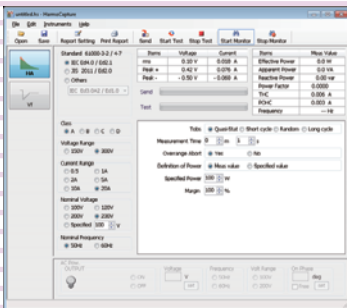


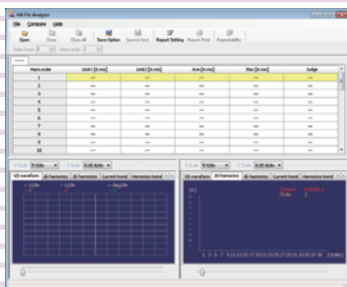
Setup Guide

Application Software

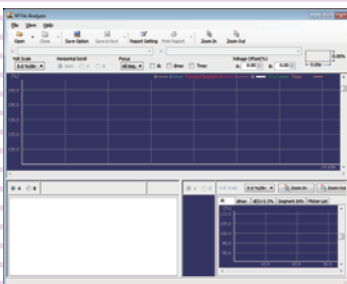
SD005-KHA Harmonics Explorer Ver. 3.7



HarmoCapture



HA File Analyzer



Vf File Analyzer

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Thank you for purchasing the Harmonics Explorer.

About This Guide

This guide is intended for first-time users of the Harmonics Explorer. It gives an overview of the product, explains how to install the software, provides notes on the usage, explains how to start the software, and so on.

After reading this guide, keep it in a safe place for quick reference. If you find any misplaced or missing pages in this guide, it will be replaced.

If you lose or damage this guide, you can purchase a new copy. In either case, please contact a Kikusui distributor or agent, and indicate the "Part No." given on the cover.

Every effort has been made to create this guide. However, if you have questions or find errors in this guide, please contact a Kikusui distributor or agent.

■ Product Version that This Guide Covers

This guide applies to the Harmonics Explorer with version 3.7.

■ Related Equipment Versions

The version appears on the display when each equipment is turned on.

- KHA1000 Harmonic/Flicker Analyzer

Firmware version 1.90 or later

- PCR-LE Series AC power supply

Firmware version 3.20 or later

- PCR-LA Series AC power supply

Firmware version 3.10 or later

- PCR-L Series AC power supply

Firmware version 2.04 or later

Harmonics Explorer can also be used for the conventional AC Power Supply PCR-L Series. In this case, read "PCR-LA" as "PCR-L."

■ How to Read This Guide

This guide is designed to be read from beginning to end. We recommend that you read the guide thoroughly from the beginning before using this product for the first time.

■ Who Should Read This Guide?

This guide is intended for those using the KHA1000 to control a harmonic current and voltage fluctuation test system and those teaching operators how to use it.

■ Trademark Acknowledgements

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The specifications of this product and the contents of this guide are subject to change without prior notice.

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For Safe Use

Before executing a test using the Harmonics Explorer, carefully read the operation manuals (especially the hardware explanations) for the products given below and pay careful attention when making connections and performing operations. Improper handling may cause serious accidents such as injuries or fire.

- KHA1000 Harmonic/flicker analyzer
- PCR-LE or PCR-LA Series AC power supply
- LIN1020JF or LIN40MA-PCR-L Line impedance network

Notations Used in This Guide

- In this guide, the KHA1000 Harmonic/flicker analyzer is also called "KHA1000", the PCR-LE or PCR-LA Series AC power supply is also called "AC power supply", and the LIN1020JF or LIN40MA-PCR-L Line impedance network is also called "Line impedance network".
- "Personal computer" and "PC" are generic terms for personal computers and workstations.
- The following symbols are used with the explanations in this guide.



CAUTION Indicates a potentially hazardous situation that, if ignored, may result in damage to the product or other property.



NOTE Indicates information that you should know.



See Indicates reference to detailed information.

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General Description

The Harmonics Explorer can remotely control the KHA1000 Harmonic/Flicker Analyzer from a PC. By using this application in combination with the AC Power Supply and the Line Impedance Network, you can perform tests that comply with IEC and JIS standards.

The Harmonics Explorer displays measured values in various ways in real time. It can evaluate, analyze, and make pass/fail judgments based on standard compliance tests.

Harmonics Explorer structure

Harmonics Explorer is made up of three application software below.

- HarmoCapture
- HA File Analyzer
- Vf File Analyzer

Conformance Standards

The Harmonics Explorer conforms to the standards listed in below. The “Standard name notations” in the table are the symbols used in HarmoCapture, and indicate the relevant standards for limit values and measuring techniques.

