KIKUSUI

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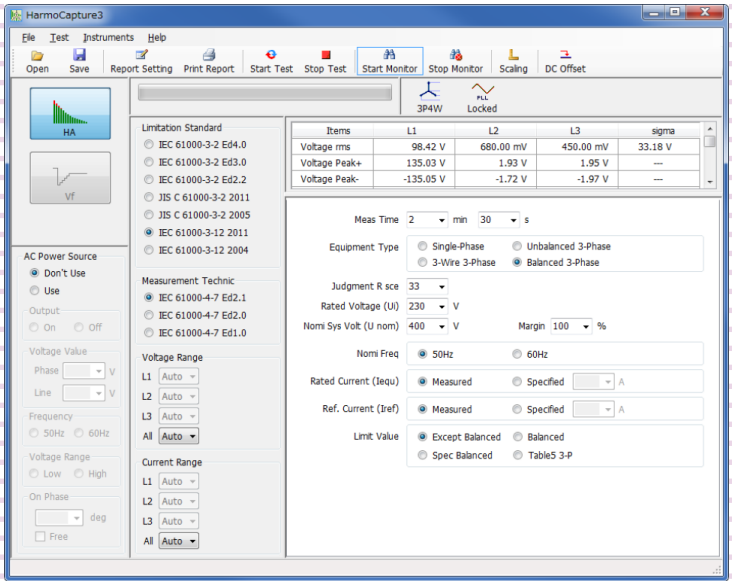
Operation Guide

Application Software

HarmoCapture3

Ver. 2.6x



Contents

Introduction

This operation guide explains how to:

- Perform standard conformance testing for harmonic currents and voltage fluctuations with HarmoCapture3, and
- Print reports of test result files.

■ Product versions that this guide covers

This operation guide applies to HarmoCapture3 with version 2.6x.

You can check the version from the help menu **About HarmoCapture3**.

■ Required versions for related equipment

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

Product name or Series name	Firmware version
KHA3000 Harmonic/Flicker Analyzer	3.40 or later
PCR-WEA or PCR-WEA2 series AC power supply (including the PCR-WEA2R, a model with a regeneration function)	3.10 or later
PCR-WE or PCR-WE2 series AC power supply (including the PCR-WE2R, a model with a regeneration function)	1.32 or later
PCR-LE or PCR-LE2 Series AC power supply	3.20 or later
PCR-LA Series AC power supply	other than 3.32 or 3.33

■ Who should read this operation guide?

The intended audience of this operation guide is anyone using the KHA3000 to control a harmonic current and voltage fluctuation test system or anyone teaching operators how to use such a system.

Explanations are given under the presumption that the reader has electrical knowledge related to harmonic current and voltage fluctuation tests.

■ Notations used in this guide

- In this guide, the KHA3000 Harmonic/Flicker Analyzer is also called “KHA3000.”
- In this guide, the LIN3020JF, LIN1020JF and LIN40MA-PCR-L Line impedance network are 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 This symbol indicates a potentially hazardous situation. Ignoring the symbol may result in damage to the product or other property.

NOTE Indicates information that you should know.

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What is HarmoCapture3?

See p. 5

HarmoCapture3 is a software application for creating test conditions for harmonic current and voltage fluctuation tests. It can also be used to execute tests and to carry out other related operations. HarmoCapture3 can execute tests in accordance with various Conformance Standards.

HarmoCapture3 can be used to:

- Remotely control the KHA3000 and the AC power supply from a PC.
- Test a single-phase/three-phase equipment that the KHA3000 with 3-channel input supports.
- 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, data lists, and 2D harmonics.)

Conformance Standards

HarmoCapture3 conforms to the following standards.

Classification	Standards for limits*1	Standards for measurement techniques*1
Harmonic current test	• IEC 61000-3-2 Ed4.0(2013) EN 61000-3-2 (2013) • IEC 61000-3-2 Ed3.0(2005) EN 61000-3-2 (2006) • IEC 61000-3-2 Ed3.0(2005)/A2(2009) EN 61000-3-2 (2006)/A2(2009) • IEC 61000-3-2 Ed2.2(2004) EN 61000-3-2 (2000)/A2(2005) • JIS C61000-3-2 (2011) • JIS C61000-3-2 (2005) • IEC 61000-3-12 Ed1.0(2004) • IEC 61000-3-12 Ed2.0(2011)	• IEC 61000-4-7 Ed2.1(2009)*2 EN 61000-4-7 (2002)/A1(2009) • IEC 61000-4-7 Ed2.0(2002)*2 EN 61000-4-7 (2002) • IEC 61000-4-7 Ed1.0(1991)*3 EN 61000-4-7 (1993)
Voltage fluctuation test	• IEC 61000-3-3 Ed3.0(2013) EN 61000-3-3 (2013) • IEC 61000-3-3 Ed2.0(2008) EN 61000-3-3 (2008) • IEC 61000-3-11 Ed1.0(2000)	• IEC 61000-4-15 Ed2.0(2010) EN 61000-4-15(2011) • IEC 61000-4-15 Ed1.1 (1997)/A1(2003) EN 61000-4-15 (1998)/A1(2003)

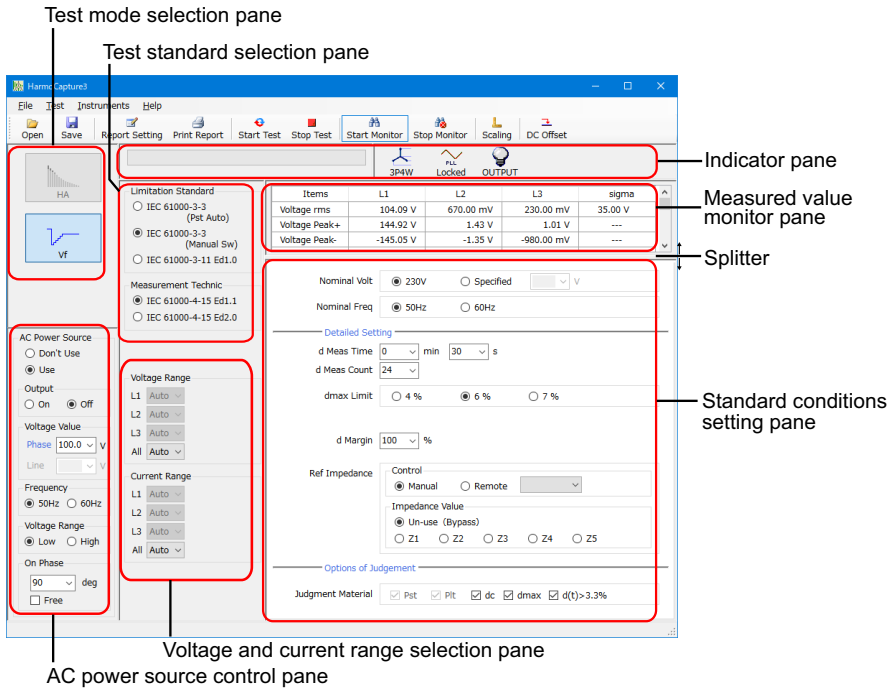
*1 EN standard names are also included in report printouts.

*2 The measurement window width is 0.2 seconds. This corresponds to 10 cycles and 12 cycles for the fundamental frequencies of 50 Hz and 60 Hz, respectively. Interharmonics are measured at 5-Hz intervals. Harmonic groups are determined by the measured harmonics and interharmonics. The harmonic group values become measured results

*3 The measurement window width is 16 cycles at the fundamental frequency. This corresponds to 0.32 seconds and 0.266 seconds for the fundamental frequencies of 50 Hz and 60 Hz, respectively. Interharmonics are not measured, only harmonics. The harmonic values become measured results.

Window Configuration

The harmonic current test window and the voltage fluctuation test window both consist of seven panes. You can change a ratio of the measured value monitor pane and the standard conditions setting pane by dragging the splitter.



Item	Description
Test mode selection pane	Click HA (harmonic current test) or Vf (voltage fluctuation test) to select the test.
AC power source control pane	Turn the output on and off, select whether or not to control the AC power supply, and set the voltage, frequency, voltage range, and on-phase (the phase when output is turned on).
Test standard selection pane	Select the test standard. Select the standard for limits and the standard for the measurement technique.
Voltage and current range selection pane	Select the voltage and current range. To select whether to set the range and terminal separately for each phase or collectively for all phases, you can choose **Ch Link** from the **Test** menu and select **Linked** or **Independent**.
Indicator pane	• The test progress bar displays the progress of the current test. • The wiring method icon indicates the selected wiring system. • The PLL icon indicates the synchronization status between the KHA3000 and the AC power test source. • When you are using the AC power supply, an OUTPUT icon, which indicates the AC power supply output status, appears. • If the KHA3000 detects overvoltage, overcurrent, or overheating, an ALARM icon appears.
Measured value monitor pane	Constantly monitors and displays the following measured values in a list: Rms current and voltage, positive and negative current and voltage peaks, active power, apparent power, reactive power, power factor, THC, POHC, THD, and PWHD
Standard conditions setting pane	Select the class and set test conditions. The items that appear vary depending on the selected standard and class.

Using a Test Condition File

There are two types of test condition files.

- Test condition files that you create using HarmoCapture3
- Test condition files that you save on the KHA3000

NOTE Even if you don't create a test condition file, you can perform tests.

Creating a Test Condition File

See p. 6

1 **In the** Test mode selection pane**, select HA (harmonic current test) or Vf (voltage fluctuation test).**

2 **Edit or create a test condition file used to perform the standard conformance test.**

For details on conformance standards, see Conformance Standards**.**

See p. 5

- Setting Test Conditions for Harmonic Current Test

See p. 18

- Setting Test Conditions for Voltage Fluctuation Test

See p. 32

- Using a Test Condition File that You Saved on the KHA3000
- Opening an Existing Test Condition File

3 **Save the test conditions file.**

Using a Test Condition File that You Saved on the KHA3000

Follow the procedure below to load a test condition file that was saved on the KHA3000 to the PC and open it with HarmoCapture3.

1 **Remove the storage media (CompactFlash card or USB flash drive) that contains the test conditions from the KHA3000.**

2 **Connect the storage media to the PC.**

3 **Load the test condition file from the storage media to the PC.**

4 **Click Open on the toolbar.**

The Open **dialog box appears.**

5 **Select the file that you want to open.**

The test condition file name extension for harmonic current tests is .HS3.

The test condition file name extension for voltage fluctuation tests is .VS3.

Opening an Existing Test Condition File

Follow the procedure below to open a test condition file that you created using HarmoCapture3.

1. Click **Open** on the toolbar.
   The Open dialog box appears.
2. Select the file that you want to open.
   The test condition file name extension for harmonic current tests is .hs3.
   The test condition file name extension for voltage fluctuation tests is .vs3.

Saving a Test Condition File

1. Click **Save** on the toolbar.
   The test condition file that you are currently editing is saved.
   If you are saving the test conditions for the first time, the Save As dialog box appears.
2. Specify the save destination and file name.
   The test condition file name extension for harmonic current tests is .hs3.
   The test condition file name extension for voltage fluctuation tests is .vs3.
   Click Save.

Saving a Test Condition File with a New Name

1. To save a test condition file with a new name, choose **Save Condition File As** from the **File** menu.
   The Save As dialog box appears.
2. Specify the save destination and file name.
   The test condition file name extension for harmonic current tests is .hs3.
   The test condition file name extension for voltage fluctuation tests is .vs3.
   Click Save.

Controlling the AC Power Supply

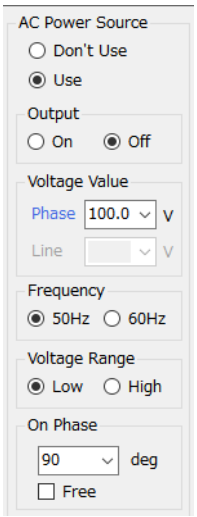
Ac Power Source Control Pane

You can use the HarmoCapture3 AC power source control pane to control the AC power supply.

CAUTION Set the AC power supply output voltage and frequency according to the EUT's power rating.

NOTE

- Set the voltage range first. You cannot enter a voltage that exceeds the voltage range that you selected.
- You can change the voltage range when the output is turned off.



Item	Description
AC power supply	Select **Use** to use the AC power supply or select **Don't Use** otherwise.
Output	Turn the AC power supply output on or off by selecting the **On** or **Off** option.
Voltage	Set the AC power supply output voltage. Enter the appropriate value according to the EUT power rating and the voltage range that you selected. If the wiring method is single-phase two-wire, single-phase three-wire or three-phase four-wire, set the phase voltage. For three-phase three-wire, set the line voltage.
Frequency	Select the AC power supply frequency.
Voltage Range	Select the AC power supply voltage range.
On-Phase	You can set the initial voltage phase angle that is generated when the output is turned on. You can set the phase in the range of 0° to 360°. To disable the on-phase feature, select the **Free** check box.

Voltage range	AC power supply	Output voltage range	
		Phase voltage	Line voltage
Low	PCR-WE	0 V to 161.0 V (0 V to 157.5 V)*1	0 V to 278.8 V (0 V to 272.7 V)*1
	PCR-LE PCR-LA	0 V to 152.5 V	0 V to 264.1 V
High	PCR-WE	0 V to 322.0 V (0 V to 315.0 V)*1	0 V to 557.6 V (0 V to 545.5 V)*1
	PCR-LE PCR-LA	0 V to 304.8 V	0 V to 527.9 V

*1 The output voltage range for AC power supply PCR-WE/PCR-WE2 series (firmware Ver. 1.32 to under 2.00) is shown in parentheses.

