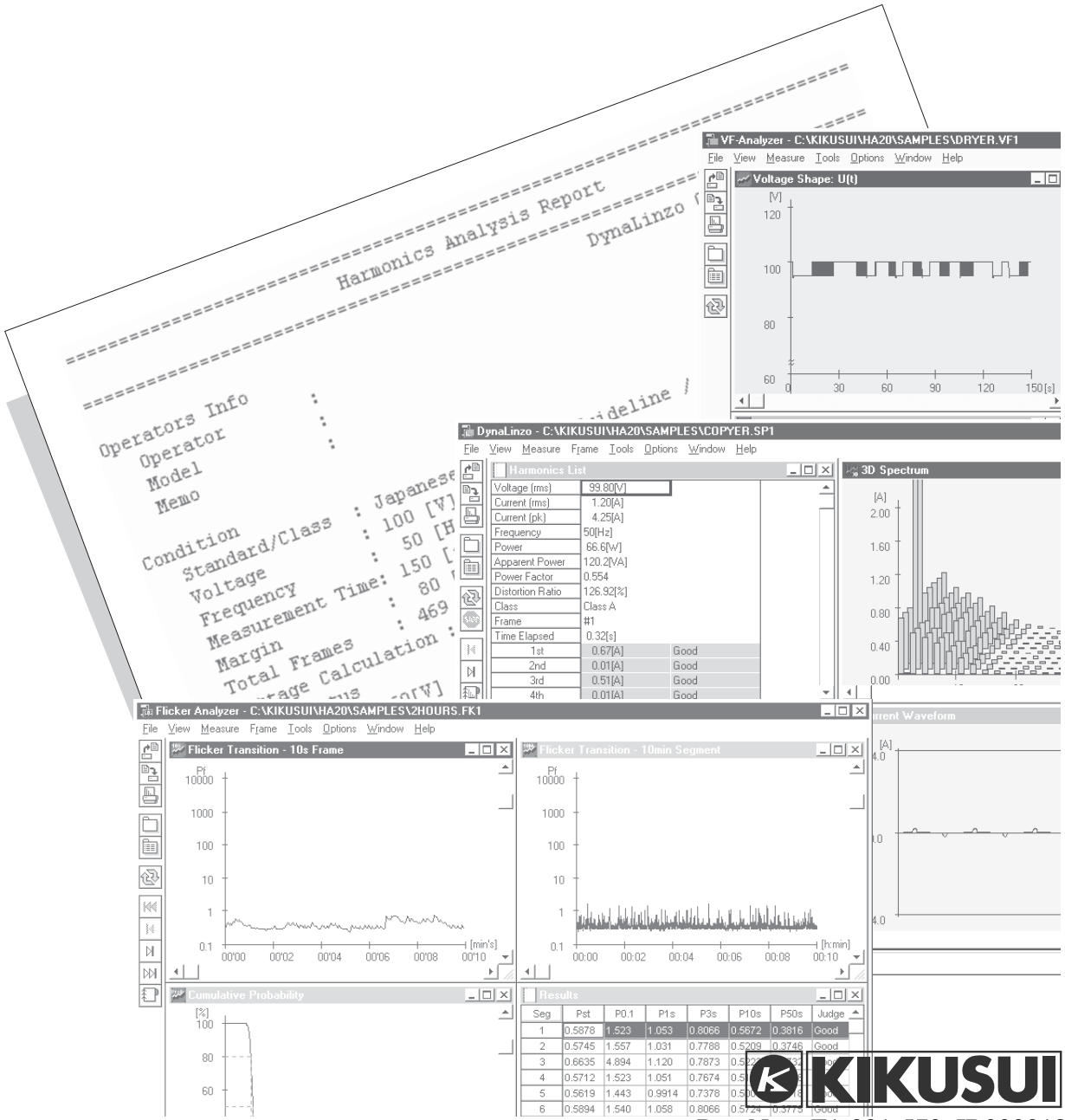
Electronic Test
Instruments &
Power Supplies

Low Frequency Emissions Analysis System

SD03-HA01F Ver. 3.1

User's Manual



KIKUSUI

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Getting Started

Overview

This system is a PC-hosted application software that enables to measure and to analyse harmonics current, voltage fluctuation, and flicker complying with the IEC Standard and associated Japanese Harmonics Guidelines, with combination of a PCR-L Power Supply and an HA01F-PCR-L Harmonics Analyzer unit. The software includes three programs, DynaLinzo, VF-Analyzer, and Flicker Analyzer.

For Windows Beginners:

Every program in the system runs under Windows environment (Windows3.1/95/98/Me).
Basic operation such as windows, menus, and buttons are exactly the same as other Windows applications. If you are not familiar with Windows, please consult documentation for Microsoft Windows.

About Application:

The package includes both Japanese and English application versions, however you can install only one language version at a time. Mind that some program displays will be in different language than you expected if you install both languages at a time. This book describes operational instructions assuming you are using English version.

Setup

To use this system, all of the programs must be installed to your hard drive. The setup should be done with a Setup program (SETUP.EXE) included in the program disk. Now we explain how to set up.

To set up this system, follow the subsequent procedures:

How To Setup

1. Start Windows
2. Insert the program CD-ROM into the drive.
3. Launch Windows Explorer and then execute the SETUP program on the CD-ROM (SETUP.EXE). If you are using Windows3.1, use File Manager instead of Explorer.
4. After a while, the SETUP screen will appear.

Install To specifies a directory name into which the application is installed. Although the default path is C:\KIKUSUI\HA30, you can change it if you want to install to other directory or drive.

GPIB Board specifies a type of GPIB adapter card you use. What you can select on the current version is National Instruments NI-488.2 only.

Language specifies the application language. You can choose either English or Japanese. You need Japanese Windows if you choose Japanese.

Checking **Install Sample Data** check box allows you to install sample data files for each application program. Make sure to check free space of your hard drive since these files requires additional 11 megabytes of disk space.

Clicking the **Continue** button makes setup start.

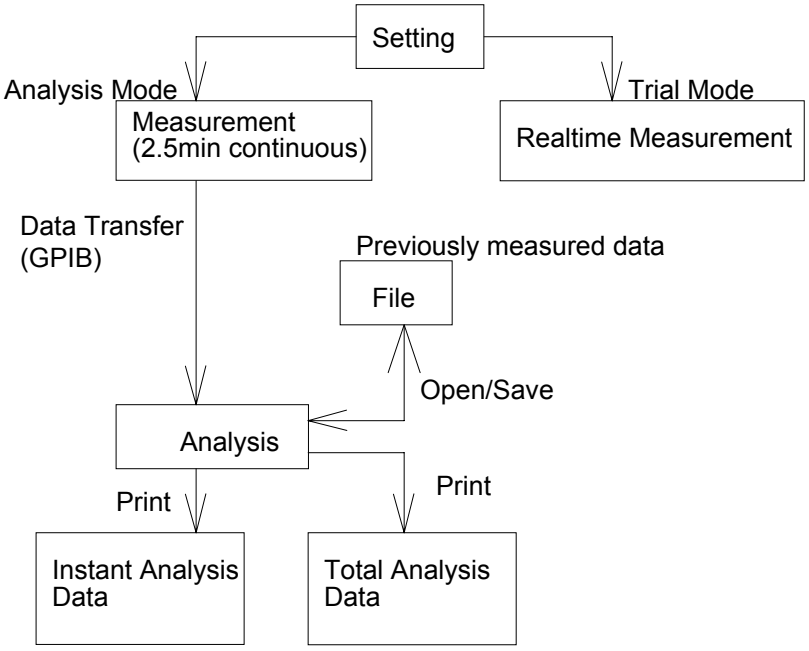
Chapter 1 DynaLinzo

Overview

DynaLinzo is a program that measures and analyses instruments that generate fluctuating harmonic current. In DynaLinzo, there are Analysis Mode and Trial Mode and you can choose either.

As default, the operation is **Analysis Mode** that measures for 2.5 minutes. It analyses and shows measurement data. Data printings are also supported for both instant harmonics data and statistical harmonics data.

In **Trial Mode** the software measures in real time and displays measurement data on a graph. However, there's no functionality to print graphs and reports.



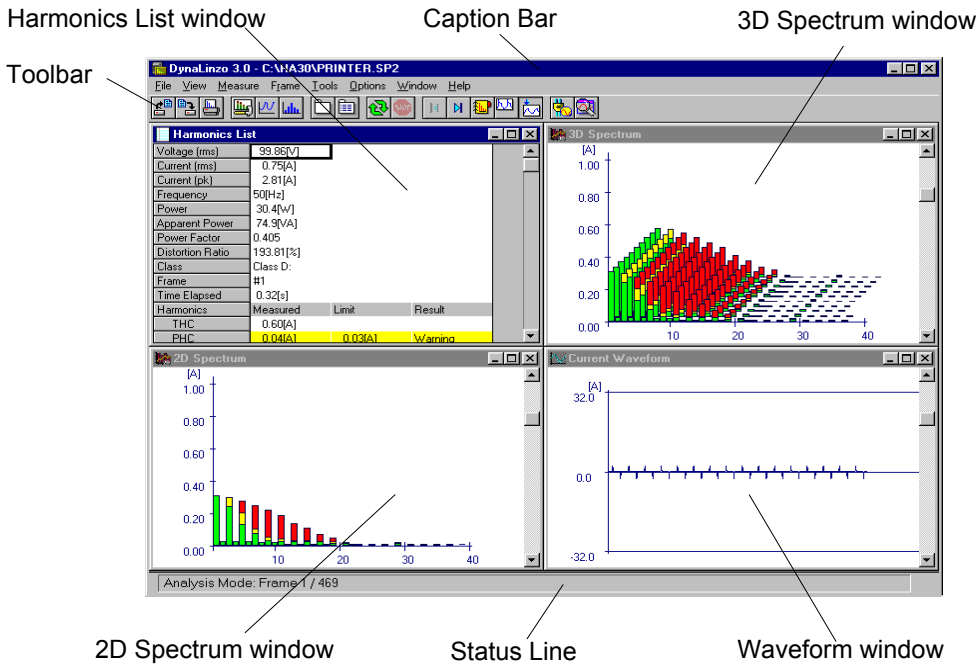
What Is Fluctuating Harmonics Analysis

The fluctuating harmonics analysis is to measure input current of an electric appliance and to analyse it cracking into harmonics components with the method of Fast Fourier Transformation. Measurement for this purpose has often been performed, however, using DynaLinzo software simplifies how to measure and analyse variance of harmonics current during 2.5 minutes. The 2.5 minute measurement is based on the IEC standard or corresponding Japanese guideline about harmonics current emission. For more information about the standard or guideline of harmonics emission, refer to harmonics news published by Kikusui or documentation from the IEC standard.

DynaLinzo allows your devices to be targeted at Europe or Japan for measurement and analysis. Depending upon which region your device is targeted at, applicable standard and guideline are slightly different. Targeted at Europe uses "**IEC 61000-3-2**" and, Japan uses "**Japanese Harmonics Guideline**" or called
“家電・汎用品高調波抑制対策ガイドライン ”

Run DynaLinzo

To run the DynaLinzo, double-click DynaLinzo icon from the Program Manager. The initial screen of DynaLinzo appears and then **Startup** dialogue box will appear. Here you can either begin a new measurement or open an existing data file. Or, you can return to the default screen of DynaLinzo closing the dialogue with the Cancel button. Described below are the default contents of the DynaLinzo initial screen.



Harmonics List Window

This window represents momentary harmonics components as numeric format. Not only harmonics components, situation data such as voltage and current are also displayed.

2D Spectrum Window

This window represents momentary harmonics data as a column chart. The X axis indicates the order of harmonics (1st to 40th) and Y axis indicates each level or intensity of harmonics (in unit [%] in class C or [A] in other classes.)

3D Spectrum Window

This window displays a 3D column chart adding Z axis. You can view harmonics transition three-dimensionally.

Current Waveform Window

This window represents current waveform as if a digital oscilloscope. The X and Y axes indicate time and peak current values respectively. In addition, there is a functionality that classifies your products into class A or class D zooming the waveform. We will discuss this topic later.

Caption Bar

Title of the window. Actually, a file path name associated with measurement data is shown. If no file name is assigned, the title will be “Untitled.”

Toolbar

Menu commands that are frequently used are arranged. See the on-line help for more detail about each button.

Status Line

The operation mode and current frame position are shown on it. For more information about frame, see “Chapter 3 DynaLinzo -- Analysis.”

Now you can measure and analyse fluctuating harmonics current. Every window illustrated in the above picture is fundamental and shown as default when startup time of DynaLinzo.

Chapter 2 DynaLinzo - Measurement

Test Condition Settings

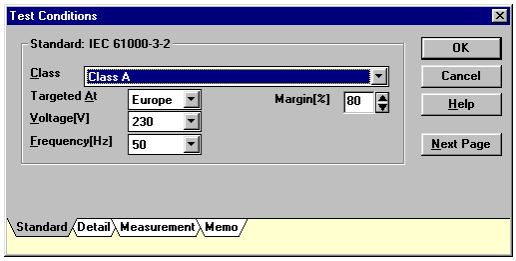
What you should do first for measurement is set each item about how to measure and how to judge. After setting each item, you can begin the test. The test condition setting can be done on the **Test Condition** dialogue box. Some items in setting can be changed even after the measurement has been done.

Select **Measure | Test Conditions** menu and then the **Test Conditions** dialogue will appear. This dialogue box can also be shown clicking **New Measurement** button from within the **Startup** dialogue.

Items in the test conditions are roughly divided into three parts as described in subsequent sections.

- Standard
- Detail
- Measurement
- Memo

Standard Settings



As fundamental settings for standard, basically you select judgement condition complying the IEC standard or the Japanese guideline. These settings can be changed even after the measurement.

Class

You have to choose one from the following four classes:

- Class A:
- Class B: Portable Tools
- Class C: Lighting Equipment
- Class D: PC, PC monitor, TV set (P<=600W)

Targeted At

You have to specify one of following regions. The applied standard or guideline will change depending on which region is selected. Note that the standard or guideline defers depending on the setting of target region.

- Europe Compliant with IEC 61000-3-2
- Japan Compliant with Japanese Harmonics Guideline

Voltage

As a nominal voltage of device to be tested, choose one from the following:

- 100V
- 200V
- 230V

Frequency

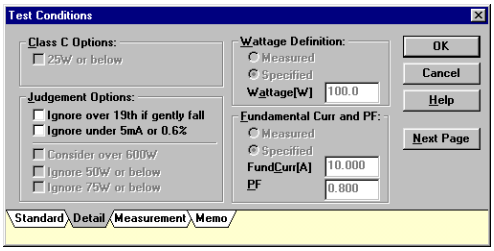
As a nominal frequency of device to be tested, choose one from the following.

- 50Hz
- 60Hz

Judgement Margin

Sets margin against to judgement. Although the margin setting itself does not affect the final judgement (GOOD/WARNING/BAD), a margin line will be displayed on every **Harmonics Transition** graph. Harmonics components that exceed the margin line are also reported in the final analysis reports.

Detail Settings



Sets items that are optional for a specific class. Depending on the class you have selected in above section, items corresponding the class will be automatically selectable. In addition, these settings can be changed even after measurement.

25W or below (Europe) / 35W or below (Japan)

This option can be chosen in Class C only.

This option is labelled as 25W or below if choosing Europe (IEC standard), or 35W or below if choosing Japan (Guideline). Checking this option declares that your EUT (equipment under test) is an instrument which is 25W or below (otherwise 35W or below). If checking 35W or below, you can also choose the "Self-ballasted lamp" option.

If you checked 25W or below (Europe mode), or if you checked both 35W or blow and Self-ballasted lamp (Japan mode), a judgement that is different with conventional Class C judgement will be applied. That is, a kind of expanded Class C, which has different limit values for 3rd/5th and requires peak phase evaluation for each of current waveform at 60/65/90/240/245/270[deg] phase points.

If you chose Japan/35 or below but did not chose the Self-ballasted lamp option, then instruments that are 35W or below are just excluded.

Notes
If you selected "Class C / Ignore 25W or Below" with IEC std (target: Europe), or if you selected "Class C / Ignore 35W or below / Self-ballasted Lamp" with Japan Guideline (target: Japan), you also need to perform a Class-D-equivalent evaluation even if your equipment under test belongs to Class C. Since this software cannot do the evaluation for Class C and Class D at the same time, you have to switch Class C and Class D as need. You can switch between these classes after the measurement has been done.

When you do the evaluation for your Class C equipment with a temporary Class D operation, we recommend you to put information onto the Operators Info as necessary so that printed reports can be identified easily.

If you choose the 25W or below (35W or below) option, you also need define the wattage value.

Ignore over 19th if gently fall

This option is applied to every class.

If the slope line of harmonics spectrum over the 19th gently falls down, judgement only needs to be done up to the 19th order ignoring the 20th and higher harmonics. However, no harmonic orders (such as even orders in class D) that are not subject to regulations will be considered.

Ignore under 5mA or 0.6%

This option is applied to every class.

If harmonics component of an order is less than 5mA or less than 0.6% of input current value, harmonics judgement can ignore the order.

Consider Over 600W

This option is applied to Japan / Class A only.

This option allows to change how to calculate allowance limit values when the power consumption exceeds 600W. This option is applied to air-conditioners and computers.

If you choose this option, you also need define the wattage value.

Ignore 50W/75W or below

This option is applied to class D only.

This option allows to ignore judgement when the power consumption is 50W or below, or 75W or below.

If you choose this option, you also need define the wattage value.

Wattage Definition

This option is enabled only if you chose one of 600W/75W/50W/35W/25W options, which are all concerning to wattage values for judgement.

When you set one of wattage-concerning conditions, you have to note how to manipulate the power consumption value of the EUT. They are considerably different between Europe mode (IEC) and Japan mode (Guideline).

Europe (IEC)	
Measured	Calculates the max value over the entire test period, and defines it as the WATTAGE.
Specified	If a measured wattage value per frame (DFT Window) is within +/-10% range of the SPECIFIED value, the measured value is used as the WATTAGE. Otherwise (when out of the range), the max value over the entire test period is used as the WATTAGE.

Japan (Guideline)	
Measured	A measured wattage value per frame (DFT Window) is used as the WATTAGE.
Specified	The specified wattage value is used as the WATTAGE for all the frames.

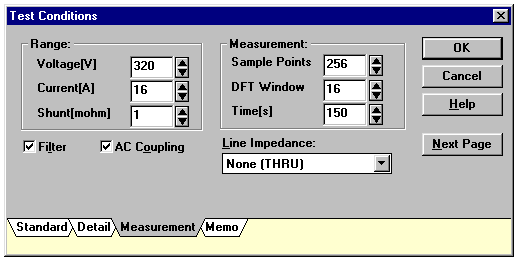
Fundamental Current & Power Factor Definitions

This option is enabled only if Class C.

In the Class C judgement, the fundamental current (1st current) value and power factor are concerning. In this case the definitions of each value are shown as below.

Europe (IEC) **Japan (Guideline)**	
Measured	Measured values per frame (DFT Window) are used as the FUNDAMENTAL CURR and POWER FACTOR.
Specified	The specified FUNDAMENTAL CURR and POWER FACTOR values are used for all the frames.

Measurement Settings



This section does hardware settings of the HA01F. These settings cannot be changed after measurement. If you want to change the settings, you will need to clear all the existing data once. We will discuss later how to restart measurement changing these items.

Range

Select range settings on **Voltage(rms)**, **Current(peak)**, and **Shunt Resister** of the HA01F unit. Valid ranges are described in the following table. Make sure to correctly set the short-bar of the **CURRENT SENSOR SELECTOR** or cabling of the **CURRENT SENSOR** of the HA01F unit for shunt resister setting.

Voltage range [Vrms]	20, 40, 80, 160, 320, 600
Current range [Apeak]	1, 2, 4, 8 (when 8 mΩ shunt) 2, 4, 8, 16, 32 (when 4 mΩ shunt) 8, 16, 32, 64, 128 (when 1 mΩ shunt)
Shunt Resistance [mΩ]	1, 4, 8

Note:
Make sure to agree the setting of Shunt Resistance in application with actual setting of HA01F. Otherwise, you will not get assurance of measurement data.

Measurement

Sets **Sample Points**, **DFT Window**, and **Measurement Time**. Sample Points specifies the number of sampling for each one cycle. (It affects fidelity of waveform, data transfer speed, and file size.) DFT Window specifies in-window fundamental cycle number applied to Fourier Transformation. It affects data transfer speed and file size. In the harmonics standard, it is normally 16 cycle when fluctuating harmonics are measured with rectangular windows. Measurement Time specifies the actual measuring time. Valid ranges for these items are described in the following table.

Sample Points	256, 512, 1024 (restricts DFT Window setting)
DFT Window	4, 8 16, 32, 64 (restricted by Sample Points setting)
Measurement Time	10 through 600 seconds (in 10sec unit)

Note:
If you want do the final judgement of harmonics, the measurement time shall be 150 seconds or longer. Any measurement time shorter than this is not strict and not compliant with the standard or guideline.

Filter

Enables or disables use of anti-aliasing filter. If measurement of harmonics component is important for you, you need to turn the filter on. However, since slight waveform deviation will be generated, you might have to disable the filter use if you are about to analyse waveforms or peak current levels.

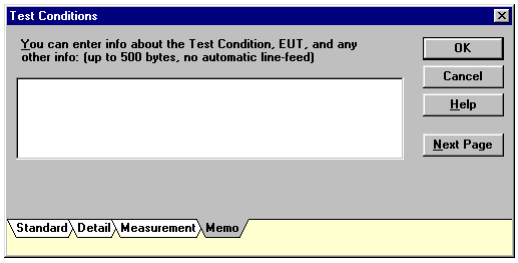
AC Coupling

Sets the input coupling to AC or DC. Typical measurement uses AC coupling.

Line Impedance

Select impedance setting for the Line Impedance Network. Note that you are still responsible for setting line impedance, since DynaLinzo doesn't set it automatically. The information of this setting is used only for final analysis reports and there is no meaning else. For information about line impedance settings, see "Appendix 1 - Setup For Line Impedance Network".

Memo Settings



You can input up to 500 letters (250 letters when using Asian characters) as a memo text for the test. The contents will be shown in the report printings.

Start Measurement

After the preparation has been done, you can start measurement. To begin the measurement, the HA01 unit needs to be controlled through the GPIB. So if it is the first time to connect GPIB, you might need to confirm that GPIB environment is configured properly.

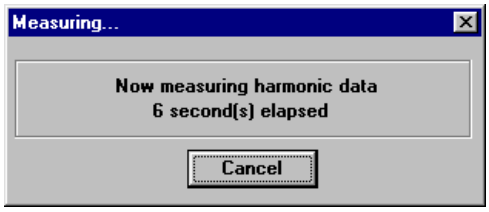
GPIB Setup

To connect an external GPIB instrument such as HA01 unit, first you must specify a GPIB device just like specifying an MS-DOS file name. The application software communicates with an external instrument through the GPIB with a device name. So if you are the first time to use GPIB functionality in the application, you have to set up the GPIB environment.

To confirm or change the GPIB setting, select **Options | GPIB Setup** menu. Then **GPIB Setup** dialogue will appear prompting you to enter a GPIB device name. Note that what you should enter here is a GPIB device name instead of its address. **GPIB Device Name** is normally configured by the driver of National Instruments GPIB. Immediately after the installation of this system, the default device name is "DEV1." The National Instruments GPIB driver also defaults device names "DEV1" through "DEV16" with which device address 1 through 16 are associated for each. So typically, the GPIB address of HA01 will be okay if it is set to 1. However, note that it might differ depending on the configuration of GPIB environment.

Start Measurement

To begin the measurement, select **Measure | Run** menu item. Once the measurement has started, either elapsed time or remaining time will be indicated in a popup dialogue. If you want to suspend the measurement due to some reason, you can just click the Cancel button to stop it.



If you intend to measure with synchronisation with your device or other instrument, apply a trigger signal to the **EXT TRIG** terminal on the HA01 unit at this state. This trigger timing will reset the internal timer. However, appearance of elapsed time or remaining time will not be reset.

