KIKUSUI

Setup Guide

Application Software

SD005-KHA Harmonics Explorer
Ver. 3.8x
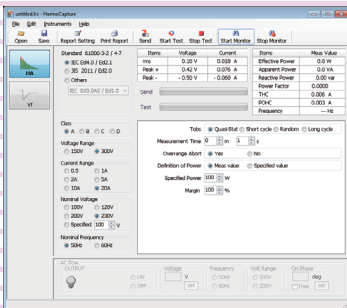
HarmoCapture
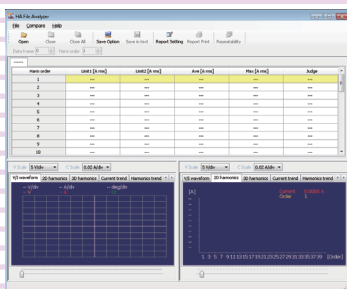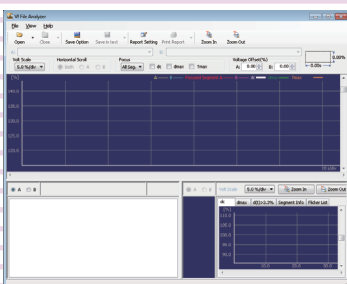
HA File Analyzer

Vf File Analyzer

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 3.8x.

■ 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-WEA or PCR-WEA2 series AC power supply (including the PCR-WEA2R, a model with a regeneration function)
Firmware version 3.10 or later
- PCR-WE or PCR-WE2 series AC power supply (including the PCR-WE2R, a model with a regeneration function)
Firmware version 1.32 or later
- PCR-LE or PCR-LE2 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."

■ 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.

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⚠ For Safe Use

Before using Harmonics Analyzing Suite to perform tests, thoroughly read the manuals of the hardware you will be using, and be sure to connect and operate the product correctly. Improper connections or handling can lead to serious accidents, injury, and fire.

Notations Used in This Guide

- In this guide, the KHA1000 Harmonic/flicker analyzer is also called "KHA1000."
- In this guide, the LIN1020JF and LIN40MA-PCR-L Line impedance network is also called "Line impedance network."
- In this guide, the PCR-WE series and PCR-WE2 series (including the PCR-WE2R, a model with a regeneration function) AC power supplies, in addition, the PCR-WEA series and PCR-WEA2 series (including the PCR-WEA2R, a model with a regeneration function) AC power supplies are also referred to as the "PCR-WE."
- In this guide, the PCR-LE series and PCR-LE2 series AC power supplies are also referred to as the "PCR-LE."
- In this guide, the PCR-LA series is also referred to as the "PCR-LA."
- **In this guide, all the above AC power supply series may be referred to collectively as the "AC power supply."**
- "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 61000-4-15Ed1.1	IEC 61000-3-3:Ed2.0(2008) EN 61000-3-3(2008)	IEC 61000-4-15:Ed1.1(2003) EN 61000-4-15(1998)/A1(2003)
	IEC 61000-3-3 IEC 61000-4-15Ed2.0	IEC 61000-3-3:Ed3.0(2013) EN 61000-3-3(2013)	IEC 61000-4-15:Ed2.0(2010) 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.
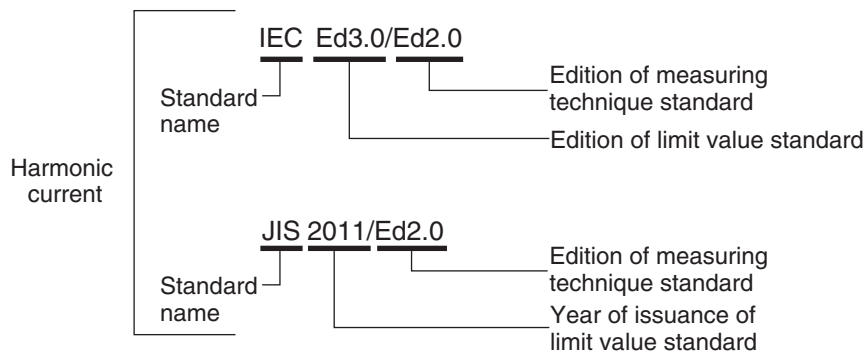
Rules for standard name notations

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 Tmax (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.

