Harmonic/Flicker Analyzer
KHA Series

Supports harmonic and flicker compliance testing of single-phase and three-phase equipment

IEC61000-3-2 Ed4.0 (Harmonics for 16 A or less)
IEC61000-3-3 Ed3.0 (Flicker for 16 A or less)
IEC61000-3-11 Ed1.0 (Flicker for over 16 A)*
IEC61000-3-12 Ed2.0 (Harmonics for 75 A or less)*
IEC61000-4-7 Ed2.0/A1, Ed2.0, Ed1.0 (Interharmonics ON/OFF)

*Only Model KHA3000
Harmonic and flicker analyzer compliant with the latest versions of the IEC and JIS standards

Harmonic/Flicker Analyzer

KHA Series

- Supports new and old harmonics/flicker standards of IEC/EN and JIS.
- Using this device alone, measurement, analysis and report creation are possible.
- Basic measurements required at design and development sites are possible.
- Pass/fail judgment on limit value is possible.
- Real-time display of test status.
- Easy support with update kit when standards are updated (for a fee)

The KHA series is a Harmonic/Flicker analyzer that complies to the standard of IEC/EN and JIS. The KHA1000 is dedicated for the single-phase equipment with two wires, and the KHA3000 applies to the test exceeding 16 A of the single-phase and three-phase equipment (up to 40 A per phase). Furthermore, the KHA series is compliant with both existing and the latest version of measurement technique standards, so you can simply select the measurements of the latest version of standard including the interharmonics, and for the conventional measurement that applies only the integral multiple harmonics without using any other device. In addition to the real-time display that can be used like an oscilloscope and FFT analyzer, the KHA series offers the real-time judgment of compliance with standards. Using the KHA series alone, you can judge test results and prepare result reports without using a PC. On top of that, you can easily configure the test system combined with the AC power supply (PCR-LE/LE2 Series) and the line impedance network (LIN Series).

KHA3000
KHA1000

<table>
<thead>
<tr>
<th>Category</th>
<th>Limit value standard Edition</th>
<th>Measurement technique standard Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IEC 61000-3-2 Ed4.0(2014)</td>
<td>IEC 61000-4-7 Ed2.0(2002), EN 61000-4-7(2002) *1</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-3-2 Ed2.0(2004)</td>
<td>IEC 61000-4-7 Ed1.0(1991), EN 61000-4-7(1993) *2</td>
</tr>
<tr>
<td></td>
<td>EN 61000-3-2(2014)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN 61000-3-2(2006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>JIS C61000-3-2(2005)</td>
<td>20 A or less</td>
</tr>
<tr>
<td></td>
<td>JIS C61000-3-2(2011)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 61000-3-12 Ed1.0(2004)</td>
<td>16 A or more, 75 A or less</td>
</tr>
<tr>
<td></td>
<td>IEC 61000-3-12 Ed2.0(2011)</td>
<td></td>
</tr>
<tr>
<td>Flicker/voltage fluctuation</td>
<td>IEC 61000-3-3 Ed2.0(2008)</td>
<td>IEC 61000-4-15 Ed2.0(2010), EN 61000-4-15(2011)</td>
</tr>
<tr>
<td></td>
<td>EN 61000-3-3(2013)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EN 61000-3-3(2008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IEC 61000-3-11 Ed1.0(2000)</td>
<td>16 A or more, 75 A or less</td>
</tr>
</tbody>
</table>

1. The measuring window width is 0.2 second. In other words, it is 10 cycles at a fundamental frequency of 50 Hz and 12 cycles at a fundamental frequency of 60 Hz. Interharmonic waves are measured at 5 Hz intervals. Harmonic groups are measured out of harmonic waves and interharmonic waves. The values of harmonic groups are the results of measurement.

2. The measurement window length is 16 cycles at the fundamental frequency. It is 0.32 second at a fundamental frequency of 50 Hz and 0.266 second at a fundamental frequency of 60 Hz. Interharmonic waves are not measured; only harmonic waves are measured. The values of harmonic waves are the results of measurement.
Applying to the single phase and the three-phases* (40 A/phase)

<table>
<thead>
<tr>
<th>16 A/phase or less *1</th>
<th>16 A to 75 A/phase *2</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC61000-3-2, -3-3</td>
<td>IEC61000-3-12, -3-11</td>
</tr>
</tbody>
</table>

Single

KHA1000 (dedicated for single phase (16 A or less))

Three

KHA3000 (Covers all)

*1: The JIS specifies 20 A/phase or less.

*2: For measurement of 40 A or more phase current, an optional device (external current sensor) is required.

