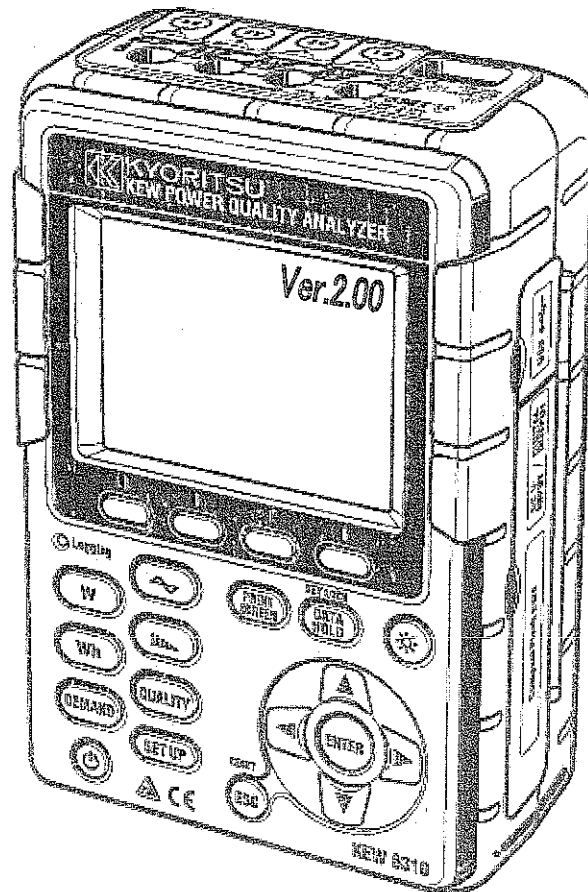


Quick manual



POWER QUALITY ANALYZER

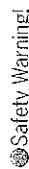
KEW 6310



**KYORITSU ELECTRICAL
INSTRUMENTS WORKS, LTD.**



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.**



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.

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The latest software can be downloaded from our web site.

<http://www.kew-ktc.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 a USB lead or a CF Card reader.

Safety certification

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

Unit 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)

Electric measurement

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.

On-site 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.

V	111.9	109.4	107.3	V
A	456.2	446.5	426.4	A
P	51.04	48.75	23.05	W
Q	0.00	0.00	39.53	Var
S	51.04	48.75	45.76	kVA
PF	1.000	1.000	0.500	
PA	0.0	-180.0	120.2	deg
P	20.76	1.1	39.92	W
Q	39.53	Var	Am	1325.8
S	146.56	kVA	AP	4154.2
PF	0.143		DCI	3.981
FA	98.2	deg	AVG	3.701

See (Section 5) W Range for further details.

Integration value measurement

Measures active/ apparent/ reactive powers on each CH.

Elapsed Time	00000:01.49
Active	WP+ : 0.95023 kWh
	WP- : -0.74935 kWh
Apparent	WS+ : 2.34122 kVAh
	WS- : -2.05886 kVAh
Reactive	WQ+ : 0.52024 kVarh
	WQ- : 0.00000 kVarh

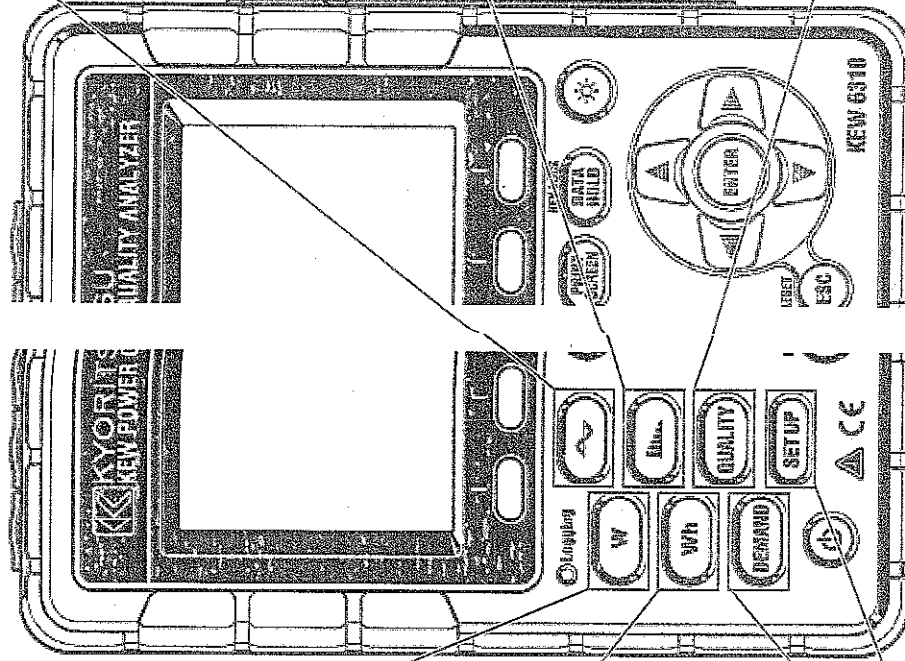
See (Section 6) Wh Range for further details.

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.

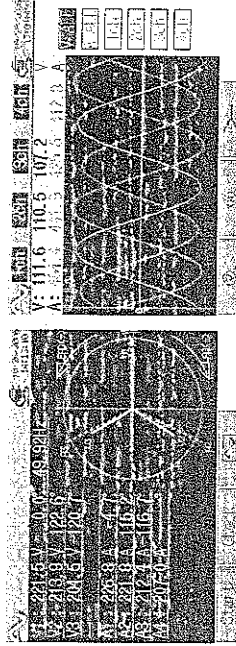
Time left	00:00:13
EDI Target	300.0kW
EDI Range	52.0kW
EDI Present	6.9kW
EDI Max	77.0kW
Interval	15sec

See (Section 7) DEMAND Range for further details.



Measurement at WAVE Range

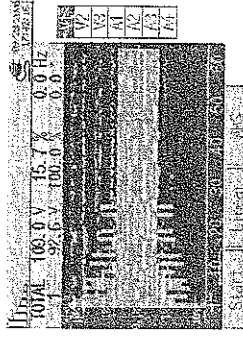
Displays vector / waveform of voltages and currents per CH



See (Section 8) WAVE Range for further details.

Harmonic measurement

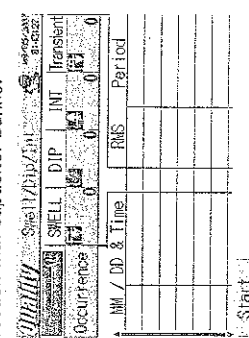
Measures / analyzes harmonic components of current & voltages



See (Section 9) Harmonic Analysis for further details.

Power quality analysis

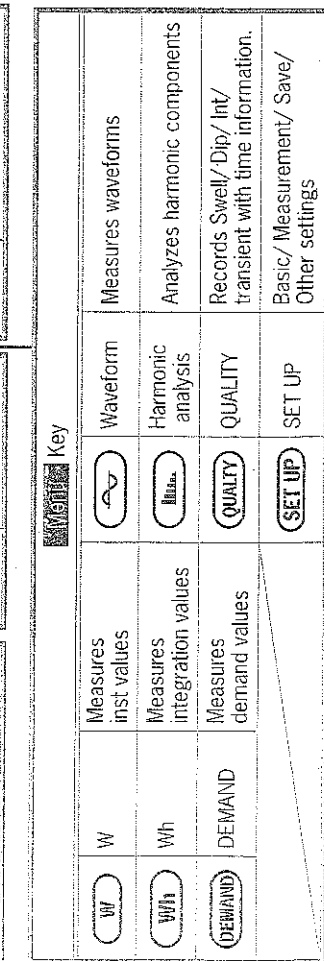
Measures swell, dip, int, transient, inrush current, unbalance ratio and flicker, and also simulates power factor correction with capacitor banks.