Classification	Standard name notation (used for HarmoCapture)	Standard number and edition for limit value*1	Standard number and edition for measuring technique*1, *2
Harmonic current	IEC Ed2.2/Ed2.0	IEC 61000-3-2:Ed2.2(2004) EN 61000-3-2(2000)/A2(2005)	IEC 61000-4-7:Ed2.0(2002) EN 61000-4-7(2002)
	JIS 2011/Ed2.0	JIS C61000-3-2(2011)	IEC 61000-4-7:Ed2.0(2002)
	JIS 2005/Ed2.0	JIS C61000-3-2(2005)	IEC 61000-4-7:Ed2.0(2002)
	JIS 2003/Ed1.0	JIS C61000-3-2(2003)	JIS C61000-4-7(1997)
	IEC Ed2.2/Ed1.0	IEC 61000-3-2:Ed2.2(2004) EN 61000-3-2(2000)/A2(2005)	IEC 61000-4-7(1991) EN 61000-4-7(1993)
	JIS 2011/Ed1.0	JIS C61000-3-2(2011)	JIS C61000-4-7(1997)
	JIS 2005/Ed1.0	JIS C61000-3-2(2005)	JIS C61000-4-7(1997)
	IEC Ed3.0/Ed2.0	IEC 61000-3-2:Ed3.0(2005) EN 61000-3-2(2006)	IEC 61000-4-7:Ed2.0(2002) EN 61000-4-7(2002)
	IEC Ed3.0/Ed1.0	IEC 61000-3-2:Ed3.0(2005) EN 61000-3-2(2006)	IEC 61000-4-7(1991) EN 61000-4-7(1993)
	IEC Ed4.0/Ed2.1	IEC 61000-3-2:Ed4.0(2014) EN 61000-3-2(2014)	IEC 61000-4-7:Ed2.1(2009) EN 61000-4-7(2002)/A1(2009)
IEC Ed4.0/Ed1.0	IEC 61000-3-2:Ed4.0(2014) EN 61000-3-2(2014)	IEC 61000-4-7(1991) EN 61000-4-7(1993)	
Flicker voltage fluctuation	IEC 61000-3-3	IEC 61000-3-3:Ed2.0(2008)	IEC 61000-4-15:Ed1.1(2003)
	IEC 61000-4-15Ed1.1	EN 61000-3-3(2008)	EN 61000-4-15(1998)/A1(2003)
	IEC 61000-3-3	IEC 61000-3-3:Ed3.0(2013)	IEC 61000-4-15:Ed2.0(2010)
	IEC 61000-4-15Ed2.0	EN 61000-3-3(2013)	EN 61000-4-15(2011)

*1 When the report is printed, the EN standard number also is written.

*2 Measuring technique standard that corresponds to limit value standard

IEC 61000-4-7:Ed2.0(2002), IEC 61000-4-7:Ed2.1(2009)

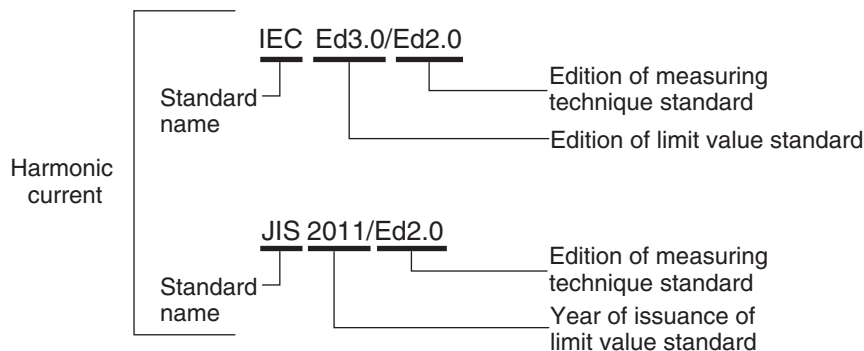
The measuring window width is 0.2 second. It is 10 cycles at a basic frequency of 50 Hz and 12 cycles at a basic frequency of 60 Hz. Harmonic groups are measured.

IEC 61000-4-7(1991)

The measuring window width is 0.32 second at a basic frequency of 50 Hz and 0.266 second at a basic frequency of 60 Hz (either is a basic frequency of 16 cycles). Harmonic groups are not measured.

JIS C61000-4-7(1997)

The measuring window width is 0.32 second at a basic frequency of 50 Hz and 0.266 second at a basic frequency of 60 Hz (either is a basic frequency of 16 cycles). Interharmonic waves and harmonic groups are not measured.