User-friendly terminals and interfaces

KHA Series comes standard with GPIB, RS232C and USB. SCPI commands make it possible to use the unit as a general-purpose power analyzer by connecting it to your computer.

Easy connection

The terminals for power input and load output are separated. This arrangement prevents connection errors, thereby eliminating the risk of short-circuiting. Of course, voltage sensing at the load is supported as well. KHA3000 offers both simplicity and expandability.

View key

You can change the test conditions with the monitor screen unchanged.
To select the standard, your desired combination can be arranged by choosing from the limit value standard and the testing measurement standard. *It is only a combination made beforehand in KHA1000.

### Supporting “repeatability” check

Comparison can be made between the present measurement data and the past measurement data to check whether or not the error is within the specified allowable range. This feature is helpful in evaluating the “repeatability” that is required in harmonic compliance testing.

#### The IEC requirements

**The measurement repeatability shall be within ±5% of limit value.**

**IEC61000-3-12:** The repeatability of the fundamental and 7th and lower harmonic orders shall be within ±5%.

The repeatability of the harmonics beyond the 7th harmonic order shall be within ±10% or ±1% of the reference fundamental current, whichever is larger.

### Conducting compliance testing without using a PC

Using this device alone, you can perform a series of test processes - from setting test conditions and running the test to judging test results against limit values and outputting result reports - without the use of a PC. The device displays pass/fail results and spectrum data on the screen in real time. What’s more, since KIKUSUI’s PCR-LE/LE2 Series AC power supply can be controlled from KHA Series, you can set up an easy-to-use test system whereby the operation panel of this device can be used as the main console.

#### Operation flow using KHA Series

- **Test preparations**
- **Start of test**
- **Test analysis**
- **Test result**

- Setting the test system
- [AC power supply/reference impedance]
- Setting test conditions
- Selecting the measurement screen
- Saving test data in a CF card or an USB memory
- Printing test reports
- Finishing the test

#### Link to a PC with using a CF card or an USB memory

A Compact Flash (CF) memory card is used to save test conditions, reports, screen hardcopies and data.

Test reports can be output to a CF card in either the PDF or text format. You can easily view and print them using a PC. The text format is useful when you want to prepare a report in your own format.

#### Equipped with a quality check function for the testing power supply

KHA Series are equipped with a function to measure the voltage, frequency, peak voltage and distortion rate of the AC power used for harmonic compliance testing in order to check whether or not the power supply is adequate for the intended test.

#### The IEC requirements

**IEC61000-3-2:**

The voltage harmonics must be the following values or less.

- 3rd (0.9%), 5th (0.4%), 7th (0.3%), 9th (0.2%), even harmonic order between 2nd and 10th (0.2%), 11th to 40th (0.1%)

**IEC61000-3-12:**

Output voltage and harmonic inclusion rate under no load

- 5th (1.5%), 3rd and 7th (1.25%), 11th (0.7%), 9th and 13th (0.6%), even harmonic orders between 2nd and 10th (0.4%), 12th and 14th to 40th (0.3%)
Harmonic / Flicker Analyzer
KHA SERIES

The unit can be easily upgraded from the front panel using a CF card.*5
*5: Users are requested to prepare CF cards.

The long-time flicker value in all segment time, “Plt” is specified to be 2 hours for the flicker monitoring period. For three-phase equipment, measurement can be taken for each phase, but that will take 2 hours x 3 = 6 hours. Simultaneous measurement of three-phases can shorten the measuring (testing) time to 2 hours.

◆ In order to fully cover the EUT input methods, you can set the wiring method (single phase, single phase 3-wire, three-phase 3-wire and three-phase 4-wire). In addition, for the setting of L1, L2 and L3 (channels), you can select interlock or independent. This allows appropriate measurement for equipment with largely different phase currents.

◆ In order to support measurement of each channel for 3 phases, the voltage and current ranges were separated for each channel and AUTO range was established for each. In addition, you can adjust the DC offset for each range with a single touch.

KHA Series are capable of measuring all major basic items including voltage, current, power, power factor, apparent power, reactive power and frequency. It also provides other measurement functions such as waveform monitoring and measurements of rush current and harmonic current in low frequency zones. These features make KHA Series a convenient routine work tool for development and design processes.

HKA Series observes the waveform of the rush current exceeding the trigger level. It can also observe the voltage waveform. HKA3000 can measure a rush current up to 160 Apeak, HKA1000 can measure a rush current up to 80 Apeak. The measuring range can be expanded to a high current by using an optional external current sensor with updating the firmware.