SD005-KHA

- 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-GPLV 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

The operation guide details the Harmonics Explorer operation. For instructions on how to view the Operation Guide, see "Viewing the Operation Guide."

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.

About Windows 10 updates

Unlike the older versions of Windows, Windows 10 is provided as Windows as a Service (WaaS) in order to continuously update the OS. It is said that updating privileges would be lost unless it is used in an Internet connected environment and Windows Update is periodically executed (currently 18 months).

If you want to stably run a test using this software over an extended period, you need to be careful about the auto update function of Window 10.

Familiarize yourself with the matter explained below, and construct the most stable OS environment possible before running a sequence.

■ **Running Windows Update**

Run Windows Update to update the OS to the latest condition (in which "You're up to date" is shown).

When the downloading of the update file is complete, Windows will be in an installation-wait state or restart-wait state after installation. If you run a sequence in this state, Windows may restart automatically even when the PC is not connected to the Internet. Be sure to select Install Now or Restart Now to complete the installation of the update program.
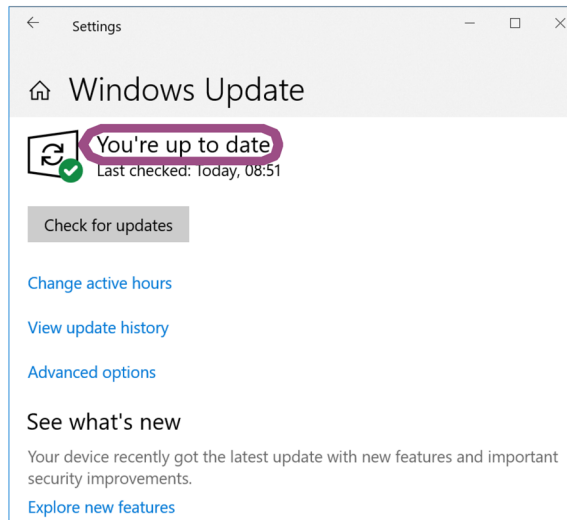
■ **Windows Update settings**

With the default Windows Update settings, when connected to the Internet, Windows 10 automatically runs Windows Update and restarts the PC using the update program. If this software is running, Windows will automatically restart while a test is running, and this will result in the cancellation of the test.

When executing a long-term test using this software, we recommend that, in the Windows Update settings, you postpone the update program installation until an appropriate time.

Setup

- 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.

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

- 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.

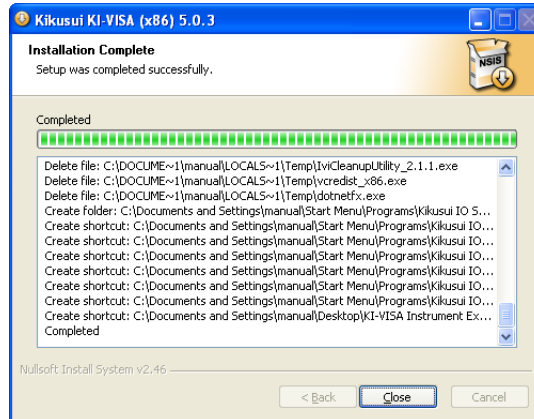**1**   **Open the kivisa folder in the CD-ROM.**
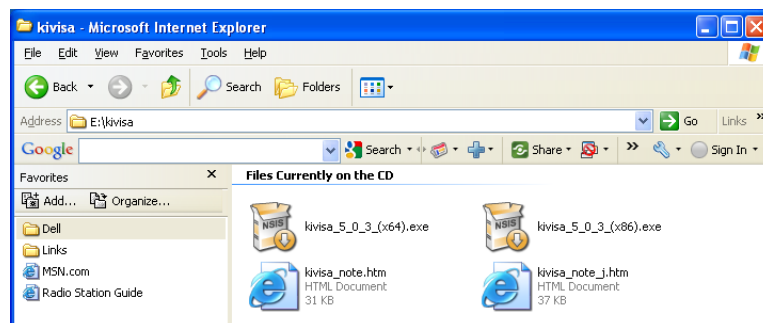
2 **Double-click kivisa_x_x_x.exe.**

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.