Rules for standard name notations

Main Features

HarmoCapture can be used to:

- Remotely control the KHA1000 and the AC power supply from a PC.
- Configure and save test conditions.
- Start and stop tests.
- Display test results (pass/fail judgment.)
- Save test result files.
- Monitor measured values (rms current and voltage, positive and negative current and voltage peaks, active power, apparent power, reactive power, power factor, THC, POHC, and frequency.)
- Print reports (comments, test conditions, and data lists.)

HA File Analyzer can be used to:

- Load the harmonic current test results file acquired by the KHA1000 or HarmoCapture.
- Display test results lists (pass/fail judgment.)
- Display graphs (V/I waveform, 2D harmonics, 3D harmonics, current trend, harmonics trend, and THC trend.)
- Check AC power source.
- Check repeatability.
- Save test results files as text.
- Print reports (comments, test conditions, results lists, and various waveform graphs.)

Vf File Analyzer can be used to:

- Load the voltage fluctuation test results file acquired by the KHA1000 or HarmoCapture.
- Display test results lists (pass/fail judgment, and segment information lists.)
- Display graphs (the maximum dc, the maximum dmax, and the maximum time over which T_{max} (or $d(t) > 3.3\%$.)
- Save test results files as text.
- Print reports (comments, test conditions, results lists, and various waveform graphs.)

System Requirements

Below are the hardware and software requirements for using the Harmonics Explorer.

- Personal computer with Microsoft Windows 10 or 7 (32-bit or 64-bit)
- At least 2 GB of memory (4 GB or more recommended)
- 1024 x 768 dots or higher resolution
- 20 GB or more free hard disk space (more space required for saving data)
- CD-ROM drive
- Mouse or other pointing device
- VISA library
NI-VISA 4.1 or later; Keysight IO Libraries Suite 14.1 or later; or KI-VISA 4.2.2 or later
- USB cable (when using USB)
- GPIB card and IEEE488 cable (when using GPIB)
- Cross serial cable (when controlling the AC power supply via RS232C)
- CompactFlash Type I (CFA), up to 512 MB (when using KHA1000 files)

VISA Driver

You must install a VISA driver to use the Harmonics Explorer.

CAUTION Do not install multiple different VISA drivers, because they may not operate properly.

NOTE

- VISA
VISA (Virtual Instrument Software Architecture) is a standard developed by the VXIplug&play Systems Alliance that defines software specifications for communicating with instruments from a PC.
- VISA driver
A VISA-compliant driver software.
- KI-VISA
- Kikusui original VISA driver compatible with VXIplug&play VISA.

The VISA driver that is required varies depending on the I/O interface that you will be using. See below to select the appropriate VISA driver.

VISA driver	Version and how to obtain the driver
KI-VISA	KI-VISA Ver 4.2.2 or later From the software CD-ROM or from the KIKUSUI Website
NI-VISA	Ver 4.1 or later From the CD-ROM provided with the GPIB card or from the National Instruments Website
Keysight IO Libraries	Suite 14.1 or later From the CD-ROM provided with the GPIB card or from the Keysight Technologies Website

- If you are using RS232C or USB, any VISA driver can be used. However, for details on licensing, refer to the license terms of the respective VISA driver.
- RS232C supports standard communications ports on a personal computer and virtual serial communication ports through a USB-RS232C converter or other similar converters. However, virtual communication ports may not work properly depending on the device driver that is provided.
- If you are using GPIB, you must use the appropriate VISA driver; otherwise, it will not work.
- KI-VISA supports the following GPIB models.

CONTEC CO., LTD.	GP-IB(PCI)L, GP-IB(PM), GP-IB(PCI)F, GP-IB(CB)F. API-GPIB driver VER4.01 or later recommended. When using GPIB cards by Contec Co., Ltd, use the ordinary API-GPIB driver, not the API-GLPV driver (LabVIEW compatible and NI-488.2M API compatible).
Interface Corporation	PCI-4301 LabVIEW compatible version (GPC-4301N driver version 1.21 or later recommended) When using GPIB cards by Interface Corporation, use the GPC-4301N driver (LabVIEW compatible and NI-488.2M API compatible), not the ordinary GPC-4301 driver.
National Instruments Corporation	GPIB-ENET/100, GPIB-USB-B, GPIB-USB-HS, or PCI-GPIB (NI-488.2M version 2.73)
Keysight Technologies	82350 (PCI-GPIB) (When using IO Libraries Suite 15.5, Agilent 488 option)

Package Contents

The Harmonics Explorer package contains the following items.

Name	Quantity
Program CD-ROM	1
Harmonics Explorer Setup Guide	1

Available Manuals

The Harmonics Explorer comes with the following manual in addition to this Setup Guide.