After the measurement has been done, all of the data will be automatically downloaded and will be displayed on the DynaLinzo screen.

Begin A New Measurement

There are several ways to perform a new measurement after previous measurement is already done.

Measurement With The Same Condition As Previous

In this case, you can just start the next measurement as well as the first time. After measurement, data will be downloaded and displayed. However, the existing data will be lost since the new data is overwritten.

Measurement With Changing HA01 Settings

If you want to restart measurement changing HA01 settings such as Range, or Measurement Time, you need to clean up exiting data once. DynaLinzo never recognises to change HA01 settings holding measured data. This avoids disagreement between existing data and HA01 settings. Therefore, it is necessary to clean up existing data once.

To clear the existing data, select **Measure | Clear Data** menu. And then select **Measure | Test Conditions** menu to change the HA01 settings. After changing conditions, you can just start the new measurement.

Measurement From Scratch

In this case, select **File | New** menu. The **Test Condition** dialogue will appear returning all the test conditions to default. In addition, associated file name also changes to "Untitled."

Trial Mode

The **Trial Mode** is an operation mode that enables you to try to measure temporarily. It is useful when you examine range settings of the HA01 unit. To go to the **Trial Mode**, select **Measure | Trial Mode** menu. The default operation mode is **Analysis Mode** that allows you to measure and analyse up to 150 second harmonics data, whenever you have just started DynaLinzo.

Starting Measurement

This mode measures harmonics current data at a constant interval (actually 1 second) and it is irrespective of the measurement time setting. This operation will continue perpetually until you explicitly stop the measurement.

Restrictions In Trial Mode

Unlike **Analysis Mode**, since no measurement data are recorded in the **Trial Mode**, any data will be gone after the measurement. Thus, there is no activity on the 3D Spectrum window and any total analysis data cannot be represented. Displayed on the application are only **Harmonics List**, **2D Spectrum**, and **Phase** windows. For more information about each window type, see "Chapter 3 DynaLinzo -- Analysis."

Return To Analysis Mode

Select **Measure | Analysis Mode** menu to return to **Analysis Mode**. DynaLinzo defaults its operation to Analysis Mode when startup.

When Abnormal Measurement Termination

DynaLinzo will abandon measurement when the system has been encountered with one of the following events:

- GPIB Line Problem
- Synchro-Cable Problem among PCR-L and HA01
- Over Range
- Overheat

GPIB Line Problem

If an abnormality has been generated on the GPIB line (for instance, when the cable has been disconnected or when the supply of HA01 has been suspended), measurement will be suspended displaying an error message.

Synchro-Cable Problem among PCR-L and HA01

A synchronisation clock signal must be always applied from the PCR-L AC supply to the HA01 unit in order to measure harmonics accurately. This signal is very important and associated with measurement essentially. If the synchronisation cable has been disconnected, measurement will be suspended displaying an error message.

Note:
Even though the synchronisation clock cable is correctly connected, an error message might appear when you perform the first measurement with each application or, when you perform the first measurement after changing sampling rate. This is because internal synchronisation system has been temporarily unlocked. In this case, re-start the measurement since there is no problem.

Over Range

The Current Range is set as a part of HA01 test conditions. If measured data that exceeds the upper-limit range is generated, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it. However, if an over range problem has been generated disabling this functionality, there will be no error message. Note that protruding data will be clipped to the upper-limit values.

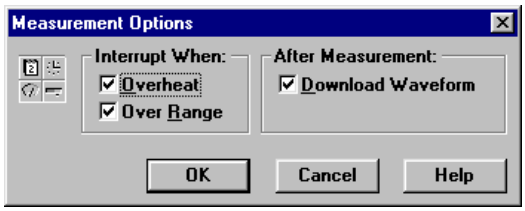
Overheat

When the HA01 has found overheat problem, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it.

For more information about error messages, see the Appendix at the last of this document. How to enable/disable Over Range and Overheat functionality is described at the next section.

Measurement Options

This allows you to set options about measurement. These option are set separately from test conditions. To set the options, select **Options | Measurement** menu. Then the Measurement Options dialogue will appear.



Interrupt When

Checking **Over Range** enables you to abandon measurement when a peak current that exceeds the current upper-limit has been generated. Checking **Overheat** enables you to abandon measurement when an overheat problem has been generated.

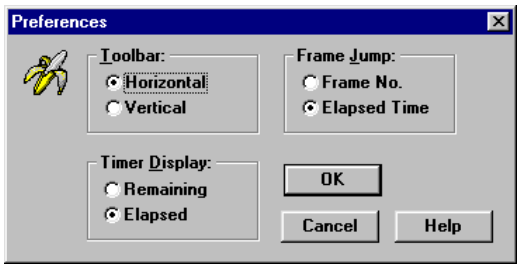
After Measurement

DynaLinzo automatically downloads harmonics data after measurement has been done. Checking **Download Waveform** allows you to read not only harmonics data but also current waveform data.

All of the settings described above are enabled as the install default. And changes will be preserved for use of next time.

Other Options

Options other than about measurement can be configured as **Preferences**. These options are also set separately from test conditions. To set the options, select **Options | Preferences** menu. Then the **Preferences** dialogue will appear. In this dialogue, you can set toolbar location, how to jump among frames, and measurement time display.



Toolbar location

Sets the location of the toolbar to **Horizontal** (top on the screen), or **Vertical** (left of the screen).

Frame Jump

Sets how to jump frames to **Frame No.** or **Elapsed Time**. For more information about this, we will discuss in the next chapter "DynaLinzo - Analysis."

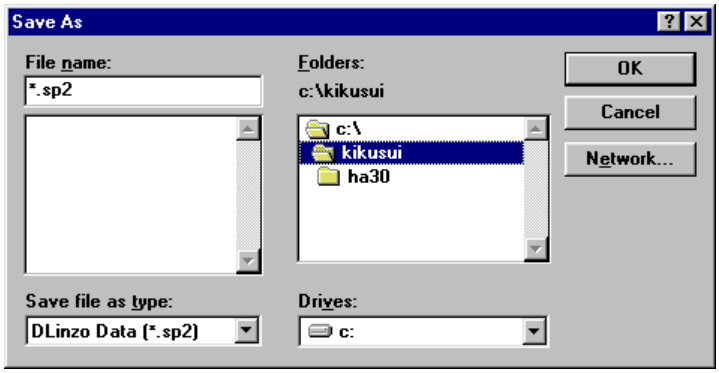
Timer Display

Sets the timer display during measurement progression to **Remaining Time** or **Elapsed Time**.

Save Data

DynaLinzo allows you to save measurement data on the hard disk. Not only measurement data, test conditions and operator information are also stored in the file. In addition, if you have downloaded current waveform data, it is also included. By saving measurement data in a file, you can analyse the data in later time. Options such as overheat or over range, however, are not included in the data file since these are not actually measurement data but operation environment of DynaLinzo.

To save data, select **File | Save** or **File | Save As** menu. A dialogue box that prompts you to decide a file name appears as necessary. Then decide an appropriate file name. The file name must be within 8 characters following the rule of DOS/Windows file system. Default extension of the file name is SP2.



Data File Size

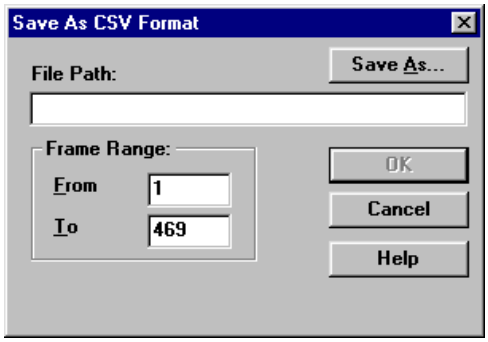
When you save your measurement data file, you might have to pay attention how much disk space is required for a data file. Actually, the size of a data file depends on test conditions (especially settings of HA01F) and whether current waveform data is included or not. The following table shows examples of file size for several typical measurement conditions. Every case includes waveform data.

Test Conditions	File Size
Frequency=50Hz Sample Points=256 DFT Window=16 Measurement Time=150 seconds	approx 603 Kbytes
Frequency=60Hz Sample Points=256 DFT Window=16 Measurement Time=150 seconds	approx 720 Kbytes
Frequency=50Hz Sample Points=1024 DFT Window=2 Measurement Time=150 seconds	approx 3 Mbytes
Frequency=60Hz Sample Points=1024 DFT Window=2 Measurement Time=150 seconds	approx 3.5 Mbytes

Even if the same measurement time, depending on settings of Sample Points and/or DFT Window, the file size may be very large.

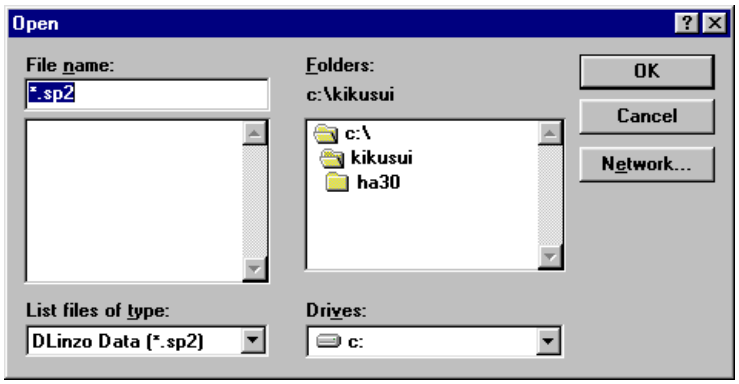
Generating CSV Files

DynaLinzo allows you to generate entire harmonics data as CSV files which can be read by other spread sheet applications such as Microsoft Excel or Lotus 1-2-3. To generate a CSV file, first bring the **Harmonics** window to the front and select **File | Save As CSV Format** menu. Then a dialogue box which prompts you to decide CSV file name and frame range for the harmonics data.



Open An Existing Data

You can read and analyse an existing data file after measurement. To open a file, select **File | Open** menu. Then a dialogue box that prompts you to decide a file name appears and then select a file (extension .SP2). After opening the file, the measurement data will be displayed on the screen as well as after measurement.



DynaLinzo has different file format and extension name between VER2.x or earlier and VER3.0 or later. (File extension of pre-VER2.x was SP1, and post-VER3.0 is SP2.) The DynaLinzo 3.0 can read old SP1 files by converting the format.

One-way Conversion SP1 → SP2:

Although the DynaLinzo3.0 can open old SP1 files, there is no capability to save back to the SP1. The save format is always SP2. Even if you opened an SP1 file, you cannot overwrite the SP1 format over it.

Chapter 3 DynaLinzo - Analysis

Methods for data analysis are roughly divided into two ways; to analyse instant harmonics
data in a micro point of view; to analyse totalling all the data in a macro point of view.
The former is called **Instant Analysis** and the later is called **Total Analysis**.

Instant Analysis

This method is to analyse momentary data moving the time axis throughout entire harmonics data. By doing it, you can see data at a moment on the time axis in detail. In this case, the minimal unit of the time axis is called **Frame**. Assuming the entire harmonics data was a book, a **frame** would be a thing like a page. Similarly to reading browsing pages, you can view entire data browsing frames forward or backward.

Now we discuss about concept of frame more in detail. The DynaLinzo system analyses for each window width throughout entire data, using DFT (Discreet Fourier Transformation) algorithm. A result fragment calculated from a DFT window is called a frame. One frame involves Harmonics Data, Phase Data, Waveform Data, and other Situation Data.

Number of frames in a packet of measurement data and time width for each frame are calculated using following formula:

$$NumOfFrame = MeasureTime[s] \times \frac{Frequency[Hz]}{DFT\ Window}$$

$$WindowTimeWidth[s] = \frac{DFTWindow}{Frequency[Hz]}$$

How to analyse browsing frames is described in the next section.

Total Analysis

This method is to analyse summarising all the measured frames. Total Analysis is furthermore divided into **Transition Analysis** and **Distribution Analysis**. The Transition Analysis is what represents transition characteristics of a specific data item. Transition of the 7th order of harmonics or Power in whole of the measurement time is a good example of **Transition Analysis**. **Distribution Analysis** is what shows a histogram chart representing judgement results complying with harmonics standard.

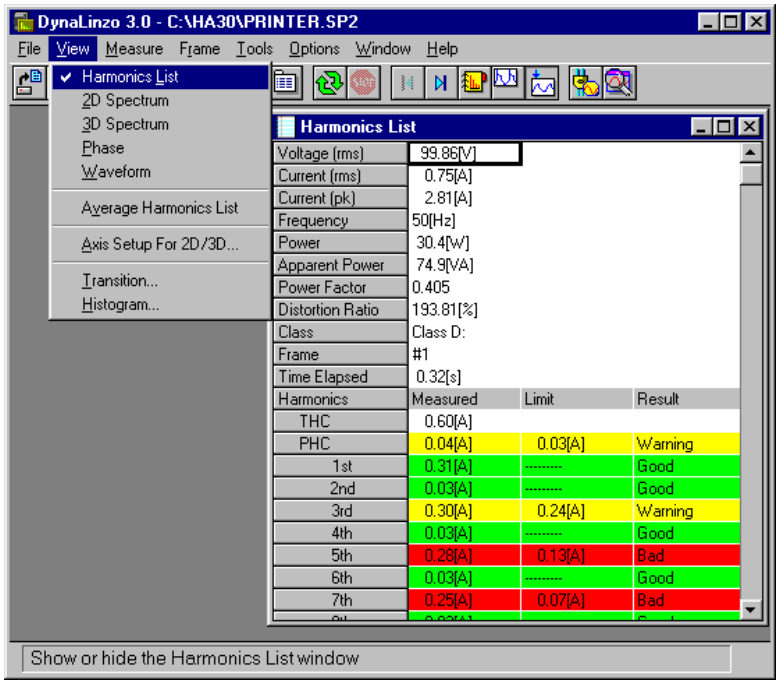
How to do Total Analysis is described after the description of Instant Analysis.

Types Of Instant Analysis Windows

Here, we discuss about types of windows associated with Instant Analysis and how to operate them. In DynaLinzo, there are six kinds of windows associated with Instant Analysis. All types other than Phase Window are displayed as default.

- Harmonics List Window
- 2D Spectrum Window
- 3D Spectrum Window
- Phase Window
- Current Waveform Window
- Average Harmonics List Window

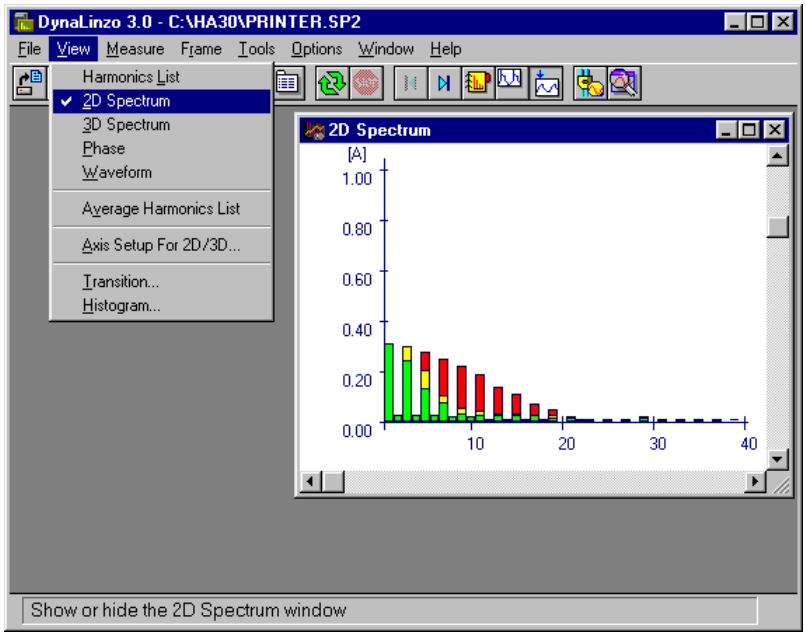
Harmonics List Window



Content of the window is a list that displays harmonics data at one moment as a numeric format. Not only harmonics components, situation data such as voltage or current is also shown. This window is displayed as default and you can show or hide it operating **View | Harmonics List** menu. The list is shown as a spread sheet style and each cell of harmonics components is represented in colour so that you can distinguish the results of harmonics judgement as described below.

Cell Colour	Description	Judgement
Green	Measured Data is within allowance level of the standard, or there is no allowance level.	GOOD
Yellow	Measured Data exceeds 100% of allowance but is within 150%.	WARNING
Red	Measured Data exceeds 150% of allowance level.	BAD

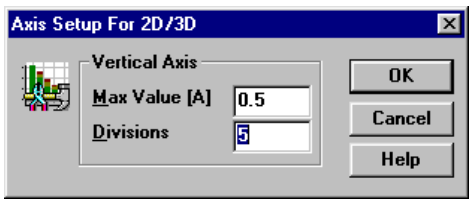
2D Spectrum Window



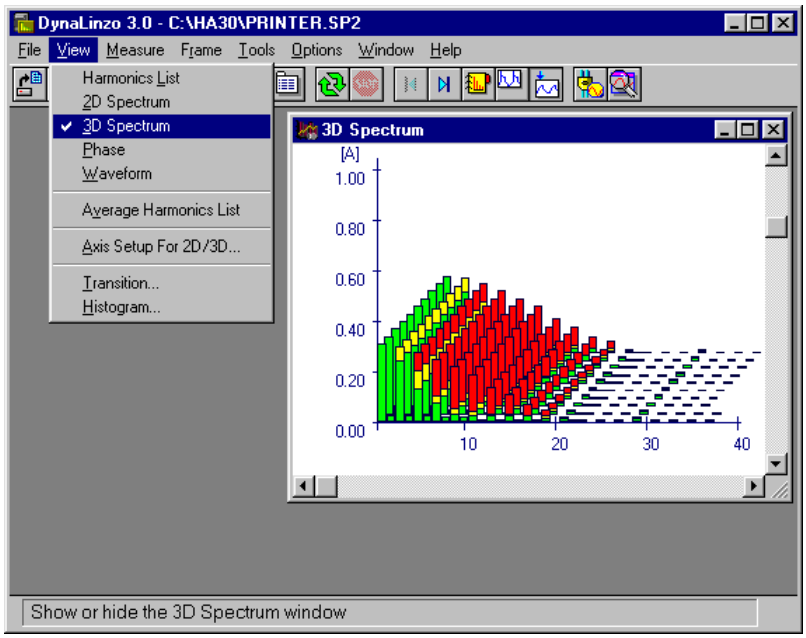
This is a column chart representation of the harmonics list. The X axis indicates order of harmonics and the Y axis indicates level of harmonics respectively. The unit of the Y axis will be [%] when class C is selected and will be [A] when other classes. This window is displayed as default, but you can show or hide it operating **View | 2D Spectrum** menu. The chart is shown in colour so that you can distinguish the results of harmonics judgement as described below. Furthermore, white lines that indicate allowance levels of the standard will not be displayed if a corresponding data exceeds the allowance level or there is no allowance limit. (When the data exceeds the allowance limit, the white line would virtually be the border between green and yellow zones.)

Chart Colour	Description	Judgement
Green	Measured Data is within allowance level of the standard, or there is no allowance level.	GOOD
Yellow	Measured Data exceeds 100% of allowance but is within 150%.	WARNING
Red	Measured Data exceeds 150% of allowance level.	BAD
While lines	Allowance level of the standard	

This window has an option setting that enables to set up the maximum value and number of division for the Y axis. Selecting **View | Axis Setup For 2D/3D** menu invokes **Axis Setup For 2D/3D** dialogue box prompting you to enter appropriate values. As for the **Max Value**, you can enter 0.1 or any larger numbers. As for **Divisions**, while you can any integer number over zero, numbers not matching with 1-2-5 step and extremely large numbers are not recommended.



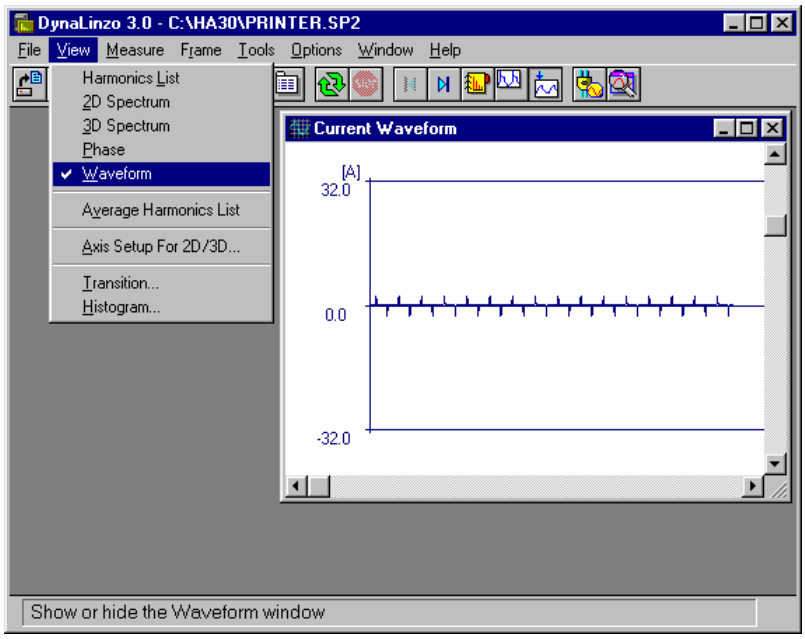
3D Spectrum Window



The 3D Spectrum is a multiple representation of the 2D Spectrum adding the time axis (Z axis). The most front column of the 3D spectrum chart designates the same data as that of the 2D and Harmonics List. Ten frames in total accompanied by time passage are also shown backward the most front data. In advance of time (or in advance of frame browsing), later data are coming from back to front on the screen.

This window is displayed as default, but you can show or hide it operating **View | 3D Spectrum** menu. Colour expression is almost the same but white lines that represent allowance levels are not shown.

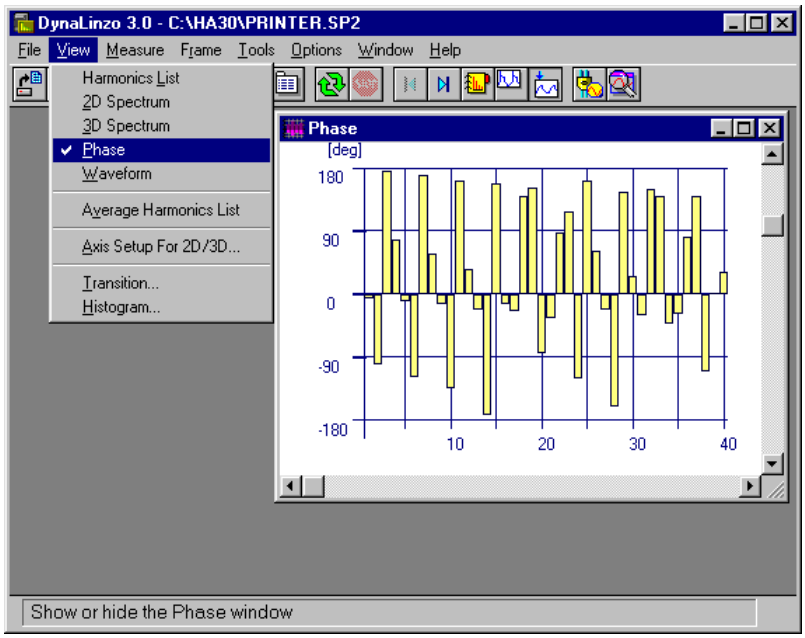
Current Waveform



This window displays current waveform. The X axis indicates time, and the Y axis indicates current value (peak) respectively. This window is displayed as default, but you can show or hide it operating **View | Waveform** menu.

