an explanation on customizing the Zoom display.

Save data

File ID : 6310-11						
Saved time & date		ELAPSED TIME	Instantaneous	Average	Max	Min
DATE	TIME	ELAPSED TIME	INST	AVG	MAX	MIN
yyyy/mm/dd	h : mm : ss	h : mm : ss	(±)x.xxxE±nn			
year/month/ date	hour:minute:second	hour:minute:second	(±) value x $10^{\pm n}$			

Header of the saved data

AVG_A1[A]_1

① ② ③ ④ ⑤

①	INST	:	Instantaneous value
	AVG	:	Average value
	MAX	:	Max value
	MIN	:	Min value
②	V	:	Voltage of each phase
	A	:	Current of each phase
	f	:	Frequency
	P	:	Active power
	Q	:	Reactive power
	S	:	Apparent power
	PF	:	Power factor
	C	:	Capacitance
	DC	:	Analogue input voltage
③	CH number		* 1 ~ 4
④	Unit		
⑤	System		

* Saved data with no number at this space contains the sum of the measured values.

Saving PFC calculation results

1 Press **Start** → **Next** → **Next** → **Complete** to start recording after checking the settings.

Press the **Start** Button at least 2 sec to start recording immediately.

Start

≪Manual≫ File name for saving data is displayed. ▼ Data saving starts.

≪Timer≫ File name for saving data is displayed. ▼ WAIT appears and flashes. Status indicator LED flashes. ▼ Stand-by until preset time comes.

2 Preset start time comes.

Saving

Status indicator LED is ON. REC flashes and CF or MEM is displayed. (flashes in red according to the preset interval)

No setting change can be made during data saving.

3 Press **Stop**. Preset termination time comes.

Stop

File name for saving data is displayed. Status indicator LED goes off. REC and CF or MEM goes off.

11. CF Card / Saved data

CF Card (operation check has completed)

Capacity	32MB	64MB	128MB	256MB	512MB	1GB
SanDisk Corp.*	SDCFB-32	SDCFB-64	SDCFB-128	SDCFB-256	SDCFB-512	SDCFG-1
Adtec co., Ltd.	AD-CFG32	AD-CFG64	AD-CFG128	AD-CFG256	-----	AD-CFX 4OT1G
BUFFALO INC.	-----	-----	RCF-X128MY	RCF-X256MY	-----	RCF-X1GY

* CF Card with more or less capacity other than listed above cannot be used with this instrument.
* Company name and model name are the trademark or the registered trademark.
A CF Card may not operate properly even if any of the following cards are used due to manufacture's specification change, etc. Please be aware above issue when purchasing commercially available CF Cards. We can offer following CF Cards (proper operation has been verified) as optional parts. Please feel free to inquire.

Max number of saved data / Possible recoding time

Destination to save data		CF Card						Internal Memory
Caiacity		32MB	64MB	128MB	256MB	512MB	1GB	1.8MB
Instantaneous value measurement	1sec	15H	1 D	2D	5D	10D	20D	7min
	1min	10D	20D	1M	2M	5M	10M	2H
	30min	10M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	2D
Integration value Measurement	1sec	6H	13H	1D	2D	4D	8D	3min
	1min	7D	15D	1M	2M	4M	8M	1H
	30min	7M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1D
DEMAND measurement	1sec	4H	8H	17H	1D	2D	5D	2min
	1min	6D	12D	24D	1M	3M	6M	1H
	30min	6M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1D
WAVE Range	10sec	1D	3D	7D	14D	28D	1M	20min
	1min	10D	21D	1M	2M	5M	11M	2H
	30min	10M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	2D
Harmonic anaysis	15sec	3D	7D	15D	1M	2M	4M	44min
	1min	15D	1M	2M	4M	8M	1Y	2H
	30min	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	3D
Swell / Dip / Int measurement*1	1sec	2D	5D	11D	22D	1M	2M	32min
	1min	5M	11M	1Y	Over 1Y	Over 1Y	Over 1Y	1D
	30min	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1M
Transient measurement*1	1sec	3D	6D	12D	24D	1M	3M	35min
	1min	6M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1D
	30min	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1M
Inrush Current measurement*1	1sec	2D	5D	11D	22D	1M	2M	32min
	1min	5M	11M	1Y	Over 1Y	Over 1Y	Over 1Y	1D
	30min	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1M
Unbalance Ratio	1sec	21H	1D	3D	7D	14D	27D	10min
	1min	14D	29D	1M	3M	7M	1Y	2H
	30min	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	3D
Flicker*1	1min	7M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	1D
Capacitance	1sec	15H	1D	2D	5D	10D	19D	7min
	1min	10D	20D	1M	2M	5M	10M	1H
	30min	10M	1Y	Over 1Y	Over 1Y	Over 1Y	Over 1Y	2D
Max number of file	Measurement data file (CSV)	512						6
	Graphics file (BMP)							7
	Configuration file (KAS)							20

*In case that no file exist in the CF card or the Internal memory.
where : H= hour(s), D=day(s), M=month(s), Y=year(s)
Numbers and time listed above are the minimum ones.
*1 Assumed one event occur per minute and calculated.

Data transfer

Data in the CF card or internal memory can be transferred to a PC via USB connection or CF card reader.