- Operation Guide (electronic manual)

The operation guide details the Harmonics Explorer operation. There are two types of HTML help and PDF. For instructions on how to view the Operation Guide, see “[Viewing the Operation Guide](#).”

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Notes on Use

The HarmoCapture is used to retrieve KHA1000 test data to your PC. To ensure that test data is retrieved, disable the following features on your PC during testing.

- Windows power save mode
- Screen saver
- Memory-resident programs

Do not run other software applications during testing.

Setup

Before Installation

- You need to log on as an administrator to install the software applications.
- Close all software applications running on your PC. The software may not be installed properly if virus protection software is running. Disable virus protection software until the installation is complete.

Inserting the CD-ROM

- 1 Insert the program CD-ROM in the drive.**
After a short time, AutoPlay window opens.
- 2 Click Open folder to view files.**
- 3 Double-click indexE.htm.**
The menu program will start. If you double-click indexJ.htm, the Japanese menu program will start.



Installation

Install the following programs exactly in the order listed; otherwise, the software may not start. Be sure to install them according to the instructions.

- IVI Shared Components*¹
- VISA driver
- Harmonics Explorer
- CONTEC Digital I/O Driver*²

*1 IVI Shared Components are installed at the same time when you install KI-VISA. There is no need to separately install them. They are also installed at the same time if you install some of the other VISA drivers.

*2 This is only required when you use the LIN1020JF Line impedance network.

Installing KI-VISA

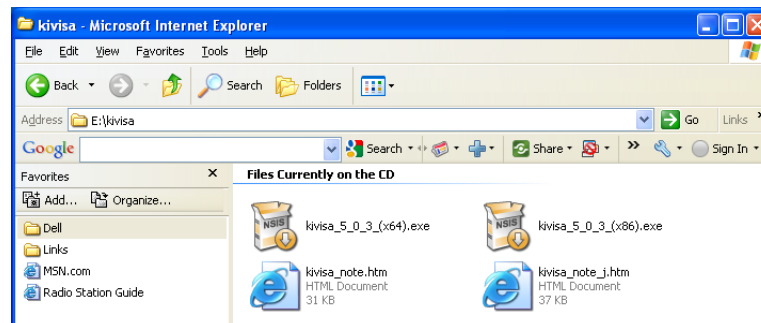
See p. 11

- To use an NI-VISA or Agilent Technologies VISA driver, refer to the manual of the respective product. If you are not installing KI-VISA, proceed to [Step 4](#).

CAUTION Do not install multiple different VISA drivers, because they may not operate properly.

1 On the menu program window, click KI-VISA x.x.x.

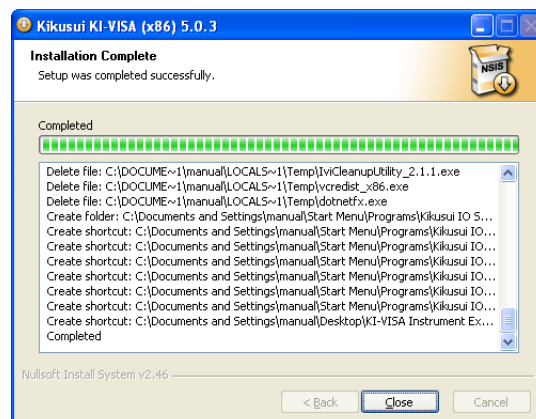
The Kivisa_x_x_x.exe file on the CD-ROM appears in the window. x_x_x is version number. Install the KI-VISA_x_x_x_(x86) to 32-bit OS or the KI-VISA_x_x_x_(x64) to 64-bit OS.



2 Double-click Kivisa_x_x_x.exe.

Then, follow the instructions on the screen.

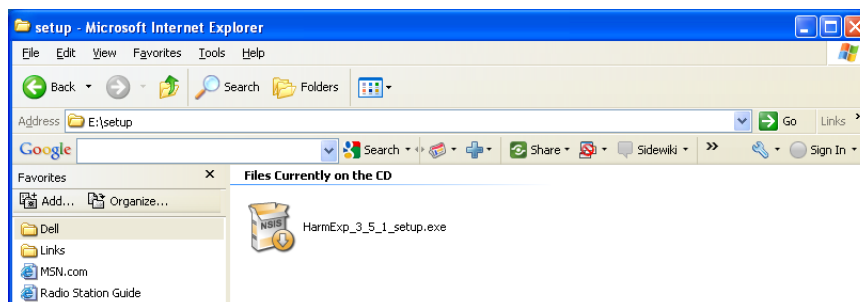
When the installation is complete, the following dialog box opens.