In addition, there is another functionality that enables you to identify class A and class D zooming up the current waveform shapes. We will explain about this at the section "Class Identification. "

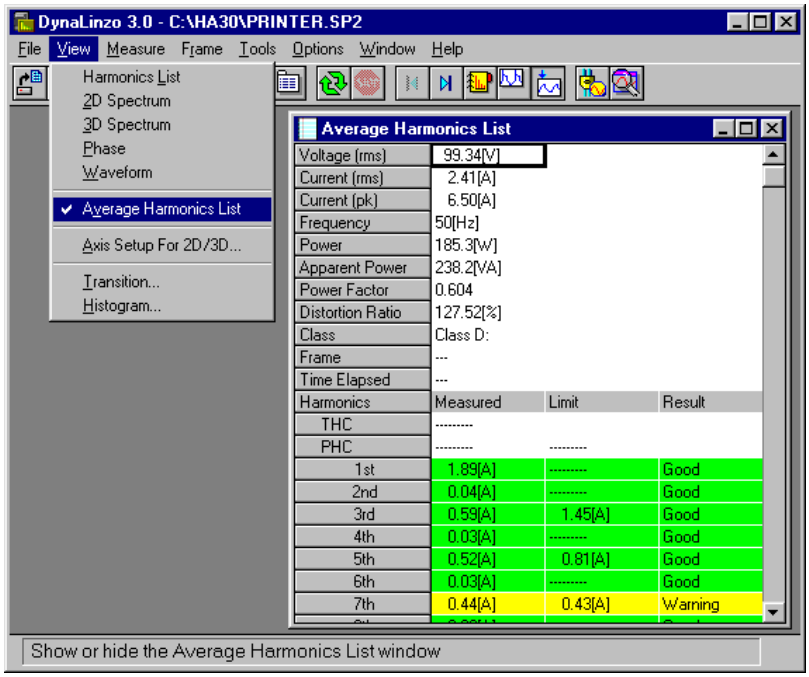
Phase Window



This window represents phase difference for each harmonics component referring to voltage phase of the PCR-L output. The X axis indicates the order of harmonics, and the Y axis indicates phase difference respectively. The unit is [deg], '+' means phase lead, and '-' means phase lag. This window is displayed as default, but you can show or hide it operating **View | Phase** menu.

Note:
In test condition settings, the smaller the Sample Points is, the worse the fidelity of the phase data becomes. In addition, immediately after changing the Sample Points setting, some measurement error may be generated since internal processing cannot get stable soon. Then, restart the measurement.

Average Harmonics List Window



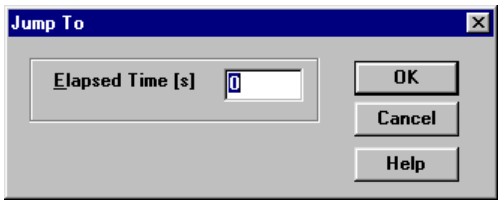
Content of the window is a list that displays average harmonics data over the entire test period as a numeric format. Not only harmonics components, situation data such as voltage or current is also shown. This window is not displayed as default and you can show or hide it operating **View | Average Harmonics List** menu. The colour separation in the result view is the same as (non-average) Harmonics List.

Browsing Frames

Five window types described so far, **Harmonics List**, **2D Spectrum**, **3D Spectrum**, **Current Waveform**, and **Phase** indicate the same data occurred at a time and are represented at several points of view. For example, a **Harmonics List** and a **2D Spectrum** shown at the same time represent completely the same data. These displays associated with each other are explained as a **Frame**. You can change the active frame that is actually shown browsing frames forward and backward exactly like browsing pages on a book.

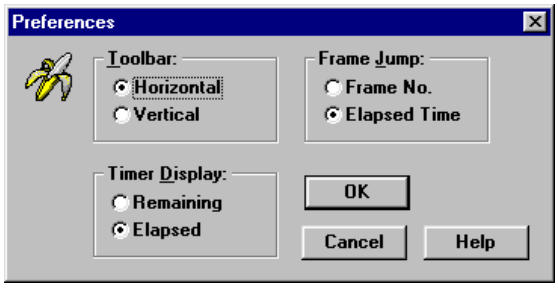
Choose **Frame | Previous** or **Frame | Next** menu. Then you can change the active frame actually shown. (To operate them, it is easier to use the **PageUp** and **PageDown** keys and the toolbar.) The status line aligned at the bottom of DynaLinzo screen indicates total number of frames and active frame number.

In addition, there is a short-cut operation to jump to a specific frame number. Selecting **Frame | Jump** menu will invoke **Jump To** dialogue that prompts you to specify the frame number to which you want to jump.



Frame No. vs. Elapsed Time

Corresponding above explanation, you have two ways to jump frame, **Frame No.** and **Elapsed Time**. As the install default, Elapsed Time is selected. To change how to jump frame, select **Options | Preference** menu.



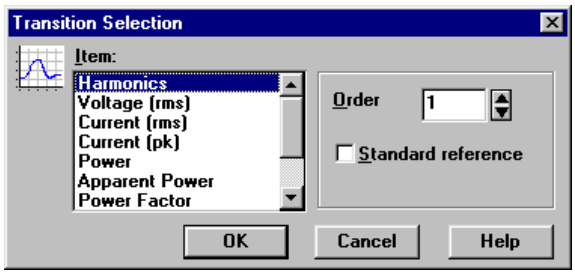
Types of Total Analysis

Now we explain about windows associated with Total Analysis and how to operate them. Since no windows associated with Total Analysis are displayed as default, you have to open necessary windows by yourself. Sorts of Total Analysis windows are roughly two, however, there are over 150 types exactly since these include lots of different items to be displayed.

- Transition Window
- Histogram Window

Transition Window

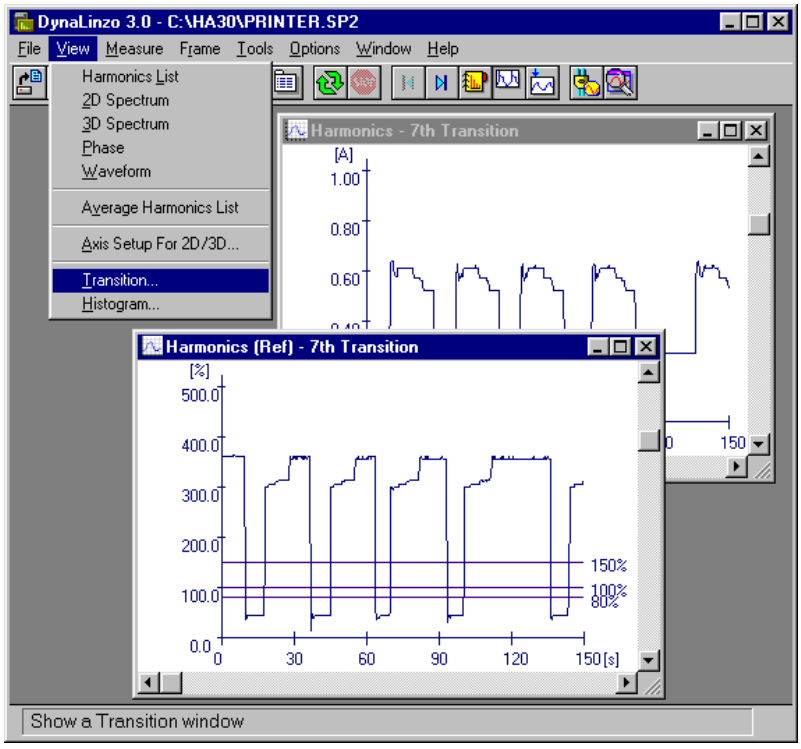
Transition Windows represent value transition focusing particular data item. To do the transition analysis, select **View | Transition** menu. Then a dialogue box that prompts you to select a data item.



In the dialogue box, you have to choose what transition you intend to see. If you select **Harmonics**, furthermore you have to select an order number from within 1st through 40th. If you check **Standard Reference** placed below the order number selection, you can display the result of that order. Otherwise, you can display just absolute values of that class. You can view transition charts about following items:

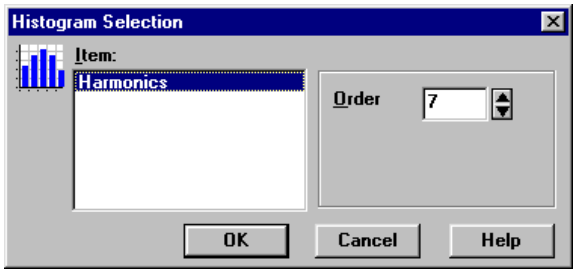
- Harmonics Components (1st through 40th)
- Voltage (rms)
- Current (rms)
- Current (peak)
- Power
- Apparent Power
- Power Factor
- Distortion Ratio
- THC
- PHC

As an example, we show a comparison among standard reference and absolute values for the 7th order harmonic. Shown in [A] unit for the Y axis is absolute values and shown in [%] unit is standard reference.

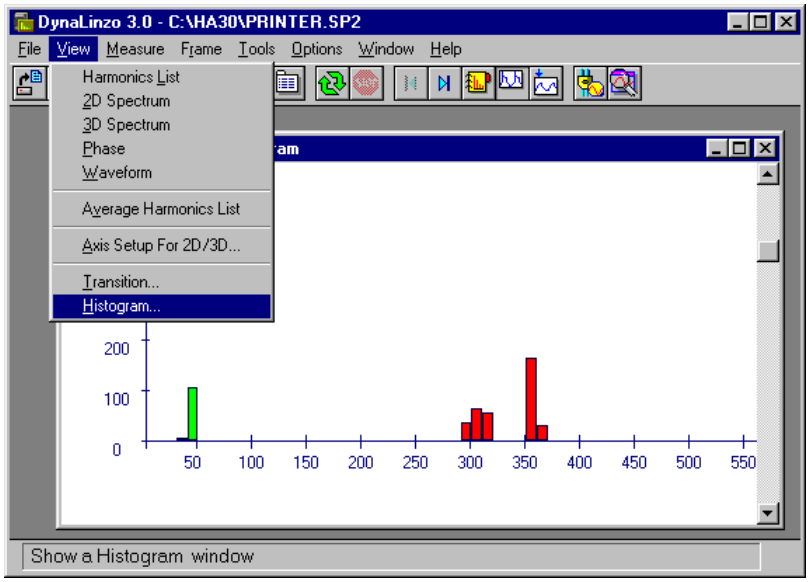


Histogram Window

Histogram Windows represents distribution state paying attention the total number of times of a particular harmonic order. The total number of times described here is the amount of frames. To do the distribution analysis, select **View | Histogram** menu. Then a dialogue box that prompts you to select a data item.



Here you only need to select an order from within 1st through 40th. Unlike transition charts, items that can be displayed as histograms are harmonics components only. As an example, we show the histogram chart for the 7th order harmonic.



The chart is shown in colour representing results.

Chart Colour	Description	Judgement
Green	Measured Data is within allowance level of the standard, or there is no allowance level.	GOOD
Yellow	Measured Data exceeds 100% of allowance but is within 150%.	WARNING
Red	Measured Data exceeds 150% of allowance level.	BAD

Note:
The histogram functionality considers up to 900% in calculation but displayed up to 600%.

Waveform Judgement Assistance

Current Waveform Evaluation

If you choose Japan mode (Harmonics Guideline), it may be hard to classify your product or device to be tested into a specific class. Identifying class B and class C is easy since you only need to categorise your product to Portable Tools or Lighting Equipment. However, as for a product other than these categories, you have to carefully decide which of class A and D your product belongs to. The key of identification is current waveform shape. Putting a special ruler on the waveform shape, you will be able to expect it a little.

If you choose Self-ballasted lamp in Japan mode (Harmonics Guideline) Class C, or if you choose 25W option in Europe mode (IEC), you need evaluate peak phases of current waveforms.

In both cases, you need evaluate waveform shape by viewing enlarged current waveforms. The tool that can do is the **Wave Viewer**. It is an independent program and doesn't run alone but associated with DynaLinzo.

To invoke **Wave Viewer**, select **Tools | Wave Viewer** menu. Then the waveform actually displayed will be zoomed up in another window.

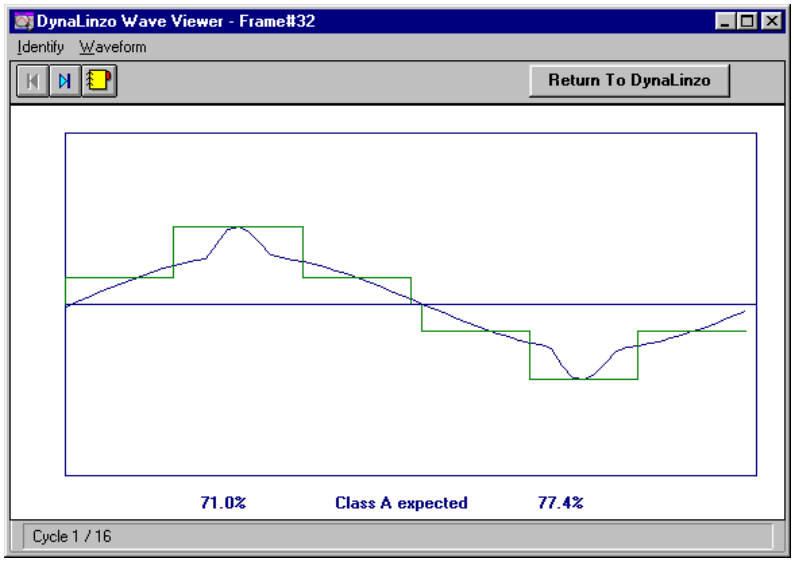
Note:
If no waveform data is included in the measurement data, you cannot invoke Wave Viewer.

The Wave Viewer displays and analyses each of current waveform in a frame. No waveforms crossing multiple frames can be shown. If you want to view a waveform in other frames, you need to return to DynaLinzo once, move to another frame, and then invoke the **Wave Viewer** again.

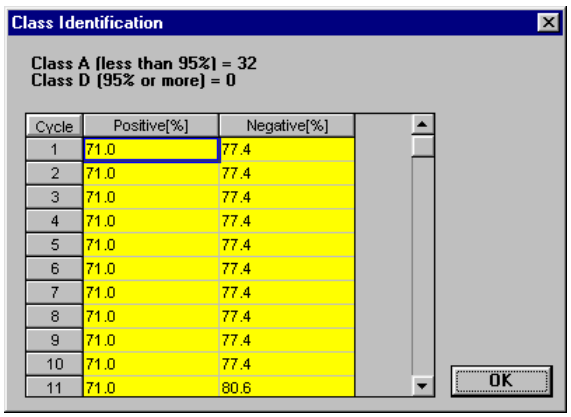
Assistance ruler lines will vary depending on the standard (target region selection) and/or class you are selecting.

Class Identification

When you choose Guideline (target region Japan) with any class, rulers for class identification, which are provided for each half cycle, are placed on the window, and the percentage of waveform containment is shown. Since, the window can show only one waveform at a time, move the page focus on the waveform if you want to see other portions.



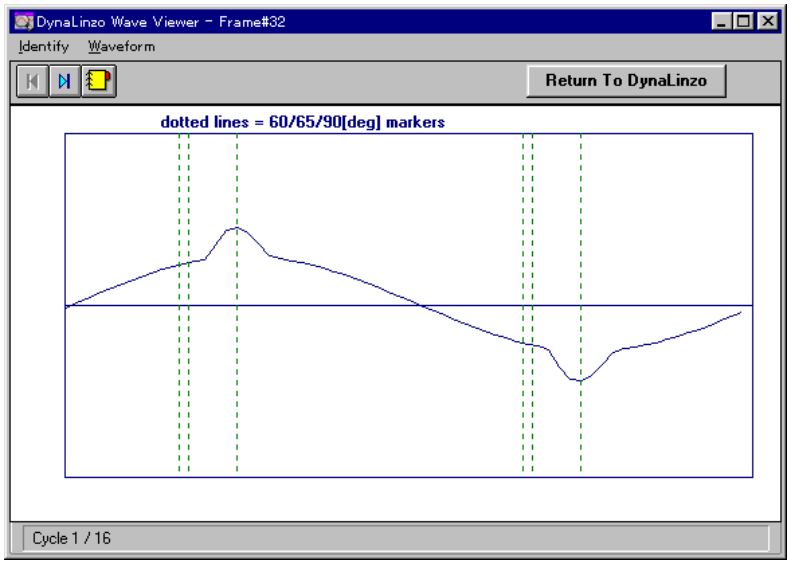
You can also view the list, which estimates an applicable class depending on the multiple waveform shapes in the frame. Select **Identify | Class** menu and then a dialogue box that includes a list of identification result will appear.



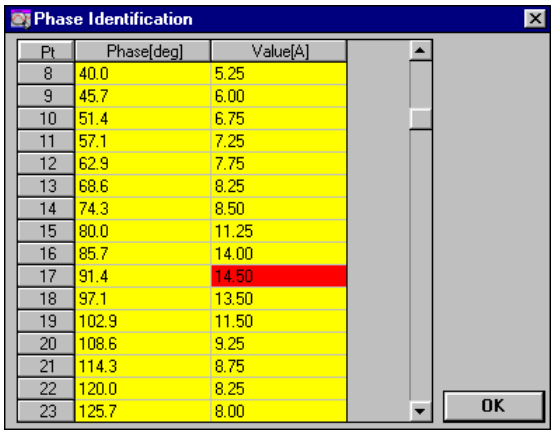
In the dialogue, the containment ratio of each current waveform inside the rulers is shown. This is a list of totalling identification result for each waveform in a frame without regarding polarity. Because DynaLinzo cannot offer any identification decision more than this, you should decide which class your product under test belongs to all by yourself.

Phase Identification

If you selected "Class C / Ignore 25W or Below" with IEC std (target: Europe), or if you selected "Class C / Ignore 35W or below / Self-ballasted Lamp" with Japan Guideline (target: Japan), the 3rd and 5th harmonics are to be evaluated even though the data is 25W (IEC) / 35W (Japan) or lower power. Also you need to evaluate current wave phases. When these selections are made, the Wave Viewer shows additionally vertical gridlines on its screen.



These gridlines shows 60/65/90/240/245/270[deg] locations based on the voltage phase. Evaluate the current phase by following to the requirements of the IEC std or Japan Guideline. Selecting **Identify | Phase** menu also displays phase angles and current values for each data point, and utilize these data for identification work. In the display, the data coloured in red means the positive peak, and the data coloured in blue means the negative peak.



Pt	Phase[deg]	Value[A]
8	40.0	5.25
9	45.7	6.00
10	51.4	6.75
11	57.1	7.25
12	62.9	7.75
13	68.6	8.25
14	74.3	8.50
15	80.0	11.25
16	85.7	14.00
17	91.4	14.50
18	97.1	13.50
19	102.9	11.50
20	108.6	9.25
21	114.3	8.75
22	120.0	8.25
23	125.7	8.00

Pt : Phase data number

Phase [deg]: Phase angle

Value [A]: Current value

Note

Since this software does not do the identification for current waveforms automatically, you have to do it by yourself.

We recommend to set Sampling setting to 1024 on the test condition to increase accuracy of current waveforms. However the finest sampling interval is 1.4deg interpolation even if setting so, therefore some sharp peak components may not be captured. In this case, try to check the output waveform from the CURRENT MONITOR terminal with a 2ch oscilloscope. In concrete you check if there is the current peak before the 65deg phase point based upon the voltage zero-cross as 0deg. Set the oscilloscope to the dual channel mode, use the voltage waveform as a trigger, and then display the half-period wave on the full screen. Then confirmation for the peak location will be easy. Read phase angle of the peak current with the screen grids as defining the voltage wave's half period as 180deg.

Data Smoothing

This functionality enables to show smoothed measurement data for each frame with a pseudo CR filter (time const 1.5s). The items which can be smoothed are **harmonics**, **voltage (rms)**, **current (rms)**, **current (peak)**, **power**, **apparent power**, **power factor**, and **distortion ratio**.

Notes:

Smoothing function affects data display and standard judgement, but does not affect file contents to be saved. The stored data (as an SP2 file) is always unsmoothed raw measurement data.

The IEC standard (Europe mode) requires that all the judgements shall be performed with "smoothed" data. Although it is possible to cancel the smoothing, this action is not compliant with the IEC standard. In contrast, the Japanese Guideline does not mention about smoothing, you can evaluate the measurement data with cancelling the smoothing.

To perform smoothing, select **Frame | Show Smoothed Data** menu. To cancel it, select **Frame | Show Raw Data** menu. The default display is smoothed data.

Setting Date/Time Info

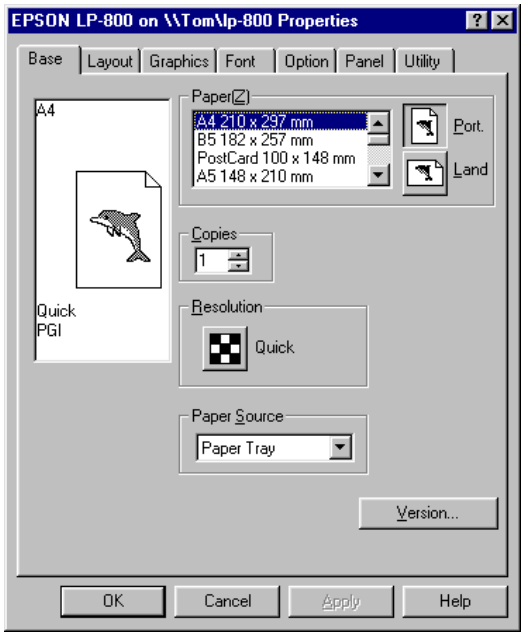
You can embed date/time information into your measurement data. Select **File | Set Date/Time Info** menu and then a dialogue box appears. You can confirm existing date/time or set current date/time. You cannot set arbitrary date/time other than current date/time.

Printing

DynaLinzo allows you to print out contents of window display and a final report of fluctuating harmonics analysis.

Printer Driver Setup

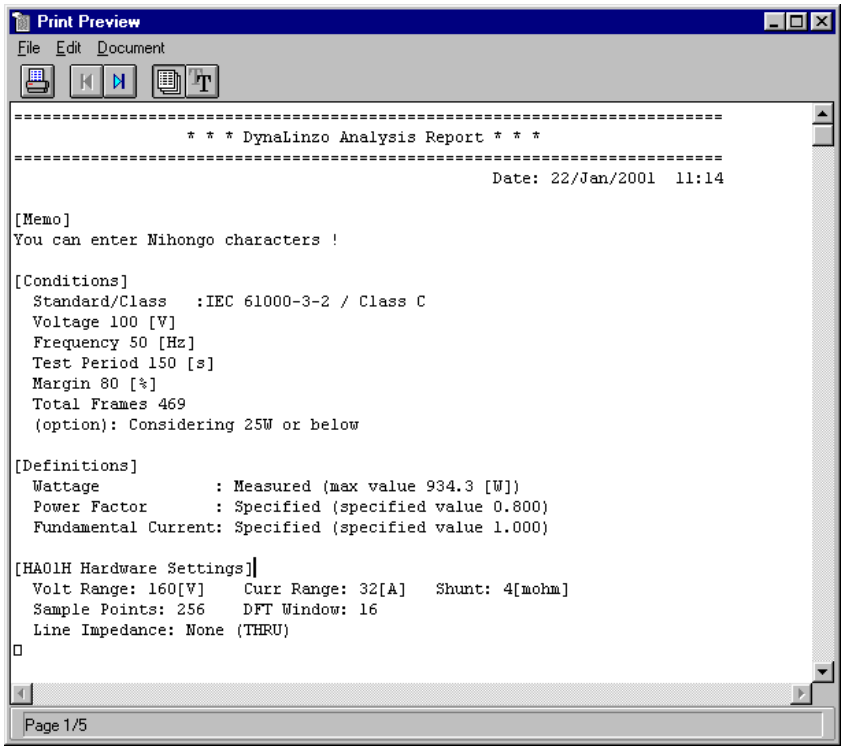
From DynaLinzo, select **File | Printer Setup** menu item. And then, if you could see a specific printer setup dialogue, you have already installed the driver. Otherwise, install a printer driver using **Control Panel**. (Actual display of the dialogue box differs depending on printer model you actually use.)



Print

Printing items are divided into two types, **Analysis Report** and **Graph/List**. Selecting **File | Print** menu, you can see the **Print What** dialogue box that prompts you to select what you are about to print. Select items from the contents, you can easily print out one or more items with one action.