PCR Configuration

A PCR configuration dialog box opens when you switch from **Don't Use** to **Use**. Use this dialog box to set the connection between the AC power supply and the PC. From this point, if the AC power supply is connected, the **Use** setting becomes valid.

This dialog box also appears when you select **PCR Configuration** from the **Instruments** menu.

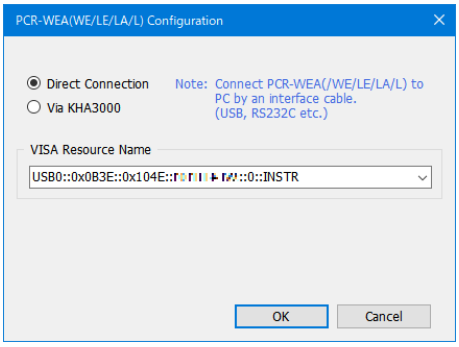
When connecting the AC power supply and the PC directly

In this connection configuration, the interface on the AC power supply can be used to connect to the PC.

NOTE On system that also use SD009-PCR-LE/WE Quick Immunity Sequencer 2 (QIS2), use this connection. However, QIS2 and HarmoCapture3 cannot run simultaneously. If QIS2 is running, close QIS2, and then run HarmoCapture3.

1. Select **Direct Connection**.
2. Select the ID appears in the list of **VISA Resource Name**.

   If the ID does not appear, check the I/F cable, VISA settings, or AC power supply interface settings.
3. Click **OK**.

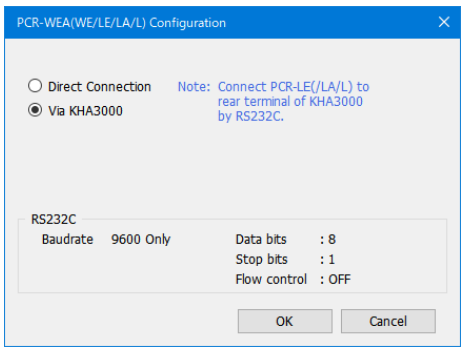


When connecting the AC power supply and the PC through the KHA3000

In this connection configuration, only RS232C can be used to connect to the PC.

1. Select **Via KHA3000**.

   The baudrate is fixed at 9600 bps.
2. Click **OK**.



Setting the Line Impedance Network

The Line Impedance Network can be used in the conformance testing of the following four standards.

When you use the LIN3020JF or LIN1020JF Line impedance network, you can set the impedance remotely from HarmoCapture3.

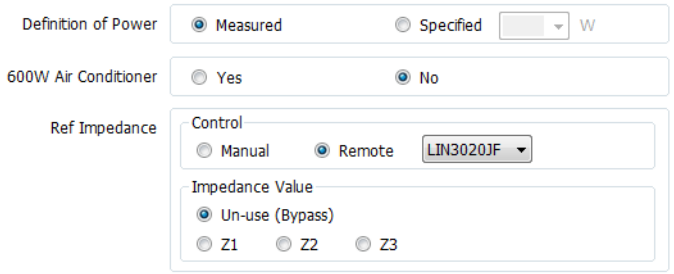
Standard	Line Impedance Network configuration
IEC 61000-3-2	Bypass*1,*2
JIS C61000-3-2	Bypass*2 or Z1 (0.4 Ω + 0.37 mH): Nominal voltage 100 V (single phase) Z2 (0.38 Ω + 0.46 mH): Nominal voltage 200 V (single phase) The standard contains a description that states that line impedance may be used if measurement results cannot be reproduced (Annex A).
IEC 61000-3-3	0.40 Ω + jn 0.25 Ω (single phase) 0.24 Ω + jn 0.15 Ω (three phase) 0.16 Ω + jn 0.10 Ω (three phase)
IEC 61000-3-11*3	0.24 Ω + jn 0.15 Ω (single phase) 0.16 Ω + jn 0.10 Ω (three phase)

*1 If you want to perform IEC 61000-3-2 standard tests on a system that uses the LIN40MA-PCR-L for the line impedance network, we recommend that you do not use the LIN40MA-PCR-L and connect the AC power supply and the KHA3000 directly. The internal circuit and wiring of the LIN40MA-PCR-L have impedance. In test systems, the IEC 61000-4-7 standard requirements (voltage drop due to wiring impedance) must be taken into consideration.
This does not apply when using the LIN3020JF or LIN1020JF.

*2 In IEC 61000-3-2 testing, we recommend that you connect the AC power supply directly to the KHA3000 rather than using the Line Impedance Network. The internal circuit of the Line Impedance Network and the wiring of the instruments have impedance. You must pay attention to the IEC 61000-4-7 requirements concerning the voltage drop due to wiring impedance.

*3 A line impedance network that supports IEC61000-3-11 can be ordered as a special order. Contact your Kikusui agent or distributor.

- Configuration example for JIS C61000-3-2 standard tests



Starting the Monitoring Operation

When you start monitoring, you can view the EUT's current, voltage, power, and other values on the Measured value monitor pane.

■ Starting the monitoring of measured values

Click **Start Monitor** on the toolbar. You cannot operate the KHA3000 from the front panel while it is being monitored by HarmoCapture3.

■ Stopping the monitoring of measured values

Click **Stop Monitor** on the toolbar and press the LOCAL key on the front panel of the KHA3000 . You can now operate the KHA3000 from the panel.

NOTE Do not change the settings in the AC power source control pane while monitoring is stopped. If you do, a communication error may occur.

Measured Value Monitor Pane

HarmoCapture3 monitors the following values.

	Values that HarmoCapture3 can monitor
Harmonic current test	• Rms current and voltage • Positive and negative current and voltage peaks • Active power, apparent power, and reactive power • Power factor • Frequency • THC and POHC • THD and PWHD
Voltage fluctuation test	• Rms current and voltage • Positive and negative current and voltage peaks • Active power, apparent power, and reactive power • Power factor • Frequency

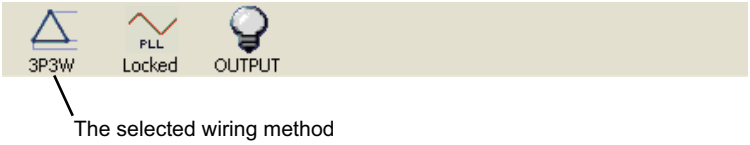
Common Settings between HA Test and Vf Test

The following items are common between harmonic current testing and voltage fluctuation testing. Configure them appropriately for the EUT.

- Wiring Method
- PLL Source
- Voltage and Current Range

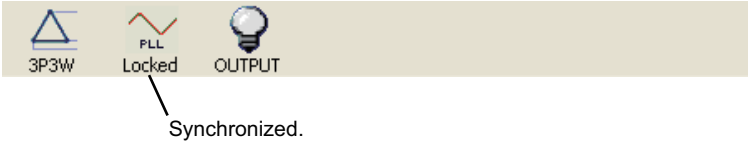
Wiring Method

Select the circuit wiring method. From the **Test** menu, point to **Wiring Method**, and choose **1P2W**, **1P3W**, **3P3W**, or **3P4W**. The selected wiring method appears in the Indicator pane.

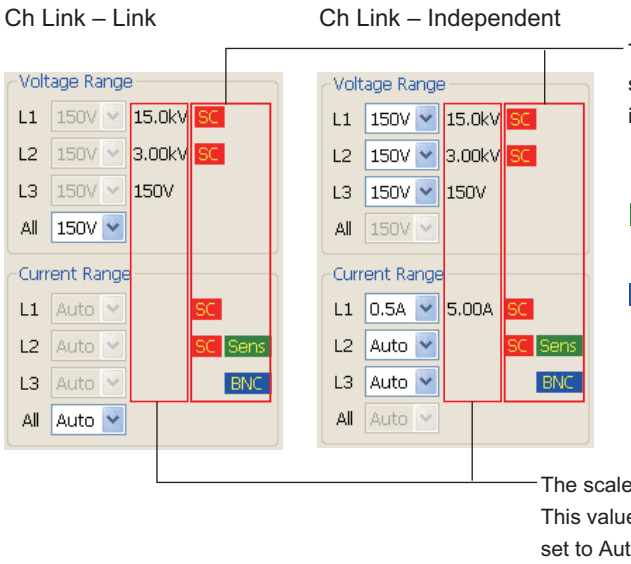


PLL Source

Select the source signal used to synchronize with the AC power frequency. You can select a voltage or current signal from phases L1, L2, and L3. Select **EXT** to use the input signal from the EXT SYNC INPUT connector on the KHA300 rear panel. From the **Test** menu, point to **PLL Source**, and then choose the appropriate source. When the selected PLL source synchronizes to the AC power frequency, "PLL Locked" appears in the Indicator pane.



Voltage and Current Range



Item	Description
Voltage range Current range	Select the voltage or current measurement range. Select the range according to the rated supply voltage or the rated supply current of the EUT. If you select **Auto**, the range is determined automatically. During a test, the range is fixed at the range that was specified when the test was started.

■ Ch Link

From the **Test** menu, point to **Ch Link**, and then choose **Link** or **Independent** for the phases between L1, L2, and L3. If you choose **Link**, the **All** combo box gets active. Using this tab, you can collectively set the voltage range, current range, and current input of all channels. If you choose **Independent**, the **L1**, **L2**, and **L3** combo boxes get active. Using these tabs, you can set the voltage range, current range, and current input for each phase separately. From the **Test** menu, point to **Ch Link**, and then choose **Link** or **Independent**.

■ Scaling

See p. 15

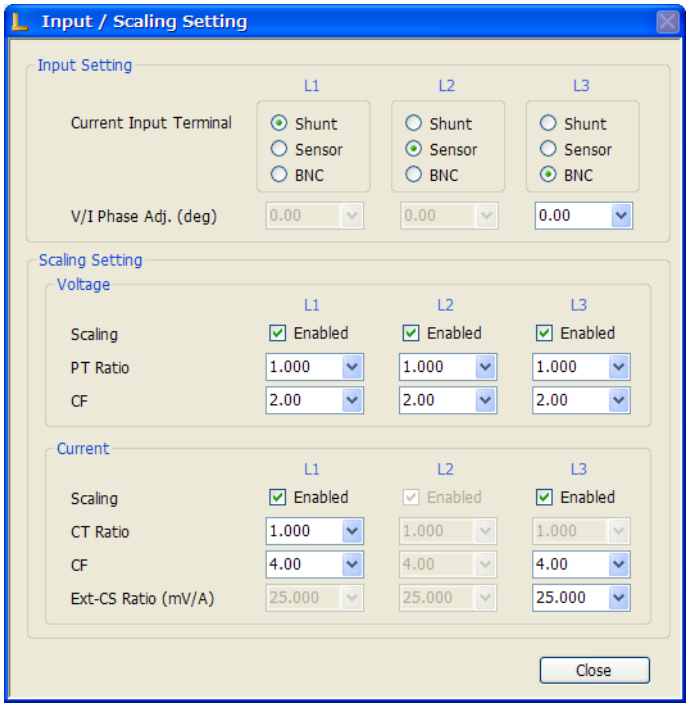
The scaled range, which is determined by the PT ratio and CT ratio specified in the Input / Scaling Setting window, is displayed to the right of the boxes for each of the phases.

When auto scaling is selected, the scaled range is not displayed.

Current Input Terminal / Scaling

Click **Scaling** on the toolbar to open the **Input / Scaling Setting** window, in which you can specify the KHA3000 current input terminals that you want to use and the scaling values that you want to apply to the input from the external PTs (potential transformers) and current sensors.

You can continue performing operations in the HarmoCapture3 main window while the **Input / Scaling Setting** window is open.



⚠CAUTION When you use the KHA3000 internal shunt, the maximum input current is 40 Arms or 100 Apeak, whichever is smaller. If the maximum input current value is exceeded, the KHA3000 current detection circuitry may burn out.
When the current detection circuitry overheats, an OHP icon appears at the top of the KHA3000 screen. If you see this icon, turn off the EUT immediately. Start testing again after the OHP icon disappears.

You can enter values in all combo boxes in the **Input / Scaling Setting** window. The values that you confirm by pressing Enter are stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

Item	Description
Input Setting	
Current Input Terminal	Select the current input terminal on the back of the KHA3000 that you want to use. To use the SOURCE and LOAD terminals, select **Shunt**. To use the EXT CLAMP terminal, select **Sensor**, and to use the EXT INPUT terminal, select **BNC**. Sens appears in the voltage and current range selection pane when you select **Sensor** and BNC appears when you select **BNC**.
V/I Phase Adj. (deg)	When the current input terminal has been set to **BNC**, select how much to adjust the phase difference between the current detected by the external current sensor and the voltage measured by the KHA3000. This setting is unrelated to the current scaling setting. You can specify a value between -180.00° and 180.00°.
Scaling Setting Voltage	
Scaling	Select this check box to scale the transformer ratio from the external PT (potential transformer). SC appears in the voltage and current range selection pane when you enable scaling.
PT Ratio	Enter the PT (potential transformer) ratio. This setting is valid when the voltage scaling is enabled. You can specify a value from 0.001 to 100.000. The scaled voltage range is the product of the specified voltage range and the CP ratio. It appears to the right of the voltage range boxes in the voltage and current range selection pane.
CF	Referring to the specified range, set this value so that the external sensor peak values can be measured without distortion. The CF (crest factor) setting affects the measurement resolution. This setting is valid when the voltage scaling is enabled. You can specify a value from 1.00 to 2.00. Normally, use 2.00.
Scaling Setting Current	
Scaling	Select this check box to scale the current values from the external current sensor. SC appears in the voltage and current range selection pane when you enable scaling. When you set the current input terminal to **Sensor**, current scaling is automatically enabled. The KHA3000 automatically detects the connected sensor and configures the necessary scaling settings.
CT Ratio	Enter the CT (current transformer) ratio. This setting is valid when the current input terminal is set to **Shunt** and current scaling is enabled. You can specify a value from 0.001 to 1000.000. The scaled current range is the product of the specified current range and the CT ratio. It appears to the right of the current range boxes in the voltage and current range selection pane.
CF	Referring to the specified range, set this value so that the external sensor peak values can be measured without distortion. The CF (crest factor) setting affects the measurement resolution. This setting is valid when the current input terminal is set to **Shunt** or **BNC** and current scaling is enabled. You can specify a value from 1.00 to 4.00. Normally, use 4.00.
Ext-CS Ratio (mV/A)	Specify the current-to-voltage conversion ratio for the external current sensor. This setting is valid when the current input terminal is set to **BNC** and current scaling is enabled. You can specify a value from 0.250 mV/A to 2500.000 mV/A. For example, if a 0.2 V/FS current sensor range is set to 10 A, the ratio is 0.2V/10 A. This converts to 20 mA/A, so enter 20.000.