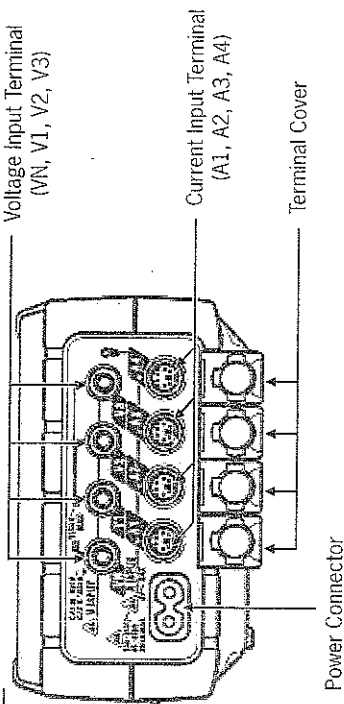
* Flicker measurement function is only available with ver.2.00 or later.

See (Section 10) Power Quality for further details.

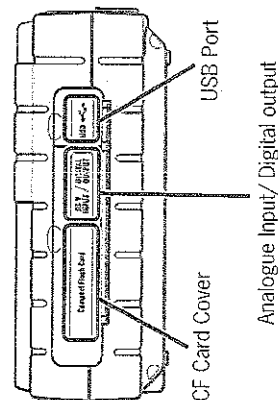
Front view



Voltage Input Terminal
(VN, V1, V2, V3)



<When the Connector Cover is closed>



<When the Connector Cover is opened>

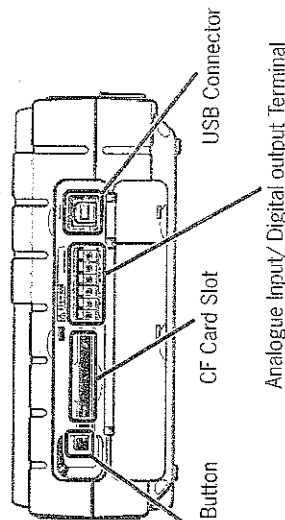
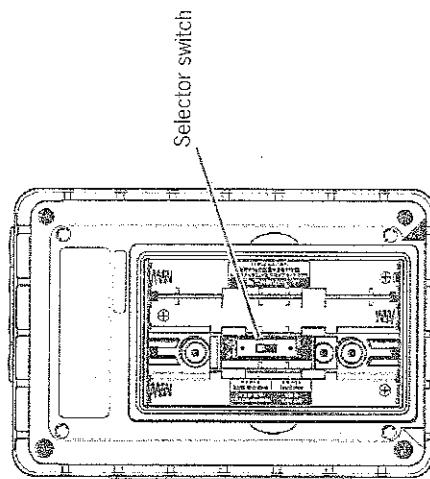


Diagram illustrating the back of the device, showing the Battery Cover and the Selector switch cover.



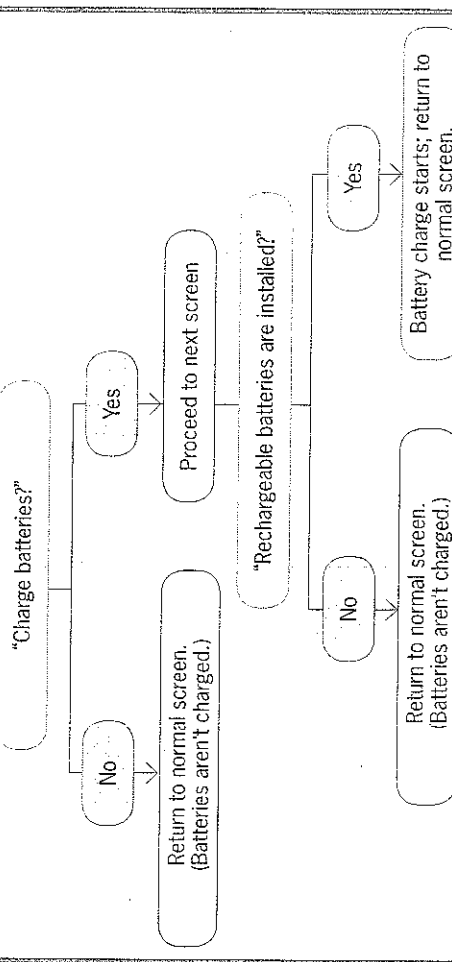
* Selector switch is under the Selector switch cover.

Charging the rechargeable Ni-MH batteries

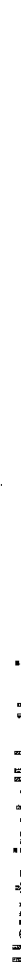
Following message to prompt battery charge appears on the LCD automatically when battery level is 40% or less at starting the instrument. Press the **ENTER** Key and **ENTER** Key according to the instructions displayed on the LCD.

- 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

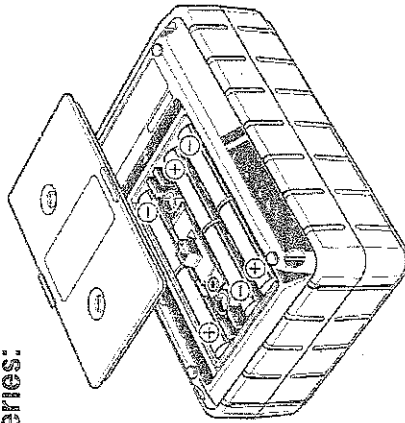
* Refer to “(4.2.4.) Other Setting” in the full instruction manual to initiate a battery charge anytime it is necessary.



Battery Mark on the LCD / Battery Level



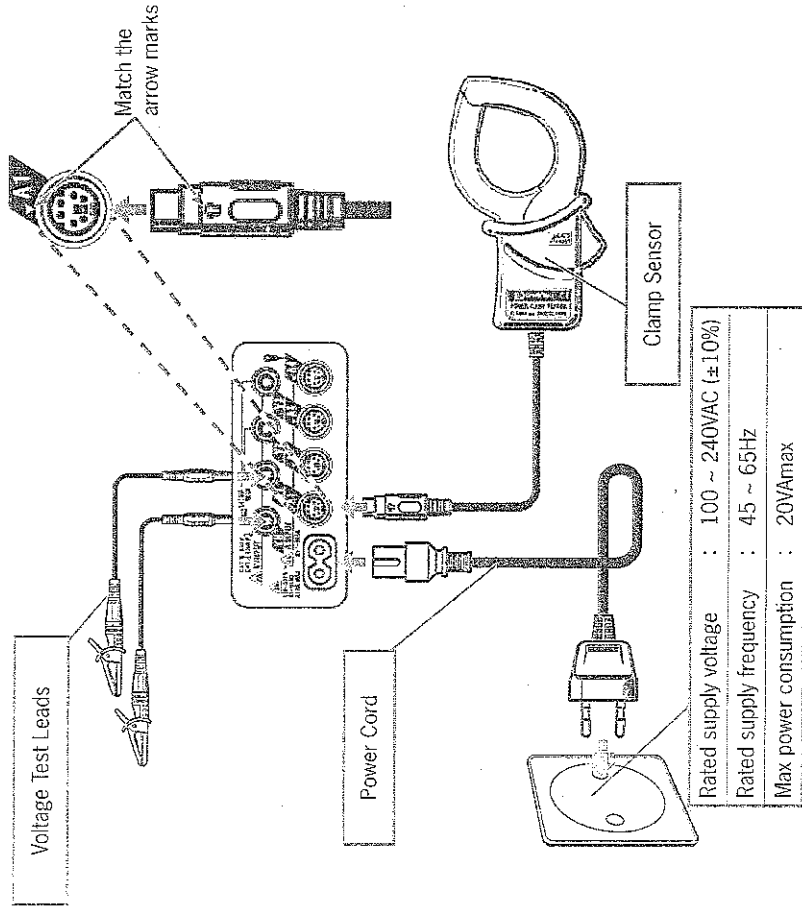
Install batteries in correct polarity as marked inside.