If you have selected an analysis report, the printing will not be executed soon but a **Print Preview** window appears instead. If needed, you can choose a printing font for report printings. Note that available fonts listed in the **Font Selection** dialogue are TrueType, fixed-pitch fonts only. To print the report, select **File | Print** menu.



Notes:
If you have not installed any printer driver yet, you should install it using Windows' **Control Panel**.

The contents of printout of harmonics list are slightly different from its display. In printouts, allowance level of the standard or guideline and associated results are also included.

Harmonics List and the final **Analysis Report** are formatted as A4 (210 x 297mm) or Letter (8.5 x 11in) in portrait orientation. Printing on smaller papers than these makes your printouts cross two or more pages and is not recommended.

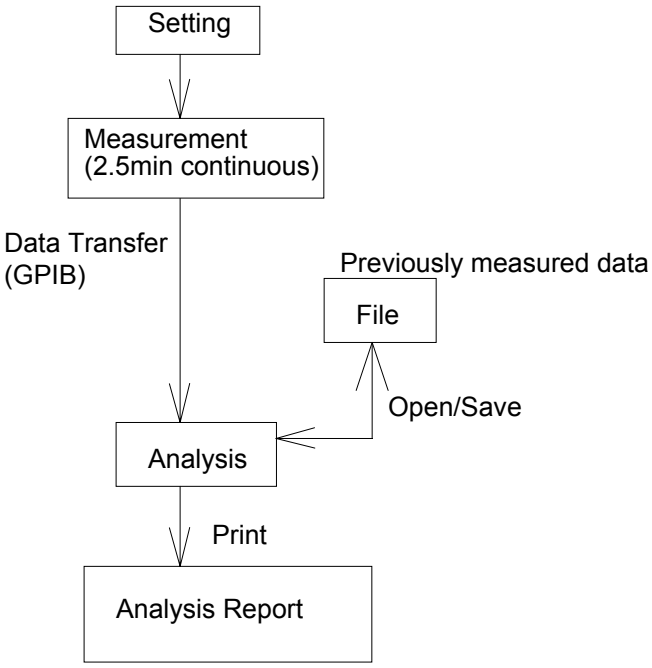
Special notes for Class-C analysis in harmonics measurement:
When analysing in Class-C, the system analyses harmonics components for each order based upon the fundamental wave. Therefore it is recommended to choose “Ignore below 25W/35W” option if you measure a load which is below 35W. Minimal current which is almost unloaded will cause extreme result values in Class-C analysis which displays harmonics percentages. Setting this option will disable judgements of such minimal current.

Chapter 4 - VF-Analyzer

Overview

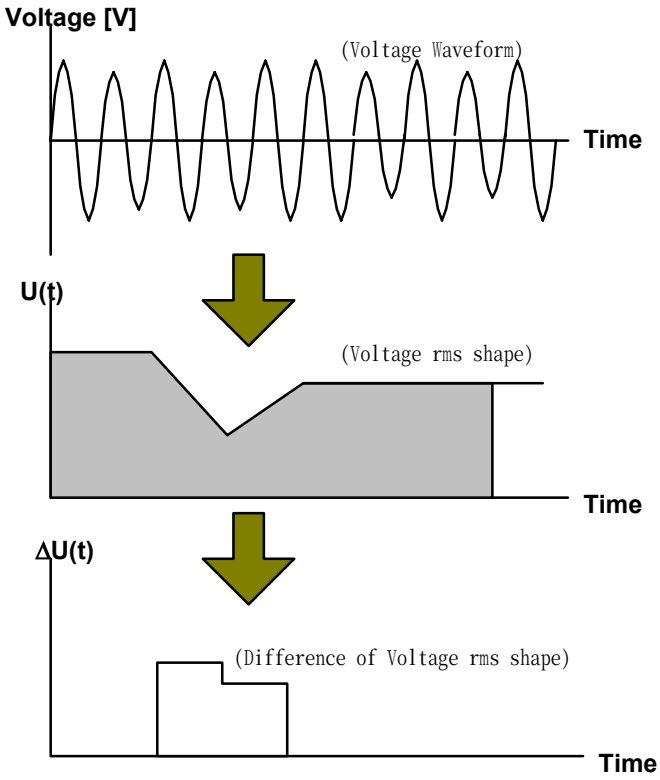
VF-Analyzer

The VF-Analyzer is an application software that measures voltage fluctuation with a combination of Kikusui PCR-L AC power supply, Line Impedance Network, and an HA01F-PCR-L unit. Now we summarise Voltage Fluctuation Analysis. The VF-Analyzer analyses data after 2.5 minute measurement and then displays it. Graphs and analysis reports can also be printed out. Now we summarise about voltage fluctuation analysis.



What Is Voltage Fluctuation Analysis

A graph that represents transition of measured rms voltage including both positive and negative polarities with connecting a load (or device to be tested), is called **U(t)**. In addition, a graph that represents a collection of absolute deference values among each adjoining data points, is called **ΔU(t)**.

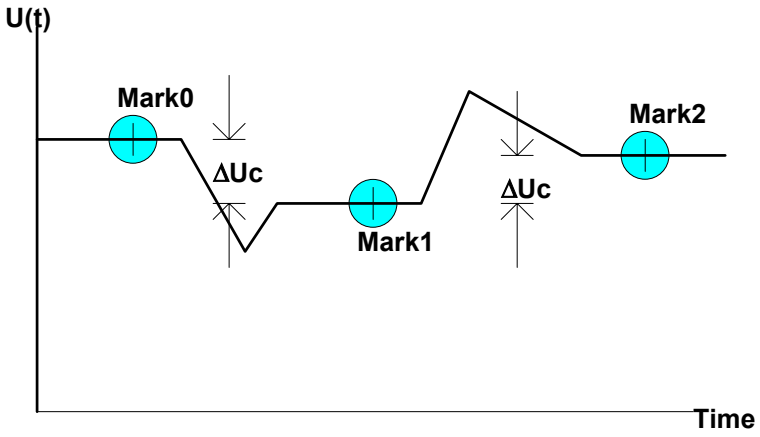


Furthermore, **ΔUmax**, **dmax**, **ΔUc**, and **dc** are to be calculated by the following rules:

ΔUmax	The maximum value of ΔU(t)
dmax	ΔUmax / nominal voltage
ΔUc	Calculate from some of marked U(t) data. You will have to mark some of U(t) data to get them.
dc	ΔUc / nominal voltage

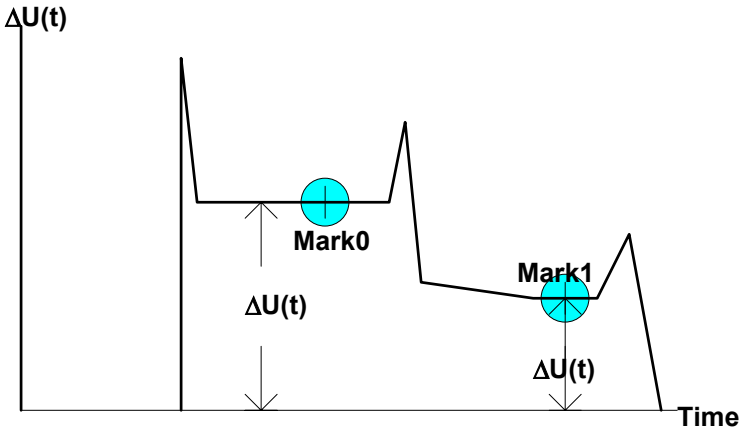
How To Get ΔUc and dc

1. Find one or more stable data portions on the **U(t)** graph and mark them.
2. Get mean values of 1 second areas on which markings are placed.
3. Get **ΔUc** values from adjoining differences.
4. Get **dc** values dividing each of **ΔUc** by **nominal voltage**.



How To Get ΔU(t) and d(t)

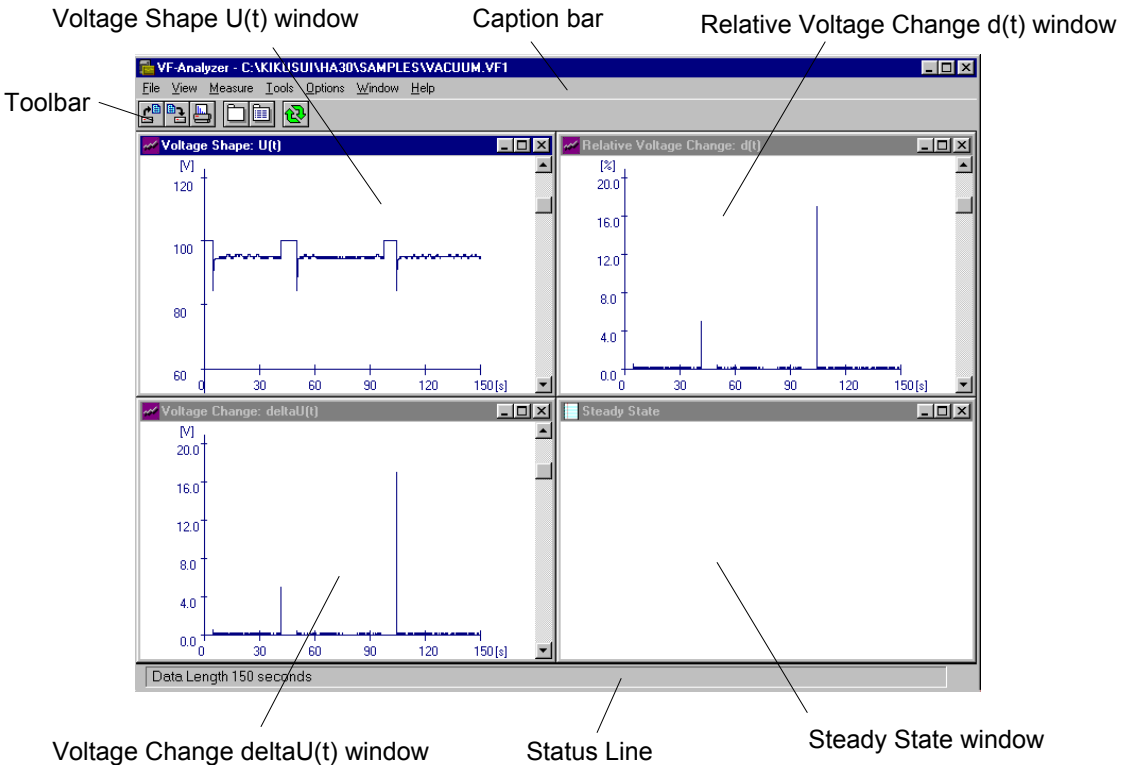
1. Find at least one stable portions on the DU(t) graph and mark them.
2. Define these values as DU(t).
3. Get d(t) values dividing each of DU(t) by nominal voltage.



Note:
Although the character of **delta** is strictly Δ in Greek language, the screen image of the application program displays this character as **delta** since Greek characters are not supported in the Windows system font.

Run VF-Analyzer

To run the VF-Analyzer, double-click VF-Analyzer icon from the Program Manager. Then the initial screen of VF-Analyzer appears and then **Startup** dialogue box will appear. Here you can either begin a new measurement or open an existing data file. Or, you can return to the default screen of VF-Analyzer closing the dialogue with the Cancel button. Described below are the default contents of the VF-Analyzer initial screen.



Voltage Shape U(t) Window

This window represents transition of voltage rms values for both positive and negative polarities.

Voltage Change delta U(t) Window

This window represents absolute differences between adjoining data points of above mentioned **Voltage Shape U(t)** graph.

Relative Voltage Change d(t) Window

This window represents relative values of above mentioned **Voltage Change delta U(t)** graph.

Steady State Window

This window represents a list of steady state data.

Caption Bar

Title of the window. Actually, a file path name associated with measurement data is shown. If no file name is assigned, the title will be "Untitled."

Toolbar

Menu commands that are frequently used are arranged. See the on-line help for more detail about each button.

Status Line

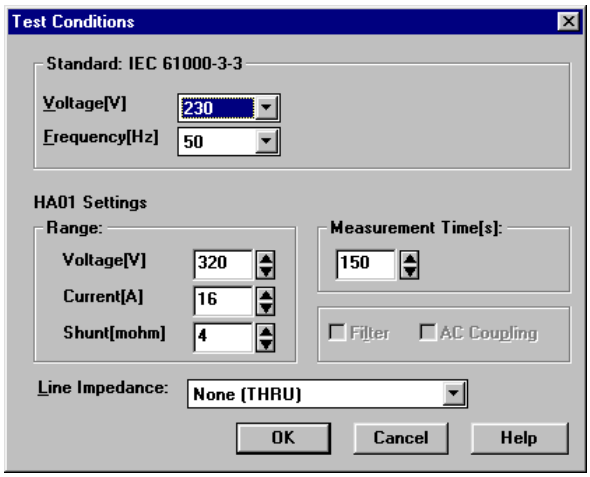
Actual time for data measurement is shown on it.

Now you can measure and analyse fluctuating harmonics current. Every window illustrated in the above picture is fundamental and shown as default when startup time of VF-Analyzer.

Chapter 5 VF-Analyzer - Measurement

Test Condition Settings

What you should do first for measurement is set each item about how to measure. Every item cannot be changed after the measurement is done. The test condition setting has to be done on the Test Condition dialogue box.



Select the **Measure | Test Conditions** menu. Then the **Test Conditions** dialogue will be shown. Items in the test conditions are roughly divided into two parts as described in subsequent sections.

- Standard Settings
- HA01 Settings

Standard Settings

As standard settings, you specify nominal voltage and nominal frequency of your product or device to be tested.

Voltage

As a nominal voltage of device to be tested, choose from the following:

- 100V
- 200V
- 230V

Frequency

As a nominal frequency of device to be tested, choose from the following.

- 50Hz
- 60Hz

HA01 Settings

Sets items for measurement, or settings of HA01.

Range

Select range settings on **Voltage(rms)**, **Current(peak)**, and **Shunt Resister** of the HA01 unit. Valid ranges are described in the following table. Make sure to correctly set the short-bar of the **Current Range Selector** or cabling of the **Current Sensor** of the HA01 unit for Shunt Resister setting.

Item	Range
Voltage [Vrms]	20, 40, 80, 160, 320, 600
Current [Apeak]	1, 2, 4, 8 (when 8 mΩ shunt)
	2, 4, 8, 16, 32 (when 4 mΩ shunt)
	8, 16, 32, 64, 128 (when 1 mΩ shunt)
Shunt Resistance [mΩ]	1, 4, 8

Note:
Make sure to agree the setting of Shunt Resistance in application with actual setting of HA01. Otherwise, you will not get assurance of measurement data.

Measurement

Sets the measuring time.

Filter

Sets the use of anti-aliasing filter. In the voltage fluctuation analysis, you cannot set this item and it is always disabled.

AC Coupling

Sets the input coupling to AC or DC. In the voltage fluctuation analysis, you cannot set this item and it is always disabled.

Line Impedance

Select impedance setting for the Line Impedance Network. Note that you are still responsible for setting line impedance, since the application doesn't set it automatically. The information of this setting is used only for final analysis reports and there is no meaning else. For information about line impedance settings, see "Appendix 1 - Setup For Line Impedance Network".

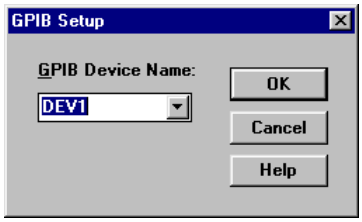
Start Measurement

After the preparation has been done, you can start measurement. To begin the measurement, the HA01 unit needs to be controlled through the GPIB. So if it is the first time to connect GPIB, you might need to confirm that GPIB environment is configured properly.

GPIB Setup

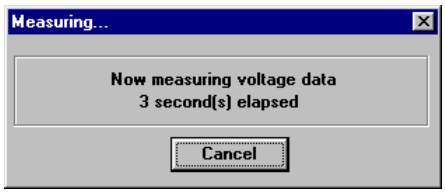
To connect an external GPIB instrument such as HA01 unit, first you must specify a GPIB device just like specifying an MS-DOS file name. The application software communicates with an external instrument through the GPIB with a device name. So if you are the first time to use GPIB functionality in the application, you have to set up the GPIB environment.

To confirm or change the GPIB setting, select **Options | GPIB Setup** menu. Then **GPIB Setup** dialogue will appear prompting you to enter a GPIB device name. Note that what you should enter here is a GPIB device name instead of its address. **GPIB Device Name** is normally configured by the driver of National Instruments GPIB. Immediately after the installation of this system, the default device name is "DEV1." The National Instruments GPIB driver also defaults device names "DEV1" through "DEV16" with which device address 1 through 16 are associated for each. So typically, the GPIB address of HA01 will be okay if it is set to 1. However, note that it might differ depending on the configuration of GPIB environment.



Start Measurement

To begin the measurement, select **Measure | Run** menu. Once the measurement has started, either elapsed time or remaining time will be indicated in a popup dialogue. If you want to suspend the measurement due to some reason, you can just click the Cancel button to stop it.



After the measurement has been done, all of the data will be automatically downloaded and will be displayed on the VF-Analyzer screen.

Begin A New Measurement

There are several ways to perform a new measurement after previous measurement is already done.

Measurement With The Same Condition As Previous

In this case, you can just start the next measurement as well as the first time. After measurement, data will be downloaded and displayed. However, the existing data will be lost since the new data is overwritten.

Measurement With Changing HA01 Settings

If you want to restart measurement changing HA01 settings such as Range, or Measurement Time, you need to clean up exiting data once. VF-Analyzer never recognises to change HA01 settings holding measured data. This avoids disagreement between existing data and HA01 settings. Therefore, it is necessary to clean up existing data once.

To clear the existing data, select **Measure | Clear Data** menu. And then select **Measure | Test Conditions** menu to change the HA01 settings. After changing conditions, you can just start the new measurement.

Measurement From Scratch

In this case, select **File | New** menu. The **Test Condition** dialogue will appear returning all the test conditions to default. In addition, associated file name also changes to "Untitled."

When Abnormal Measurement Termination

VF-Analyzer will abandon measurement when the system has been encountered with one of the following events:

- GPIB Line Problem
- Synchro-Cable Problem among PCR-L and HA01
- Over Range
- Overheat

GPIB Line Problem

If an abnormality has been generated on the GPIB line (for instance, when the cable has been disconnected or when the supply of HA01 has been suspended), measurement will be suspended displaying an error message.

Synchro-Cable Problem among PCR-L and HA01

A synchronisation clock signal must be always applied from the PCR-L AC supply to the HA01 unit in order to measure harmonics accurately. This signal is very important and associated with measurement essentially. If the synchronisation cable has been disconnected, measurement will be suspended displaying an error message.

> Note:
> Even though the synchronisation clock cable is correctly connected, an error message might appear when you perform the first measurement with each application or, when you perform the first measurement after changing sampling rate. This is because internal synchronisation system has been temporarily unlocked. In this case, re-start the measurement since there is no problem.

Over Range

The Current Range is set as a part of HA01 test conditions. If measured data that exceeds the upper-limit range is generated, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it. However, if an over range problem has been generated disabling this functionality, there will be no error message. Note that protruding data will be clipped to the upper-limit values.

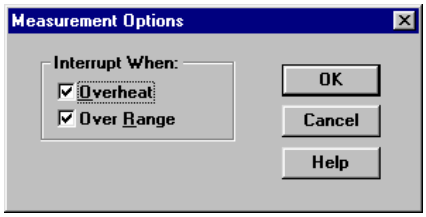
Overheat

When the HA01 has found overheat problem, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it.

For more information about error messages, see the Appendix at the last of this document. How to enable/disable Over Range and Overheat functionality is described at the next section.

Measurement Options

This allows you to set options about measurement. These option are set separately from test conditions. To set the options, select **Options | Measurement** menu. Then the Measurement Options dialogue will appear.

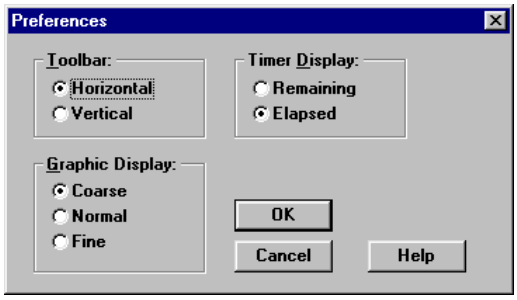


Interrupt When

Checking **Over Range** enables you to abandon measurement when a peak current that exceeds the current upper-limit has been generated. Checking **Overheat** enables you to abandon measurement when an overheat problem has been generated.

Other Options

Options other than about measurement can be configured as **Preferences**. These options are also set separately from test conditions. To set the options, select **Options | Preferences** menu. Then the **Preferences** dialogue will appear. In this dialogue, you can set toolbar location, how to jump among frames, and measurement time display.



Toolbar location

Sets the location of the toolbar to **Horizontal** (top on the screen), or **Vertical** (left of the screen).

Graphic Display

Sets resolution of graphics display to one of Coarse, Normal, and Fine. We will describe about this topic in the next chapter "VF-Analyzer - Analysis."

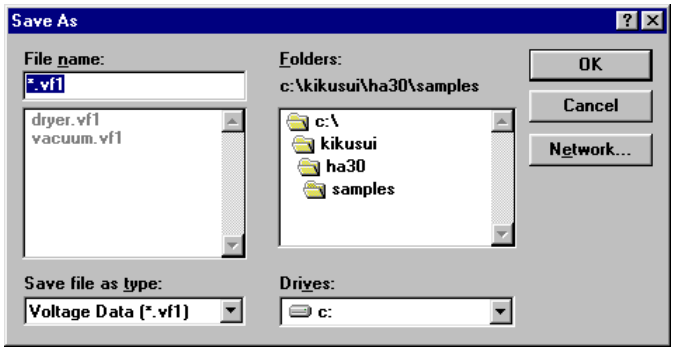
Timer Display

Sets the timer display during measurement progression to **Remaining Time** or **Elapsed Time**.

Save Data

VF-Analyzer allows you to save measurement data on the hard disk. In data files, not only measurement data, test conditions, and operator information are also saved. Saving measurement data in a file, you can analyse the data in later time. Options such as overheat or over range, however, are not included in the data file since these are not actually measurement data but operation environment of VF-Analyzer.

To save data, select **File | Save** or **File | Save As** menu. A dialogue box that prompts you to decide a file name might appear. Then decide an appropriate file name. The file name must be within 8 characters following the rule of DOS/Windows file system. Default extension of the file name is VF1.



Data File Size

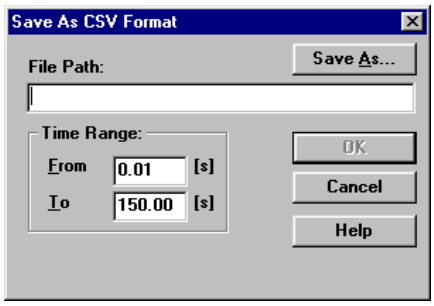
When you save your measurement data file, you might have to pay attention how much disk space is required for a data file. Actually, the size of a data file depends on test conditions (especially settings of HA01). The following table shows examples of file size for several typical measurement conditions. Every case includes the maximum numbers of markings

Test Conditions	File Size
Frequency=50Hz Measurement Time=150 seconds	181,120 bytes
Frequency=60Hz Measurement Time=150 seconds	217,120 bytes

Comparing the case of DynaLinzo, the amount of necessary file capacity is not so large. And eliminating all the markings can only reduce 960 bytes for each data file.

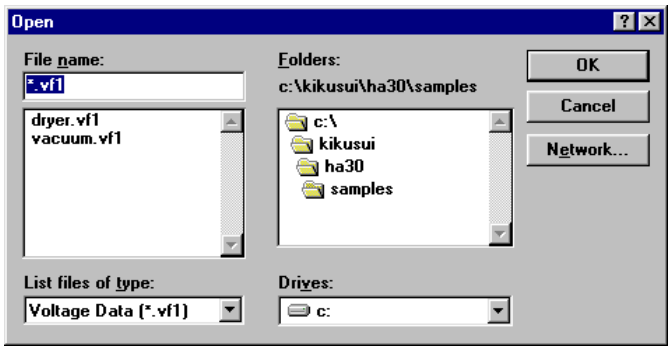
Generating CSV Files

VF-Analyzer allows you to generate Voltage Shape U(t) data as CSV files which can be read by other spread sheet applications such as Microsoft Excel or Lotus 1-2-3. To generate a CSV file, first bring the **Voltage Shape U(t)** window to the front and select **File | Save As CSV Format** menu. Then a dialogue box which prompts you to decide CSV file name and time range for the voltage shape data.