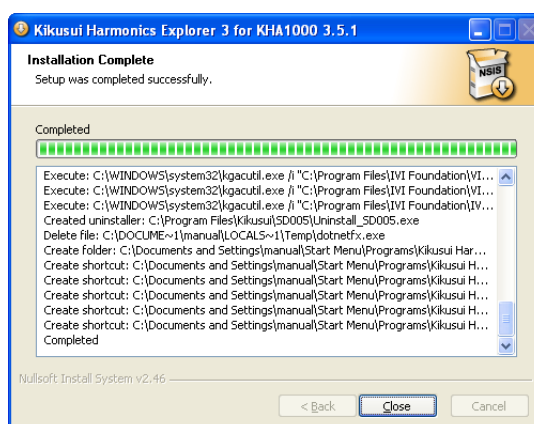
- 3 **Click Close and return to the menu program window.**
Proceed to the Kikusui Harmonics Explorer for KHA1000 installation.

Installing Harmonics Explorer

- 4 **On the menu program window, click Kikusui Harmonics Explorer for KHA1000.**
The HarmExp_X_X_X.exe file on the CD-ROM appears in the window.



- 5 **Double-click HarmExp_X_X_X.exe.**
Then, follow the instructions on the screen.
When the installation is complete, the following window appears.

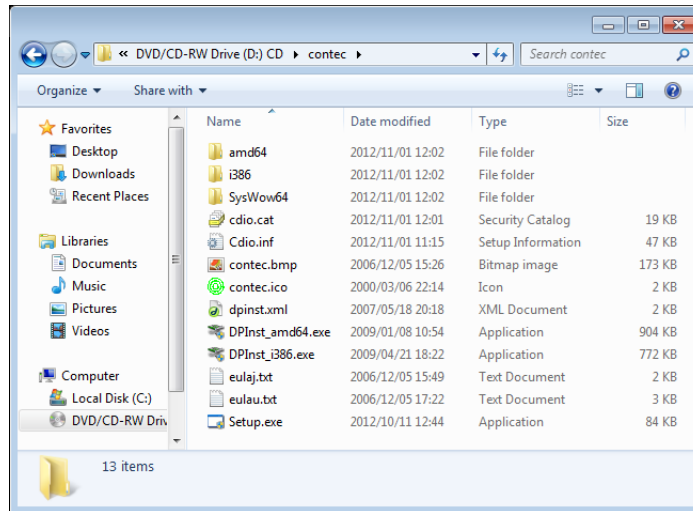


- 6 **Click Close.**

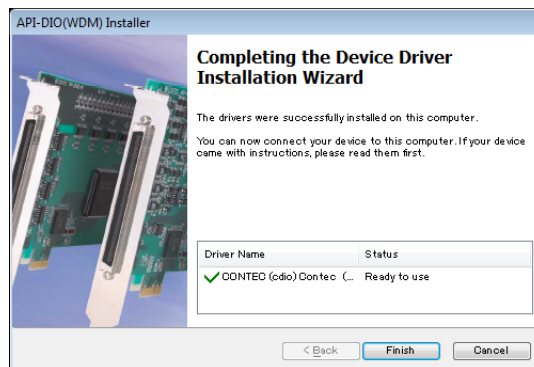
Installing CONTEC Digital I/O Driver

To use the LIN1020JF Line Impedance Network, install the CONTEC digital I/O driver. You can set the impedance from HarmoCapture.

- 1 **Connect the USB port of the LIN1020JF to the PC using a USB cable.**
- 2 **Turn on the Line impedance network.**
- 3 **On the menu program window, click CONTEC Digital I/O Driver API-DIO(WDM).**
The Setup.exe file on the CD-ROM appears in the window.

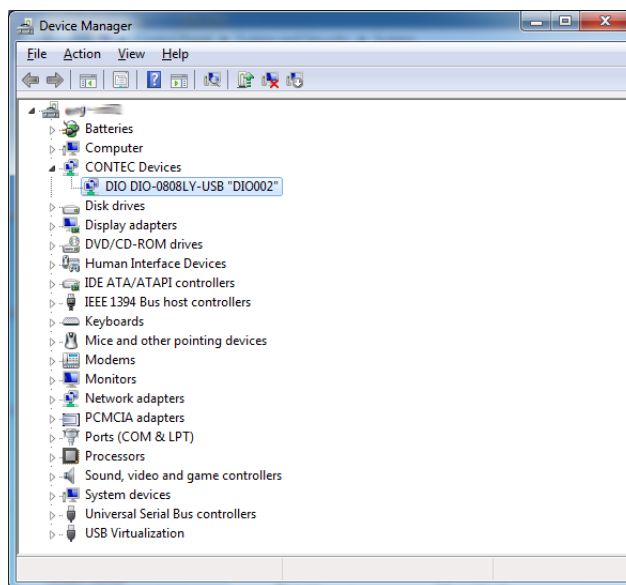


- 4 **Double-click Setup.exe.**
Then, follow the instructions on the screen.
When the installation is complete, the following window appears.