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)

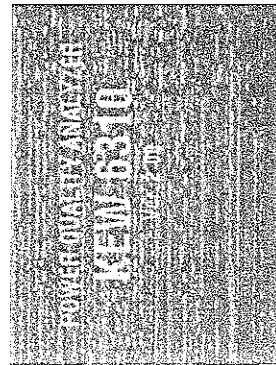
Battery power is consumed even if the instrument is being off. Remove all the batteries if the instrument is to be stored and will not be in use for a long period.

Cord Connection



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.



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SELF-TESTING ROUTINE

OK!

4. Setting

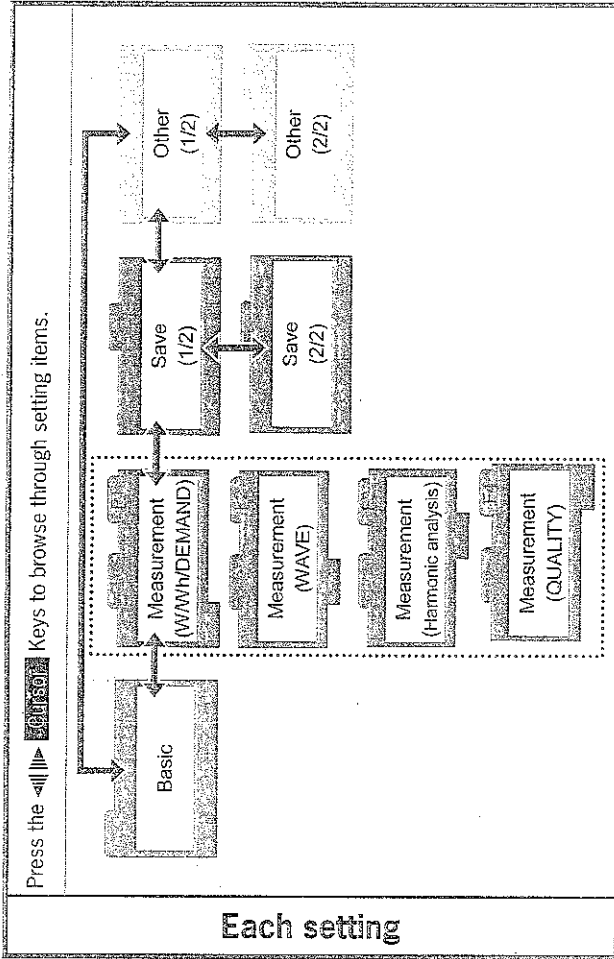
The "SET UP" consists of following 4 settings.

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



Select any desirable items with Keys and confirm it with Key. Using the Key cancels the setting change. Following is an example to select the wiring to be tested at basic setting.

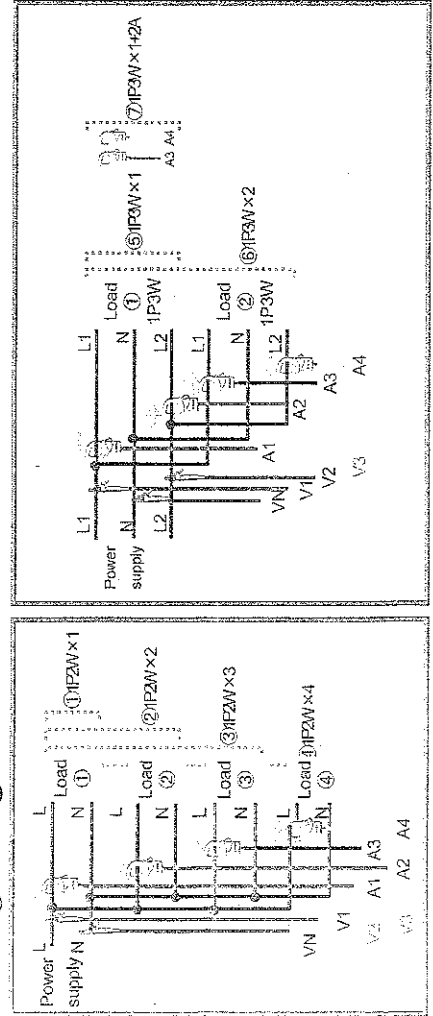
1. Select a setting item — Wiring

Basic Setting

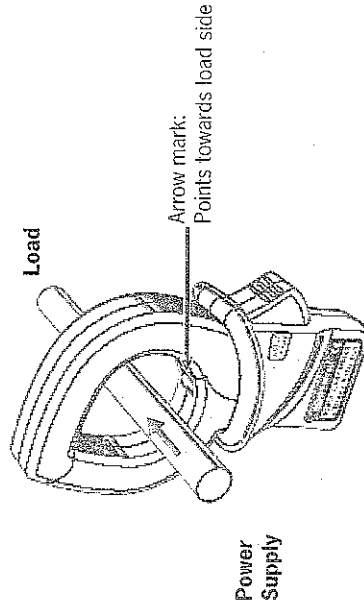
Setting item	Details of Setting
Wiring	① 1P2W×1 ④ 1P2W×4 ⑦ 1P3W×1+2A ⑩ 3P3W×1+2A ⑬ 3P4W×1+1A ⑯ 4A ② 1P2W×2 ⑤ 1P3W×1 ⑧ 3P3W×1 ⑪ 3P3W3A ⑭ 3P4W×1+1A ⑰ 4A
Voltage Range	150V/300V/600V/1000V
VT Ratio	0.01~9999.99 (1.00)
Clamp / Current Range	8128: 1/5/10/20/50A/AUTO 8127: 10/20/50/100A/AUTO 8126: 20/50/100/200A/AUTO 8125: 50/100/200/500A/AUTO 8124: 100/200/500/1000A/AUTO 8129: 300/1000/3000A 8141: 100/500mA/1A/AUTO 8142: 100/500mA/1/5/10A/AUTO 8143: 500mA/1/5/10A/AUTO 8146: 500mA/1/5/10A/AUTO 8147: 500mA/1/5/10A/AUTO 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 ⑯.