Open An Existing Data

You can read and analyse an existing data file after measurement. To open a file, select **File | Open** menu. Then a dialogue box that prompts you to decide a file name appears. Then select an appropriate file name from the list. After opening the file, the measurement data will be displayed on the screen as well as after measurement.



Chapter 6 VF-Analyzer - Analysis

Unlike fluctuating harmonics analysis, you have to do most things all by yourself in voltage fluctuation analysis. However, it is not true that you need to do all the troublesome calculations yourself. Since indispensable data portions for analysis cannot be identified by the VF-Analyzer itself, you have to specify these portions manually.

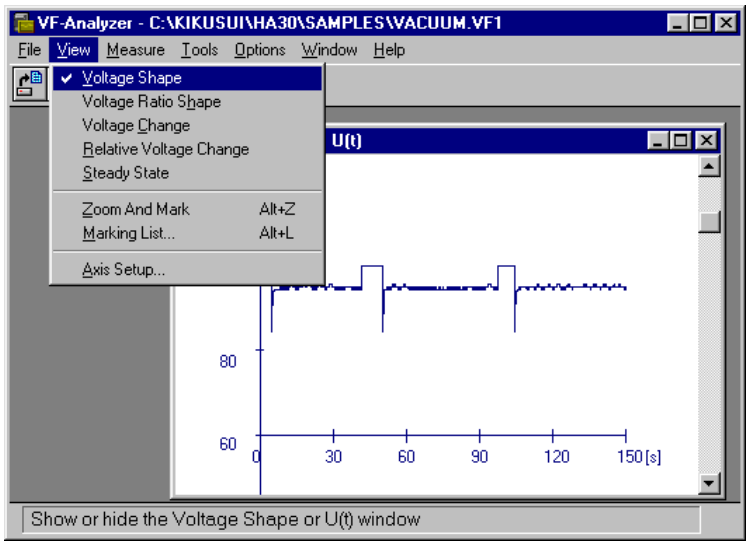
This operation by hand is called **marking** and you only need to mark one or more indispensable portions as necessary. Which portion you should mark is, however, very important. You have to understand contents of each window type shown in VF-Analyzer. So we explain types of windows on which data is displayed first, and then we discuss about **marking** in detail.

Types Of Windows

Here, we discuss about types of windows displayed in the VF-Analyzer and how to operate them. In the VF-Analyzer, there are five kinds of windows and some are displayed some are not as default.

- Voltage Shape U(t) Window
- Voltage Ratio Shape U(t)/U_N Window
- Voltage Change delta U(t) Window
- Relative Voltage Change d(t) Window
- Steady State Window

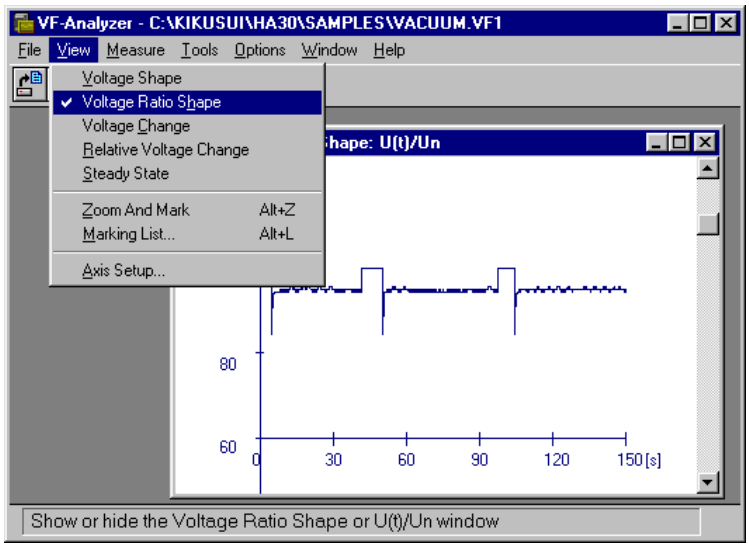
Voltage Shape U(t) Window



This window represents transition of voltage rms values for both positive and negative. Placing the mouse cursor on the graph screen, a set of data on the mouse cursor location will be displayed on the status line, which is in turn shown at the bottom of the application screen. Listed below are data contents shown on the status line:

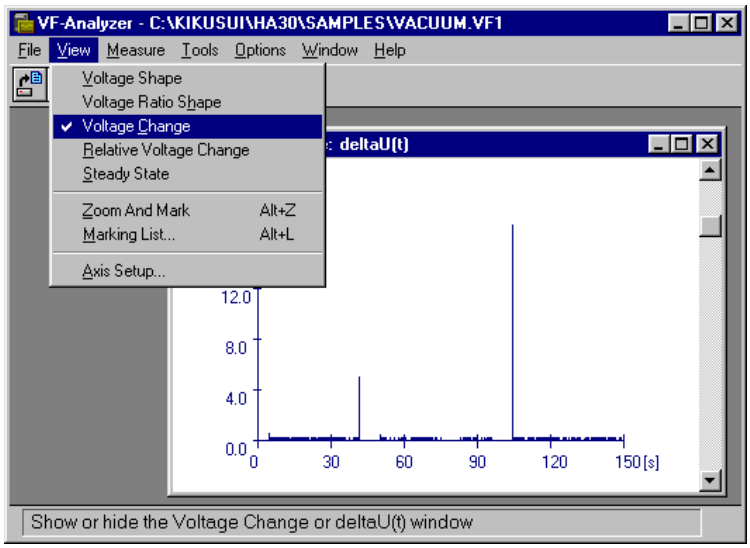
- **Time** = Time on the mouse cursor location
- **Data** = Graph Data on the mouse cursor location (voltage rms of half-wave)
- **Vrms** =voltage rms of full-wave
- **Irms** = current rms of full-wave
- **Ipk** = maximum current value in entire full-waves
- **Power** =power of full-wave

Voltage Ratio Shape U(t)/U_N Window



This window represents transition of voltage ratio (rms voltage / nominal voltage) values for both positive and negative. Other than graphic contents are exactly the same as Voltage Shape U(t) window.

Voltage Change delta U(t) Window

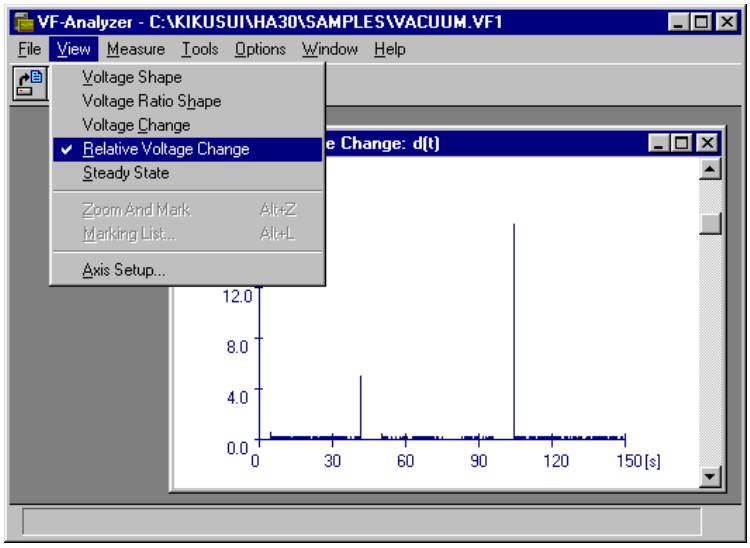


This window represents differences between adjoining data points of above mentioned **Voltage Shape** data as absolute values. Placing the mouse cursor on the graph screen, a set of data on the mouse cursor location will be displayed on the status line.

Listed below are data contents shown on the status line:

- **Time =** Time on the mouse cursor location
- **Data =** Graph Data on the mouse cursor location (differences of each half-wave voltage rms)
- **Vrms =**voltage rms of full-wave
- **Irms =** current rms of full-wave
- **Ipk =** maximum current value in entire full-waves
- **Power =**power of full-wave

Relative Voltage Change d(t) Window

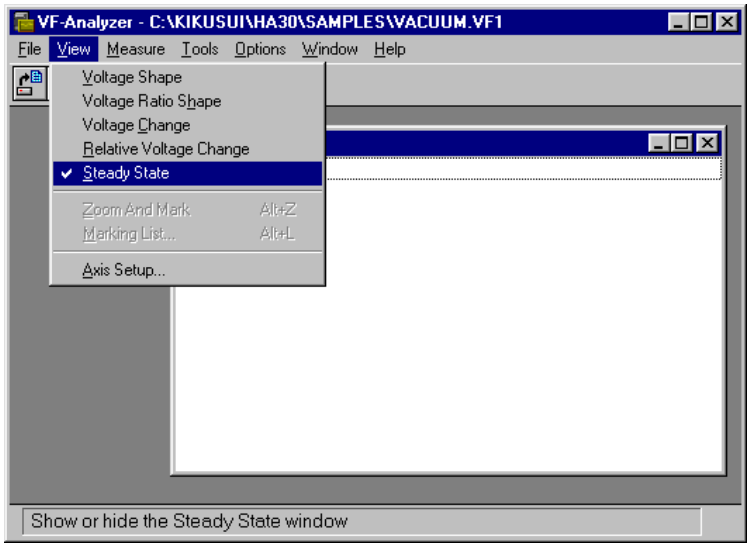


This window represents relative values of above mentioned **Voltage Change delta U(t)** graph. Actually, data displayed on it are values of Voltage Change divided by nominal voltage (or voltage actually measured). Placing the mouse cursor on the graph screen, a set of data on the mouse cursor location will be displayed on the status line.

Listed below are data contents shown on the status line:

- **Time =** Time on the mouse cursor location
- **Data =** Graph Data on the mouse cursor location (relative differences of each half-wave voltage rms)
- **Vrms =**voltage rms of full-wave
- **Irms =** current rms of full-wave
- **Ipk =** maximum current value in entire full-waves
- **Power =**power of full-wave

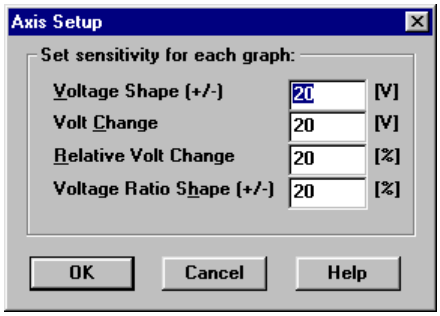
Steady State Window



This window represents a list of **Steady State** data. However, nothing will be shown immediately after measurement. Every item can be shown only when at least one marking that will be discussed after the next section has been set. In addition, placing the mouse cursor on this window doesn't represent any status line display.

Axis Setup

You can set Y-axis of all the graphs other than Steady State window. Selecting **View | Axis Setup** invokes **Axis Setup** dialogue box prompting you to enter appropriate values for each graph individually.



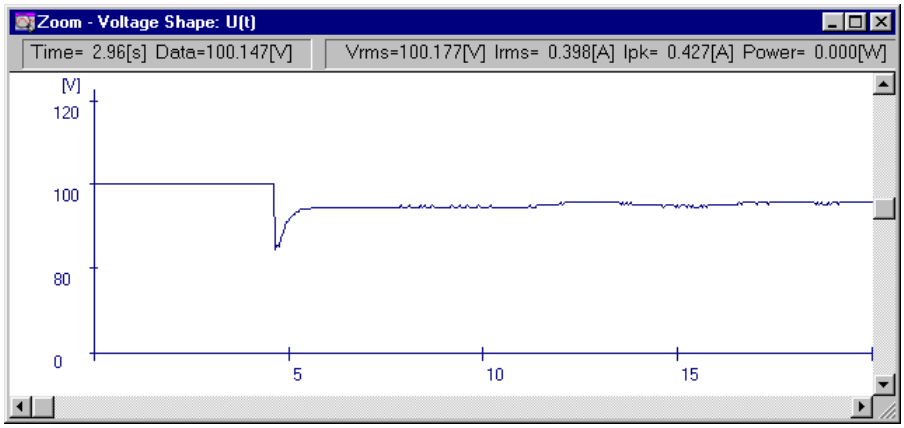
Zoom And Mark

So far, we explained that fundamental graph windows displayed in the VF-Analyzer are Voltage Shape, Voltage Ratio Shape, Voltage Change, Relative Voltage Change, and Steady State. As for **Voltage Shape, Voltage Ratio Shape**, and **Voltage Change**, there is also a **Zoom** functionality.

Using the **Zoom** functionality, up to 150 seconds of measurement data crammed into a narrow screen can be expanded horizontally (or along with the Time axis). This zoomed window is called **Zoomed Window**. Do not forget that an important mission called "**marking**" is waiting for you in the zoomed window. It is an indispensable work to decide which portions must be paid attention to analyse voltage fluctuation. Actually, no markings can result no voltage fluctuation analysis. From the next section, we discuss about how to operate zoomed windows and how to set markings.

Displaying Zoomed Window

To display a zoomed window, first activate a base window into which data is crammed and select **View | Zoom And Mark** menu. Then a zoomed window that is little bit longer horizontally than other windows will appear.



Data in a zoomed window will be represented on the ribbon (grey area aligned at the top of the window) instead of status line. The contents of data are exactly the same as that of base window. Although zoomed window cannot display entire data of 150 seconds at a time since its x-axis is expanded beyond VGA screen width, operating the horizontal scroll bar allows you to view entire scope.

Note:
What can be zoomed are **Voltage Shape U(t), Voltage Ratio Shape U(t)/U_N** and **Voltage Change delta U(t)** windows.

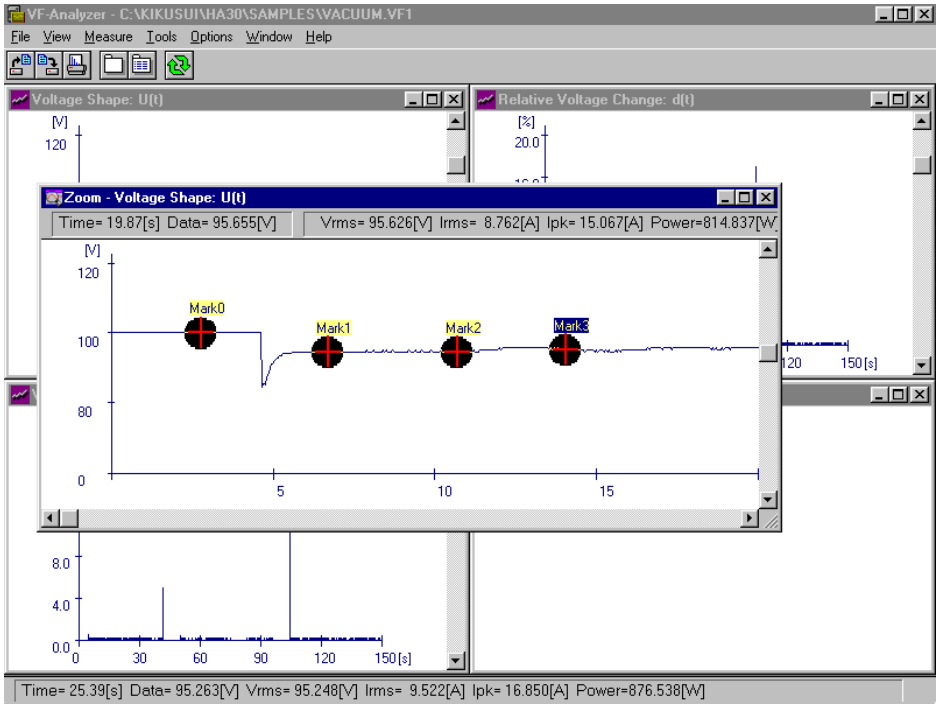
Marking

In voltage fluctuation analysis, not entire scope of data has to be analysed and totalled. Giving focuses only to data portions you want to watch and marking them, you collect and total for analysis picking them up. It is also true as for analysis reports finally output. Which portion should be marked has to be decided by yourself.

Since you can mark on a zoomed window, you can set markings on the **Voltage Shape U(t)** window, **Voltage Ratio Shape U(t)/U_N** window, and **Voltage Change delta U(t)** window. The maximum number of markings is 20 (No.0 through No.19) for each zooming. Note that meanings of marking on each zoom window are slightly different. So now we explain about difference among targets.

Marking Of Voltage Shape U(t)

In marking of **Voltage Shape**, markings themselves exactly make data of **Steady State**. For example, if you have marked four points, each three adjoining difference will be displayed on **Steady State** window.

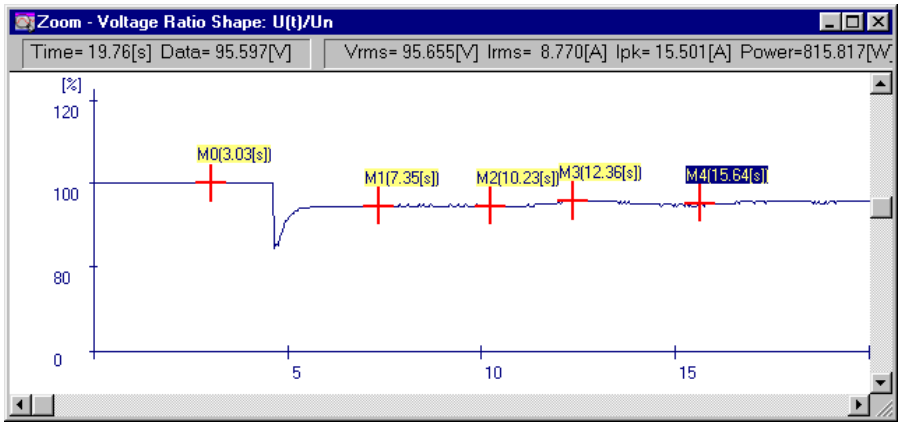


In this window, since markings must be done to get **Steady State** data, you should not mark groundless portions. Instead, you have to mark portions that voltages are stable and flat on the graph.

Contents represented in **Steady State** are voltage differences by these markings. Each data includes corresponding marking number, time difference, and voltage difference. In addition, note that voltage data of a marking is not a centre value but a mean value among ±0.5 seconds from the centre. The ±0.5 second area is the same width of a circle marking shape. The width of a circle shape is equivalent to 1 second.

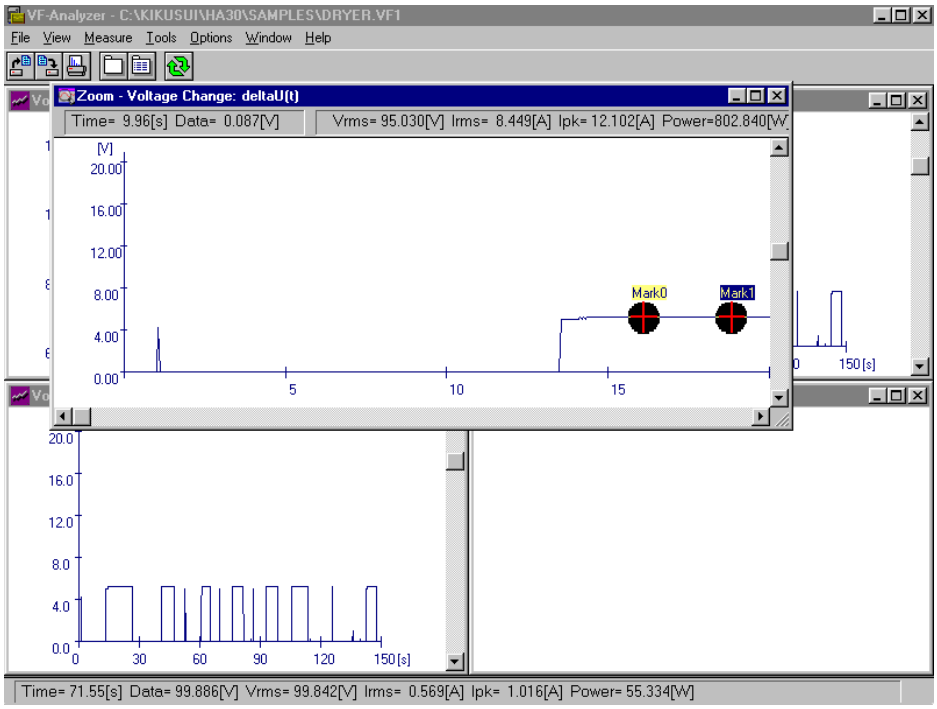
Marking Of Voltage Ratio Shape U(t)/U_N

In marking of **Voltage Ratio Shape**, markings are just results of the final analysis report. Data differences between each marking are also calculated.



Marking Of Voltage Change delta U(t)

In marking of **Voltage Change**, markings are just results of the final analysis report and no differences are calculated. So you can mark any portion as you like. In addition, note that voltage data of a marking is the centre value.



How To Set Markings

To add a marking, click the left button of the mouse on a zoomed window. Then a circle-shaped marking will appear with its ordinary number. To delete it, click the right button of the mouse on the marking you want to cancel.

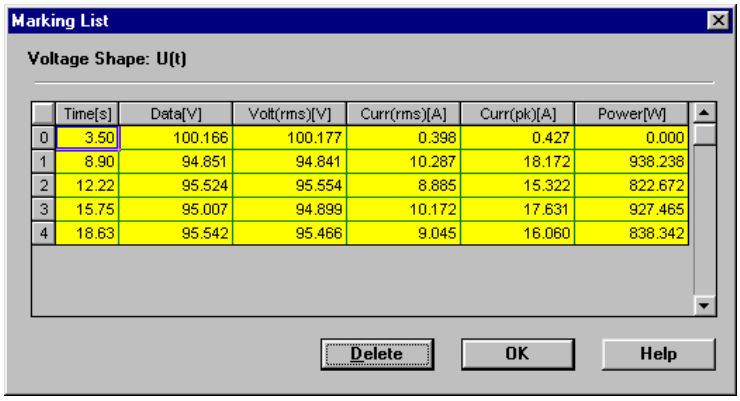
If you are marking on **Voltage Shape U(t)** or **Voltage Change deltaU(t)**, you cannot place another marking on very adjacent places around existing marking. In this case, the existing older marking will be replaced with the newer one. For example, if you have marked at a very close portion from the existing marking labelled *Mark0*, the new marking will be *Mark0* disposing of the existing marker. Actually, two markings that have a time difference 1 second or less are inferred as close or overlapped. It is convenient that each marker shape has an equivalent width to 1 second.

If you are marking on **Voltage Ratio Shape U(t)/U_N**, markings, the markings can be placed at any location unless placing on existing positions, also up to 20 markings.

If the aim of marking point has been fallen, you can fine-adjust the location with the **Left Arrow** and **Right Arrow** keys on the PC keyboard. In this operation, a marking that can be fine-adjusted is called **focused marking**. The focused marking is one with a highlighted number label. Normally a marking that has been added latest is focused. To move the focus to another, press **Tab** or **Shift + Tab** key.

Marking List Display

You can view all the existing markings as a list format. To show the marking list, activate the base window and then select **View | Marking List** menu. Then a **Marking List** dialogue will appear.

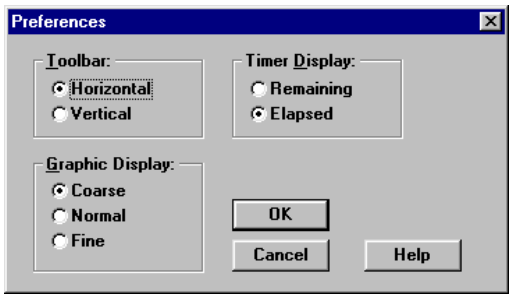


Graph Resolution Setup

The resolution of graphic display can be changed. Setting the resolution to **Coarse** makes graphs be able to draw quickly, however, peak components such as glitches might not be shown correctly. Setting the resolution to **Fine** makes graphs be able to show peak components correctly, however, display speed becomes slow. Listed below are characteristics on these resolution settings:

Setting	Display Resolution	Quickness	Accuracy
Coarse	1 pt in every 5 pts	Quick	Bad
Normal	1 pt in every 3 pts	Normal	Normal
Fine	All points	Dull	Good

To change setting of resolution of graphics display, select **Option | Preference** menu. Then you can also change toolbar location, timer display.