Before Starting a Test

Follow the procedure below before actually starting a test.

See p. 11

1 **Set the line impedance network.**

See p. 9

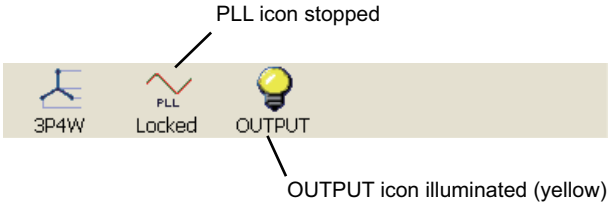
2 **Set the AC power supply.**

For instructions on how to control the AC Power Supply using HarmoCapture3, see, "Controlling the AC Power Supply."

3 **Check that the PLL icon in the indicator pane has stopped. When you are using the AC power supply, check that the OUTPUT icon is illuminated in yellow.**

If the PLL icon does not stop, check that:

- The AC power supply is delivering appropriate power.
- The PC power supply is set within the PLL lock frequency range of 45 to 65 Hz.
- The voltage sensing terminal plug is attached and wired to the VOLTAGE SENSING terminal on the KHA3000 rear panel. For details on wiring, see the *KHA3000 Operation Manual*.



4 **Click DC Offset on the toolbar.**

The DC offset of the KHA 3000 measurement circuitry is adjusted.

5 **Turn the EUT on.**

6 **Open an existing test condition file, or create a new test condition file.**

See p. 12

7 **Check that Start Monitor on the toolbar is selected.**

See p. 12

8 **In the Measured Value Monitor Pane, check the THC value.**

Change the EUT operating conditions so that the THC value is at maximum.

9 **Set the current range.**

Choose Auto unless you know the current value. When you choose Auto, the KHA3000 automatically adjusts the range and makes measurements. During a test, the range is fixed at the range that was specified when the test was started.

Setting Test Conditions for Harmonic Current Test

Common Settings

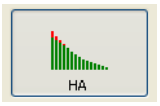
The following items are common between harmonic current testing and voltage fluctuation testing. Configure them appropriately for the EUT.

See p. 13

- Wiring Method
- PLL Source
- Voltage and Current Range

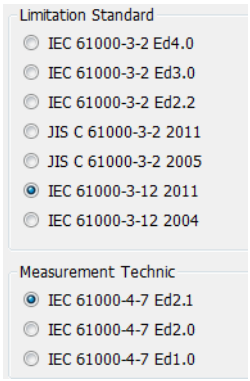
Selecting the Harmonic Current Testing Mode

In the Test mode selection pane, select **HA** (harmonic current test).



Selecting a Test Standard

In the Test standard selection pane, select the limitation standard and the standard for measurement techniques.



The requirements of the IEC 61000-3-2 Ed4.0 standard are the same as those of IEC 61000-3-2 Ed3.0 A2.

If you select IEC 61000-4-7 Ed2.0A1 or IEC 61000-4-7 Ed2.0, interharmonics are measured and stored as harmonic group values. We recommend IEC 61000-4-7 Ed2.0A1 or IEC 61000-4-7 Ed2.0 for fluctuating harmonic measurements.

When IEC 61000-3-2 Standard is Selected

The following items can be set when you select IEC 61000-3-2 Ed4.0, IEC 61000-3-2 Ed3.0 or IEC 61000-3-2 Ed2.2 standard.

Item	Description
Class	Select the class according to the EUT. The limit value that is used as the reference for standard conformance judgment is determined by the class. • A: Balanced three-phase equipment, household appliances excluding equipment identified as Class D, electric power tools excluding portable tools, dimmers for incandescent lamps, audio equipment, and equipment not specified in one of the other three classes • B: Portable tools and arc welding equipment which is not professional equipment • C: Lighting equipment • D: Personal computers, personal computer monitors and television receivers having a specified power less than or equal to 600 W.
Nominal Voltage	Set the rated supply voltage of the EUT. Select 230 V (fixed value) or Specified. If you select Specified, enter a value from 100 V to 600 V.
Nominal Frequency	Select the rated supply frequency of the EUT.
Measurement Time*1	Enter the measurement time from 0 minutes 1 second to 160 minutes 0 seconds. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Margin	Set the margin relative to the harmonic current limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Definition of Power	Set the power value of the EUT. Select **Measured** or **Specified**. If you select Specified, enter a value from 0 W to 135000 W.
PF & Fund Current (When Class C is selected.)	Set how to set the power factor and fundamental current of the EUT. Select **Measured** or **Specified**. If you select Specified, enter a power factor value from 0.00 to 1.00 and a fundamental current from 0.0 A to 75.0 A.
Limit Value (When Class C is selected.)	• Normal limit: Set to the Class C limit. Select this setting for lighting equipment that exceeds 25 W. • Class A Limit: Select this setting for incandescent lighting equipment with a dimmer that exceeds 25 W. • Class D Limit: Select this setting for discharge lighting equipment with an input power of 25 W or less. • 3rd/5th/Current Wave: Enabled when you select the IEC 61000-3-2 Ed3.0 A2 standard.

*1 If you set the standard to IEC 61000-3-2 Ed3.0 A2, select Class C, and set the limit values to 3rd/5th/Current Wave, the measurement time will be 0.2 seconds. The Measurement Time setting will be disabled.

When JIS C 61000-3-2 Standard is Selected

Item	Description
Class	Select the class according to the EUT. The limit value that is used as the reference for standard conformance judgment is determined by the class. • A: Balanced three-phase equipment, household appliances excluding equipment identified as Class D, electric power tools excluding portable tools, dimmers for incandescent lamps, audio equipment, and equipment not specified in one of the other three classes • B: Portable tools and arc welding equipment which is not professional equipment • C: Lighting equipment • D: Personal computers, personal computer monitors, television receivers and inverter refrigerators having a specified power less than or equal to 600 W.
Nominal Voltage	Set the rated supply voltage of the EUT. Select 230 V (fixed value) or Specified. If you select Specified, enter a value from 100 V to 600 V. Voltage conversion is not performed on the limit for a specified nominal voltage (based on the limit for 230 V).
Nominal Frequency	Select the rated supply frequency of the EUT.
Measurement Time*1	Enter the measurement time from 0 minutes 1 second to 160 minutes 0 seconds. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Margin	Set the margin relative to the harmonic current limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Definition of Power	Set the power value of the EUT. Select **Measured** or **Specified**. If you select Specified, enter a value from 0 W to 135000 W.
Ref Impedance	Control Manual or Remote*2 Impedance Value Un-use (Bypass), Z1, Z2, Z3, Z4, Z5
PF & Fund Current (When Class C is selected.)	Set how to set the power factor and fundamental current of the EUT. Select **Measured** or **Specified**. If you select Specified, enter a power factor value from 0.00 to 1.00 and a fundamental current from 0.0 A to 75.0 A.
Limit Value (When Class C is selected.)	• Normal limit: Set to the Class C limit. Select this setting for lighting equipment that exceeds 25 W. • Class A Limit: Select this setting for incandescent lighting equipment with a dimmer that exceeds 25 W. • Class D Limit: Select this setting for discharge lighting equipment with an input power of 25 W or less. • 3rd/5th/Current Wave: Enabled when you select the JIS 61000-3-2 2011 standard.
600 W Air Conditioner (When Class A is selected.)	Select **Yes** for an air conditioner with active input power that exceeds 600 W or select **No** otherwise.

*1 If you set the standard to IEC 61000-3-2 Ed3.0 A2, select Class C, and set the limit values to 3rd/5th/Current Wave, the measurement time will be 0.2 seconds. The Measurement Time setting will be disabled.

*2 Selectable only when you are using a LIN3020JF or LIN1020JF Line Impedance Network and the CONTEC digital I/O driver is installed in the PC. From the Remote drop-down list, select the DIO DIO-0808LY-USB device name that you specified with Device Manager on your PC. For details on setting the device name, see "Installing CONTEC Digital I/O Driver" in the Setup Guide.
For other conditions, set Control to Manual.

When IEC 61000-3-12 Standard is Selected

The following items can be set when you select IEC 61000-3-12 2011 or IEC 61000-3-12 2004 standard.

Item	Description
Measurement Time	Enter the measurement time from 0 minutes 1 second to 10 minutes 0 seconds. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Equipment	Select the EUT equipment type. The limit is set according to the type you select.
Judgement Rsce	Set the estimated judgement Rsce value in the range of 33 to 350.
Rated Voltage (Up)	When single-phase equipment or unbalanced three-phase equipment is selected, enter the rated voltage (Up) of the phase in the range of 100 V to 600 V.
Rated Voltage (Ui)	When interphase equipment or unbalanced three-phase equipment is selected, enter the rated interphase voltage (Ui) in the range of 100 V to 600 V.
Nominal Sys Volt (Unom)	Enter the nominal system voltage in the range of 100 V to 600 V.
Margin	Set the margin relative to the harmonic current limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Nominal Frequency	Select the rated supply frequency of the EUT.
Rated Current (Iequ)	Specify the rated current (Iequ). Select Measured or Specified. If you select Specified, enter the rated current in the range of 0.1 A to 75.0 A.
Ref. Current (Iref)*1	Set the reference fundamental current (Iref) of the EUT. Select measured value or specified value. If you select specified value, enter the value in the range of 0.1 A to 75.0 A.
Ref. Fund Current (I1)*2	Set the reference fundamental current (I1) of the EUT. Select measured value or specified value. If you select specified value, enter the value in the range of 0.1 A to 75.0 A.
Limit Value	Select the limit value. • Except Bal'd 3-P: Select this option when measuring unbalanced three-phase equipment, interphase equipment, single-phase equipment, or a single-phase load of hybrid equipment. • Balanced 3-P: Select this option for balanced three-phase equipment, or a three-phase load of hybrid equipment. • Spec Bal'd 3-P: Select this option if the three-phase equipment meets any of the specified conditions in IEC 61000-3-12.

*1 Only when IEC 61000-3-12 2011 standard is selected
*2 Only when IEC 61000-3-12 2004 standard is selected

Executing a Harmonic Current Test

This section explains the testing procedure for the following three tests separately.

- Performing a Test Based on IEC 61000-3-2 or JIS (Reference impedance: Un-use) Standard
- Performing a Test Based on JIS (Reference impedance: Use) Standard
- Performing a Test Based on IEC 61000-3-12 Standard

See p. 25

Performing a Test Based on IEC 61000-3-2 or JIS (Reference impedance: Un-use) Standard

This section explains the testing procedure for the cases when you have selected one of the following standards.

- IEC 61000-3-2 Ed4.0, IEC 61000-3-2 Ed3.0 or IEC 61000-3-2 Ed2.2 standard
- When you have selected the JIS C 61000-3-2 2011 or JIS C 61000-3-2 2005 standard and set Ref Impedance to "Un-use (Bypass)."

See p. 20

NOTE

- If you have select the JIS C 61000-3-2 2011 or JIS C 61000-3-2 2005 standard and set Reference impedance to "Un-use (Bypass)," the checking procedure of the AC power source is the same as the procedure for the IEC 61000-3-2 standards, the **AC Power Source** button is not displayed.
- When you select the IEC 61000-3-2 standards, the **AC Power Source** button is not displayed on the toolbar. Because the IEC 61000-3-2 standards do not require that the EUT power source be turned off to check the AC power test source, HarmoCapture3 continues to check the AC power supply while a test is in progress.

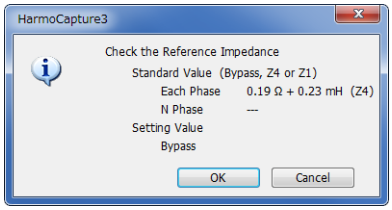
See p. 17

1 **Follow the procedure described in " Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Click Start Test on the toolbar.**

A line impedance setup confirmation dialog box appears.



See p. 11

3 **If the line impedance network is set correctly, click OK.**

If you click Cancel**, the test is not executed.**

After the test starts, the test progress bar indicates the progress.

See p. 41

You can abort the test in the middle of a test.

See p. 42

4 **When the test is complete, a judgment result dialog box appears. To save the test results, click Yes.**

To print reports, you must save the test result file.

See p. 41

5 **Stop the test.**

Performing a Test Based on JIS (Reference impedance: Use) Standard

See p. 20

This section explains the testing procedure for the cases when you have selected the JIS C 61000-3-2 2011 or JIS C 61000-3-2 2005 standard and set Ref Impedance to a value between Z1 and Z5.