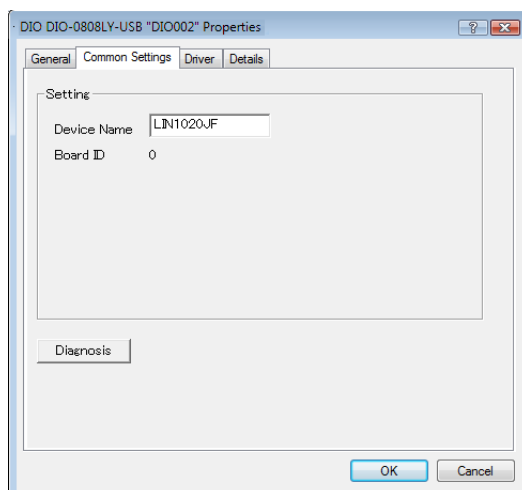
- 5 **Click Finish.**

- 6** On your PC, choose **Computer, Properties, and then Device Manager.**
“CONTEC Devices” appears in the Device Manager window.



- 7** Right-click **CONTEC Devices-DIO DIO-0808LY-USB**, and then click **Properties.**
DIO DIO-0808LY-USB "DIO000" Properties appear.

- 8** On the **Common Settings** tab, change **Device Name** to any name.
You can use the default device name if you like. You can also change this later. The device name you specify here will appear when you select LIN1020JF from HarmoCapture.



Installing Adobe Reader

If an application used to view PDF files is not installed on your PC, proceed with the following steps to install Adobe Reader.

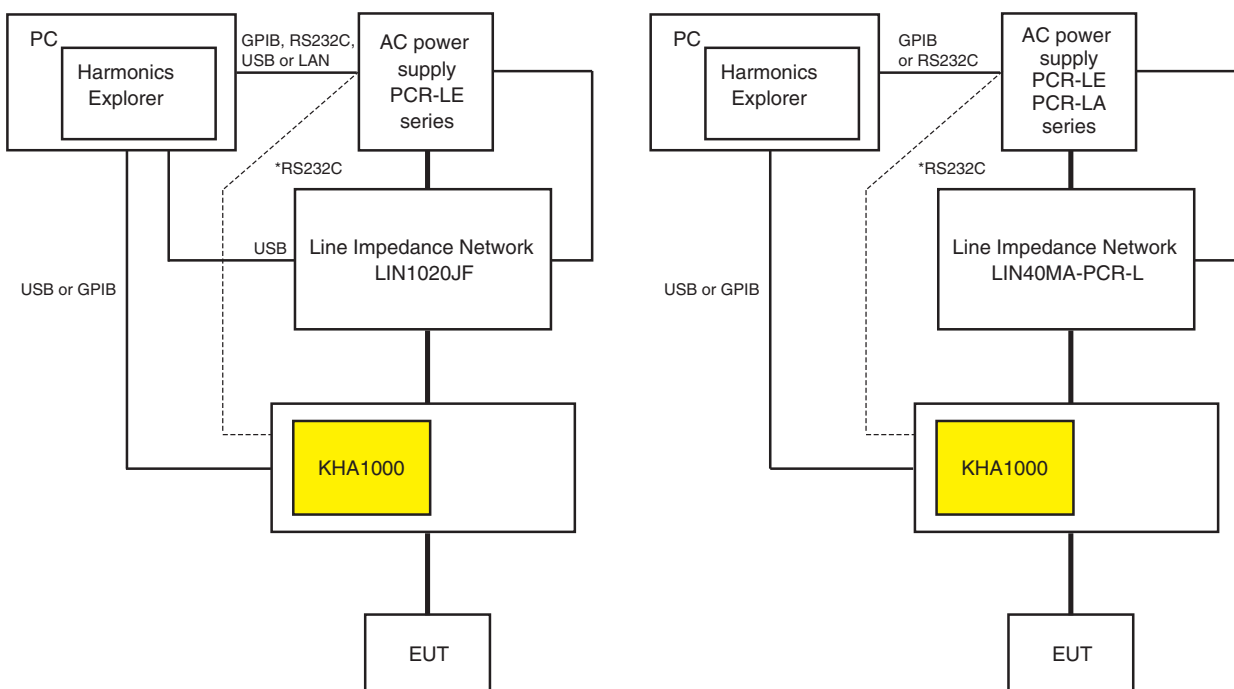
- 1** Click Back in the browser window.
- 2** On the installation window, click Adobe Reader x.x.
- 3** Double-click AdbeRdrxx_en_US.exe.
xx described after AdbeRd is version number.
Then, follow the instructions on the screen.