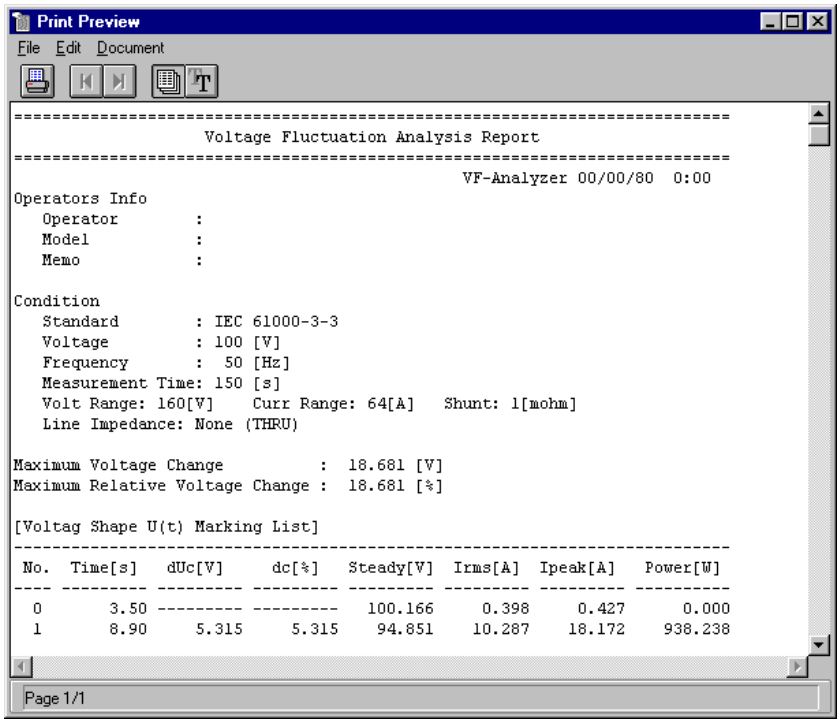
Printing

VF-Analyzer allows you to print out contents of window display and a final report of voltage fluctuation analysis.

Print

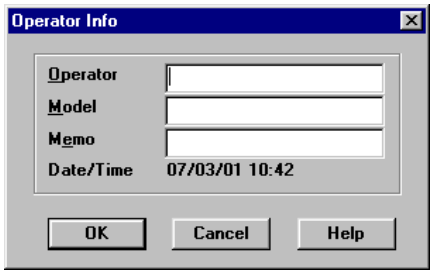
Printing items are divided into two types, **Analysis Report** and **Graphs**. Selecting **File | Print** menu, you can see the **Print What** dialogue box that prompts you to select what you are about to print. Select items from the contents, you can easily print out one or more items with one action.

If you have selected an analysis report, the printing is not executed soon but a **Print Preview** window appears instead. If needed, you can choose a printing font for report printings. Note that available fonts listed in the **Font Selection** dialogue are TrueType, fixed-pitch fonts only. To print the report, just select **Print** menu.



Operator Information

As additional items for the report printings, you can append information about an operator. Choose **File | Operator Information** menu. Then the following **Operator Info** dialogue appears and fill out each item.



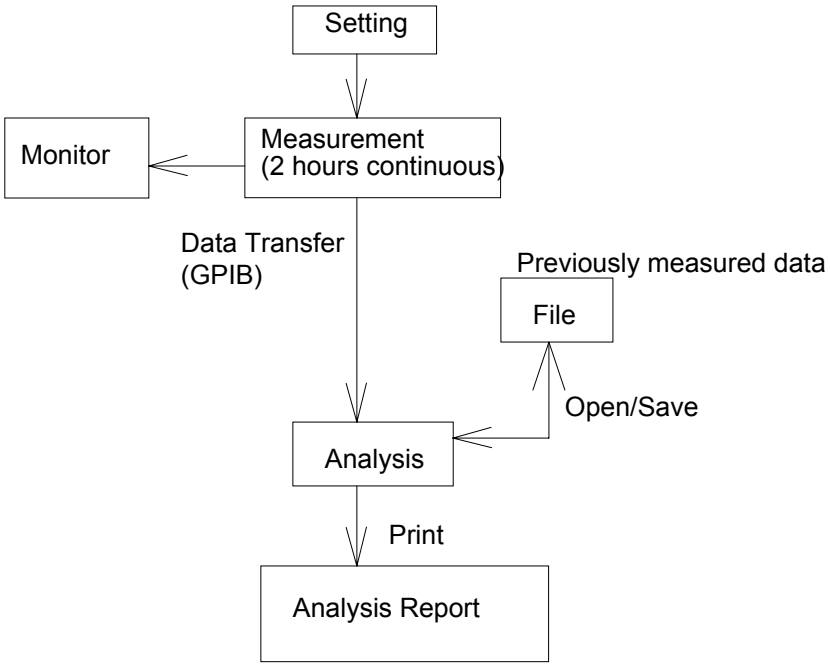
Notes:
If you have not installed any printer driver yet, you should install it using **Control Panel** program placed in the **Main** folder of **Program Manager**.

The final **Analysis Report** is formatted as A4 (210 x 297mm) or Letter (8.5 x 11in) in portrait orientation. Printing on smaller papers than these makes your printouts cross two or more pages and is not recommended.

Chapter 7 - Flicker Analyzer

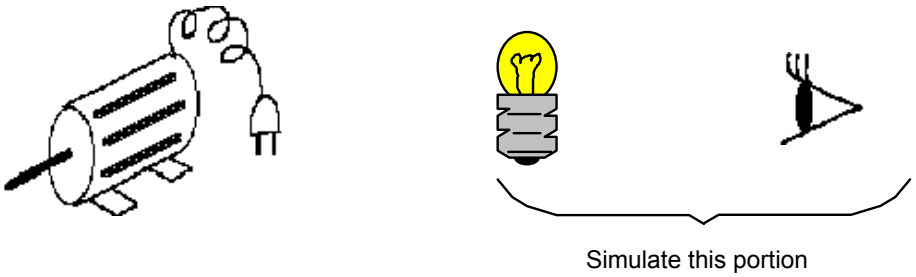
Overview

The Flicker Analyzer is an application software that measures and analyses flicker values using an integrated system consisting of PCR-L AC Power Supply, Line Impedance Network, and an HA01F-PCR-L unit. This application can measure flicker data and display it not only during measurement but also after measurement has been done. These measured data also can be printed out, saved, and retrieved to/from the disk.



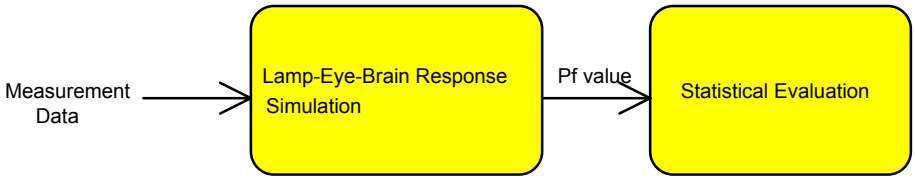
This program measures flickers generated from a device to be tested using a flicker meter that complies with IEC-868 and IEC-868-0 standards and calculates short period flicker values (**Pst**) and a long period flicker value (**Plt**). How much obstacle or flicker of lights is to be affected can be numericalized.

Generally, when operation state of an instrument changes, for example, starting a motor suddenly or turning a heater on, the volume of current suddenly changes too, in turn the supply voltage changes thereby lighting equipment flickers. The Flicker Analyzer is an application program that analyses these flickers considering human's sight characteristics or lamp-eye-brain response. The software analyses obstructions caused by sudden current variance and evaluates your devices or products with compliance with the IEC-61000-3-3 standard.



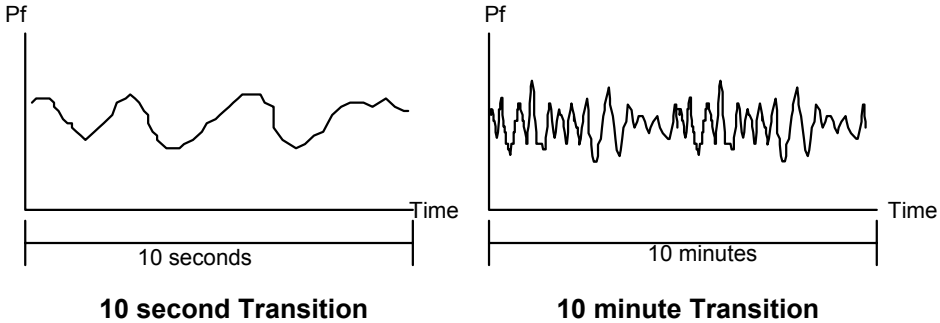
The operation block of this program is roughly divided into following two blocks and results from the Simulation Block are **PF** values.

- Simulation Block that numericalizes measured data simulating sight characteristics of human's eyes. (Included in HA01 unit)
- Statistical Evaluation Block that does statistical transaction and evaluates measured data.



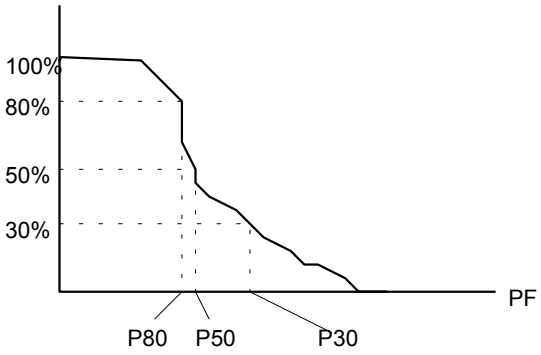
Measurement Progression

In the Flicker Analyzer application, PF values in measurement will be displayed on time transition graphs. Note that there are two types of graphs **10 second transition** and **10 minute transition** that display a 10 second **Frame** and a 10 minute **Segment** respectively. **Frame** and **Segment** are terminology defined in this application but the IEC standard. A frame is a block of 10 second duration in a series of data and a segment is a block of 10 minute duration. The **10 second transition** represents measured data in a frame and **10 minute transition** represents measured data in a segment allowing you to view gentle variance of flicker data.



10 second Transition **10 minute Transition**

The program also draws a histogram chart that totals measured P_F values. This characteristic is called **Cumulative Probability** in the IEC standard. This graph will continue to grow in every 10 second while measurement progresses. The system calculates a Pst (short period flicker value) in every 10 minute duration has been elapsed. If there are more than one segment in a measurement, corresponding Pst values for each segment will be calculated. For instance, if you do a 2 hour measurement, twelve Pst values must exist.



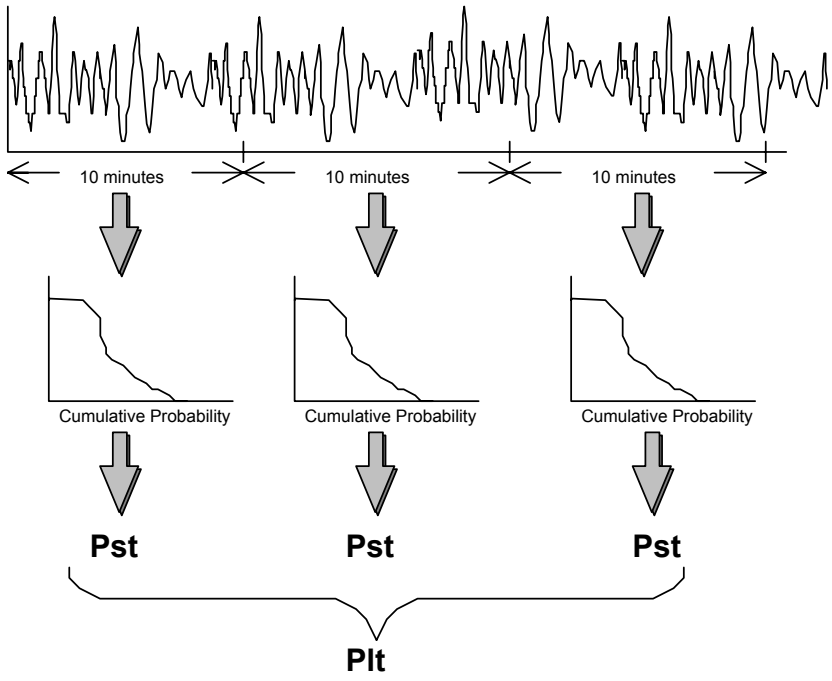
Cumulative Probability Graph

A Pst value is calculated with the following formula from flicker values (such as P80, P50, P30, ...P0.1) corresponding each percentage for the cumulative probability.

$$P50s = (P30 + P50 + P80)/3$$
$$P10s = (P6 + P8 + P10 + P13 + P17)/5$$
$$P3s = (P2.2 + P3 + P4)/3$$
$$P1s = (P0.7 + P1 + P1.5)/3$$
$$Pst = \sqrt{0.0314\,P0.1 + 0.0525\,P1s + 0.0657\,P3s + 0.28\,P10s + 0.08\,P50s}$$

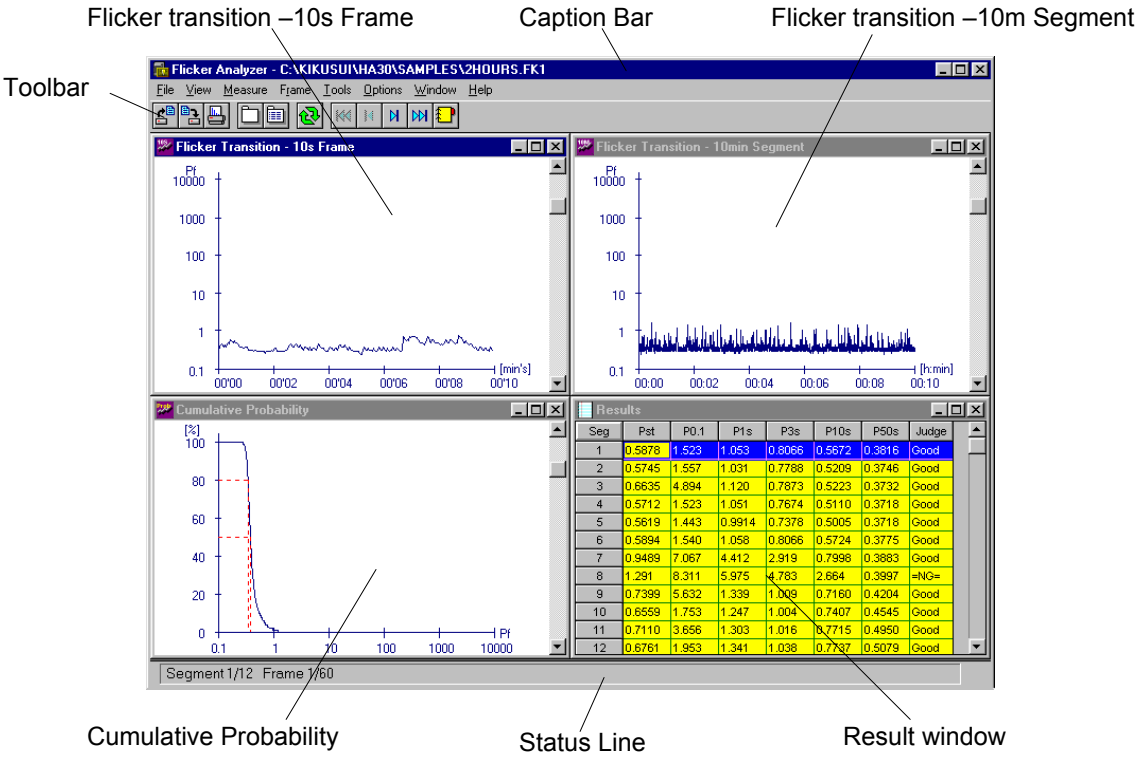
Only one Plt (long period flicker) value exists in a unit of measurement data. To get the Plt value, furthermore, this system calculates a cube root of average of cubed Pst values for each 10 minute:

$$Plt = \sqrt[3]{\frac{Pst^3 + Pst^3 \ldots Pst^3}{N}}$$



Run Flicker Analyzer

To run the Flicker Analyzer, double-click Flicker Analyzer icon from the Program Manager. Then the initial screen of Flicker Analyzer appears and then **Startup** dialogue box will appear. Here you can either begin a new measurement or open an existing data file. Or, you can return to the default screen of Flicker Analyzer closing the dialogue with the Cancel button. Described below are the default contents of the Flicker Analyzer initial screen.



Flicker Transition - 10s Frame

This window represents transition characteristics in a 10 second frame.

Flicker Transition - 10min Segment

This window represents transition characteristics in a 10 minute segment.

Cumulative Probability

This window represents probability characteristic in a 10 minute segment. The content of the graph synchronises to above mentioned Flicker Transition 10min Segment window.

Results

This window shows results of analysed Pst and Plt values.

Caption Bar

Title of the window. Actually, a file path name associated with measurement data is shown. If no file name is assigned, the title will be "Untitled."

Toolbar

Menu commands that are frequently used are arranged. See the on-line help for more detail about each button.

Status Line

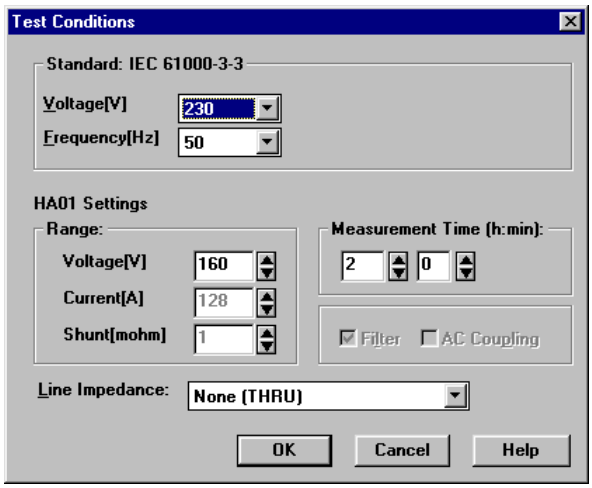
Actual time for data measurement is shown on it.

Now you can measure and analyse fluctuating harmonics current. Every window illustrated in the above picture is fundamental and shown as default when startup time of Flicker Analyzer.

Chapter 8 Flicker Analyzer - Measurement

Test Condition Settings

What you should do first for measurement is set each item about how to measure. Every item cannot be changed after the measurement is done. The test condition setting has to be done on the **Test Condition** dialogue box.



Select the **Measure | Test Conditions** menu. Then the **Test Conditions** dialogue will be shown. Items in the test conditions are roughly divided into two parts as described in subsequent sections.

- Standard Settings
- HA01 Settings

Standard Settings

As standard settings, you specify a standard that is applied to your measurement and analysis.

Voltage

As a nominal voltage of device to be tested, choose from the following. There is no special meaning for measurement to set voltage other than for contents of final analysis reports.

- 100V
- 200V
- 230V

Frequency

As a nominal frequency of device to be tested, this program fixes the frequency setting to 50Hz.

HA01 Settings

Sets items for measurement, or settings of HA01 unit. These settings cannot be changed after measurement.

Range

Select a range setting on **Voltage(rms)** of the HA01 unit. Valid ranges are described in the following table. Other settings such as **Current(peak)** and **Shunt Resister** are fixed in this application and cannot be changed. Make sure to correctly set the short-bar of the **Current Range Selector** or cabling of the **Current Sensor** of the HA01 unit for Shunt Resister setting.

Item	Range
Voltage [Vrms]	20, 40, 80, 160, 320, 600
Current [Apeak]	Fixed to 128
Shunt Resistance [mΩ]	Fixed to 1

Measurement Time

Sets the measuring time. Valid setting is between 10 minutes and 24 hours in 10 minute unit, or 5 minutes or 1 minute. Since 5 minute and 1 minute measurements are applicable only to trial use, you should not select such short time operation if you want to get final analysis reports.

Filter

Sets the use of anti-aliasing filter. In the flicker analysis, you cannot set this item and it is always enabled.

AC Coupling

Sets the input coupling to AC or DC. In the flicker analysis, you cannot set this item and it is always disabled.

Line Impedance

Select impedance setting for the Line Impedance Network. Note that you are still responsible for setting line impedance, since the application doesn't set it automatically. The information of this setting is used only for final analysis reports and there is no meaning else. For information about line impedance settings, see "Appendix 1 - Setup For Line Impedance Network".

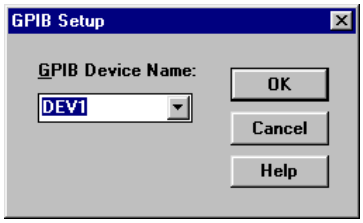
Start Measurement

After the preparation has been done, you can start measurement. To begin the measurement, the HA01 unit needs to be controlled through the GPIB. So if it is the first time to connect GPIB, you might need to confirm that GPIB environment is configured properly.

GPIB Setup

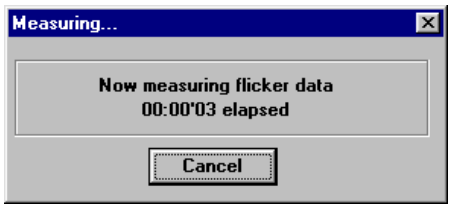
To connect an external GPIB instrument such as HA01 unit, first you must specify a GPIB device just like specifying an MS-DOS file name. The application software communicates with an external instrument through the GPIB with a device name. So if you are the first time to use GPIB functionality in the application, you have to set up the GPIB environment.

To confirm or change the GPIB setting, select **Options | GPIB Setup** menu. Then **GPIB Setup** dialogue will appear prompting you to enter a GPIB device name. Note that what you should enter here is a GPIB device name instead of its address. **GPIB Device Name** is normally configured by the driver of National Instruments GPIB. Immediately after the installation of this system, the default device name is "DEV1." The National Instruments GPIB driver also defaults device names "DEV1" through "DEV16" with which device address 1 through 16 are associated for each. So typically, the GPIB address of HA01 will be okay if it is set to 1. However, note that it might differ depending on the configuration of GPIB environment.



Start Measurement

To begin the measurement, select **Measure | Run** menu. Once the measurement has started, either elapsed time or remaining time will be indicated in a popup dialogue. If you want to suspend the measurement due to some reason, you can just click the Cancel button to stop it.



Unlike DynaLinzo and VF-Analyzer applications, there is no functionality of external trigger on the Flicker Analyzer. Applying a trigger signal onto the **EXT TRIG** terminal causes not only meaningless operation, but also breaks measurement session itself. So you should not apply any external trigger signals during flicker measurement.

This program downloads flicker data in every 10 second while the measurement is running. Displayed in windows are the latest data that correspond to measurement progress.

Begin A New Measurement

There are several ways to perform a new measurement after previous measurement is already done.

Measurement With The Same Condition As Previous

In this case, you can just start the next measurement as well as the first time. After measurement has started, data will be downloaded and displayed. However, the existing data will be lost since the new data is overwritten.

Measurement With Changing HA01 Settings

If you want to restart measurement changing HA01 settings such as Range, or Measurement Time, you need to clean up exiting data once. Flicker Analyzer never recognises to change HA01 settings holding measured data. This avoids disagreement between existing data and HA01 settings. Therefore, it is necessary to clean up existing data once.

To clear the existing data, select **Measure | Clear Data** menu. And then select **Measure | Test Conditions** menu to change the HA01 settings. After changing conditions, you can just start the new measurement.

Measurement From Scratch

In this case, select **File | New** menu. The **Test Condition** dialogue will appear returning all the test conditions to default. In addition, associated file name also changes to "Untitled."