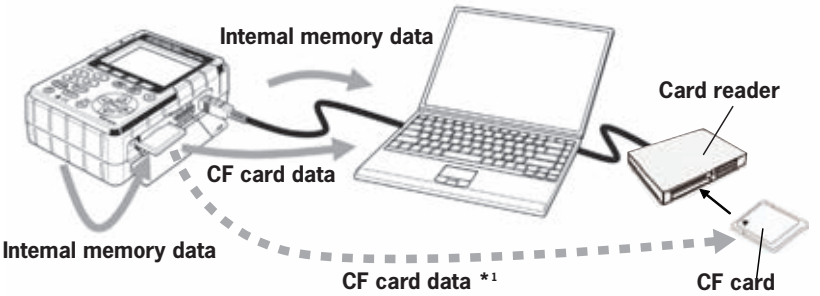
	Transfer to PC via:	
	USB	Card reader
CF card data (file)	△*1	○
Internal memory data (file)	○	——*2

*1 It is reccomended to transfer the data with big size by a use of CF card reader since trasfer of such data via USB takes time. (transfer time : approx 4MB/ hour)

*2 Data in the internal memory can be tranferred to a CF card.

*As to the manipulation of the CF card, please refer to the instruction manual attached to the card.

*In order to save the data without any problem, make sure to delete the file other than the data measured with this instrument in the CF card.



File format and name

Measurement data

File Name : 01 – CF 001 .CSV
① ② ③ ④

①	Measuring Items	01 : Data measured at W Range
		02 : Data measured at Wh Range
		03 : Data measured at DEMAND Range
		04 : Waveform data
		05 : Vector data
		06 : Harmonic data
		07 : Swell / Dip / Int data
		08 : Transient data
		09 : Inrush current data
		10 : Unbalance ratio
		11 : Capacitance
		12 : Flicker date
		13 : Voltage Interval data
		14 : Voltage Interval data
		15 : Current Interval data
②	Save in	CF : CF Card
		ME : Internal memory
③	File No	001 ~ 999
④	Format	CSV

Configuration file

File Name : ME ① 000123 ② .KAS ③

①	Save in	CF : CF card
		ME : Internal memory
②	File No	000000 ~ 999999
③	Extension	KAS

Bitmap file

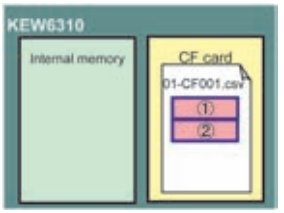
File Name : PS ① – CF ② 001 ③ .BMP ④

①	Save item	PS : Print screen
②	Save in	CF : CF card
		ME : Internal memory
③	File No	001 ~ 999
④	Extension	BMP

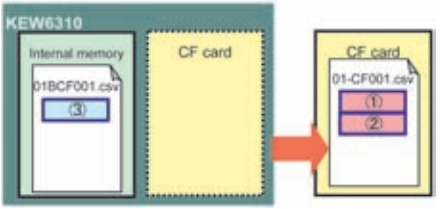
Backup Memory

In case one CF card is removed and inserted while saving data:

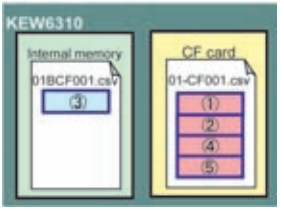
Saving



①. A file is created in the CF card, when CF card is selected as a destination for saving data, and measurement data is saved to the CF card.

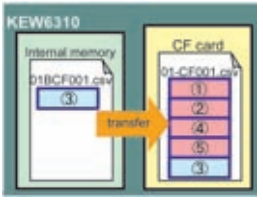


②. A backup file is created in the internal memory when a CF card is removed at saving data.
Further data is saved to the internal memory.



③. When inserting the CF card again during a data saving, further data will be saved to the last available space in CF card ①or ②.

Saving completes	Download completes
Backup files in the internal memory are automatically transferred to the last available space in a CF card. (Time-series is as follows.)	Use of supplied software [KEW PQA MASTER] enables to sort files in time-series.



12. Wiring check

Proper wirings can be checked at (WAVE) WAVE Range.

1. Ordinal screen	2. Checking wiring	3. Check completes
		
Press the F2 Key.	Wiring check starts.   [Checking status] & [Proper vector] are displayed.	Wiring check completes. In case of NG, Error message appears. (Press the ENTER Key when OK is displayed.) 

* Check results may by affected if great power factors exist at the measurement sites.

Criteria of Judgment and cause

Check	Criteria of Judgment	Cause
Frequency	Frequency of V1 is between 42 and 68Hz.	• Voltage clip is firmly connected to the DUT? • Measuring too high harmonic components?
Voltage input	Voltage input is 10% or more of (Voltage Range x VT).	• Voltage clip is firmly connected to the DUT? • Voltage test leads are firmly connected to the Voltage input terminals on the instrument?
Voltage balance	Voltage input is within ±30° of reference voltage (V1) * (not judged by single-phase wiring)	• Setting against the wiring under test are matched? • Voltage clip is firmly connected to the DUT? • Voltage test leads are firmly connected to the Voltage input terminals on the instrument?
Voltage phase	Phase of voltage input is within ±10° of reference value (proper vector).	• Voltage test leads are properly connected? (Connected to proper channels?)
Current input	Current input is 5% or more of (Current Range x CT).	• Clamp sensors are firmly connected to the Power input terminals on the instrument? • Setting for Current Range is appropriate for input levels?
Current phase	Current input is within ±60° of reference value (proper vector).	• Arrow mark on a Clamp sensor and the orientation of flowing current is matched? (Power supply to Load) • Clamp sensors are connected properly?

DISTRIBUTOR

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