Interface Configuration

System Configuration

The block diagram of the harmonic current and voltage fluctuation test system is shown in the following. Before making the settings explained later, connect the devices.

When you use the LIN1020JF line impedance network, you can set the impedance remotely from HarmoCapture. The LIN1020JF line impedance network can be combined with the PCR-LE series AC power supply only.



* If the RS232C has been used to connect between the KHA1000 and the AC power supply, re-connect it between the PC and the AC power supply.

Harmonic current and fluctuation voltage test system

KHA1000 Setup

In the KHA1000 system setup window, proceed with the following setup. For details, see the KHA1000 manual.

- 1 Press SYSTEM on the panel.**
- 2 From the I/F Select list, select the communication interface.**
 - USB: Select this to connect the KHA1000 to the PC using a USB cable (recommended).
 - GPIB: Select this to connect the KHA1000 to the PC using the GPIB cable. If you select GPIB, select an appropriate GPIB address from 1 to 30.
- 3 Turn off the KHA1000 POWER switch, and then turn it back on again.**

AC Power Supply Setup

To use RS232C, set the communication parameters from the AC power supply panel as shown below.

- PCR-LE Series

Baudrate: 9600 bps/ 19200 bps/ 38400 bps
 Data: 8 bits / 7 bits
 Stop: 1 bit / 2 bits
 Parity: None (fix)
 Flow Ctrl: OFF / RTS·CTS

 A shaded area indicates a set value.

- PCR-LA Series

	0	8	1	1	
Baud rate	1: 9600 bps	2: 19200 bps			
Stop bit	1: 1 bit	2: 2 bits			
Data length	7: 7 bits	8: 8 bits			
Parity	0: None	1: Odd number	2: Even number		

 A shaded area indicates a set value.

- PCR-L Series

	0	8	1	4	
Baud rate	1: 1200 bps	2: 2400 bps	3: 4800 bps	4: 9600 bps	
Stop bit	1: 1 bit	2: 1.5 bits	3: 2 bits		
Data length	7: 7 bits	8: 8 bits			
Parity	0: None	1: Odd number	2: Even number		

 A shaded area indicates a set value.

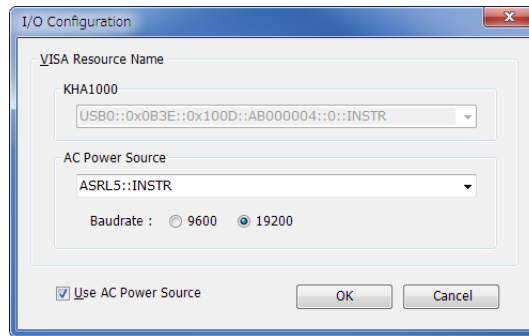
To use the GPIB, select an appropriate value from 1 to 30 for the GPIB address.
 For details, see the AC power supply manual.

Harmonics Explorer Startup

Starting HarmoCapture

- 1 To start HarmoCapture, click All Programs > Kikusui Harmonics Explorer, and then click HarmoCapture.**

If the communication with the KHA1000 fails immediately after HarmoCapture starts, the I/O Configuration dialog box will open. If the communication is successful, the following steps up to [Step 2](#) are automatically executed.



■ If the software is able to retrieve the device ID string

Select the ID appears in the list and click OK.

The USB or GPIB is displayed as USB or GPIB with the acquired character string. The RS232C is displayed by a port number.

- **Example: KHA1000, GPIB0::1::INSTR**

The KHA1000 and PC are connected using the GPIB, and the GPIB address is indicated as 1. The GPIB address is from 1 to 30.

- **Example: AC Pow., ASRL1**

The AC power supply and PC are connected using the RS232C, and the port number indicated is 1.