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 Details	ON / OFF
Demand inspection cycle	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	ON / OFF
THD (total harmonic distortion) calculation	THD-F (fundamental wave basis) / THD-R (total RMS basis)	THD-F (fundamental wave basis) / THD-R (total RMS basis)
	Allowable range	Default value / Customization
Harmonic Analysis*	MAX HOLD	ON / OFF
	Save item V	ON / OFF
	A	ON / OFF
Swell/ Dip/ Int measurement	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 50~310 90~630 170~1270 340~2000 (selectable range) Vpeak(210) Vpeak 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) Voltage range 150V 300V 600V 1000V Threshold value (selectable range) 50~310 90~630 170~1270 Vpeak Vpeak (1415) Hysteresis 1~10% against Voltage Range (5%) Trigger point Past:0~200, Next:200~0 (100 each) 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) Output threshold 1~20% (3%) V Range 150V 300V 600V Filter coefficient 230V lamp 120V lamp Output item Pst (1min) / Pst/Pit Output Threshold 0.8~20.0 (1.0) 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

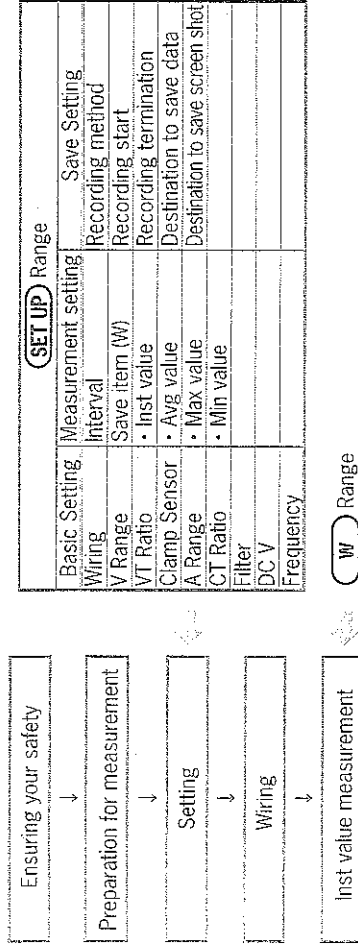
Setting Item	Details of Setting
Recording method	Manual / Timer
Recording starts	Year / Month / Date Hour : Minute : Second
Recording ends	10000/ 00 / 00 00 : 00 : 00
Destination to save data	CF Card / Internal Memory
Destination to save screenshot	(CF Card, if it has been inserted)
Formatting CF Card	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 / Français / Español
Date format	YYYY/MM/DD / MM/DD/YYYY / DD/MM/YYYY
Time and date*	yyy/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



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

Switching Screens / Zoom

Select a system	LOAD 2-3-4 Avg Max Min	Key Key	 Measured values per CH Total measured values
Select an item	 Key	List Zoom	 Measured values per CH Total measured values
Check setting details	Key	Key	 Measured values per CH Total measured values

* Press 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

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									
year/month/ date		hour:min:sec		hour:min:sec									

Fig. D-36-001

e.g. 1.234E+02=1.234x10²=123.4

Header of the saved data

AVG_A1[A]_1

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
2	Press Start → Next → Next → Complete to start recording after checking the settings. Press the Start Button at least 2 sec to start recording immediately.	 Saving
3	Press Start → Next → Next → Complete to start recording after checking the settings. Press the Start Button at least 2 sec to start recording immediately.	 Stop

6. Integration value measurement

Steps for measurement

Ensuring your safety

Preparation for measurement

Setting

Wiring

Integration value measurement

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

SETUP 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

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

Select a channel

1ch 2ch 3ch

Key

Key

Display for Wh Range

Display for W Range

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

Save data

Saved time & date		Active Power energy (consumption / regenerating)		Apparent Power energy (consumption / regenerating)		Reactive Power energy (consumption / regenerating)	
DATE	TIME	ELAPSED TIME	ELAPSED TIME	INTEG_WP	INTEG_WS	INTEG_WQ	INTEG_WQ
yyyy/mm/dd	h : mm : ss	h : mm : ss	h : mm : ss	(±)X.XXXXXE±nn		(±)X.XXXXXE±nn	
year/month/date	hour:min:sec	hour:min:sec	hour:min:sec	(±) value x 10 ⁿⁿ		(±) value x 10 ⁿⁿ	

* Reactive power (consumption : + / regenerating : -) will be recorded with phase information: lagging (l) 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	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	Start	Press [Start] → [Next] → [Complete] to start recording after checking the settings.
2	Saving	Press the [Start] Button at least 2 sec to start recording immediately.
3	Stop	Press [Stop] to stop recording.

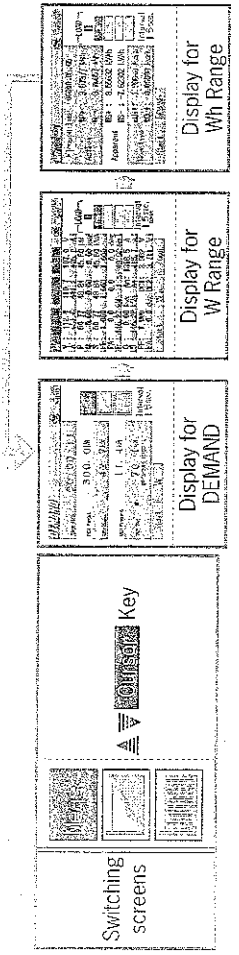
7. Demand measurement

Steps for measurement

- Ensuring your safety
- Preparation for measurement
- Setting
- Wiring
- Demand measurement

* 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

Saved time & date	ELAPSED TIME	Active power energy (consumption/ regenerating)	Apparent power energy (consumption/ regenerating)	Reactive power energy (consumption/ regenerating)	DEMAND	TARGET
	TIME	Integration	Variation in interval	Integration	DEMAND	TARGET
DATE	h:mm:ss	INTVL_WP	INTVL_WS	INTVL_WQ	INTVL_WP	INTVL_WS
year/month/day	h:mm:ss	INTVL_WP	INTVL_WS	INTVL_WQ	INTVL_WP	INTVL_WS
year/month/day	h:mm:ss	INTVL_WP	INTVL_WS	INTVL_WQ	INTVL_WP	INTVL_WS

* 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)
	WQ+	Reactive power energy (consumption): lagging
	WQc+	Reactive power energy (consumption): leading
	WQ-	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** → **Complete** to start recording after checking the settings.

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

Start

File name for saving data is displayed.

Data saving starts.

Status indicator LED flashes.

Stand-by until preset time comes.

2 **Saving**

Preset start time comes.

Status indicator LED is ON.

Flashes and () or () 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.

() and () or () goes off.

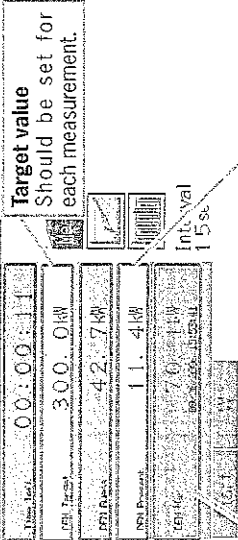
Measurement Screen

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

Predicted value
Predicted demand value when preset demand interval elapses under present load.
 $(\text{Present value}) \times (\text{preset interval})$
(elapsed time)
* Integration and calculations are done as time elapses.

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.

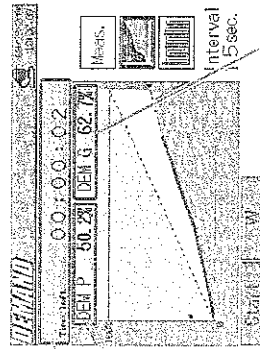
Present value
Demand value (average power) within a demand interval.
 $(\text{WP} \times) \times (\text{1 hour})$
(interval)
* Integration and calculations are done as time elapses.



Shifts in specific period

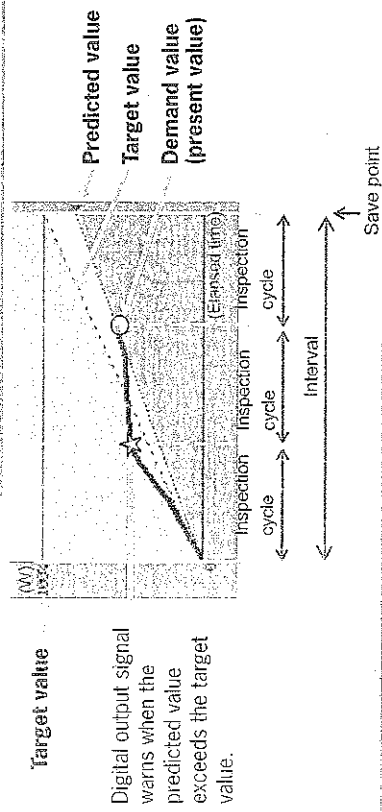
Remaining time (Time left)
Demand interval is counted down.