NOTE

- When you select the JIS C 61000-3-2 2011 or JIS C 61000-3-2 2005 standard, the **AC Power Source** button is displayed on the toolbar. If you are using one of the standards listed above and you have set Reference impedance to a value between Z1 and Z5, before you perform the test, you have to turn the EUT power source off and check the performance of the AC power test source. This check only takes a moment to complete. Use the **AC Power Source** button to perform this check. If you have set Reference impedance to "Un-use (Bypass)," the checking procedure of the AC power source is the same as the procedure for the IEC 61000-3-2 standards, so you do not need to use the **AC Power Source** button.
- When you select the IEC 61000-3-2 standards, the **AC Power Source** button is not displayed on the toolbar. Because the IEC 61000-3-2 standards do not require that the EUT power source be turned off to check the AC power test source, HarmoCapture3 continues to check the AC power supply while a test is in progress.

See p. 17

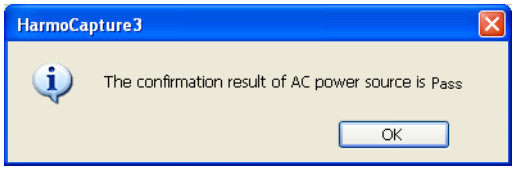
1 **Follow the procedure described in " Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Turn the EUT off.**

3 **Click the AC Power Source button on the toolbar.**

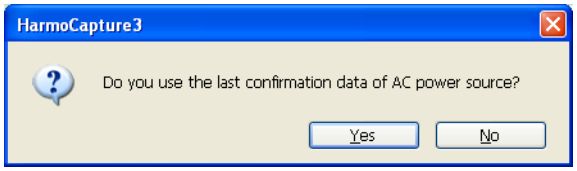
A dialog box that shows the results of the check is displayed.



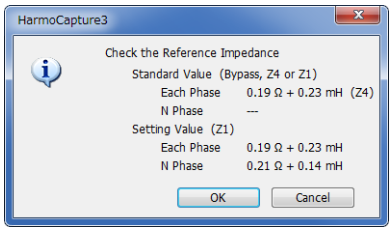
4 **Click OK.**

5 Click **Start Test** on the toolbar.

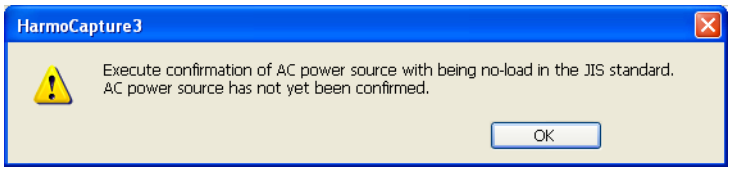
A dialog box asking whether you want to use the data that was received from the check of the AC power source that was performed in Step 3 is displayed.



Next, a line impedance setup confirmation dialog box appears.



If you did not check the AC power source in Step 3 , the following dialog box is displayed.



Click OK, and return to Step 2 .

After you perform the check of the AC power source once, this dialog box will not be displayed again until you restart HarmoCapture.

See p. 11

6 If the line impedance network is set correctly, click **OK**.

If you click Cancel, the test is not executed.

After the test starts, the test progress bar indicates the progress.

See p. 41

You can abort the test in the middle of a test.

See p. 42

7 When the test is complete, a judgment result dialog box appears. To save the test results, click **Yes**.

To print reports, you must save the test result file.

See p. 41

8 Stop the test.

Performing a Test Based on IEC 61000-3-12 Standard

Follow the test procedure below when you set the limitation standard to IEC 61000-3-12 2011 or IEC 61000-3-12 2004.

See p. 17

1 **Follow the procedure described in "Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Determine the conditions for selecting the limit value.**

See p. 26

Refer to Determining the conditions for selecting the limit value (61000-3-12 2011)

See p. 30

or Determining the conditions for selecting the limit value (61000-3-12 2004).

3 **Set the estimated Rsce value.**

See p. 27

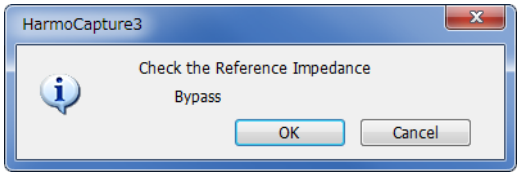
Refer to Estimated Rsce setting and test execution flowchart (61000-3-12 2011)

See p. 30

or Setting the estimated Rsce value (61000-3-12 2004).

4 **Click Start Test on the toolbar.**

A line impedance setup confirmation dialog box appears.



See p. 11

5 **If the line impedance network is set correctly, click OK.**

If you click Cancel, the test is not executed.

After the test starts, the test progress bar indicates the progress.

See p. 41

You can abort the test in the middle of a test.

See p. 42

6 **When the test is complete, a judgment result dialog box appears. To save the test results, click Yes.**

To print reports, you must save the test result file.

7 **Follow the test execution flowchart, and check whether the test result meets the limit value.**

If necessary, change the estimated Rsce value, and execute the test again.

See p. 27

Refer to Estimated Rsce setting and test execution flowchart (61000-3-12 2011)

See p. 29

or Estimated Rsce setting and test execution flowchart (61000-3-12 2004).

See p. 41

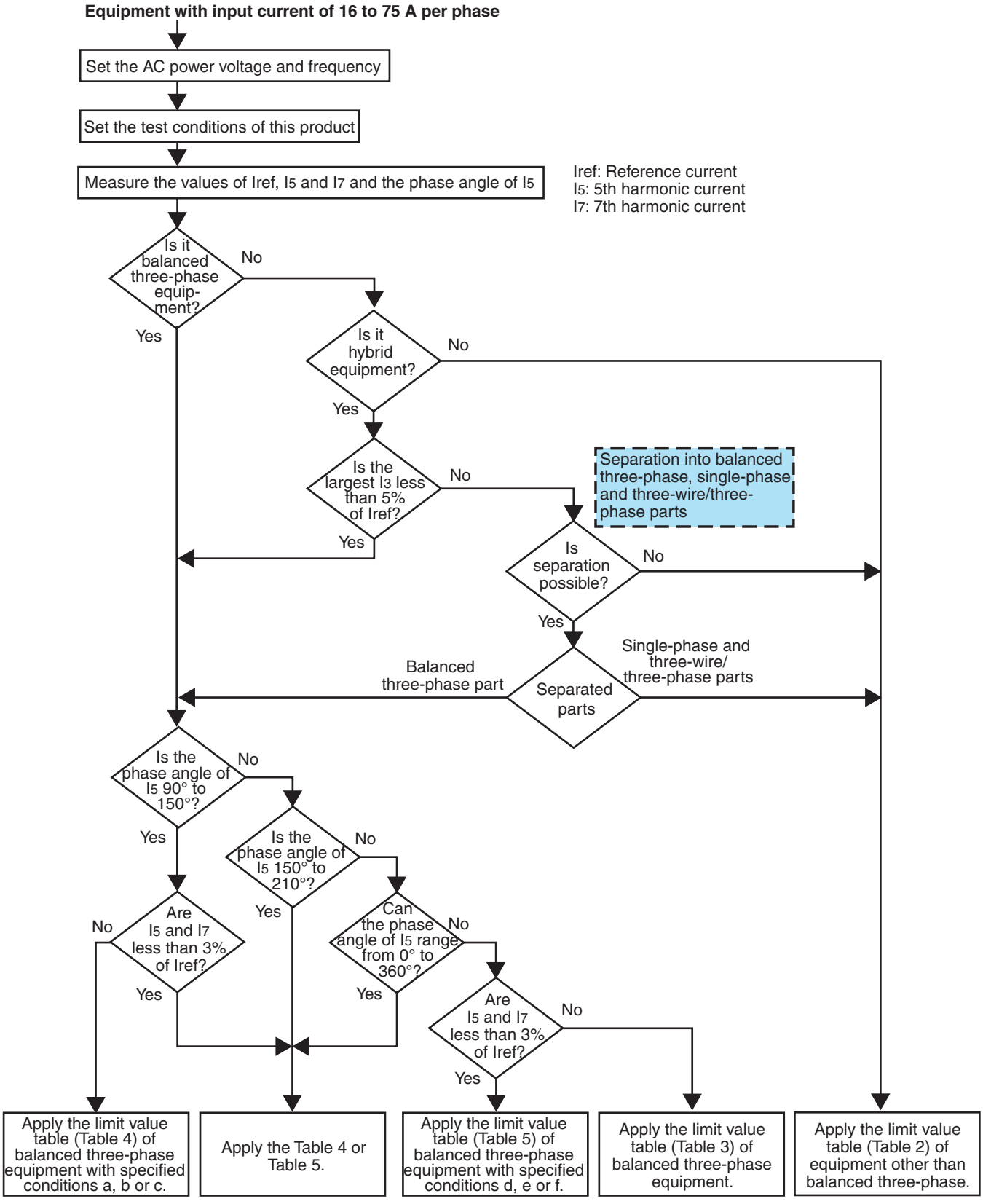
8 **Stop the test.**

Determining the conditions for selecting the limit value (61000-3-12 2011)

See p. 31

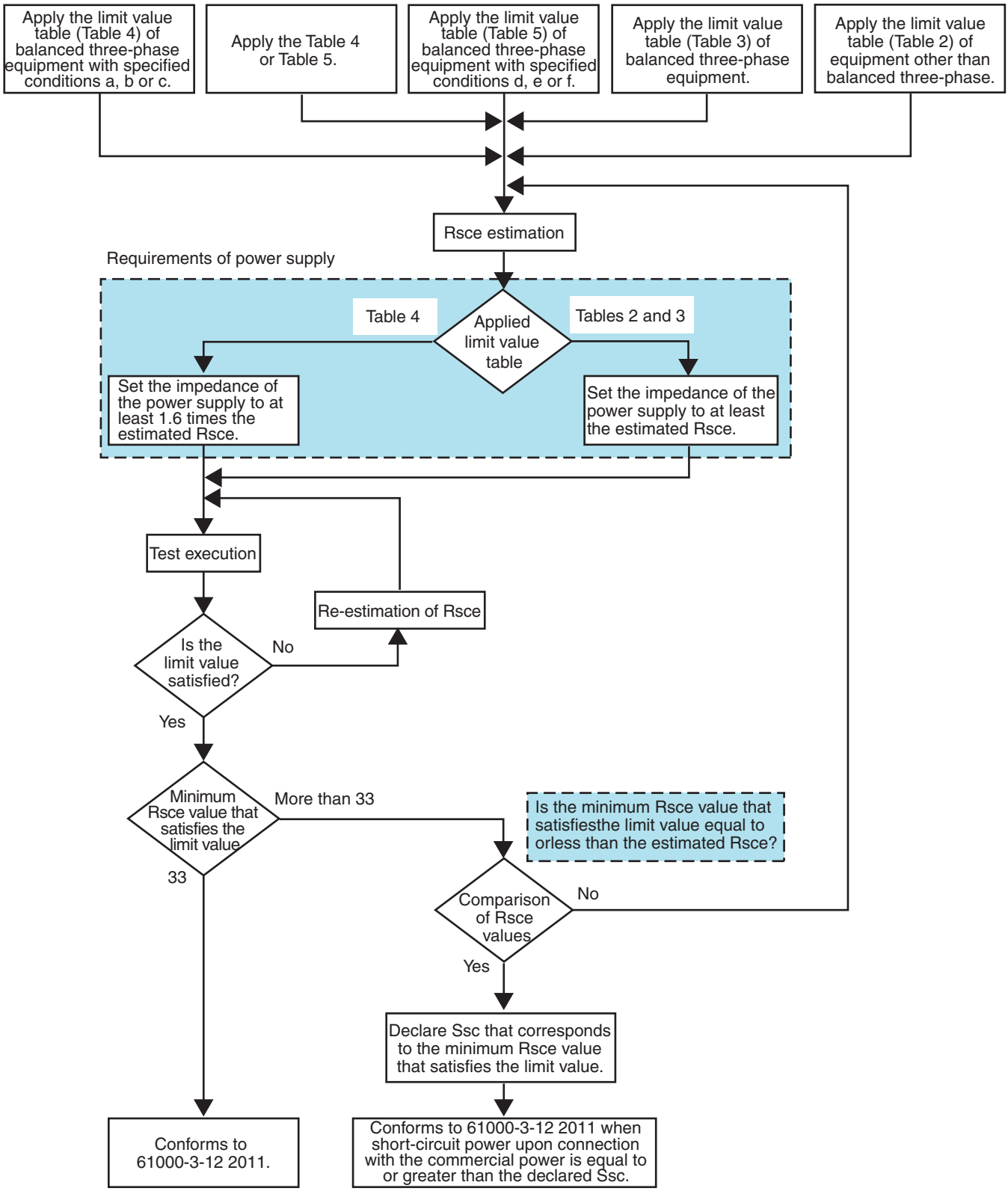
1 **Refer to the KHA3000 harmonic list.**

2 **Follow the flowchart, and select the limit value to apply.**



The expression of each item is simplified. For details, refer to the standards.

Estimated Rsce setting and test execution flowchart (61000-3-12 2011)



The expression of each item is simplified. For details, refer to the standards.