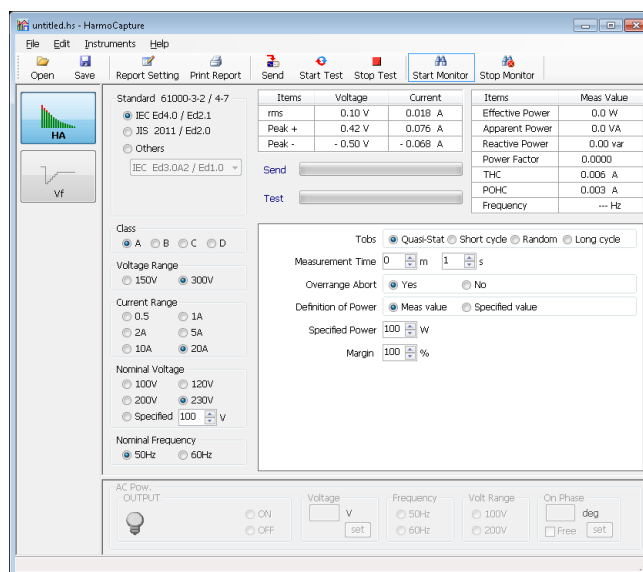
■ If the ID does not appear in the list

Check the I/F cable, VISA settings, or KHA1000 system settings, and then start over from [Step 1](#).

If you are connecting the AC power supply to a PC through RS232C, select the same baud rate (data rate 9600 or 19200) you set on the AC power supply. Communication will not work if the setting is incorrect.

2 HarmoCapture starts in the current KHA1000 test mode.

HarmoCapture starts in accordance with the KHA1000 test mode. The following screen is an example of the startup window when the KHA1000 is in the harmonic current test mode.



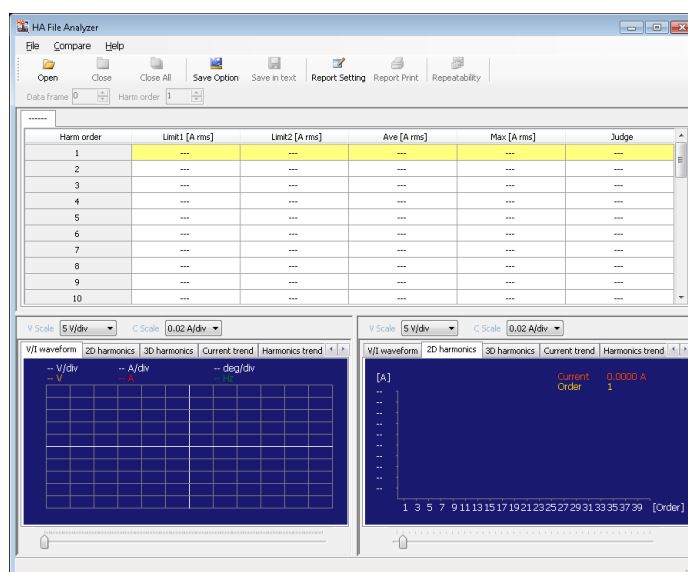
NOTE

If you start HarmoCapture when the KHA1000 is executing a test, the test will be stopped.

Starting HA File Analyzer

HA File Analyzer operates without being connected to the KHA1000.

1 To start HA File Analyzer, click All Programs > Kikusui Harmonics Explorer, and then click HA File Analyzer.

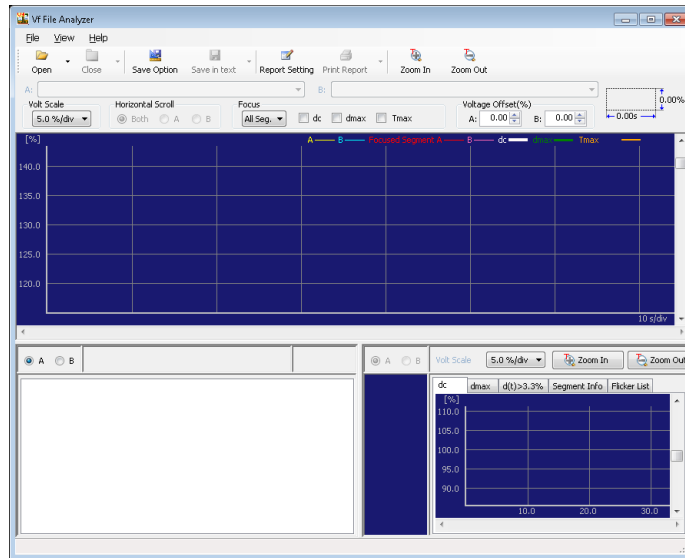


Harmonics Explorer Startup (continued)

Starting Vf File Analyzer

Vf File Analyzer operates without being connected to the KHA1000.

- 1 To start Vf File Analyzer, click **All Programs > Kikusui Harmonics Explorer**, and then click **Vf File Analyzer**.



Viewing the Operation Guide

The Operation Guide details the instructions on how to use each application software. On each application software, choose User's manual (English) from the Help menu.