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



Prediction
Percentage of the predicted value against the target value.
 (predicted value)
(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.

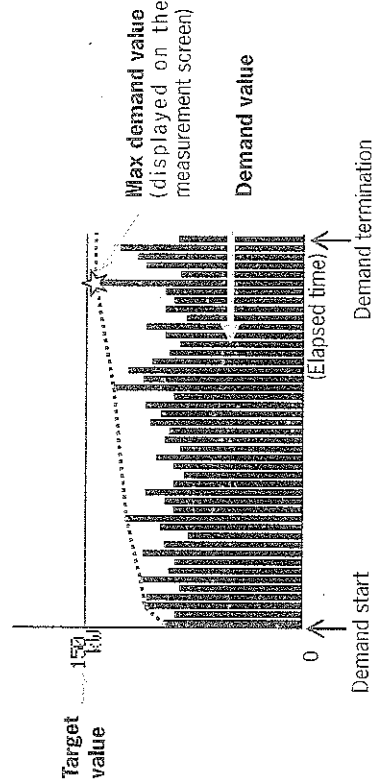
Target demand
White bar: Percentage of hidden area
Blue bar: Percentage of the present displayed area

Cursor
Use the **Cursor** key to move the cursors.

Meas.
Interval
15 sec.

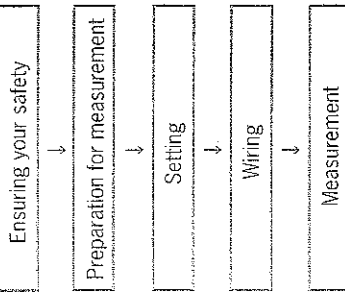
Recording start time

Most recent recorded time



8. WAVE Range

Steps for measurement



SETUP 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		

Measurement Range

Symbol displayed on the LCD		
V	Voltage	A Current

Switching displays : Vector / Waveform (switching CH)

Vector Display

Waveform Display

Switching CH

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

Save data

Saved time & date			Waveform data	
DATE	TIME	Channel	ELAPSED TIME	Instantaneous value
yyyy/mm/dd	h : mm : ss	CH	* Line 1/Line 2	1/128 ~ 129/256
year/month/date	hour:min:sec	Ai/Vi	h : mm : ss	(±)x.xxxE±nn
		A / V	hour:min:sec	(±) value x 10 ⁿⁿ

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

Saved time & date			Vector data		
DATE	TIME	Instantaneous	Average	Max	Min
yyyy/mm/dd	h : mm : ss	INST	AVG	MAX	MIN
year/month/date	hour:min:sec	(±)x.xxxE±nn	(±)x.xxxE±nn		
		(±) value x 10 ⁿⁿ			

Header of the saved data

File ID : 6310-04 (Waveform data)

5/133

① ②

File ID : 6310-05 (Vector data)

INST_A1deg1

① ② ③ ④

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

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

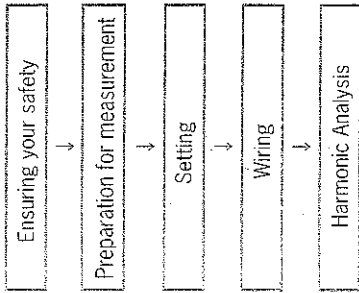
* when [deg] is displayed at space ④, it means phase angle

Saving at WAVE Range

1	Press Start → Next → Next → Complete Press the Start Button at least 2 sec to start recording immediately.		to start recording after checking the settings.
Start	File name for saving data is displayed Data saving starts.		<Manual> File name for saving data is displayed ↓ appears and flashes. Status indicator LED flashes. ↓ Standby until preset time comes. ↓ Preset start time comes.
2			Status indicator LED is ON. flashes and or is displayed. (flashes in red according to the preset interval) ↓ No setting change can be made during data saving.
Saving			Press Stop ↓ Preset termination time comes. ↓ File name for saving data is displayed. Status indicator LED goes off. and or goes off.
3			Stop

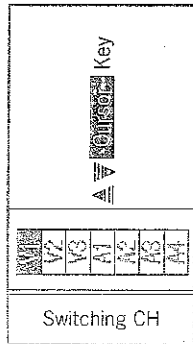
9. Harmonic Analysis

Steps for measurement

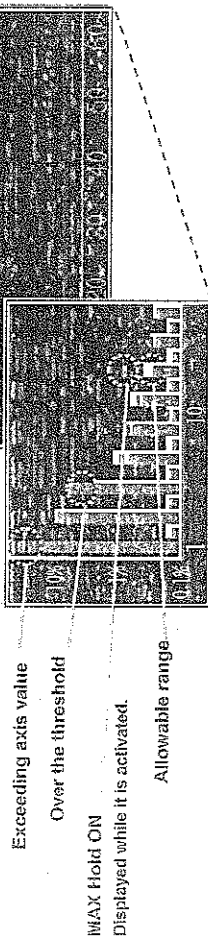


(SET UP) Range		
Basic Setting	Measurement setting	Save Setting
Wiring	Interval	Recording method
V Range	THD calculation	Recording start
VT Ratio	Allowable range	Recording termination
Clamp Sensor	MAX HOLD	Destination to save data
A Range	Save item	Destination to save screen shot
CT Ratio		
Filter		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

Switching displays



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 (1 st)	° Phase angle

Save data

File ID: 631006				
Saved time & date		Channel	RMS	Total THD
DATE	TIME	CH	TOTAL	THD
yyw/mm/dd	h:mm:ss	V _i / A _i		(±) x.xxxE ± n
year/month/ date	hour:min:sec	V / A		(±) value x 10 ⁻ⁿ

Header of the saved data

1 [V/A]

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

Saving Harmonic analysis results

1

Press [Start] → [Next] → [Complete]

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

Start

2

Press [Start] → [Next] → [Complete]

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

Saving

3

Press [Start] → [Next] → [Complete]

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

Stop

1

Press [Start] → [Next] → [Complete]

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

Start

2

Press [Start] → [Next] → [Complete]

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

Saving

3

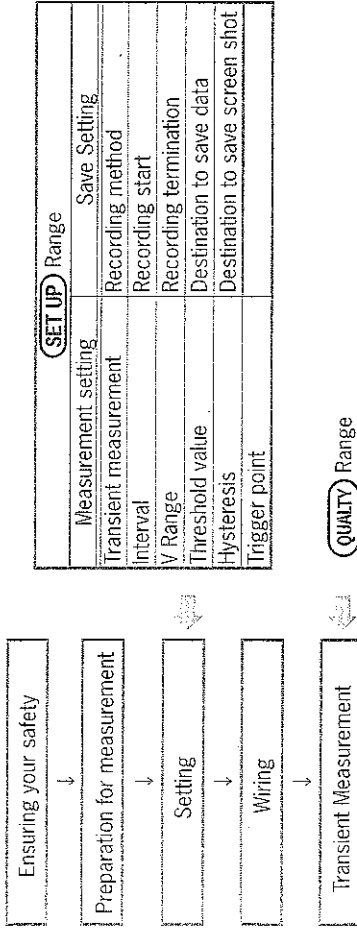
Press [Start] → [Next] → [Complete]