When Abnormal Measurement Termination

Flicker Analyzer will abandon measurement when the system has been encountered with one of the following events:

- GPIB Line Problem
- Synchro-Cable Problem among PCR-L and HA01
- Over Range
- Overheat

GPIB Line Problem

If an abnormality has been generated on the GPIB line (for instance, when the cable has been disconnected or when the supply of HA01 has been suspended), measurement will be suspended displaying an error message.

Synchro-Cable Problem among PCR-L and HA01

A synchronisation clock signal must be always applied from the PCR-L AC supply to the HA01 unit in order to measure harmonics accurately. This signal is very important and associated with measurement essentially. If the synchronisation cable has been disconnected, measurement will be suspended displaying an error message.

Over Range

The Current Range is set as a part of HA01 test conditions. If measured data that exceeds the upper-limit range is generated, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it. However, if an over range problem has been generated disabling this functionality, there will be no error message. Note that protruding data will be clipped to the upper-limit values.

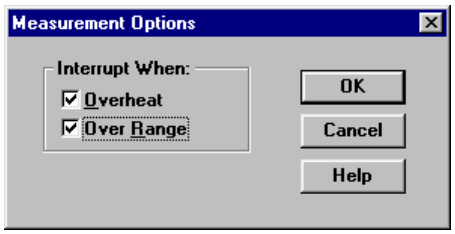
Overheat

When the HA01 has found overheat problem, measurement will be suspended displaying an error message. This functionality can be disabled if you don't need to use it.

How to enable/disable Over Range and Overheat functionality is described at the next section.

Measurement Options

This allows you to set options about measurement. These options are set separately from test conditions. To set the options, select **Options | Measurement** menu. Then the **Measurement Options** dialogue will appear.



Interrupt When

Checking **Over Range** enables you to abandon measurement when a peak current that exceeds the current upper-limit has been generated. Checking **Overheat** enables you to abandon measurement when overheat problem has been generated.

All of the settings described above are enabled as the install default. And changes will be preserved for use of next time you start up Flicker Analyzer.

Other Options

Options other than about measurement can be configured as **Preferences**. These options are also set separately from test conditions. To set the options, select **Options | Preferences** menu. Then the **Preferences** dialogue will appear. In this dialogue, you can set toolbar location, how to jump among frames, and measurement time display.

Toolbar location

Sets the location of the toolbar to **Horizontal** (top on the screen), or **Vertical** (left of the screen).

Timer Display

Sets the timer display during measurement progression to **Remaining Time** or **Elapsed Time**.

Save Data

Flicker Analyzer allows you to save measurement data on the hard disk. In data files, not only measurement data, test conditions, and operator information are also saved. Saving measurement data in a file, you can analyse the data in later time. Options such as overheat or over range, however, are not included in the data file since these are not actually measurement data but operation environment of Flicker Analyzer.

To save data, select **File | Save** or **File | Save As** menu. A dialogue box that prompts you to decide a file name might appear. Then decide an appropriate file name. The file name must be within 8 characters following the rule of DOS/Windows file system. Default extension of the file name is FK1.

Data File Size

When you save your measurement data file, you might have to pay attention how much disk space is required for a data file. Actually, the size of a data file depends on test conditions (especially settings of HA01 unit). The following table shows examples of file size for several typical measurement conditions.

Test Conditions	File Size
Measurement Time=2 hours	409,312 bytes
Measurement Time=24 hours	4,909,984 bytes

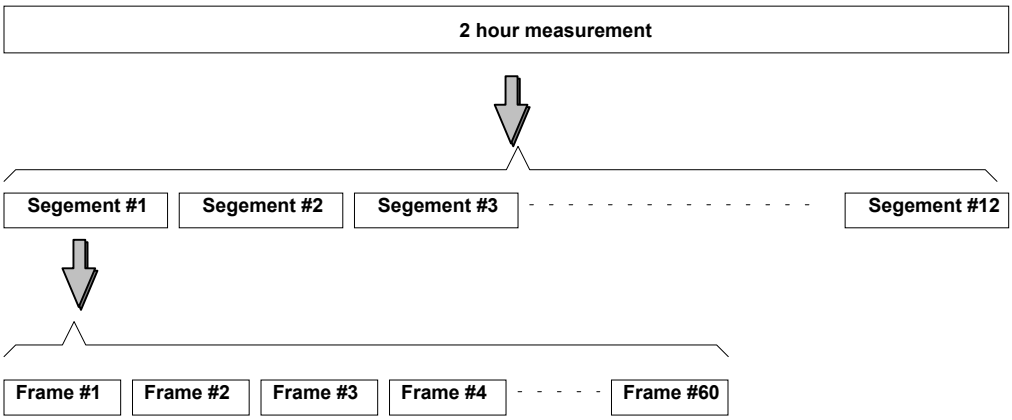
Open An Existing Data

You can read and analyse an existing data file after measurement. To open a file, select **File | Open** menu. Then a dialogue box that prompts you to decide a file name appears. Then select an appropriate file name from the list. After opening the file, the measurement data will be displayed on the screen as well as after measurement.

Chapter 9 Flicker Analyzer - Analysis

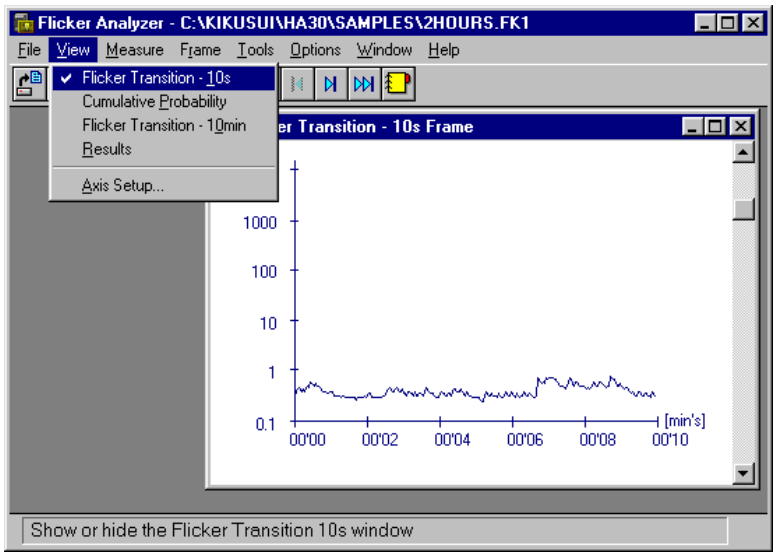
Browsing Segments/Frames

Measured data from the Flicker Analyzer is administrated by 1-minute blocks (segments) and 10-second blocks (frames) hierarchically. If you do a 2 hour (or 120 minute) measurement, for example, there are 12 segments in it and one segment has 60 frames. The following picture shows how 2 hour measurement data is analysed. Note that number of segments in a measurement data differs depending on measurement time, whereas number of frames in a segment is always 60. (With the exceptions of 1 minute and 5 minute measurements.)



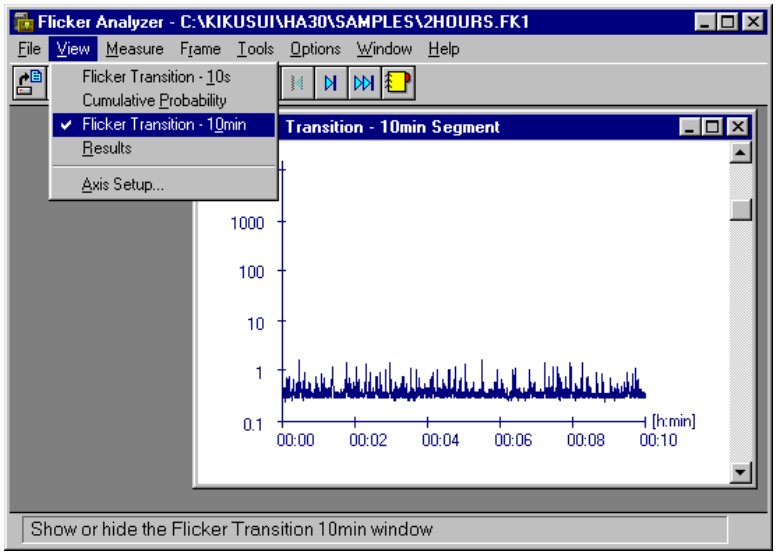
Four types of windows displayed in the application have a different concept about time base. **Flicker Transition - 10s Frame** window displays transition characteristics of one-frame contents. **Flicker Transition - 10min Segment** and **Cumulative Probability** windows correspond to one-segment contents. The former represents transition characteristics and the later represents distribution status. In contrast, the **Results** window represents statistical results of entire measurement data. Now we explain about the contents of each window in more detail.

Flicker Transition - 10s Frame



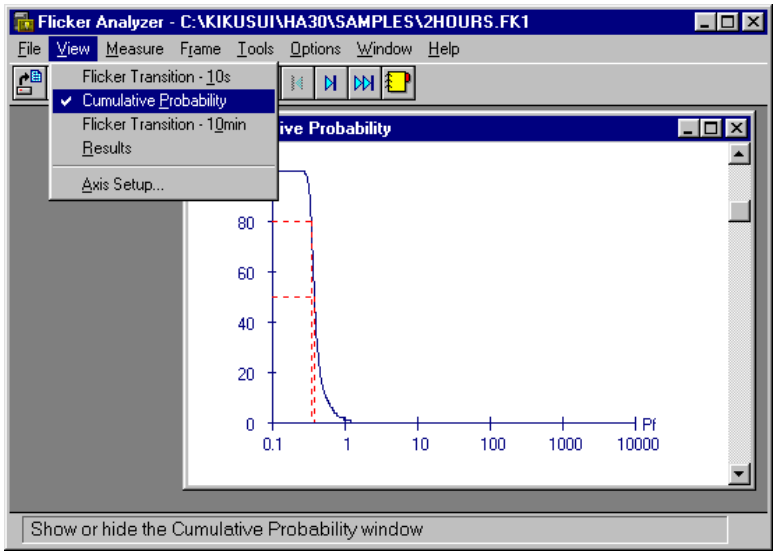
This window represents transition of PF values in a frame. The X axis indicates time elapsed from the beginning of the measurement, and the Y axis indicates the PF values. However, the X axis (time axis) displays only minute and second units but hour units. Be careful when you read the X axis if you do measurement more than one hour.

Flicker Transition - 10min Segment



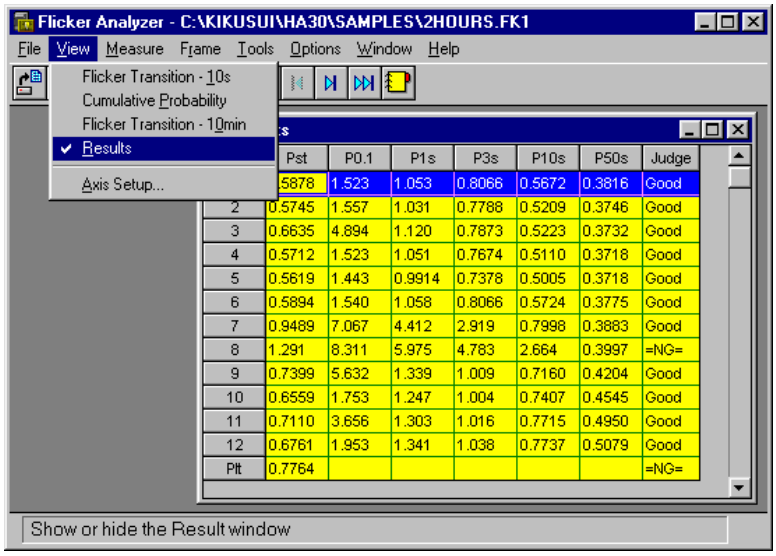
This window represents transition of PF values in a segment. The X axis indicates time elapsed from the beginning of the measurement, and the Y axis indicates the PF values. However, the X axis (time axis) doesn't display second unit portion.

Cumulative Probability



This window represents distribution status (cumulative probability) of PF values in a segment. This is not simply a histogram but a histogram that contains cumulated data. The X axis indicates PF values and Y axis shows frequency of corresponding data in a segment. In addition, the 50% and 80% marker lines are also displayed.

Results

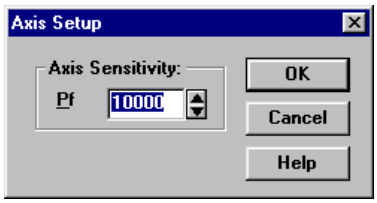


This window displays statistical results of entire measurement data in a list format. Each line of the list represents result data such as Pst corresponding each segment. Furthermore, the final Plt value is also shown at the last line of the list.

Note:
Items in the judge column in the list are shown only when a 10 minute or longer measurement has been completely done. No data will be displayed if you do a one minute or five minute measurement.

Axis Setup

As for **Flicker Transition 10s Frame**, **Flicker Transition 10min Segment**, and **Cumulative Probability** windows, you can change the setup for graph axes. Choosing **View | Axis Setup** menu, the **Axis Setup** dialogue will appear. Then select an axis value for Pf values. You can select one from within 10, 100, 1000, and 10000. In **Flicker Transition 10s Frame** and **Flicker Transition 10min Segment**, the setting of Y axis changes. And in the **Cumulative Probability** window, the setting of X axis changes.



Frame And Segment

As for windows that are corresponding to **frame** or **segment** described so far, the portions currently displayed (or focused) can be moved. You can browse frames and segments currently visible forward and backward, as if you would turn pages over on a book.

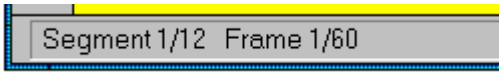
Browsing Frames

Choose **Frame | Previous Frame** or **Next Frame**. Then you can change the active frame actually shown in the **Flicker Transition 10s Frame** window. (To operate them, it is easier to use the **PageUp** and **PageUp** keys and the toolbar.)

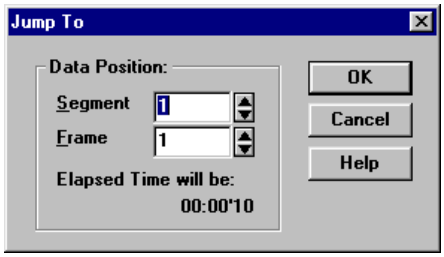
Browsing Segments

Choose **Frame | Previous Segment** or **Next Segment**. Then you can change the active frame actually shown in the **Flicker Transition 10min Segment** window. (To operate them, it is easier to use the **Alt+PageUp** and **Alt+PageUp** keys and the toolbar.)

The status line aligned at the bottom of Flicker Analyzer screen indicates total number of segments/frames and their active numbers.



In addition, there is a short-cut operation to jump to a specific frame number. Selecting **Frame | Jump To** menu will invoke a Jump dialogue that prompts you to specify a segment or a frame number to which you want to jump.



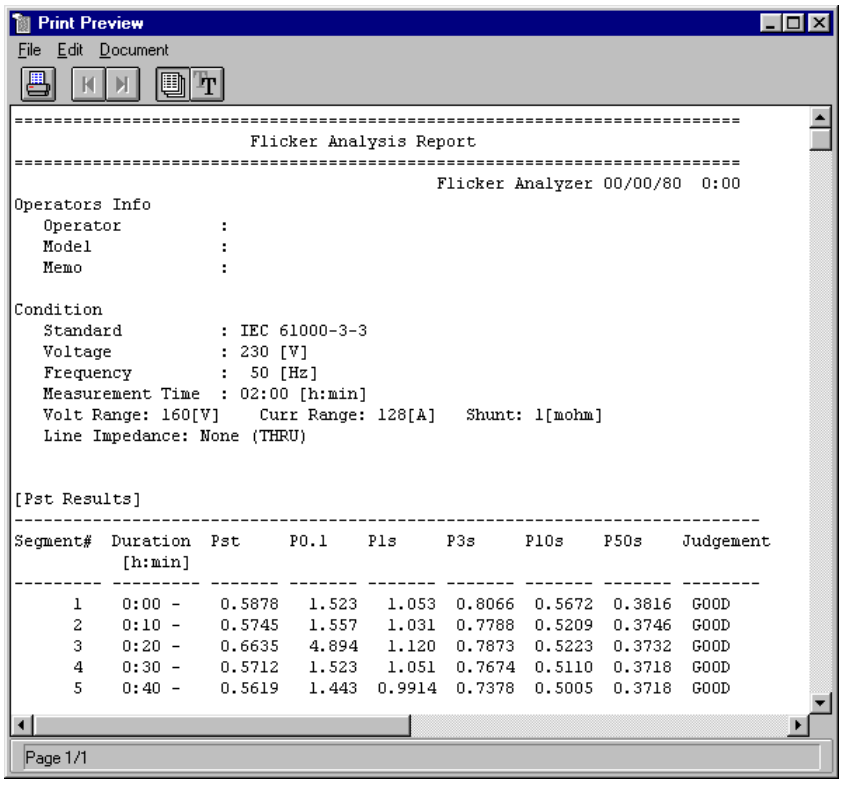
Printing

Flicker Analyzer allows you to print out contents of window display and a final report of flicker analysis.

Print

Printing items are divided into two types, **Analysis Report** and **Graphs**. Selecting **File | Print** menu, you can see the **Print What** dialogue box that prompts you to select what you are about to print. Selecting items from the contents, you can easily print out one or more items with one action.

If you have selected an analysis report, the printing is not executed soon but a **Print Preview** window appears instead. If needed, you can choose a printing font for report printings. Note that available fonts listed in the **Font Selection** dialogue are TrueType, fixed-pitch fonts only. To print the report, just select **Print** menu.

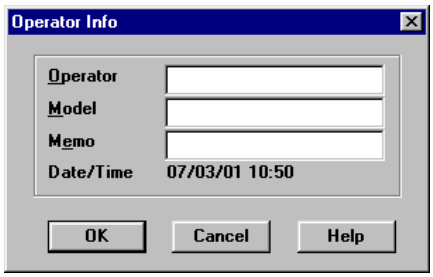


Notes:
If you have not installed any printer driver yet, you should install it using **Control Panel** program placed in the **Main** folder of **Program Manager**.

The final **Analysis Report** is formatted as A4 (210 x 297mm) or Letter (8.5 x 11in) in portrait orientation. Printing on smaller papers than these makes your printouts cross two or more pages and is not recommended.

Operator Information

As additional items for the report printings, you can append information about an operator. Choose **File | Operator Information** menu. Then the following **Operator Info** dialogue appears and fill out each item.



Chapter 10 PCR-L Control Panel

Overview

PCR-L Control Panel is a tiny program that works as if actual PCR-L controller panel. Using this program, you can:

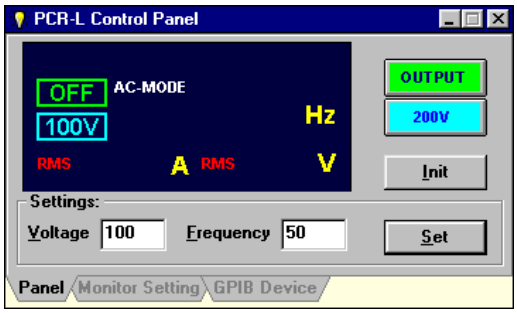
- Turn on or off the OUTPUT of supply.
- Set Voltage Range to 200V or 100V.
- Set Voltage and Frequency.
- Initialise the panel settings.
- Monitor actual voltage output (rms or peak).
- Monitor actual current output (rms or peak).

The PCR-L Control Panel has three tabbed pages and each has categorised functionality as follows:

- Panel
- Monitor Setting
- GPIB Device

Panel

The Panel page of the program has a display that indicates settings and monitored values as if actual controller panel of PCR-L AC Power Supply.



OUTPUT

This button turns on or off the supply output. Once you have pressed this button, the button will be kept pressed until you release this functionality again. The setting state will be shown in ON or OFF indicator at the left side of the display panel.

200V

This button turns on or off the 200V Range setting. Once you have pressed this button, the button will be kept pressed until you release this functionality again. The setting state will be shown in 200V or 100V indicator at the left side of the display panel. Note that you cannot change the range setting while the supply output is turned on.

Init

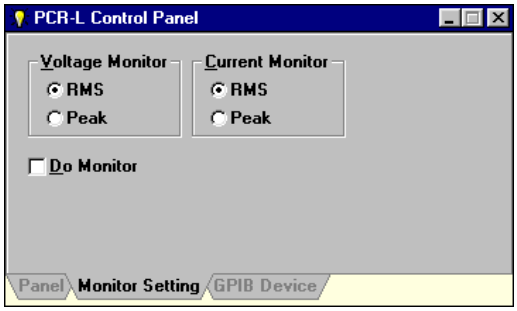
This button returns the PCR-L AC Power Supply to factory-default state. Initialising the supply will turn off the OUTPUT and 200V Range setting as well as returning Voltage and Frequency settings to default.

Settings

You can set voltage and frequency as you want. However, there are some setting restriction due to the hardware of PCR-L AC Power Supply. Listed in the following table are valid range for voltage and frequency settings.

Item	Valid Range
Voltage	0.0 through 152.5 [V] in 100V range
	0.0 through 305.0 [V] in 200V range
Frequency	1.0 through 999.9 [Hz] in any range

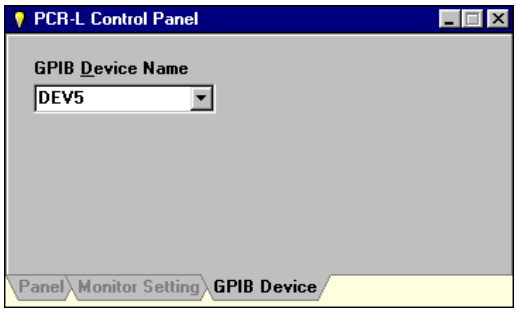
Monitor Setting



This page enables or disables voltage and current-monitor functionality. If you want to do it, check the **Do Monitor** check box. After returning to the **Panel** page, the monitor functionality will start.

GPIB Device

This setting specifies the GPIB device name through which this program communicates with your PCR-L AC Power Supply. Note that what you should enter here must be a GPIB device name instead of its address. **GPIB Device Name** is normally configured by the driver of National Instruments GPIB. Immediately after the installation of this system, the default device name will be "DEV5." Also the GPIB address of your PCR-L should be 5 to avoid a collision with addresses of HA01 units.



Appendix 1 Setup For Line Impedance Network

This section describes about switch settings for Line Impedance Network LIN40MA-PCR-L.

If you are using a Line Impedance Network LIN40MA-PCR-L, you must set switches on it to appropriate positions so that accurate measurement can be performed complying with the standard. Note that switch settings differ depending on what item you are measuring. Tables shown below are switch settings needed for each measurement item:

Harmonics Analysis (DynaLinzo)

LIN Settings / Standard	IMPEDANCE SELECT (Rear)	IMPEDANCE (Front)	IMPEDANCE SELECT (Front)
IEC 61000-3-2	1PH, L/L	OUT (THRU)	---------
Japanese Guideline (100V)	1PH, L/L	IN	Z1
Japanese Guideline (200V)	1PH, L/L	IN	Z2

Voltage Fluctuation Analysis (VFA) and,
Flicker Analysis (Flicker Analyzer)

LIN Settings / Standard	IMPEDANCE SELECT (Rear)	IMPEDANCE (Front)	IMPEDANCE SELECT (Front)
Both Standards	1PH, L/L	IN	Z3

Note:

These settings are applicable only to Kikusui Line Impedance Network LIN40MA-PCR-L.
If you are using other line impedance network such as LIN40M-PCR-L, consult instruction manuals for each product.
Please refer also the instruction manual even using Line Impedance Network LIN40MA-PCR-L

Appendix 2 Error Messages

Here, we describe error messages generated from DynaLinzo, VF-Analyzer, and Flicker Analyzer. Error numbers are divided into several groups.

- #220- Common error messages about GPIB
- #1000- Conventional error messages from DynaLinzo
- #1100- Fatal error messages from DynaLinzo
- #2000- Conventional error messages from VF-Analyzer
- #2100- Fatal error messages from VF-Analyzer
- #3000- Conventional error messages from Flicker Analyzer
- #3100- Fatal error messages from Flicker Analyzer

Common Error Messages About GPIB

ERR-220 Cannot open GPIB device [device-name]. It might be a device driver problem.