Then, follow the instructions on the screen.

When the installation is complete, the following window opens.

Installation complete window of KI-VISA_x_x_x_(x86) for 32-bit OS

NOTE kivisa_x_x_x(x64).exe for 64-bit OS contains two software packages, KI-VISA (x64) and KI-VISA (WOW64). When KI-VISA (x64)has been successfully installed, the installation of KI-VISA (WOW64) begins. Be sure to confirm that the installation of KI-VISA (WOW64) has finished successfully.

3 **Click Close.**

Proceed to the Kikusui Harmonics Explorer for KHA1000 installation.

Installing Harmonics Explorer

4 **Open the setup folder in the CD-ROM.**
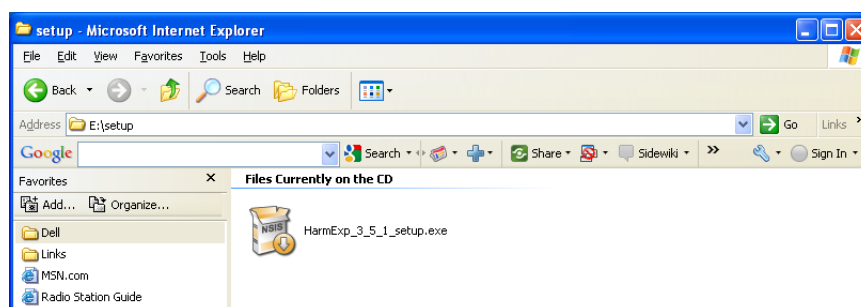
5 **Double-click HarmExp_X_X_X_setup.exe.**

Then, follow the instructions on the screen.

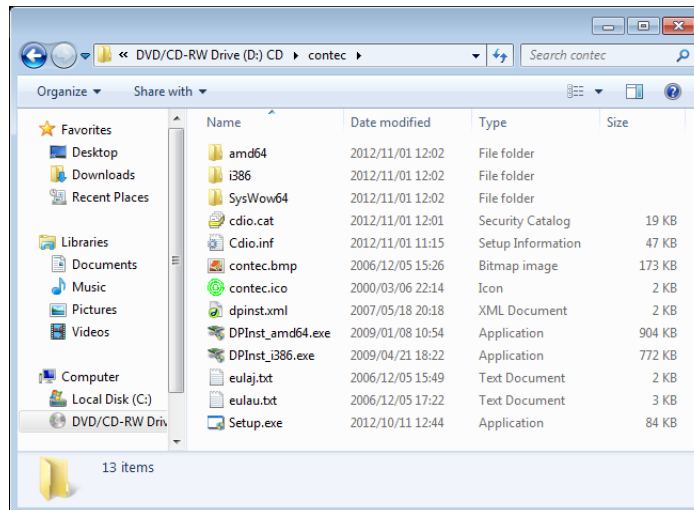When the installation is complete, the following window appears.
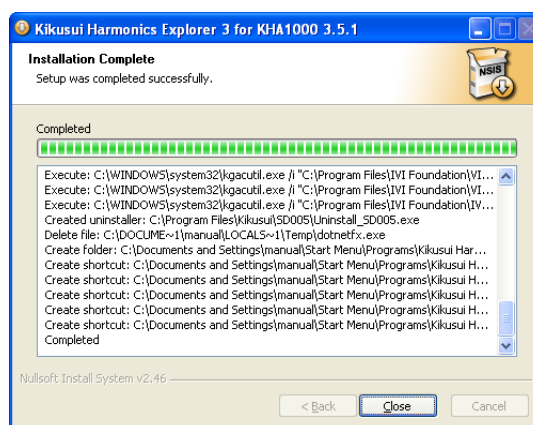

6 **Click Close.**

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 **Open the contec folder in the CD-ROM.**