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

Stop

Transient measurement

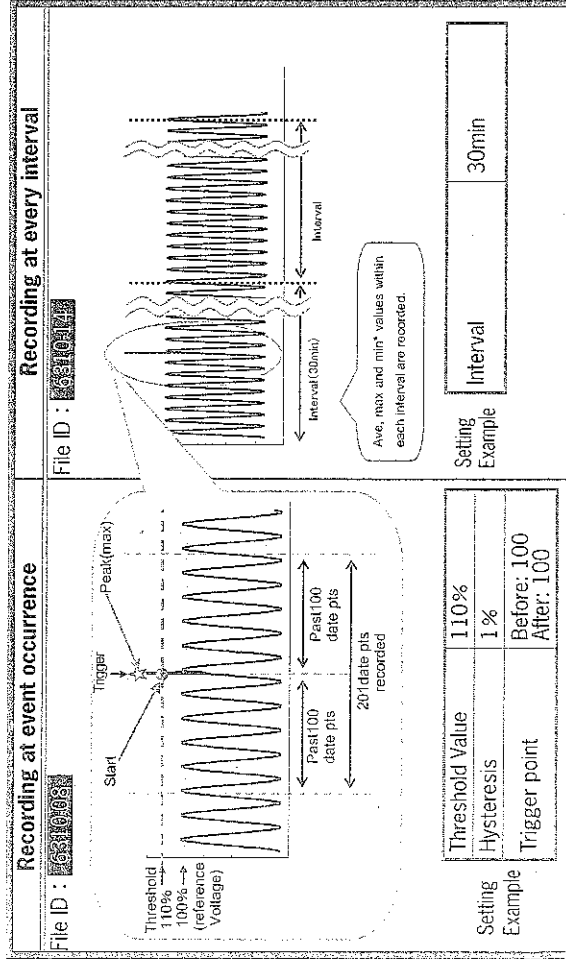
Steps for measurement



* 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.



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

Saved time & date		TIME	Max	Data
DATE	yyyy/mm/dd	h : mm : ss.ss	MAX	201 data
year/month/date	hour:min:sec		(±) value x 10 ⁿⁿ	
Max (Peak)				

Saved time & date		TIME	Instantaneous	Average	Max	Min
DATE	yyyy/mm/dd	h:mm:ss	INST	AVG	MAX	MIN
year/month/date	hour:min:sec		(±) value x 10 ⁿⁿ	(±) value x 10 ⁿⁿ		
ELAPSED TIME		h:mm:ss				
ELAPSED TIME		hour:min:sec				

Header of the saved data

50 ~ 1_1 ~ 150

①	201 data in total	:	Data No.
①	201	:	

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

Saving Transient Measurement

1	Start	2	Saving	3	Stop
Press [Start] → [Next] → [Complete]	Press the [Start] Button at least 2 sec to start recording immediately.	Press the [Start] Button at least 2 sec to start recording immediately.	Press the [Start] Button at least 2 sec to start recording immediately.	Press the [Start] Button at least 2 sec to start recording immediately.	Press the [Start] Button at least 2 sec to start recording immediately.
	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.
	Data saving starts.	Data saving starts.	Data saving starts.	Data saving starts.	Data saving starts.
	Status indicator LED is ON.	Status indicator LED is ON.	Status indicator LED is ON.	Status indicator LED is ON.	Status indicator LED is ON.
	Stand-by until preset time comes.	Stand-by until preset time comes.	Stand-by until preset time comes.	Stand-by until preset time comes.	Stand-by until preset time comes.
	Preset start time comes.	Preset start time comes.	Preset start time comes.	Preset start time comes.	Preset start time comes.
	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.	File name for saving data is displayed.
	Status indicator LED goes off.	Status indicator LED goes off.	Status indicator LED goes off.	Status indicator LED goes off.	Status indicator LED goes off.

Inrush Current Measurement

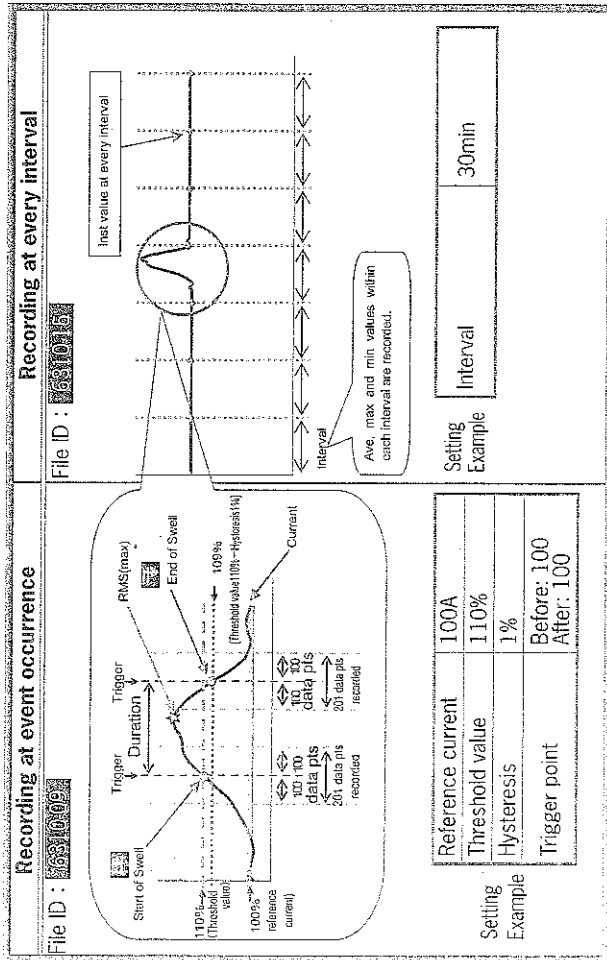
Steps for measurement

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

* 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.



Save data

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

Header of the saved data

50 ~ 1 1 ~ 150

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

Saving Inrush Current Measurement

1	Press Start → Next → Complete to start recording after checking the settings.
Start	Press the Start Button at least 2 sec to start recording immediately.
2	Press Start → Next → Complete to start recording after checking the settings.
Saving	Press the Start Button at least 2 sec to start recording immediately.
3	Press Start → Next → Complete to start recording after checking the settings.
Stop	Press the Start Button at least 2 sec to start recording immediately.

Unbalance Ratio

Steps for measurement

Ensuring your safety

Preparation for measurement

Setting

Wiring

* Measurements can be made with any of wiring configurations: ①, ②, ③.

Unbalance Ratio **QUALITY** 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		

Symbol displayed on the LCD									
V Voltage	A Current	P Active Power	+ consumption	- regenerating	Q Reactive Power	+ lagging	- leading		
S Apparent Power	PF Power Factor	+ lagging	- leading	PA Phase angle	f Frequency				
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 →

AVG

Max

Min

Cursor Key

Select an item

▲

▼

Cursor Key

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

Save data

Saved time & date				
DATE	TIME	ELAPSED TIME	Instantaneous	Average
yyyy/mm/dd	h : mm : ss	h : mm : ss	INST	AVG
year/month/date	hour:min:sec	hour:min:sec	(±) xxxE±nn	(±) value x 10 ⁿⁿ

Header of the saved data

AVG_A1[A]_1

① ② ③ ④ ⑤

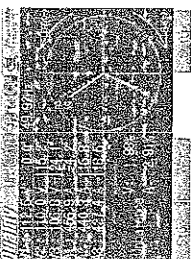
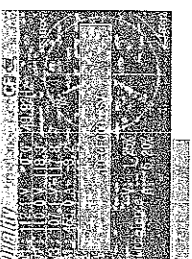
①	INST	: Instantaneous value
	AVG	: Average value
	MAX	: Max value
	MIN	: Min value
②	UV	: Voltage unbalance ratio
	UA	: Current unbalance ratio
	V	: Voltage of each phase
	A	: Current of each phase
	f	: Frequency
	P	: Active power
	Q	: Reactive power
	S	: Apparent power
	PF	: Power factor
	PA	: Phase 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

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

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

1	Start	 File name for saving data is displayed. Data saving starts. Status indicator LED flashes. Standby until preset time comes.
2	Saving	 Status indicator LED is ON. flashes and ON or OFF 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. and ON or OFF goes off.