GPIB access has been corrupted at the initialisation step. [device-name] denotes an actual device name. There may be a problem that the GPIB driver has not been correctly installed or that associated device name is not defined in the GPIB driver configuration.

Or, there may also be a case that not enough file handles are allocated in DOS/Windows. Then, you have to close files that are left open. If the problem couldn't be solved by doing so, increase the settings on FILES in your CONFIG.SYS and then reboot DOS system. Typical Windows system requires FILES=50 or more as the FILES setting.

ERR-221 Cannot close GPIB device [device-name]. It might be a device driver problem.

GPIB access has been corrupted at the closing step. [device-name] denotes an actual device name. There may be a problem that the GPIB driver has not been correctly installed or that associated device name is not defined in the GPIB driver configuration.

ERR-223 You attempted to connect to unrecognised instrument XXX.

Instrument connected to the GPIB is incorrect. There is a possibility that a GPIB instrument other than HA01 is connected. In addition, there may be a case that ROM version is not applicable even if an HA01 unit.

ERR-230 GPIB write error in device XXX. Please check GPIB cable connection and driver setup.

A communication error has been generated at writing step to a GPIB instrument. Please confirm that the GPIB cable is correctly connected, HA01 is turned on, and GPIB address is correctly set.

ERR-231 GPIB read error in device XXX. Please check GPIB cable connection and driver setup.

A communication error has been generated at reading step to a GPIB instrument. Please confirm that the GPIB cable is correctly connected, HA01 is turned on, and GPIB address is correctly set.

Error Messages From DynaLinzo

ERR-1002 The max value of vertical axis must be 0.1 or greater.

The axis setting for 2D Spectrum and 3D Spectrum is invalid. Enter a value 0.1 or greater as the maximum value.

ERR-1003 Frame number must be between 1 and N.

Frame number is not correct at the frame jump operation. Enter an integer value between 1 and N (that depends on the situation).

ERR-1004 'To' value must be greater than 'From' value or the same.

Frame range is invalid. End of frame No. to save as CSV format must be greater than beginning frame No., or the same.

ERR-1005 Division of the axis must be between 1 and 10.

The axis setting for 2D Spectrum and 3D Spectrum is invalid. The value for division of axis must be an integer greater than zero.

ERR-1006 Harmonic order must be between 1 and 40.

Invalid order number for harmonics. You can specify 1 through 40.

ERR-1009 Overheat detected. Please shutdown the output from the power supply.

There is a possibility that a shunt resistance connected to the HA01F has an overheat problem. Please quickly shutdown the PCR-L output.

ERR-1010 Synchronisation of the PCR-L is unlocked. Check the synchronisation cable.

A synchronisation cable between HA01F and PCR-L might be disconnected.

ERR-1011 Over range detected. Please change the HA01F setup.

One of peak current has exceeded its range setting value. Change the HA01F setting in the test condition setup, and then try again.

ERR-1015 Wattage value must be between 0.1 and 99999.9.

The specified wattage value is not correct.

ERR-1016 Power Factor value must be between 0.001 and 1.000.

The specified power factor value is not correct.

ERR-1017 Fundamental Current value must be between 0.1 and 99999.9.

The specified fundamental current value is not correct.

ERR-1100 Insufficient memory. Quit other needless applications and then try again.

There is insufficient memory. If other applications such as word-processor is working at a time, quit them to increase free memory capacity. If the problem couldn't be solved by doing so, try to restart Windows.

ERR-1103 This program must be run under 386 Enhanced Mode.

Your Windows seems running under Standard Mode. This program requires 386 Enhanced Mode environment. To check current operation mode, choose **Help | About** menu from Program Manager.

ERR-1104 File not found XXXX.

The file you attempt to open is not found. XXXX denotes an actual file name.

ERR-1105 Cannot access xxxx. The file may be locked by other software or insufficient disk space.

File access has been failed, because other application software is opening the same file, free disk space is insufficient, or available file handles are insufficient.

ERR-1106 Not valid file format XXXX.

The file you attempt to open is not a valid file for the SP1 format. XXXX denotes an actual file name.

ERR-1107 Not enough disk space. Delete needless files to increase available disk space.

Due to insufficient free disk space, write operation for a file has been corrupted. Arrange your hard disk drive to increase free disk space using File Manager.

ERR-1108 Couldn't execute XXXX.

The system couldn't execute an external program such as Waveform Viewer or PCR-L Control Panel. There is a possibility that the executable file is not found or insufficient memory.

Error Messages From VF-Analyzer

ERR-2002 Axis Setup of the Voltage Shape (+/-) must be between 1 and N.

The N is the same as nominal voltage currently set. Axis setting on Voltage Shape U(t) graph is incorrect. As a display range, you can enter an integer value +1 or greater, or -1 or less.

ERR-2003 Axis Setup of the Volt Change must be between 1 and 1000.

Axis setting on Voltage Change deltaU(t) graph is incorrect. As a display range, enter an integer value +1 or greater.

ERR-2004 Axis Setup of the Relative Volt Change must be between 1 and 1000.

Axis setting on Relative Voltage Change dU(t) graph is incorrect. As a display range, enter an integer value +1 or greater.

ERR-2005 Time value must be between 0.01 and 150.0 seconds.

Time value or range you have specified is invalid.

ERR-2006 Axis Setup of the Voltage Ratio Shape (+/-) must be between 1 and N.

The N is the same as nominal voltage currently set. Axis setting on Voltage Ratio Shape $U(t)/U_N$ graph is incorrect. As a display range, you can enter an integer value +1 or greater, or -1 or less.

ERR-2007 'To' value must be greater than 'From' value or the same.

Time range you specify is invalid. End of time elapsed to save as CSV format must be greater than beginning time elapsed, or the same.

ERR-2009 Overheat detected. Please shutdown the output from the power supply.

There is a possibility that a shunt resistance connected to the HA01 has an overheat problem. Please quickly shutdown the PCR-L output.

ERR-2010 Synchronisation of the PCR-L is unlocked. Check the synchronisation cable.

A synchronisation cable between HA01 and PCR-L might be disconnected.

ERR-2011 Over range detected. Please change the HA01 setup.

One of peak current has exceeded its range setting value. Change the HA01 setting in the test condition setup, and then try again.

ERR-2012 Too many markings. You can assign up to 20 markings.

You attempted to add the 21st marking. Up to 20 markings can be set.

ERR-2100 Insufficient memory. Quit other needless applications and then try again.

There is insufficient memory. If other applications such as word-processor is working at a time, quit them to increase free memory capacity. If the problem couldn't be solved by doing so, try to restart Windows.

ERR-2103 This program must be run under 386 Enhanced Mode.

Your Windows seems running under Standard Mode. This program requires 386 Enhanced Mode environment. To check current operation mode, choose **Help | About** menu from Program Manager.

ERR-2104 File not found XXXX.

The file you attempt to open is not found. XXXX denotes an actual file name.

ERR-2105 Cannot access xxxx. The file may be locked by other software or insufficient disk space.

File access has been failed, because other application software is opening the same file, free disk space is insufficient, or available file handles are insufficient.

ERR-2106 Not valid file format XXXX.

The file you attempt to open is not a valid file for the VF1 format. XXXX denotes an actual file name.

ERR-2107 Not enough disk space. Delete needless files to increase available disk space.

Due to insufficient free disk space, write operation for a file has been corrupted. Arrange your hard disk drive to increase free disk space using File Manager.

ERR-2108 Couldn't execute XXXX.

The system couldn't execute an external program such as Waveform Viewer or PCR-L Control Panel. There is a possibility that the executable file is not found or insufficient memory.

Error Messages From Flicker Analyzer

ERR-3001 Measurement Time must be between 00:10 and 24:00 in 10-minute unit, or must be 5 minutes or 1 minute.

Setting values for measurement time are incorrect. Enter correct values.

ERR-3009 Overheat detected. Please shutdown the output from the power supply.

There is a possibility that a shunt resistance connected to the HA01 has an overheat problem. Please quickly shutdown the PCR-L output.

ERR-3010 Synchronisation of the PCR-L is unlocked. Check the synchronisation cable.

A synchronisation cable between HA01 and PCR-L might be disconnected.

ERR-3011 Over range detected. Please change the HA01 setup.

One of peak current has exceeded its range setting value. Change the HA01 setting in the test condition setup, and then try again.

ERR-3100 Insufficient memory. Quit other needless applications and then try again.

There is insufficient memory. If other applications such as word-processor is working at a time, quit them to increase free memory capacity. If the problem couldn't be solved by doing so, try to restart Windows.

ERR-3103 This program must be run under 386 Enhanced Mode.

Your Windows seems running under Standard Mode. This program requires 386 Enhanced Mode environment. To check current operation mode, choose **Help | About** menu from Program Manager.

ERR-3104 File not found XXXX.

The file you attempt to open is not found. XXXX denotes an actual file name.

ERR-3105 Cannot access xxxx. The file may be locked by other software or insufficient disk space.

File access has been failed, because other application software is opening the same file, free disk space is insufficient, or available file handles are insufficient.

ERR-3106 Not valid file format XXXX.

The file you attempt to open is not a valid file for the FK1 format. XXXX denotes an actual file name.

ERR-3107 Not enough disk space. Delete needless files to increase available disk space.

Due to insufficient free disk space, write operation for a file has been corrupted. Arrange your hard disk drive to increase free disk space using File Manager.

ERR-3108 Couldn't execute XXXX.

The system couldn't execute an external program such as Waveform Viewer or PCR-L Control Panel. There is a possibility that the executable file is not found or insufficient memory.

ERR-3109 This version of HA01 cannot be connected to the Flicker Meter application. ROM version 2.0 or higher is required.

Flicker Analyzer application requires an HA01 unit that equips ROM version 2.0 or higher. Older ROM version has no functionality for the flicker meter.

Appendix 3 Analysis Report Examples

DynaLinzo Report Printing Example

```
================================================================================
                  * * * DynaLinzo Analysis Report * * *
================================================================================
                                                    Date: 19/Feb/2001  19:20

[Memo]









[Conditions]
  Standard/Class   :Japanese Harmonics Guideline / Class D
  Voltage 100 [V]
  Frequency 50 [Hz]
  Test Period 150 [s]
  Margin 80 [%]
  Total Frames 469

[Definitions]
  Wattage            : Measured
  Power Factor       : Specified (specified value 0.800)
  Fundamental Current: Specified (specified value 1.000)

[HA01H Hardware Settings]
  Volt Range: 160[V]    Curr Range: 32[A]   Shunt: 4[mohm]
  Sample Points: 256    DFT Window: 16
  Line Impedance: None (THRU)
```

[Relative frequency of over-limit]

Order	80%< [%]	100%< [%]	150%< [%]	Judgement
PHC	------	61.83		
1	------	------	------	----------
2	------	------	------	----------
3	65.25	62.47	0.00	= NG =
4	------	------	------	----------
5	69.72	67.80	63.33	= NG =
6	------	------	------	----------
7	72.92	71.43	68.44	= NG =
8	------	------	------	----------
9	77.61	74.84	71.43	= NG =
10	------	------	------	----------
11	77.40	75.05	71.43	= NG =
12	------	------	------	----------
13	73.77	71.64	68.02	= NG =
14	------	------	------	----------
15	68.23	66.10	61.41	= NG =
16	------	------	------	----------
17	53.52	42.22	40.72	= NG =
18	------	------	------	----------
19	66.31	53.73	39.23	= NG =
20	------	------	------	----------
21	68.87	66.74	26.01	= NG =
22	------	------	------	----------
23	31.13	27.93	20.26	= NG =
24	------	------	------	----------
25	59.06	50.75	12.15	= NG =
26	------	------	------	----------
27	52.03	41.79	0.00	= NG =
28	------	------	------	----------
29	40.30	38.59	33.69	= NG =
30	------	------	------	----------
31	37.95	36.67	29.64	= NG =
32	------	------	------	----------
33	38.81	35.39	6.18	= NG =
34	------	------	------	----------
35	42.00	6.18	0.00	GOOD
36	------	------	------	----------
37	0.43	0.00	0.00	GOOD
38	------	------	------	----------
39	0.00	0.00	0.00	GOOD
40	------	------	------	----------

[Longest contiguous harmonic currents over 100% limits]

Order	Length [s]	StartAt [s]
1		
2		
3	32.00	104.00
4		
5	33.60	102.40
6		
7	34.56	101.44
8		
9	35.52	100.80
10		
11	35.52	100.80
12		
13	34.56	101.76
14		
15	32.96	103.36
16		
17	24.32	111.68
18		
19	24.00	112.00
20		
21	33.28	102.72
22		
23	10.24	72.96
24		
25	19.20	73.92
26		
27	24.32	111.68
28		
29	23.04	112.96
30		
31	22.40	113.60
32		
33	22.08	113.92
34		
35	8.96	0.32
36		
37	0.00	0.32
38		
39	0.00	0.32
40		

[Worst harmonic currents to applied limits]

Order	Worst [A]	Limit [A]	Worst/Limit [%]	Time [s]
1				
2				
3	0.33	0.26	127.41	32.32
4				
5	0.30	0.14	207.92	32.32
6				
7	0.27	0.08	362.35	32.32
8				
9	0.22	0.03	624.16	0.32
10				
11	0.19	0.02	757.07	0.32
12				
13	0.14	0.02	685.95	0.32
14				
15	0.11	0.02	607.95	0.32
16				
17	0.07	0.02	468.01	0.32
18				
19	0.05	0.01	334.18	5.76
20				
21	0.06	0.03	178.86	76.16
22				
23	0.05	0.03	179.26	27.52
24				
25	0.04	0.02	164.39	27.84
26				
27	0.01	0.01	133.75	32.32
28				
29	0.02	0.01	184.70	32.96
30				
31	0.01	0.01	165.94	0.32
32				
33	0.01	0.01	151.41	0.32
34				
35	0.01	0.01	107.06	0.32
36				
37	0.01	0.01	84.88	0.32
38				
39	0.01	0.01	55.61	81.92
40				

[Average harmonic current analysis]

Order	AveData [A]	Limit [A]	Ave/Limit [%]	Judgement
1	1.89	-------	---------	---------
2	0.04	-------	---------	---------
3	0.59	1.45	40.87	= NG =
4	0.03	-------	---------	---------
5	0.52	0.81	64.27	= NG =
6	0.03	-------	---------	---------
7	0.44	0.43	104.34	= NG =
8	0.02	-------	---------	---------
9	0.34	0.21	161.33	= NG =
10	0.02	-------	---------	---------
11	0.25	0.15	169.02	= NG =
12	0.01	-------	---------	---------
13	0.16	0.13	126.72	= NG =
14	0.01	-------	---------	---------
15	0.09	0.11	83.87	= NG =
16	0.01	-------	---------	---------
17	0.05	0.10	54.40	= NG =
18	0.01	-------	---------	---------
19	0.05	0.09	54.27	= NG =
20	0.01	-------	---------	---------
21	0.04	0.08	53.20	= NG =
22	0.01	-------	---------	---------
23	0.03	0.07	43.88	= NG =
24	0.01	-------	---------	---------
25	0.03	0.07	38.29	= NG =
26	0.00	-------	---------	---------
27	0.01	0.06	23.83	= NG =
28	0.00	-------	---------	---------
29	0.01	0.06	21.23	= NG =
30	0.00	-------	---------	---------
31	0.01	0.05	26.66	= NG =
32	0.00	-------	---------	---------
33	0.01	0.05	28.36	= NG =
34	0.00	-------	---------	---------
35	0.01	0.05	24.61	GOOD
36	0.00	-------	---------	---------
37	0.01	0.04	14.09	GOOD
38	0.00	-------	---------	---------
39	0.00	0.04	5.54	GOOD
40	0.00	-------	---------	---------

The Final Judgement : = NG =
Compliant with the standard

Signature _____

VF-Analyzer Report Printing Example

```
========================================================================
                    Voltage Fluctuation Analysis report
========================================================================
                                                VF-Analyzer 8/19/94 16:05
Operators Info
   Operator        : Makoto
   Model           : Sample Copy M
   Memo            : Kik

Condition
   Standard        : IEC 61000-3-3
   Voltage         : 100 [V]
   Frequency       :  50 [Hz]
   Measurement time:  40 [s]
   Volt Range: 160[V]    Curr Range: 16[A]   Shunt: 4[mohm]
   Line Impedance: Z3 : 0.4ohm + j0.25ohm


Maximum Voltage change          :   1.977 [V]
Maximum relative voltage change :   1.977 [%]

[Voltag Shape U(t) Marking List]
------------------------------------------------------------------------
 No.  Time[s]   dUc[V]     dc[%]   Steady[V]  Irms[A]  Ipeak[A]   Power[W]
---- --------- --------- --------- --------- --------- --------- ----------
  0      2.92  --------- ---------   99.411     6.924    14.695    563.628
  1      5.01     0.890     0.890    98.521    14.241    26.190   1349.574
  2      6.88     0.060     0.060    98.581    13.801    25.560   1305.013
  3      8.68     0.006     0.006    98.575    13.760    25.380   1301.096
  4     14.81     0.014     0.014    98.589    13.675    25.253   1292.771

[Voltag change dU(t) Marking List]
------------------------------------------------------------------------
 No.  Time[s]  dU(t)[V]   d(t)[%]   Vrms[V]   Irms[A]  Ipeak[A]   Power[W]
---- --------- --------- --------- --------- --------- --------- ----------
  0      2.77     0.058     0.058    99.435     6.675    13.897    541.592
  1      6.81     0.087     0.087    98.563    13.817    25.629   1306.482
  2      9.51     0.058     0.058    98.577    13.593    25.059   1285.426
  3     11.13     0.756     0.756    98.955     9.909    17.770    959.295


                                        Signature _____________________
```

Flicker Analyzer Report Printing Example

```
========================================================================
                        Flicker Analysis Report
========================================================================
                                          Flicker Analyzer 95/04/25 15:00
Operators Info
   Operator          :
   Model             :
   Memo              :

Condition
   Standard          : IEC 61000-3-3
   Voltage           : 230 [V]
   Frequency         :  50 [Hz]
   Measurement Time  : 02:00 [h:min]
   Volt Range: 160[V]    Curr Range: 128[A]   Shunt: 1[mohm]
   Line Impedance: Z3 : 0.4ohm + j0.25ohm

[Pst Results]
-------------------------------------------------------------------------------
Segment#  Duration  Pst     P0.1    Plst    P3st    P10st   P50st   Judgement
           [h:min]
--------- --------- ------- ------- ------- ------- ------- ------- ---------
      1    0:00 -    0.5878   1.523   1.053  0.8066  0.5672  0.3816  GOOD
      2    0:10 -    0.5745   1.557   1.031  0.7788  0.5209  0.3746  GOOD
      3    0:20 -    0.6635   4.894   1.120  0.7873  0.5223  0.3732  GOOD
      4    0:30 -    0.5712   1.523   1.051  0.7674  0.5110  0.3718  GOOD
      5    0:40 -    0.5619   1.443  0.9914  0.7378  0.5005  0.3718  GOOD
      6    0:50 -    0.5894   1.540   1.058  0.8066  0.5724  0.3775  GOOD
      7    1:00 -    0.9489   7.067   4.412   2.919  0.7998  0.3883  GOOD
      8    1:10 -     1.291   8.311   5.975   4.783   2.664  0.3997  = NG =
      9    1:20 -    0.7399   5.632   1.339   1.009  0.7160  0.4204  GOOD
     10    1:30 -    0.6559   1.753   1.247   1.004  0.7407  0.4545  GOOD
     11    1:40 -    0.7110   3.656   1.303   1.016  0.7715  0.4950  GOOD
     12    1:50 -    0.6761   1.953   1.341   1.038  0.7737  0.5079  GOOD
-------------------------------------------------------------------------------


[Plt Result]
-------------------------------------------------------------------------------
Plt       Judgment
--------- ---------------------------------------------------------------------
   0.7764  = NG =
-------------------------------------------------------------------------------


                                Signature              _____________________
```

Appendix 4 Software Specification

System Requirements

Items	Required at least:	Recommended
Personal Computer & Operating Systems	PC-compatible which runs: Windows 3.1/3.11, Windows For Workgroups 3.11 Windows 95 Windows98 WindowMe (Your PC shall have enough power to run the OS you use.) CD-ROM drive 640 x 480 x 16 colour system or better Mouse Printer	PC-compatible which runs: Windows 3.1/3.11, Windows For Workgroups 3.11 Windows 95 Windows98 WindowMe (Your PC shall have enough power to run the OS you use.) CD-ROM drive 640 x 480 x 16 colour system or better Mouse Printer
GPIB card	National Instruments GPIB card	National Instruments GPIB card
Disk space to install	Approx 2Mbytes. Additionally 11Mbytes needed to install sample data files	Approx 2Mbytes. Additionally 11Mbytes needed to install sample data files
Power Supply	Kikusui PCR-L AC Power Supply	Kikusui PCR-L AC Power Supply with an IB11-PCR-L GPIB I/F
Line Impedance Network	LIN40MA-PCR-L Line Impedance Network	LIN40MA-PCR-L Line Impedance Network
Harmonics Measurement Unit	Harmonics Analyzer HA01F-PCR-L (ROM version 2.0 or higher)	Harmonics Analyzer HA01F-PCR-L (ROM version 2.0 or higher)

DynaLinzo

Number of phase to be measured	1 (Single Phase)
Data to measure	Fluctuating Harmonics (1 to 40th) Current Waveform
Standard compatible	Japanese Harmonics Guideline(Japan Mode) IEC 61000-3-2 (Europe Mode)
Judgement exclusion	Ignore above 19th if gently fall (all classes) Ignore below 5mA/0.6% (all classes) Consider above 600W(Class A Japan) Ignore 35W or below(Class C Japan, Class D Japan) Ignore 25W or below(Class C Europe) Ignore 50W or below (Class D) Ignore 75W or below (Class D)
Waveform & Peak Phase judgement	Judgement assistance functionality is provided using Wave Viewer.
Judgement Margin	Can set 10 to 100% of allowance level (in 10% unit)
Available Voltage	100, 200, 230V
Available Frequency	50, 60Hz
Data representation	Harmonics List 2D Spectrum 3D Spectrum Phase Average Harmonics List Transition charts for all items Histogram charts for specific order
Report Generation	Analysis Report of fluctuating harmonics (English only)

Data file size	Test Condition Frequency=50Hz Sample Points=256 DFT Window=16 Measurement Time=150 seconds Approx 600 Kbytes Frequency=60Hz Sample Points=256 DFT Window=16 Measurement Time=150 seconds Approx 720 Kbytes Frequency=50Hz Sample Points=1024 DFT Window=2 Measurement Time=150 seconds Approx 3 Mbytes Frequency=60Hz Sample Points=1024 DFT Window=2 Measurement Time=150 seconds Approx 3.5 Mbytes

VF-Analyzer

Number of phase to be measured	1 (Single Phase)
Data to measure	Voltage Fluctuation
Standard compatible	IEC 61000-3-3
Available Voltage	100, 200, 230V
Available Frequency	50, 60Hz
Data representation	Voltage Shape U(t) Graph Voltage Ratio Shape U(t)/U_N Graph Relative Voltage Change d(t) Graph Voltage Change deltaU(t) Graph Steady State list
Report Generation	Analysis Report of voltage fluctuation (English only)
Data file size	Frequency=50Hz Measurement Time=150 seconds 181,120bytes Frequency=60Hz Measurement Time=150 seconds 217,120bytes

Flicker Analyzer

Number of phase to be measured	1 (Single Phase)
Data to measure	Flicker
Standard compatible	IEC 61000-3-3
Available Voltage	100, 200, 230V
Available Frequency	50Hz
Data representation	10 second Transition PF(t) Graph 10 minute Transition PF(t) Graph Probability Graph Result List (Pst and Plt)
Report Generation	Analysis Report of flicker (English only)
Data file size	Frequency=50Hz Measurement Time=2 hours 409,312bytes Frequency=50Hz Measurement Time=24 hours 4,909,984bytes