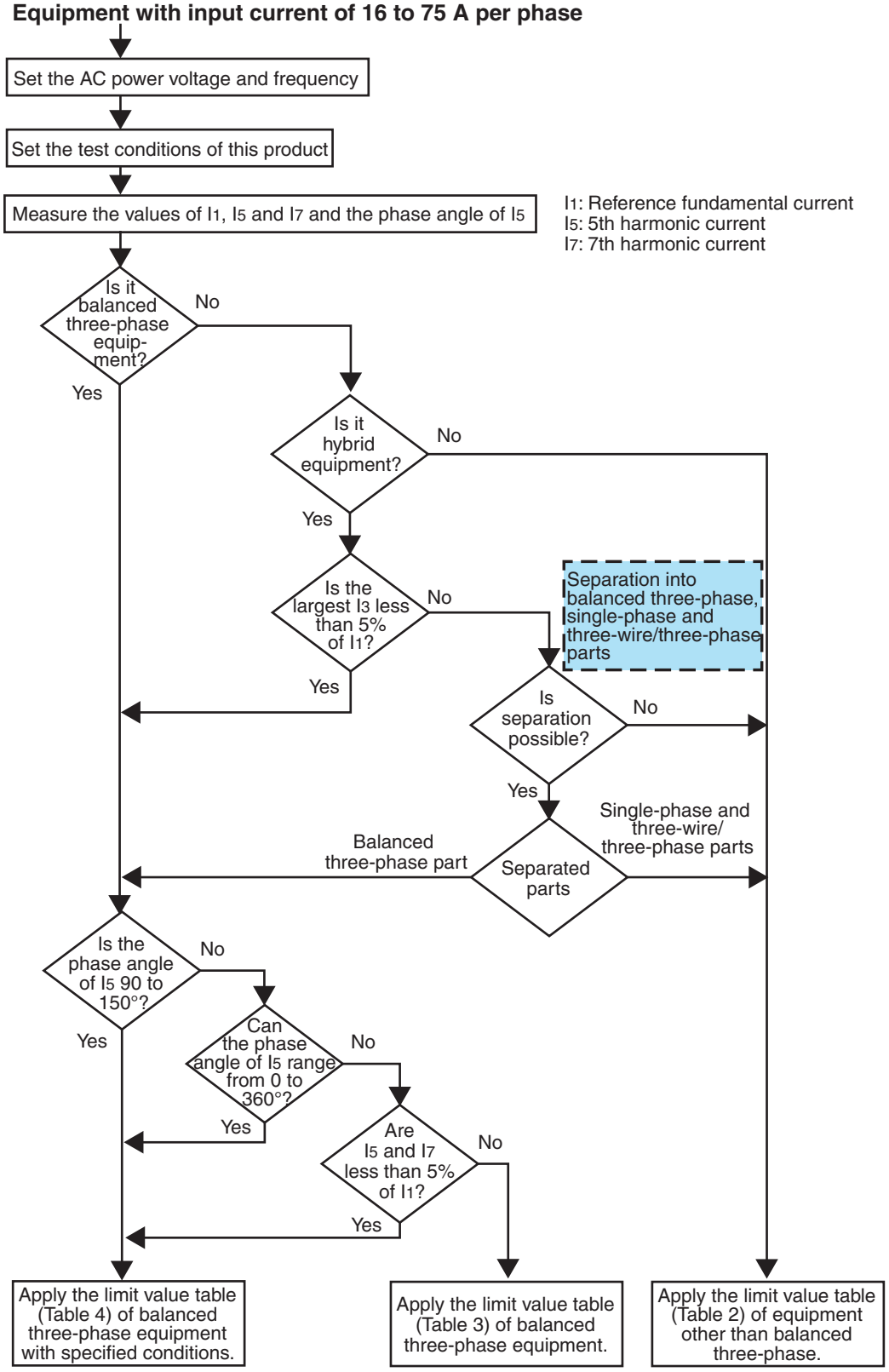
Determining the conditions for selecting the limit value (61000-3-12 2004)

See p. 31

1 **Refer to the KHA3000 harmonic list.**

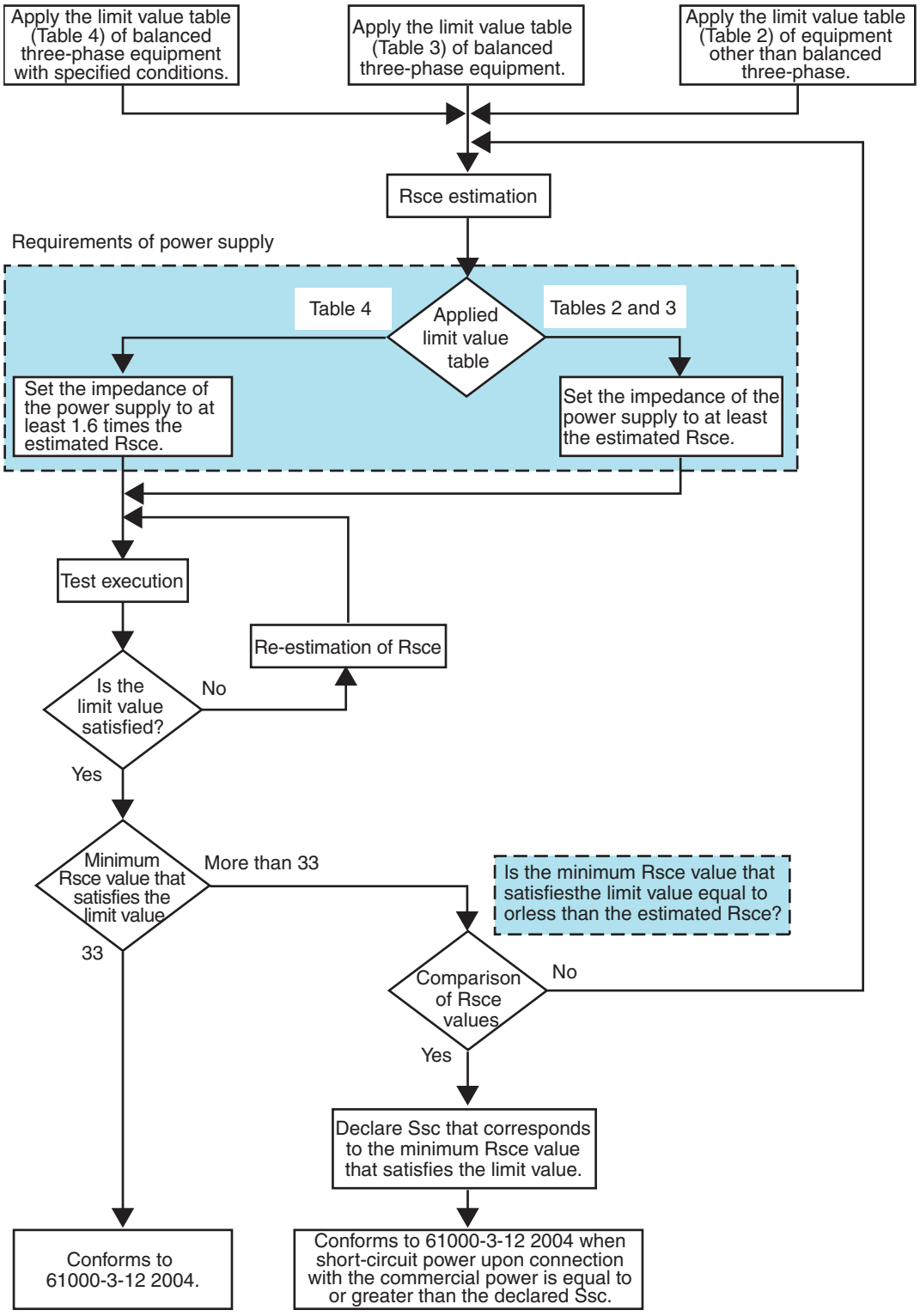
2 **Follow the flowchart, and select the limit value to apply.**

Equipment with input current of 16 to 75 A per phase



The expression of each item is simplified. For details, refer to the standards.

Estimated Rsce setting and test execution flowchart (61000-3-12 2004)



The expression of each item is simplified. For details, refer to the standards.

Setting the estimated Rsce value (61000-3-12 2004)

See p. 12

1 Start the Monitoring Operation.

2 **Enter the monitored Rsce value in the Judgement Rsce box.**

Enter the largest Rsce value among L1, L2, and L3. The input range is 33 to 350.

The testing of Rsce for hybrid equipment is executed on each component separately. Use the maximum calculated Rsce value for each component.

From 33, gradually increase the Judgement Rsce value each time you execute the test.

3 **Turn off the AC power supply output.**

4 **Set the AC power supply impedance to match the requirement defined by the standard.**

Estimate Rsce, and then ready a power supply that meets the impedance requirement defined by the standard for the estimated value. The impedance requirement defined by the standard varies depending on the applied limits as follows:

- If you apply the limit for balanced three-phase equipment with specific conditions, set the impedance to 1.6 times the estimated Rsce or greater.
- If you apply the limit for other types of equipment, set the impedance to the estimated Rsce or greater.

5 **Turn on the AC power supply output.**

■ Measured value monitor (61000-3-12 2004 only)

The measured value monitor displays real-time measured values at the top section of the standard conditions setting pane.

Item		Description
Ch	Phase wired to the measuring circuit	Displays measuring circuits L1, L2, or L3.
Factor	Harmonics from 2 to 40, THD, or PWHD	Displays the harmonic, THD, or PWHD whose margin is the lowest with respect to the limit value.
Rsce	Short-circuit ratio	Single-phase equipment: Short-circuit power Ssc/(3 X rated apparent power of the single-phase equipment Sequ) Interphase equipment: Short-circuit power Ssc/(2 X rated apparent power of the single-phase equipment Sequ) Three-phase equipment: Short-circuit power Ssc/rated apparent power of all three-phase equipment Sequ
Sequ	Rated apparent power	• Single-phase equipment: Rated voltage (phase voltage) Up X rated current Iequ • Interphase equipment: Rated voltage (line voltage) Ui X rated current Iequ • Balanced three-phase equipment: $\sqrt{3}$ X Rated voltage (line voltage) Ui X rated current Iequ • Unbalanced three-phase equipment: 3 X Rated voltage (phase voltage) Up X rated current Iequ
Ssc	Short-circuit power	The minimum system power that can be connected. • Single-phase equipment: Short-circuit ratio Rsce X (3 X rated apparent power of the single-phase equipment Sequ) • Interphase equipment: Short-circuit ratio Rsce X (2 X rated apparent power of the interphase equipment Sequ) • Three-phase equipment: Short-circuit ratio Rsce X (rated apparent power of all three-phase equipment Sequ

Item		Description
Z	System impedance	The maximum impedance of the system that can be connected. (nominal system voltage Unom)^2/Ssc
THD	Total harmonic distortion	The measured value of the total harmonic distortion for the standard that is being evaluated.
PWHD	Partial weighted harmonic distortion	The measured value of the partial weighted harmonic distortion for the standard that is being evaluated.

NOTE In 61000-3-12 2011, there is no measured value monitor for displaying instantaneous values because the THC or PWHC value is determined at the end of the test depending on reference current Iref, which is the average rms current during the test period.

Refer to the KHA3000 harmonic list

Operate the KHA3000 panel to view the harmonic list.

1. Click **Stop Monitor** on the toolbar.
   You can now operate the KHA3000 panel.
2. Press **REMOTE/LOCAL** on the KHA3000.
3. Press **VIEW**.
   The HA-Observation and Analysis display appears.
4. Press **F6** to switch to page **1** of the **menu**.
5. Press **F1** to set **View Type** to **Harmonics List**.
   The list of measured harmonic values appears.
6. Press **F2** to select **View Setting**.
   The submenu appears.
7. Press **F4** to select **In/Iref[%]** or **In/I1[%]** under **Meas Value Selection**.
8. Press **F5** to set **Check View Phase** to **L1**.
   Refer to the limit value of each phase.

Setting Test Conditions for Voltage Fluctuation Test

Common Settings

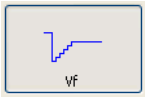
The following items are common between harmonic current testing and voltage fluctuation testing. Configure them appropriately for the EUT.

See p. 13

- Wiring Method
- PLL Source
- Voltage and Current Range

Selecting the Voltage Fluctuation Testing Mode

In the Test mode selection pane, select **Vf** (voltage fluctuation test).

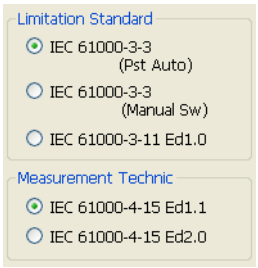


Selecting a Test Standard

In the Test standard selection pane, select the limitation standard and the standard for measurement techniques.

■ d measurement

The voltage fluctuation test has two d measurement methods that are set on HarmoCapture3 or the KHA3000. The Pst measurement time and d measurement time correspond to the one segment time. One segment time is equal to the Pst measurement time or d measurement time that you entered in the test conditions settings of HarmoCapture3 or the KHA3000.



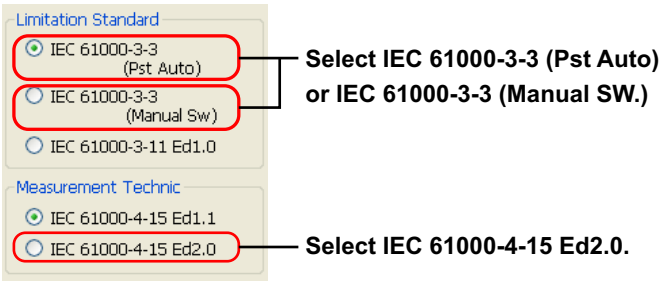
Pst Auto
The d measurement as well as the Pst and Plt (flicker) measurements are performed simultaneously. The d measurement results (dmax, dc, and Tmax (or d(t)>3.3%)) display the maximum values for each Pst measurement time.
The Pst measurement time X Pst measurement count is equal to the Plt measurement time.