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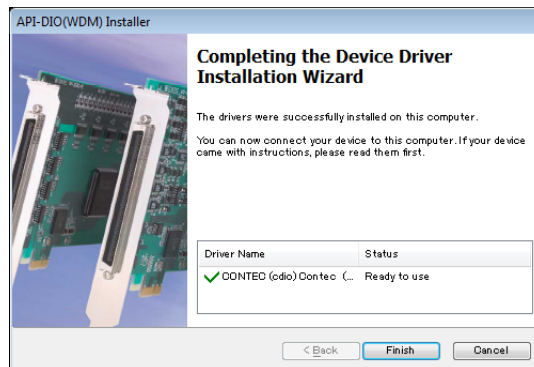
5 **Click Finish.**

6 **On the Windows Control Panel, click Device Manager.**

"CONTEC Devices" appears in the Device Manager window.
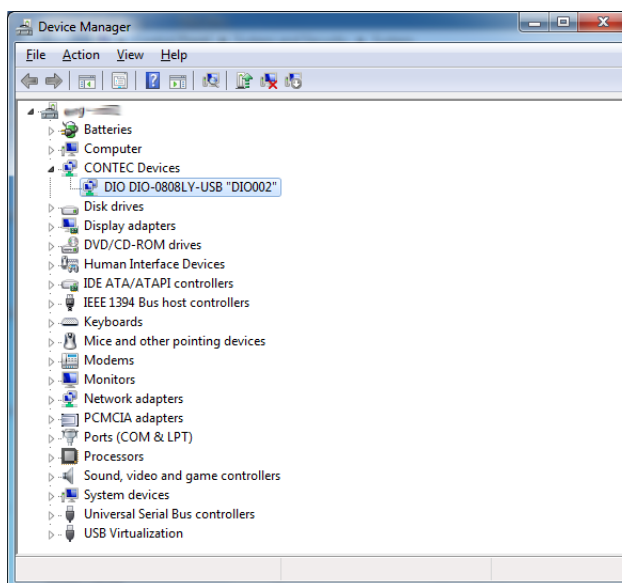
7 **Right-click CONTEC Devices-DIO DIO-0808LY-USB, and then click Properties.**

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.
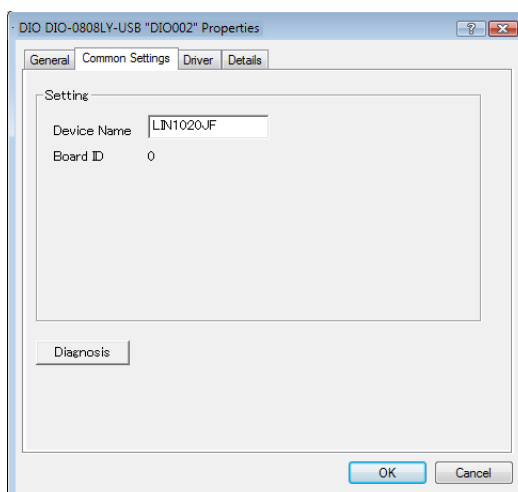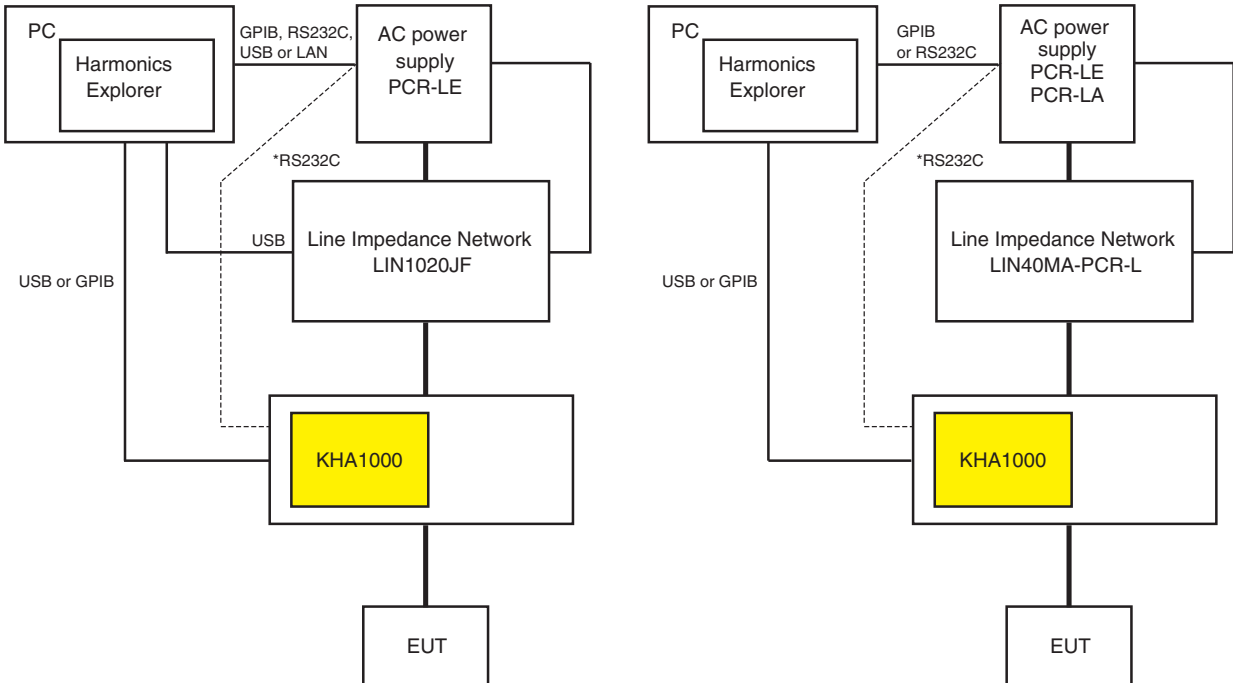
Interface Configuration