A rush current can be measured while the EUT is connected. This saves you from going through the trouble of preparing an oscilloscope and current probe. Set the input phase angle of the AC power supply using the application software (SD006-KHA, SD005-KHA), and turn on the unit. The rush current can be measured with good reproducibility. The phase angle can be set in the unit of 1°.

Harmonic current test
Flicker/voltage fluctuation test

Graph display
● V/I waveforms
● 2D harmonics
● THD
● Current trend
● Harmonic current trend
● Vector phases *Only Model KHA3000

List display
● List (real-time measured values)
● Harmonic list
● Result list

List of view types *The screens are examples of KHA3000.

<table>
<thead>
<tr>
<th>Harmonic current test</th>
<th>Flicker/voltage fluctuation test</th>
</tr>
</thead>
<tbody>
<tr>
<td>V/I waveforms</td>
<td>V/I waveforms</td>
</tr>
<tr>
<td>2D harmonics</td>
<td>rms waveform</td>
</tr>
<tr>
<td>3D harmonics</td>
<td>SI (short time flicker value)</td>
</tr>
<tr>
<td>THD</td>
<td>waveform</td>
</tr>
<tr>
<td>Current trend</td>
<td>CPF (cumulative probability)</td>
</tr>
<tr>
<td>Harmonic current trend</td>
<td>dc waveform</td>
</tr>
<tr>
<td>Vector phases *Only Model KHA3000</td>
<td>dmax waveform</td>
</tr>
<tr>
<td></td>
<td>d (t) &gt; 3.3% waveform</td>
</tr>
</tbody>
</table>

▲ 2D harmonics ▲ Flicker list ▲ Rush current measurement (KHA3000)
**KHA1000 System Components**  [For Single-phase/4 kVA, PC Control]

For PCR-LE
- Single-phase 2-wire circuit test

![Diagram of KHA1000 System Components](image)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 kVA</td>
<td>PCR4000LE</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>LIN1020JF</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>KHA1000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>OT01-KHA</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SD005-KHA</td>
<td>1</td>
</tr>
</tbody>
</table>

**KHA3000 System Components**  [For Single-phase/8 kVA, 3-phase/12 kVA, PC Control]

For PCR-LE
- Three-phase 3-wire circuit / three-phase 4-wire circuit test

![Diagram of KHA3000 System Components](image)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 kVA</td>
<td>PCR4000LE</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>LIN3020JF</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>3P05-PCR-LE</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>KHA3000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SD006-KHA</td>
<td>1</td>
</tr>
</tbody>
</table>

*1 SD006-KHA Ver2.41 or later is required

**KHA3000 System Components**  [For Single-phase 3three-phase/6 kVA, Single-phase 3-wire/4 kVA, PC Control]

For PCR-L2

![Diagram of KHA3000 System Components](image)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 kVA</td>
<td>PCR6000LE2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>LIN3020JF</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>KHA3000</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SD006-KHA</td>
<td>1</td>
</tr>
</tbody>
</table>

*1 SD006-KHA Ver2.41 or later is required
◆ The large current CT (Current Transformer) for the KHA3000

The large current CT (Current Transformer) for the KHA3000

Application example of the combination system with other manufacture's equipment

Use the terminal "I Monitor" and "V Monitor" on the back of RIN.

*In order to satisfy the voltage drop of 0.5 Vrms in the measurement specified in the IEC61000-4-7 Ed2, it is recommended that the wiring between the OUTPUT and the SOURCE terminal of the KHA series must be connected short and use the thick cable as possible (at least thicker than 8mm², 16mm² to 22mm² for measuring more than 16 A).

Comparison of the measurement value

The Internal Shunt VS
9018-50/9272-10
by HIOKI

HIOKI 9018-50 50A Mode
(12.5 A range)
HIOKI 9018-50 100A Mode
(12.5 A range)
HIOKI 9272-10 200A Mode
(10 A range)

The relative error between the measurement value by the internal shunt resistor and the measurement value of the harmonics current by the clamp sensor (manufactured by HIOKI) is measured with ±0.6%, therefore, the sufficient precision is confirmed in the practical operation applied to the standard requirement of 5% specified in the IEC61000-4-7.