[illegible][illegible]

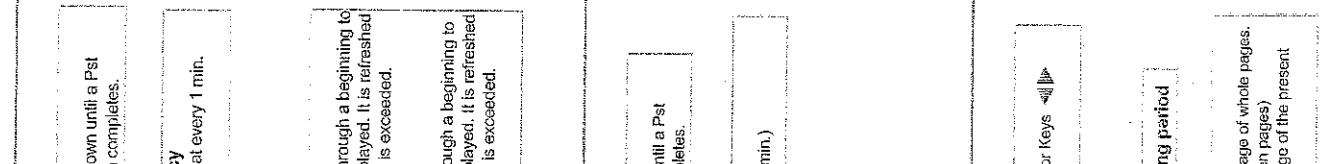
completes.

[illegible]

until a Post
lates.

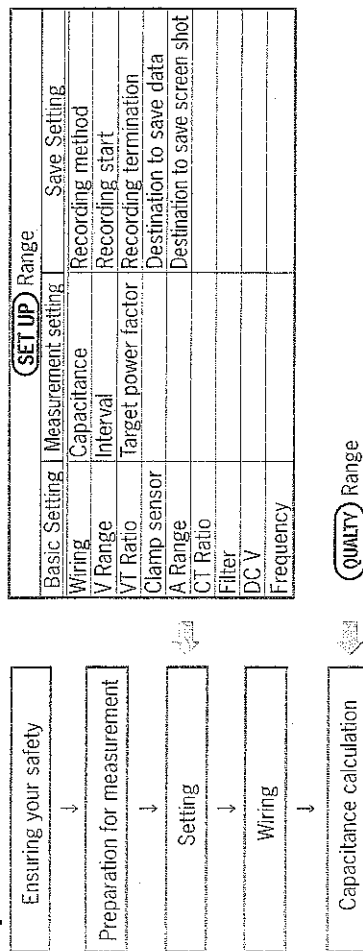
Journal of Management Inquiry 20(6) 798-814
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<http://www.sagepub.com/journalsPermissions.nav>

...or Keys 



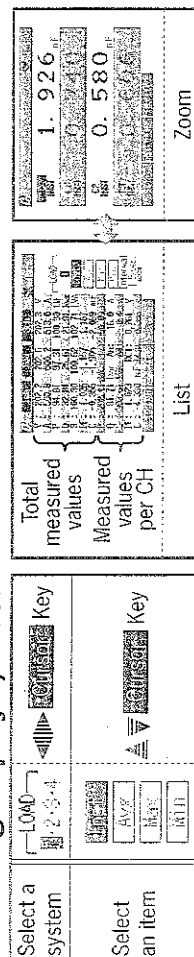
Capacitance Calculation - Sizing of capacitor banks for Power factor correction (PFC)

Steps for measurement



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

Switching displays / Zoom



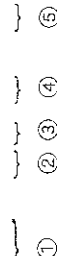
Press **F6** Key to switch on the Zoom and List display. Refer to "**(Section 6) Instantaneous measurement**" for an explanation on customizing the Zoom display.

Save data

Saved time & date		Execution statistics				
DATE	TIME	ELAPSED TIME	Instantaneous INST	Average AVG	Max MAX	Min MIN
yyyy/mm/dd	h : mm : ss	h : mm : ss		(±)x.xxxE±nn		
year/month/date	hour/minute/second	hour/minute/second		(±)x.xxxE±nn		
		hour/minute/second		(±)x.xxxE±nn		
				(±)x.xxxE±nn		

Header of the saved data

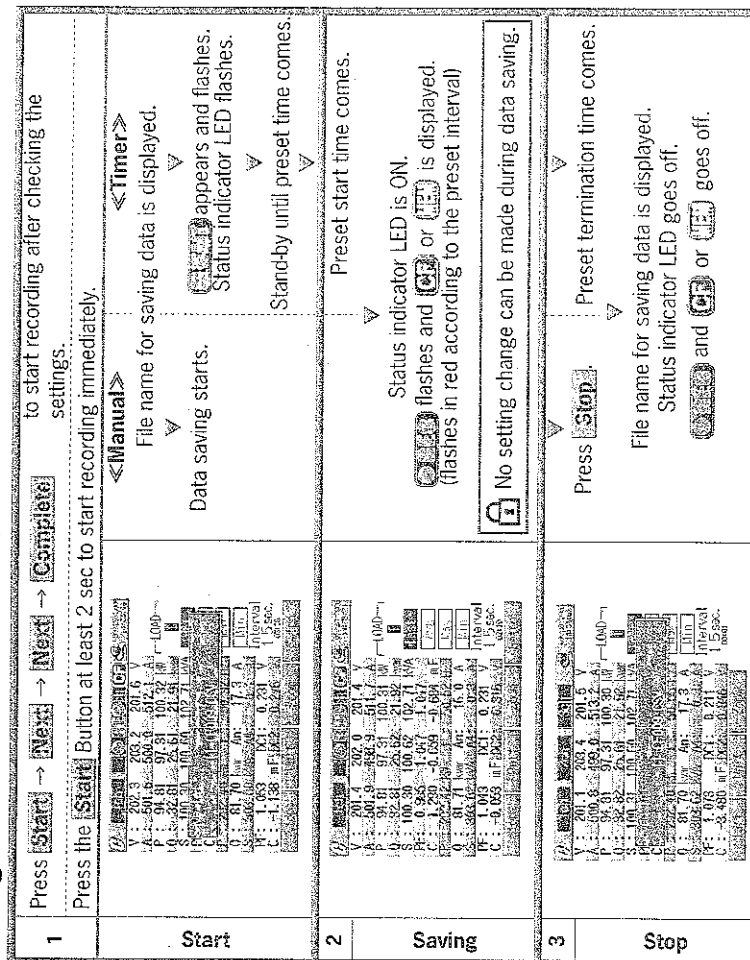
AVG Al[A] 1



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



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 40T1G
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 manufacturer'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 recording time

Destination to save data	CF Card										Internal Memory
	32MB	64MB	128MB	256MB	512MB	1GB	1GB	1GB	1GB	1GB	
Capacity	15H	1D	2D	5D	10D	20D	20D	20D	20D	20D	1.8MB
Instantaneous value measurement	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	7min
Integration value Measurement	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	2H
DEMAND measurement	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	3min
WAVE Range	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	1H
Harmonic analysis	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	2min
Swell / Dip / Int measurement*1	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	1H
Transient measurement*1	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	1D
Inrush Current measurement*1	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	20min
Unbalance Ratio	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	2H
Flicker*1	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	2H
Capacitance	1sec	1min	30min	1sec	1min	30min	1sec	1min	30min	1sec	2H
Max number of file	Measurement data file (CSV)	Graphics file (BMP)	Configuration file (KAS)	512							6
				512							7
				512							20

* In case that no file exist in the CF card or the internal memory, where: H= hours, D=days(s), M=month(s), Y=years(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.