Manual
The test is performed in accordance with "Test conditions and procedure for measuring d max. Voltage changes caused by manual switching" that is defined in IEC 61000-3-3-am1(2001) Annex B. The KHA3000 takes the arithmetic average of the 22 measurement values excluding the maximum and minimum values and makes a judgment.

■ Selecting the IEC 61000-3-3 Ed3.0 standard

The measuring instrument requirements of the IEC 61000-3-3 Ed3.0 standard are specified in IEC 61000-4-15 Ed2.0 standard. By selecting the standard for measurement techniques to IEC 61000-4-15 Ed2.0 standard, you can measure Tmax and other parameters according to IEC 61000-3-3 Ed3.0.

To perform tests based on the IEC 61000-3-3 Ed3.0 standard on HarmoCapture3, select the standard as follows.



When IEC 61000-3-3 (Pst Auto) Standard is Selected

Item	Description
Nominal Voltage	Set the rated supply voltage of the EUT. Select 230 V (fixed value) or Specified. If you select Specified, enter a value from 100 V to 600 V.
Nominal Frequency	Select the nominal test frequency according to the EUT rating.
Pst Meas Time	Set the flicker test measurement time from 0 minutes 30 seconds to 15 minutes 0 seconds. Normally, set this value to 600 seconds, because the standard specifies a measurement time of 10 minutes. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Pst Meas Count	Enter the Pst measurement count in the range of 1 to 12.
dmax Limit Value	Set the limit value for dmax (maximum relative voltage fluctuation) for d measurement (voltage fluctuation test). The limit value varies depending on the EUT. • 4 %: No additional conditions. • 6 %: [1] Manual switching equipment. [2] Automatic switching equipment that switches more than twice per day, and that has delayed restart capability (delay of 20 to 30 seconds or more) after power shutdown, or equipment that is designed to be manually restarted. • 7 %: [1] Equipment attended when in use (such as dryers, vacuum cleaners, electric drills, lawn mowers, and mixers). [2] Equipment that automatically switches once or twice per day or that is intended to be manually switched, and that has delayed restart capability (delay of 20 to 30 seconds or more) after power shutdown, or equipment that is designed to be manually restarted.
Flicker Margin	Set the margin relative to the standard Pst or Plt limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of the test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
d Margin	Set the margin relative to the standard dc, dmax, or Tmax (or d(t)>3.3%) limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Ref Impedance	Control Manual or Remote*1 Impedance Value Un-use (Bypass), Z1, Z2, Z3, Z4, Z5
Judgement Material	Select the limit values that will be judged. If you select multiple items, judgement is performed on the limits of those items.

*1 Selectable only when you are using a LIN3020JF or LIN1020JF Line Impedance Network and the CONTEC digital I/O driver is installed in the PC. From the Remote drop-down list, select the DIO DIO-0808LY-USB device name that you specified with Device Manager on your PC. For details on setting the device name, see "Installing CONTEC Digital I/O Driver" in the Setup Guide.
For other conditions, set Control to Manual.

When IEC 61000-3-3 (Manual SW) Standard is Selected

Item	Description
Nominal Voltage	Set the rated supply voltage of the EUT. Select 230 V (fixed value) or Specified. If you select Specified, enter a value from 100 V to 600 V.
Nominal Frequency	Select the nominal test frequency according to the EUT rating.
d Measurement Time	Set the d measurement time from 0 minutes 30 seconds to 3 minutes 0 seconds. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
d Measurement Count	Set the d measurement count in the range of 3 to 24.
dmax Limit Value	Set the limit value for dmax (maximum relative voltage fluctuation) for d measurement (voltage fluctuation test). The limit value varies depending on the EUT. • 4 %: No additional conditions. • 6 %: [1] Manual switching equipment. [2] Automatic switching equipment that switches more than twice per day, and that has delayed restart capability (delay of 20 to 30 seconds or more) after power shutdown, or equipment that is designed to be manually restarted. • 7 %: [1] Equipment attended when in use (such as dryers, vacuum cleaners, electric drills, lawn mowers, and mixers). [2] Equipment that automatically switches once or twice per day or that is intended to be manually switched, and that has delayed restart capability (delay of 20 to 30 seconds or more) after power shutdown, or equipment that is designed to be manually restarted.
d Margin	Set the margin relative to the standard dc, dmax, or Tmax (or d(t)>3.3%) limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Ref Impedance	Control Manual or Remote*1 Impedance Value Un-use (Bypass), Z1, Z2, Z3, Z4, Z5
Judgement Material	Select the limit values that will be judged. If you select multiple items, judgement is performed on the limits of those items.

*1 Selectable only when you are using a LIN3020JF or LIN1020JF Line Impedance Network and the CONTEC digital I/O driver is installed in the PC. From the Remote drop-down list, select the DIO DIO-0808LY-USB device name that you specified with Device Manager on your PC. For details on setting the device name, see "Installing CONTEC Digital I/O Driver" in the Setup Guide.
For other conditions, set Control to Manual.

When IEC 61000-3-11 Ed1.0 Standard is Selected

Item	Description
Nominal Voltage	Set the rated supply voltage of the EUT. Select 230 V (fixed value) or Specified. If you select Specified, enter a value from 100 V to 600 V.
Nominal Frequency	Select the nominal test frequency according to the EUT rating.
Pst Meas Time	Set the flicker test measurement time from 0 minutes 30 seconds to 15 minutes 0 seconds. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Pst Meas Count	Enter the Pst measurement count in the range of 1 to 12.
Flicker Margin	Set the margin relative to the standard Pst or Plt limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of the test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
d Margin	Set the margin relative to the standard dc, dmax, or d(t)>3.3% limit (100 %) in the range of 10 % to 100 %. The judgment result is displayed in a dialog box upon the completion of a test. • Pass: Less than or equal to the set margin • Warn: Greater than the set margin but less than the limit • Fail: Greater than the limit
Ref Impedance	Control Manual or Remote*1 Impedance Value Un-use (Bypass), Z1, Z2, Z3, Z4, Z5
Test Impedance	Specify the test impedance. The selectable test impedances vary depending on the wiring method setting. Select Z test (1P/3P) R_A=0.15 Ω X_A=j0.15 Ω R_N=0.10 Ω X_N=j0.10 Ω, Z ref (1P/3P) R_A=0.24 Ω X_A=j0.15 Ω R_N=0.16 Ω X_N=j0.10 Ω, or Specified. If you select Specified, enter the resistive and reactive components of each R_A test phase in the range of 0.00 Ω to 1.00 Ω. Enter the resistive and reactive components of the R_N test neutral line in the range of 0.00 Ω to 1.00 Ω. If you specify a value outside of the range, the value will be reset to the previous value when you select another test condition or start testing.
Judgement Material	Select the limit values that will be judged. If you select multiple items, judgement is performed on the limits of those items.

*1 Selectable only when you are using a LIN3020JF or LIN1020JF Line Impedance Network and the CONTEC digital I/O driver is installed in the PC. From the Remote drop-down list, select the DIO DIO-0808LY-USB device name that you specified with Device Manager on your PC. For details on setting the device name, see "Installing CONTEC Digital I/O Driver" in the Setup Guide.
For other conditions, set Control to Manual.

Executing a Voltage Fluctuation Test

This section explains the testing procedure for the following three tests separately.

See p. 37
- Executing a 61000-3-3 (Pst Auto) Standard Test

See p. 38
- Executing a 61000-3-3 (Manual SW) Standard Test

See p. 39
- Executing a 61000-3-11 Standard Test

Executing a 61000-3-3 (Pst Auto) Standard Test

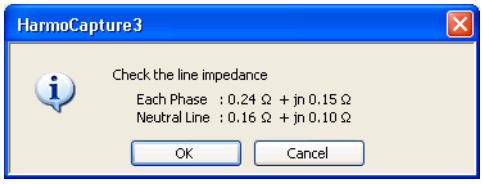
Follow the test procedure below when you set the limitation standard to IEC 61000-3-3 (Pst Auto).

See p. 17
1 **Follow the procedure described in "Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Click Start Test on the toolbar.**

A line impedance setup confirmation dialog box appears.



See p. 11
3 **If the line impedance network is set correctly, click OK.**

If you click Cancel**, the test is not executed.**

After the test starts, the test progress bar indicates the progress.

See p. 41
You can abort the test in the middle of a test.

See p. 42
4 **When the test is complete, a judgment result dialog box appears. To save the test results, click Yes.**

To print reports, you must save the test result file.

● The test results meet the limit.
- The EUT conforms to 61000-3-3.

● The test results do not meet the limit.
- Execute 61000-3-11 testing.

See p. 41
5 **Stop the test.**

Executing a 61000-3-3 (Manual SW) Standard Test

Follow the test procedure below when you set the limitation standard to IEC 61000-3-3(Manual SW).

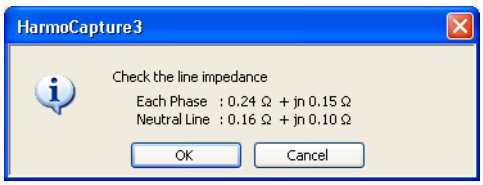
See p. 17

1 **Follow the procedure described in "Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Click Start Test on the toolbar.**

A line impedance setup confirmation dialog box appears.

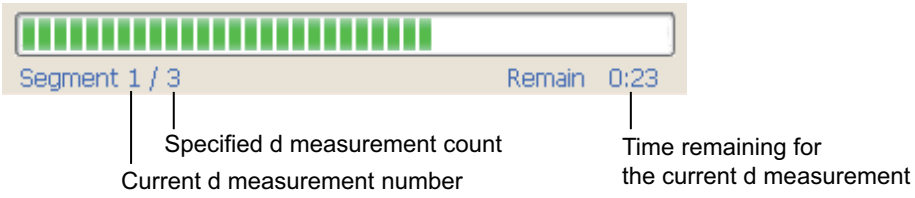


See p. 11

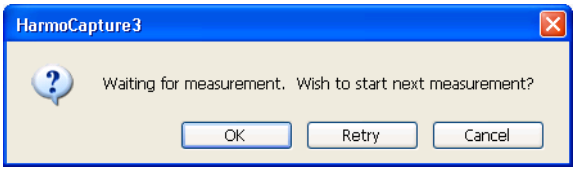
3 **If the line impedance network is set correctly, click OK.**

If you click Cancel, the test is not executed.

After the test starts, the test progress bar indicates the progress.



After the measurement of a segment ends, a dialog box appears for selecting the next action. To measure the next segment, click OK. **To remeasure the same segment, click** Retry. **To end the test, click** Cancel.



See p. 41

You can abort the test in the middle of a test.

See p. 42

4 **When the test is complete, a judgment result dialog box appears. To save the test results, click Yes.**

To print reports, you must save the test result file.

- The test results meet the limit.
  - The EUT conforms to 61000-3-3.
- The test results do not meet the limit.
  - Execute 61000-3-11 testing.

See p. 41

5 **Stop the test.**

Executing a 61000-3-11 Standard Test

Follow the test procedure below when you set the limitation standard to IEC 61000-3-11.

NOTE

Decide on which of the following conditions to use, and then set the test impedance that is appropriate for the condition that you select.

- Declare that the power supply that is connected to the EUT has a current capacity of at least 100 A per phase.
- Declare the maximum permissible systematic impedance (Zmax) of the power supply that is connected to the EUT.

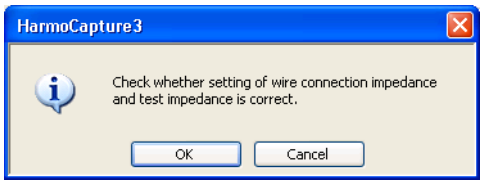
See p. 17

1 **Follow the procedure described in "Before Starting a Test."**

If you enter a value in a combo box on the test condition setup screen, press Enter to confirm the value. The confirmed value is stored in the drop-down list and can be recalled later. Up to eight of the most recent values are stored.

2 **Click Start Test on the toolbar.**

A line impedance setup confirmation dialog box appears.



See p. 11

3 **If the line impedance network is set correctly, click OK.**

If you click Cancel**, the test is not executed.**

After the test starts, the test progress bar indicates the progress.

See p. 41

You can abort the test in the middle of a test.

See p. 42

4 **When the test is complete, a judgment result dialog box appears. To save the test results, click Yes.**

To print reports, you must save the test result file.

● If you choose the condition that requires you to "declare that the power supply that is connected to the EUT has a current capacity of at least 100 A per phase"

- If the test results meet the limit value, you can declare that the EUT conforms to 61000-3-11 under the condition that the power supply that is connected to the EUT has a current capacity of at least 100 A per phase.
- If the test results do not meet the limit value, execute the 61000-3-11 test again under the condition that you declare the maximum permissible systematic impedance (Zmax) of the power supply that is connected to the EUT.

● If you choose the condition that requires you to "declare the maximum permissible systematic impedance (Zmax) of the power supply that is connected to the EUT"

- If the test results meet the limit value, you can declare that the EUT conforms to 61000-3-3.