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.
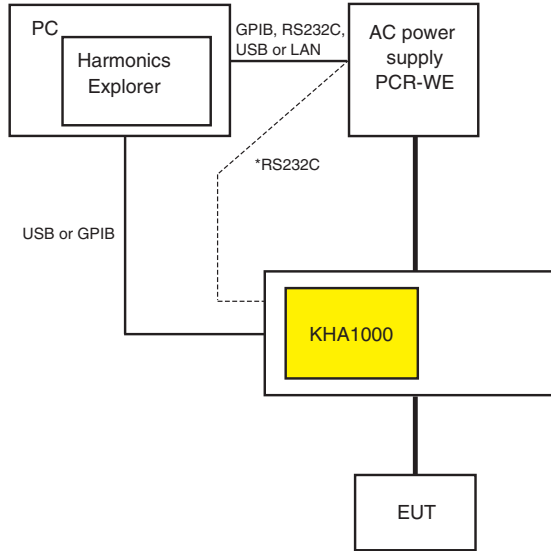
* If the RS233C has been used to connect between the KHA1000 and the AC power supply, re-connect it between the PC and the AC power supply.

* If the RS233C 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

When you use the LIN1020JF line impedance network, you can set the impedance remotely from HarmoCapture.

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

After selecting the interface to use, set the parameters. For details, see the AC power supply manual.

● RS232C

• PCR-WE, PCR-LE

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

0 8 1 2

└─ 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

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.

● GPIB

Select an appropriate GPIB address from 1 to 30. Make sure that the address does not overlap with the KHA1000 address.

● USB (PCR-WE, PCR-LE)

Simply select USB. There are no other settings that are required.

● LAN (PCR-WE, PCR-LE)

Normally, you should set DHCP and AUTO IP to ON to set the IP address automatically.
For P2P (Peer to Peer) connections, set DHCP to OFF and AUTO IP to ON and set the IP address automatically.

Harmonics Explorer Startup

Starting HarmoCapture

1 **Click the Windows Start > 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.
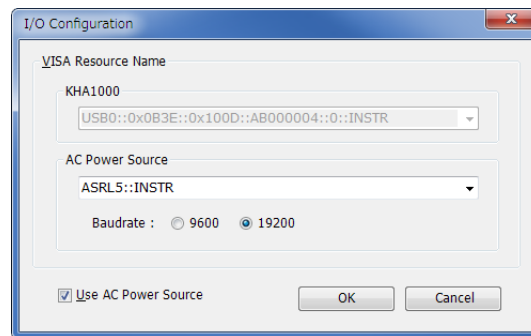
■ **If the software is able to retrieve the device ID string**