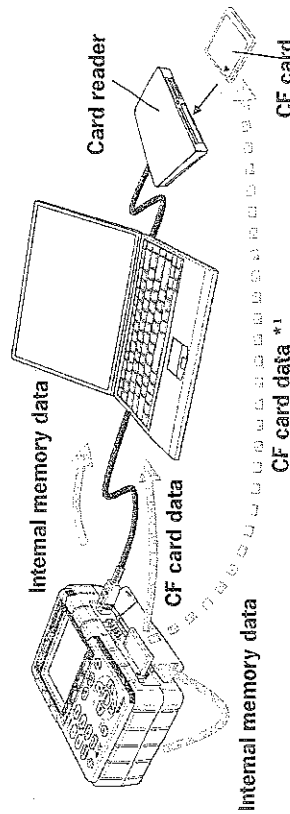
	Transfer to PC via:	
	USB	Card reader
CF card data (file)	△*1	○
Internal memory data (file)	○	—*2

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

*2 Data in the internal memory can be transferred 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

File Name : 01 - CF 001.CSV

① ② ③ ④

① Measuring items	② Save in	③ File No	④ Format
01 : Data measured at W Range	CF : CF Card	001 ~ 999	CSV
02 : Data measured at Wh Range	ME : Internal memory		
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			
CF : CF Card			
ME : Internal memory			
001 ~ 999			
CSV			

Configuration file

File Name : ME 000123 .KAS
① ② ③

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

Bitmap file

File Name : PS - CF 001 BMP
① ② ③ ④

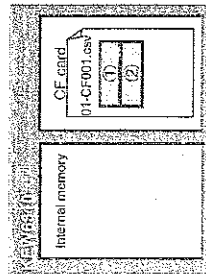
① Save item	PS : Print screen
② Save in	CF : CF card
③ File No	ME : Internal memory 001 ~ 999
④ Extension	BMP

Backup Memory

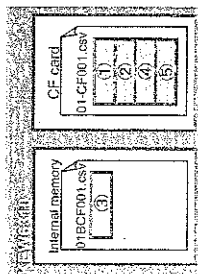
In case one CF card is removed and inserted while saving data:

Saving

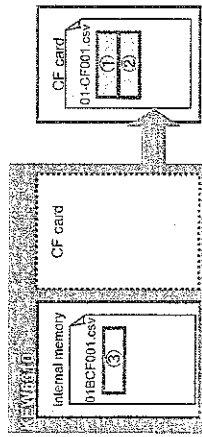
- ①. A file is created in the CF card, when CF card is selected as a destination for saving data, and measurement data is saved to the CF card.



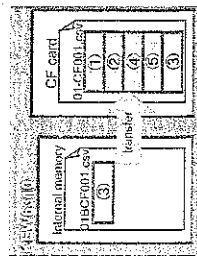
- ②. A backup file is created in the internal memory when a CF card is removed at saving data.
Further data is saved to the internal memory.



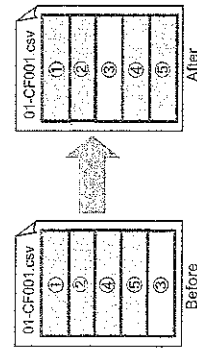
- ③. When inserting the CF card again during a data saving, further data will be saved to the last available space in CF card ① or ②.

**Saving completes**

Backup files in the internal memory are automatically transferred to the last available space in a CF card. (Time-series is as follows.)

**Download completes**

Use of supplied software (KEW PQA MASTER) enables to sort files in time-series.

**12. Wiring check**

Proper wirings can be checked at WAVE Range.

1. Ordinal screen	2. Checking wiring	3. Check completes
Press the Key.	Wiring check starts. 	Wiring check completes. In case of NG, Error message appears. (Press the Key when OK is displayed.)

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

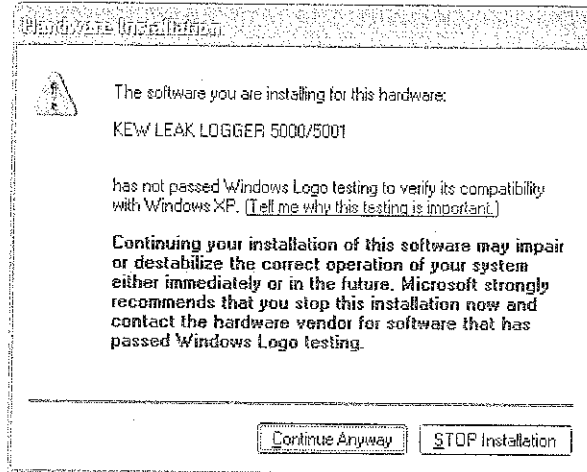
Criteria of Judgment and cause

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 $\pm 30^\circ$ 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 $\pm 10^\circ$ 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 $\pm 60^\circ$ 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?

Notice

Attention should be paid to the following points when installing the USB device driver.

The message below is displayed on a PC, which is operating on Windows® XP, at installing the USB device driver.



* Model name is displayed as "KEW XXXXXXXX".

The USB device driver for this instrument has been checked that it operates properly on Windows® XP. Continuing the installation of this software will not impair or destabilize the correct operation of a PC. Click **"Continue Anyway"** and continue the installing of the software when above caution is displayed.

Clicking the "STOP Installation" disables the communication between a PC and this instrument. Remove the USB driver for this instrument once to reinstall the USB driver. (For further details, refer to the backside of this notice.)

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Q	"Installing doesn't start although a PC and the instrument is connected with a USB cable." "The names of connected instrument aren't displayed although a PC and the instrument is connected with a USB cable."
A	The USB driver may not be installed normally. Please follow the procedure below and delete the existing USB driver. Then install it again.

1. Connect a PC and this instrument with a USB cable.
2. Clicking "Device Manager" on the PC.
 - ◆ **For Windows XP** Click [Start] at the lower left on the screen --> [Control Panel] --> [System]. Then click the [Hardware] Tab and [Device Manager].
In case "System" is not displayed on the screen, click the "Switch to Classic View".
 - ◆ **For Windows 98/Me/2000** Click [Start] --> [Settings] --> [Control Panel] --> [System]. Then click [Hardware] tab; or click [Device Manager] on property window.
3. Select "KEW XXXXXX" (Name of this instrument) at "Universal Serial Bus controllers" or "Other devices" and right click on it.
4. Click "Uninstall" and delete the USB driver.
5. Disconnect the USB cable connected with a PC and this instrument. Then reconnect the USB cable to this instrument.
6. A screen for "Found New Hardware Wizard" is displayed a few minuets later.
Then put the CD into the CD-ROM drive. Specify the location for the driver according to the following procedure.
 - ◆ **For Windows XP** Select [Install from a list or specific location (Advanced)] and click [Next >]. [Search for the best driver in these locations.] and [Search removable media (floppy, CD-ROM...)].
 - ◆ **For Windows Me** Select [Specify the location of the driver (Advance)] and click [Next >]. Then click [Search for the best driver for your device.(Recommended)] and [Removable media (floppy, CD-ROM...)].
 - ◆ **For Windows 98** Select [Search for the best driver for your device (Recommended)] and click [Next >] Put a check mark for [CD-ROM drive].
 - ◆ **For Windows 2000** Select [Search for a suitable driver for my device (Recommended)] and click [Next >]. Put a check mark for [CD-ROM drive].

Clicking the [Next >] starts installing.
7. Installing completes when the wizard is finished. Click "Finish".