See p. 43, p. 40

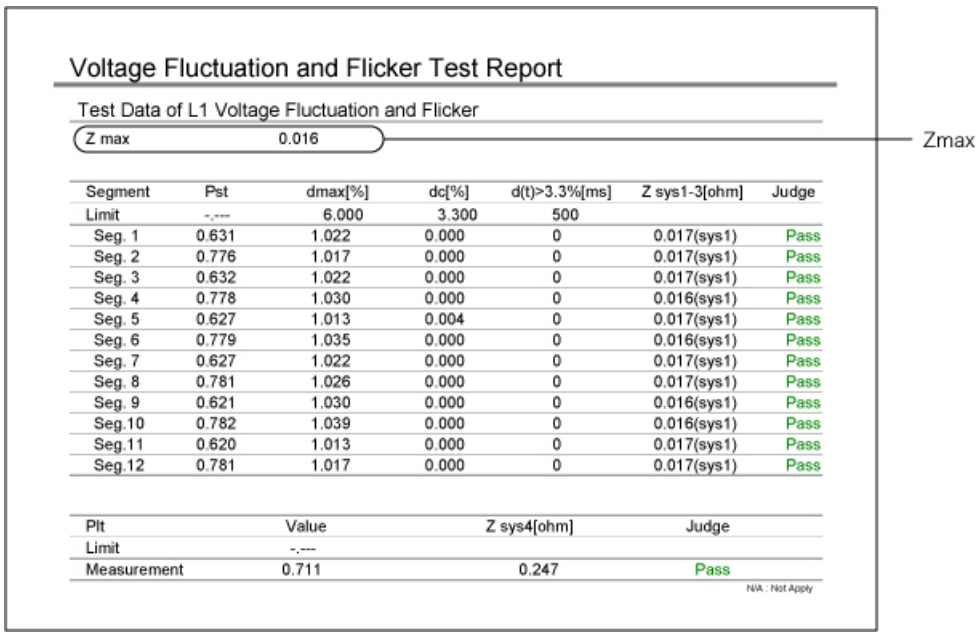
- If the test results do not meet the limit value, print a report and check Zmax. You can declare that the EUT conforms to 61000-3-11 under the condition that you specify the maximum permissible systematic impedance (Zmax) of the power supply that is connected to the EUT.

See p. 41

5 **Stop the test.**

Checking Zmax

In 61000-3-11 testing, if you are declaring the maximum permissible system impedance (Zmax) of the power supply that is connected to the EUT, print a report of the test results and check the maximum permissible system impedance (Zmax).



Voltage Fluctuation and Flicker Test Report

Test Data of L1 Voltage Fluctuation and Flicker

Z max 0.016 — Zmax

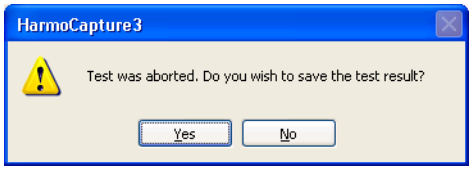
Segment	Pst	dmax[%]	dc[%]	d(t)>3.3%[ms]	Z sys1-3[ohm]	Judge
Limit	-.---	6.000	3.300	500		
Seg. 1	0.631	1.022	0.000	0	0.017(sys1)	Pass
Seg. 2	0.776	1.017	0.000	0	0.017(sys1)	Pass
Seg. 3	0.632	1.022	0.000	0	0.017(sys1)	Pass
Seg. 4	0.778	1.030	0.000	0	0.016(sys1)	Pass
Seg. 5	0.627	1.013	0.004	0	0.017(sys1)	Pass
Seg. 6	0.779	1.035	0.000	0	0.016(sys1)	Pass
Seg. 7	0.627	1.022	0.000	0	0.017(sys1)	Pass
Seg. 8	0.781	1.026	0.000	0	0.017(sys1)	Pass
Seg. 9	0.621	1.030	0.000	0	0.016(sys1)	Pass
Seg.10	0.782	1.039	0.000	0	0.016(sys1)	Pass
Seg.11	0.620	1.013	0.000	0	0.017(sys1)	Pass
Seg.12	0.781	1.017	0.000	0	0.017(sys1)	Pass

Plt	Value	Z sys4[ohm]	Judge
Limit	-.---		
Measurement	0.711	0.247	Pass

N/A : Not Apply

Aborting the Test

1 Click **Stop Test** on the toolbar.
When the test is complete, a dialog box appears asking whether you want to save the test results.



2 To save the test results, click **Yes**. Otherwise, click **No**.
The Save As dialog box appears.

3 Specify the save destination and file name.
The test result file name extension for harmonic current tests is .hr3.
The test result file name extension for voltage fluctuation tests is .vr3.

4 Click **Save**.

Stopping the Test System

When using the AC Power Supply

1 Turn the EUT off.

See p. 9

2 Click **Off** under Output in the AC power source control pane.

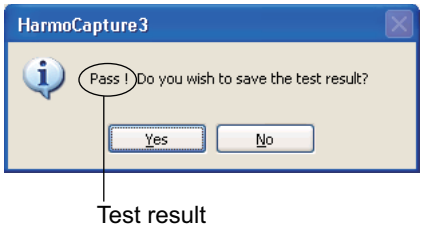
When using another AC power supply

1 Turn the EUT off.

2 Turn the AC power supply output off.

Saving a Test Result File

When the test is complete, a judgment result dialog box appears. The judgment result can take on any of the following values.



- Pass: Less than or equal to the set margin
- Warn: Greater than the set margin but less than the limit
- Fail: Greater than the limit

1 **To save the test results, click Yes.**

Otherwise, click No. Even if you click No**, until you execute the next test, you can save the test result file by choosing** Save Result File As **from the** File **menu. However, if you change the test conditions, you cannot save the test results afterwards.**

2 **In the Save As dialog box, specify the save destination and file name.**

The test result file name extension for harmonic current tests is .hr3.

The test result file name extension for voltage fluctuation tests is .vr3.

3 **Click Save.**

Printing a Report

Reports are printable PDF files of test result files. You can include comments in reports, such as the company name and test environment.

Reports are automatically saved in the same folder as test result files using the same file name as the test result file that they are converted from and a .pdf extension.

NOTE To print PDF files, you need a PDF viewing application such as Adobe Reader.

There are two ways to print reports.

- Printing a Report after the Completion of Each Test
- Printing a Report by Selecting a Test Result File

See p. 45

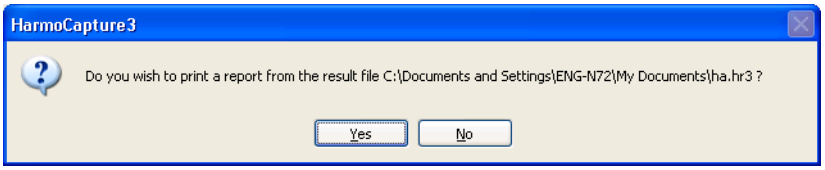
Printing a Report after the Completion of Each Test

See p. 47

1 **Open the Report Setting dialog box, enter necessary comments, and select the data to print.**

2 **Click Print Report on the toolbar.**

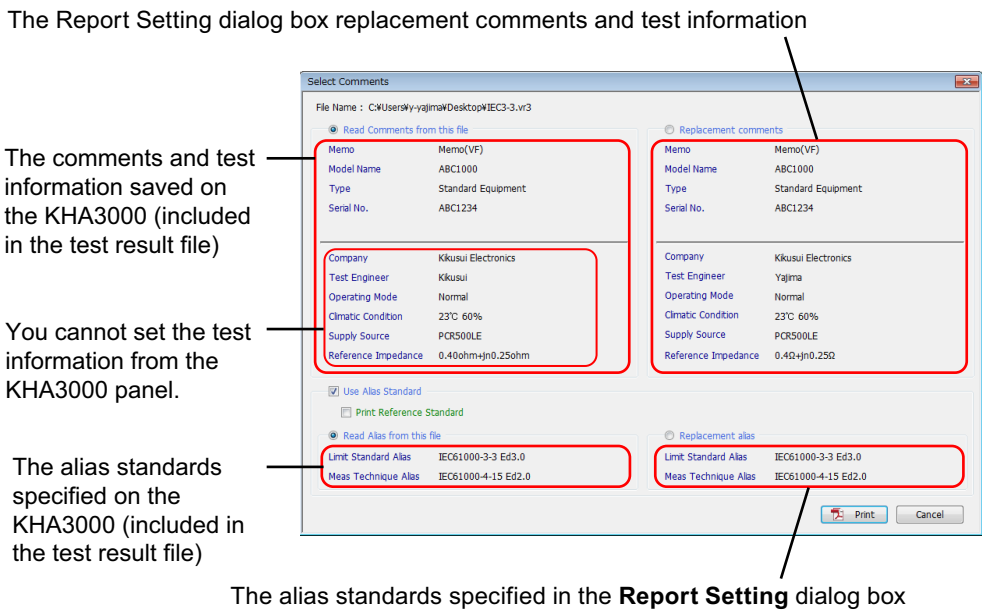
A Print confirmation dialog box appears.



If HarmoCapture3 does not have the previous test result file information, a message appears. Select a test result file to print.

3 **Click Yes.**

A Select Comment **dialog box appears.**



4 Select the comments, test information, and test standard that you want to print on the report.

Item	Description
Read Comments from this file	The comments and test information in the test result file are printed on the report.
Replacement comments	The comments and test information in the Report Setting dialog box are printed on the report.
Use Alias Standard	Select this option to print standard names other than the default standard names on the report.
Print Reference Standard	Select this option to print on the report the standard names also that are displayed when you select the test standards using the KHA3000 or the HarmoCapture3.
Read Alias from this file	The alias standards specified on the KHA3000 are printed on the report.
Replacement alias	The alias standards in the Report Setting dialog box are printed on the report.

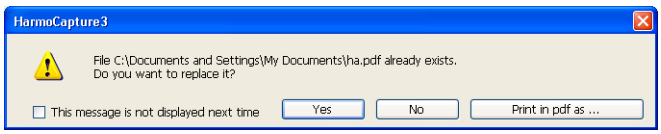
See p. 47

For more information about replacement comments, see "Entering Comments, Test Information and Alias Standard."

5 Click **Print**.

Your PDF viewing application (such as Adobe Reader) starts, and the report appears.

If you already printed this report and there is a PDF file with the same name, a message appears.



Click Print in pdf as **to save the report as a PDF file with a different file name.**

If you select the This message is not displayed next time **check box, the message will not appear the next time. You can clear this check box in the** Report Setting **dialog box.**

6 Print the report from your PDF viewing application.

Printing a Report by Selecting a Test Result File

1 **In the Test mode selection pane, select the appropriate test mode.**
If you want to print a harmonic current test report, select HA**. If you want to print a voltage fluctuation test report, select** Vf**.**

See p. 47

2 **Open the** Report Setting **dialog box, enter necessary comments, and select the data to print.**

3 **From the File menu, choose Select file and Print Report.**
The Open dialog box appears.

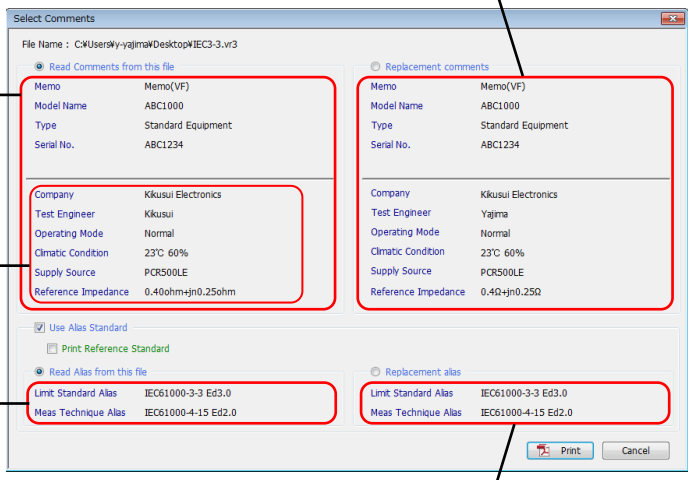
4 **Select the test result file that you want to print a report of, and click Open.**
The Select Comments **dialog box appears.**

The Report Setting dialog box replacement comments and test information

The comments and test information saved on the KHA3000 (included in the test result file)

You cannot set the test information from the KHA3000 panel.

The alias standards specified on the KHA3000 (included in the test result file)



The alias standards specified in the **Report Setting** dialog box

5 **Select the comments, test information, and test standard that you want to print on the report.**

Item		Description
Read Comments from this file		The comments and test information in the test result file are printed on the report.
Replacement comments		The comments and test information in the Report Setting dialog box are printed on the report.
Use Alias Standard		Select this option to print standard names other than the default standard names on the report.
	Print Reference Standard	Select this option to print on the report the standard names also that are displayed when you select the test standards using the KHA3000 or the HarmoCapture3.
	Read Alias from this file	The alias standards specified on the KHA3000 are printed on the report.
	Replacement alias	The alias standards in the Report Setting dialog box are printed on the report.

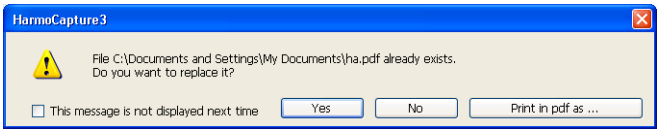
See p. 47

For more information about replacement comments, see "Entering Comments, Test Information and Alias Standard."

6 **Click Print.**

Your PDF viewing application (such as Adobe Reader) starts, and the report appears.

If you already printed this report and there is a PDF file with the same name, a message appears.



Click Print in pdf as **to save the report as a PDF file with a different file name.**

If you select the This message is not displayed next time **check box, the message will not appear the next time. You can clear this check box in the** Report Setting **dialog box.**

7 **Print the report from your PDF viewing application.**

Configuring the Report Format

In the Report Setting dialog box, you can:

- Enter comments.
- Send comments to the KHA3000.
- Enable or disable the PDF file overwrite message.
- Select the data to print.