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.
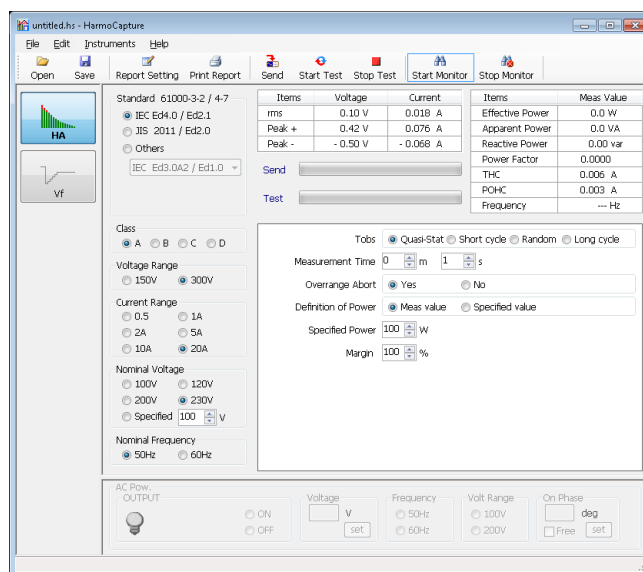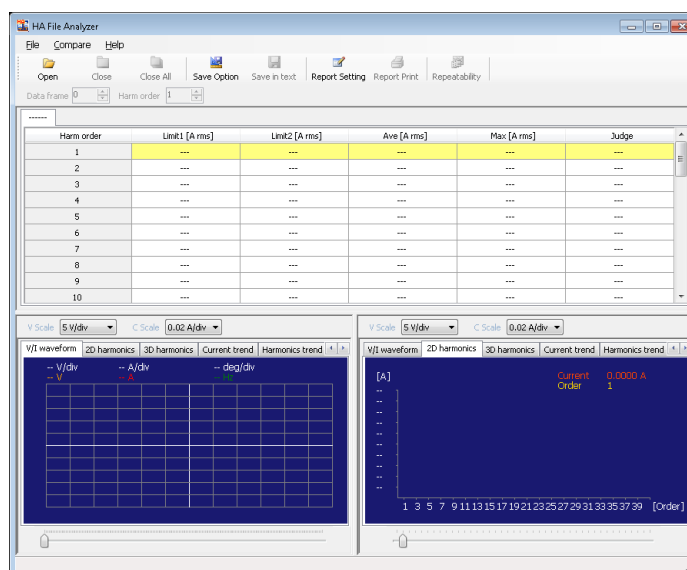

NOTE If you start HarmoCapture when the KHA1000 is executing a test, the test will be stopped.

Starting HA File Analyzer

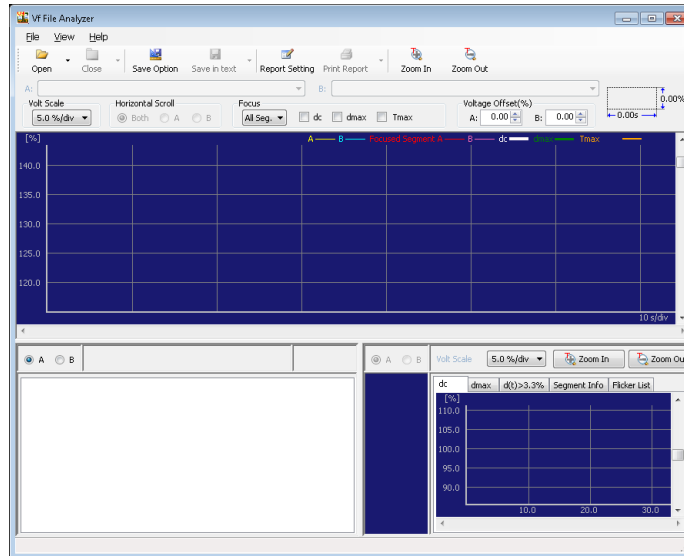HA File Analyzer operates without being connected to the KHA1000.

1 **Click the Windows Start > Kikusui Harmonics Explorer, and then click HA File Analyzer.**

Starting Vf File Analyzer

Vf File Analyzer operates without being connected to the KHA1000.

1   **Click the Windows Start > 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.