1 **Click Report Setting button on the toolbar.**
The Report Setting **dialog box appears.**

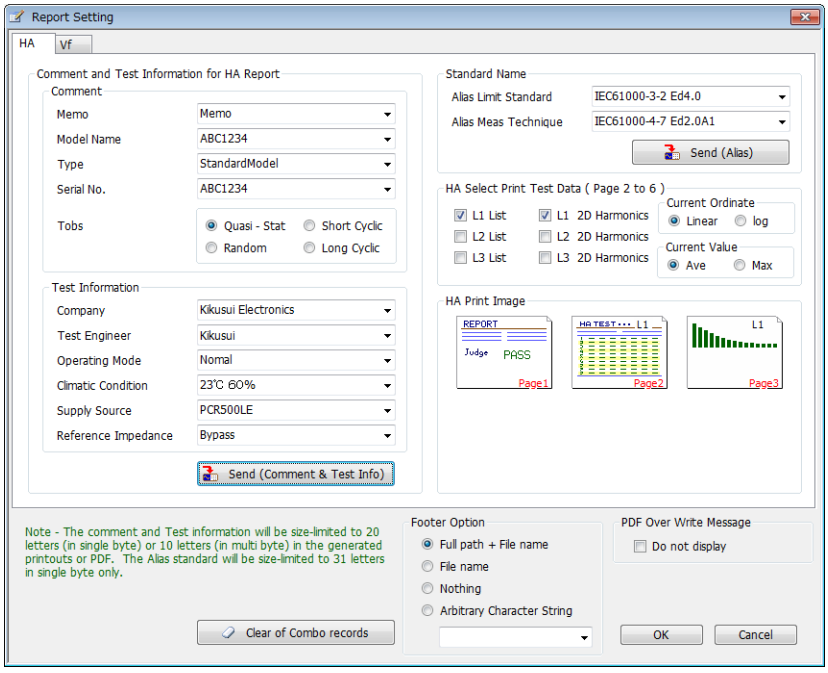
2 **Click the HA or Vf tab to select the test mode whose report settings you want to configure.**

Entering Comments, Test Information and Alias Standard

In the **Report Setting** dialog box, you can enter comments, test information and alias standard that are printed on the first report page. When you print a report, you can choose to print the information that you have entered or the information in the test result file.
The comments that you enter can be sent to the KHA3000 and are recorded in the test result file.

1 **Click Report Setting button on the toolbar.**
The Report Setting **dialog box appears.**

2 **Click the HA or Vf tab to select the test mode whose report settings you want to configure.**



3 **Enter information into the boxes under Comments, Test Information, and Standard Name.**
The characters that you confirm by pressing Enter are stored in the drop-down list and can be recalled later. Up to eight of the most recent characters are stored.

■ Comments and test information

For each of these sets of comments and test information, the maximum number of characters that can be printed on reports is 20 characters. You can enter text that exceeds 20 characters, but only the first 20 characters will be printed.

Memo:	
Model Name:	The name of the EUT
Type:	The model number of the EUT
Serial No. :	The serial number of the EUT
Tobs:	Test observation period (when the HA tab is selected only.)

You cannot set the test information from the KHA3000 panel. To do so, you must transmit the information that you enter here to the KHA3000. The KHA3000 stores the information internally and includes it in the test result file.

The comment items can only be entered in HarmoCapture3.

Company:

Test Engineer:

Operating Mode:

Climatic Condition:

Supply Source:

Reference Impedance:

■ Alias standard

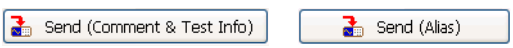
You can enter up to 31 characters for the alias standards.

Deleting characters

Press **Delete** to delete a character. To clear a combo box, enter a space, and press Enter. If you do not enter any characters, the corresponding comment is not updated. After you close the dialog box, the previous comment will return.

Transmitting Information to the KHA3000

In the **Report Setting** dialog box, click **Send (Comments & Test Info)** or **Send (Alias)** to send the information that you have entered to the KHA3000. You can enter comments and the alias standards easily from a PC instead of from the KHA3000 panel. You cannot enter test information from the KHA3000 panel, but you can send information to the KHA3000 and save it. If you print a report from the KHA3000, the printout will contain the entered information.



After you have sent test information to the KHA3000, you cannot reset the test information values, even if you click **Cancel**.

Footer Option

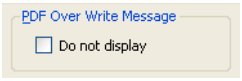
Adds a footer to a report.

You can select any one of **Full path + File name**, **File name**, **Nothing**, or **Arbitrary Character Strings**.

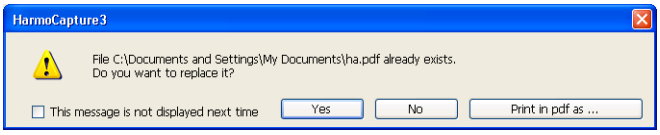
The character strings that you enter in the **Arbitrary Character Strings** combo box are stored, when you click the **OK**. Up to eight of the most recent characters are stored.

PDF Overwrite Message

If you select a test result file that you have printed before, a PDF file overwrite message appears. The **Do not display** check box is used to enable or disable this message.



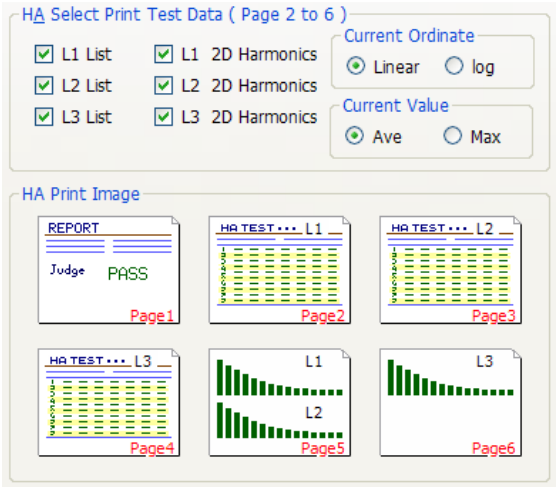
If you select the **This message is not displayed next time** check box in the PDF file overwrite dialog box, the **Do not display** check box in the **Report Setting** dialog box is also selected. If you clear the **Do not display** check box, the PDF file overwrite message is enabled.



Selecting which Data to Print

You can select which phase data to print in reports using the L1, L2, and L3 check boxes. After selecting which data to print, you can preview how the report will be printed.

For harmonic current tests, you can set the current scale to Linear or log and select whether to print average values or maximum values.



Clearing combo box history

The **Comment** and other combo boxes retain histories of entries that you make even when you close HarmoCapture3. You can select these entries from the list the next time. However, there may be cases in which it is better to reset the combo boxes to their default conditions (without the histories) if another user is going to use HarmoCapture3. To clear the histories of all combo boxes, follow the procedure below.

1 Click **Report Setting** button on the toolbar.

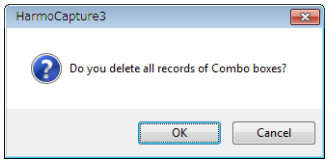
The Report Setting **dialog box appears.**

2 Click the **HA** or **Vf** tab.

Regardless of which tab you select, the histories of all combo boxes on both tabs will be cleared.

3 Click **Clear of Combo records** button.

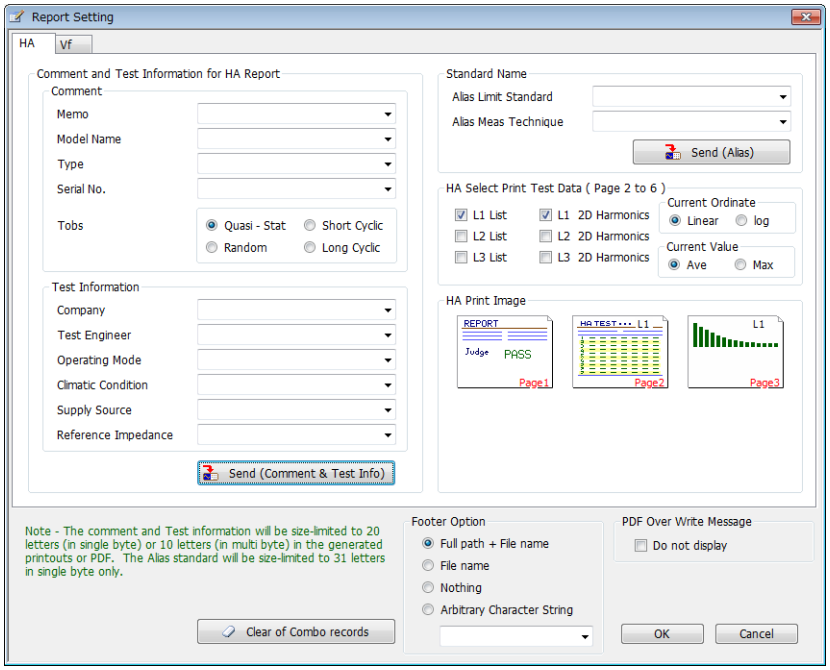
The message appears.



4 Click **OK** button.

The histories of the Comment, Test Information, **and** Standard Name **combo boxes are cleared.**

Contents already sent to the KHA3000 will not be cleared.



Error Messages

An error message will appear if there is a problem with the communication between HarmoCapture3 and the KHA3000 or the AC power supply or if you execute a test without specifying settings that are required. If an error message appears, carry out the corrective action below.

Error message	Corrective action
Instrument I/O connection is failed. Do you wish to set up I/O Configuration?	Check the wiring between your PC and the KHA3000. If you selected the **Use** option in the AC power source control pane, check that the KHA3000 is wired properly to the AC power supply. Check that the VISA resource in the **I/O Configuration** dialog box is displayed properly.
Error occurred (Connection was lost). HarmoCapture3 is closed.	
Error occurred (Device is not found). HarmoCapture3 is closed.	Harmonics Analyzing Suite is not installed properly. Re-install it.
Multicast is prohibition.	You cannot run multiple instances of HarmoCapture3.
PLL is in unlocked state.	This error message appears when the KHA3000 input voltage is unstable or when the AC power supply output is not turned on. Check the equipment wiring. If the AC power supply output is not turned on, turn it on. For instructions on how to turn the AC power supply output on, see "Controlling the AC Power Supply." If you need to check the KHA3000 configuration while HarmoCapture3 is running, click **Stop Monitor** to switch the KHA3000 to local mode, and then operate the KHA3000 from the front panel to view the configuration.
xxx is into use. Therefore, writing was protected.	This error message appears if you print a report when the PDF report file of the same test is open. Close the PDF report file first, and then print the report.

Menu Reference

Menu	Description
File	
Open Condition File...*1	Opens a test condition file that you created using HarmoCapture3 or a test condition file that you saved on the KHA3000.
Save Condition File*1	Saves the test conditions that you are currently editing to a file. (The file is saved with an .hs3 or .vs3 extension.)
Save Condition File As...	Saves the test conditions that you are editing to a file with the name that you specify. (The file is saved with an .hs3 or .vs3 extension.)
Save Result File As...	Saves the most recent test results to a file (with a .hr3 or .vr3 extension). If you change the test conditions, you will not be able to save the test results afterwards.
Report Setting...*1	You can enter the comments that are printed in reports. The comments that you enter can be sent to the KHA3000. You can specify which phase data to print in reports using L1, L2, and L3.
Print Report*1	Prints a report of the last test result file that was saved since you started HarmoCapture3.
Select File and Print Report...	Prints a report of a test result file you saved on the KHA3000 or a test result file you saved using HarmoCapture3.
Exit	Exit from HarmoCapture3.
Instruments	
I/O Configuration...	Checks the KHA3000 VISA Resource Name (ID.)
PCR Configuration...	Set the connection method between the AC power supply and the PC.
Test	
Start Test*1	Executes a test under the test conditions currently being displayed.
Stop Test*1	Stops the test currently being executed.
Start Monitor*1	Starts the real-time monitoring of values that the KHA3000 is measuring.
Stop Monitor*1	Stops the real-time monitoring of values that the KHA3000 is measuring.
Scaling*1	You can set the current input terminals that you want to use and the scaling to apply to the input from the external PTs (potential transformers) and current sensors.
DC Offset*1	You can adjust the DC offset of the KHA 3000 measurement circuitry.
AC Power Source*1, *2	Checks the performance of the AC power supply for a test.
Wiring Method	Selects the circuit wiring method.
PLL Source	Selects the source for synchronizing to the AC power frequency.
Ch Link	Selects Linked or Independent for phases L1, L2, and L3.
Help	
User's Manual (Japanese)	Opens the HarmoCapture3 Japanese Operation Guide.
User's Manual (English)	Opens the HarmoCapture3 English Operation Guide.
About HarmoCapture3...	Displays the version of HarmoCapture3.

*1 The toolbar provides buttons.
*2 Only when the JIS C 61000-3-2 2005 standard is selected.

If you find any misplaced or missing pages in the manuals, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact your Kikusui agent or distributor. At that time, inform your agent or distributor of the “Part No.” written on the front cover of this manual.

Every effort has been made to ensure the accuracy of this manual. However, if you have any questions or find any errors or omissions, please contact your Kikusui agent or distributor.

After you have finished reading this manual, store it so that you can use it for reference at any time.

KIKUSUI ELECTRONICS CORP.

1-1-3 Higashiyamata, Tsuzuki-ku, Yokohama,
224-0023, Japan
Tel: +81-45-482-6353 Fax: +81-45-482-6261

www.kikusui.co.jp/en