Information of the clamp current sensor

CLAMP ON SENSOR
9272-10
CLAMP ON PROBE
9018-50
SENSOR UNIT
9555-10

For inquiry: HIOKI E. E. CORPORATION http://www.hioki.co.jp/

◆ Application example of the combination system with other manufacture's equipment

*1: Current sensing wire: Use the wire with sufficient capacity which allows up to 20 A for the KHA1000, and up to 40 A for the KHA3000.
*2: Voltage sensing wire: There is no current flows on this wire, so the wire size should be sufficient with the type around "UL1015 AWG20". (It should be concerned for the withstanding voltage)
*3: Output wire: Select the wire with the current capacity of 20 A for the KHA1000, and 40 A for the KHA3000. It may cause to effect for the voltage drop. (Recommended of the wire size : 14mm² to 22mm²)
*4: The short-bar must be connected.
*5: Set it to KHA3000 Ver2.00 or more and Delta Transform "Enable".
This dedicated application software consists of 3 programs. Using this software, you can set test conditions and control the execution of tests. You can also control the AC power supply (PCR-LE) used for tests. Furthermore, you can print the harmonic spectrum, and current and voltage waveforms on your reports.

<table>
<thead>
<tr>
<th>Program configuration of SD006-KHA Harmonics Analyzing Suite and SD005-KHA Harmonics Explorer</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD006-KHA</td>
</tr>
<tr>
<td>HarmoCapture 3</td>
</tr>
<tr>
<td>HA File Analyzer 3</td>
</tr>
<tr>
<td>Vf File Analyzer 3</td>
</tr>
</tbody>
</table>

[system requirements]
- 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 Keysight 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 AC power supply via RS232C)
- CompactFlash Type I (CFA), up to 512 MB (when using KHA3000 files)

**HarmoCapture 3 / HarmoCapture**

HarmoCapture 3 / HarmoCapture lets you control KHA Series remotely from a PC in the same way you control it from the operation panel of the device. The program will start as appropriate for the test mode. 

- Test condition setting screen for harmonic current test (HarmoCapture 3)
- Test condition setting screen for harmonic current test (HarmoCapture)
HA File Analyzer 3 / HA File Analyzer

HA File Analyzer 3 / HA File Analyzer are application programs that allows you to analyze the data in the test result files (xxx.hr3 / xxx.hr) saved by HarmoCapture 3 / HarmoCapture. It is not necessary to connect with KHA Series to run, so, you can analyze test data anywhere you want.

VF File Analyzer 3 / Vf File Analyzer

VF File Analyzer 3 / Vf File Analyzer are application programs that allows you to analyze the data in the test result files (xxx.vr3 / xxx.vr) saved by HarmoCapture 3 / HarmoCapture. It is not necessary to connect with KHA Series to run, so, you can analyze test data anywhere you want.
Line Impedance Network
LIN series (LIN1020JF/LIN3020JF/OP01-LIN1020JF)

It is equipped with the IEC/JIS/JET standard impedance. It supports voltage fluctuation and flicker tests.

**LIN1020JF (For single phase 20 A)** *1
LIN1020JF is equipped with the impedance determined by the IEC flicker test (IEC61000-3-3) and JIS harmonics (JIS C61000-3-2), which can be configured via the USB interface (standard feature) or the contact signal interface from the application software. The single-phase two-wire IEC flicker/harmonics test system can be configured in combination with AC power supply PCR-LE/LE2 and harmonic flicker analyzer KHA1000/KHA3000.

**LIN3020JF (For single phase / three phase 20 A)** *1
LIN3020JF is equipped with the impedance determined by the IEC flicker test (IEC61000-3-3) and JIS harmonics (JIS C61000-3-2), which can be configured via the USB interface (standard feature) or the contact signal interface from the application software. The single-phase two-wire/three-wire/three-phase IEC flicker/harmonics test systems can be configured in combination with AC power supply PCR-LE/LE2 and harmonics flicker analyzer KHA1000/KHA3000.

*1: The LIN-JF can be used with PCR-LE and PCR-LE2 AC power supplies. PCR-L and PCR-LA series or AC power supplies made by other manufacturers cannot be used.

**OP01-LIN1020JF**
OP01-LIN1020JF is an additional unit that is used to expand LIN1020JF in three phases (addition of V phase and W phase).

* OP01-LIN1020JF does not work solely.

<table>
<thead>
<tr>
<th>Model</th>
<th>Maximum current (per phase)</th>
<th>Wiring configuration</th>
<th>IEC 61000-3-3 230 V 50 Hz</th>
<th>JIS C61000-3-2 *2</th>
<th>JET GR0002-1-3.0</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIN1020JF</td>
<td>20 A</td>
<td>Single phase 2-wire</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>Product for IEC flicker / voltage fluctuation test</td>
</tr>
<tr>
<td>LIN3020JF</td>
<td></td>
<td>Single phase 2-wire/3-wire</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>*2: Insertion of the impedance is optional in the JIS harmonics test. (Normally applied for bypass.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three phase 3-wire/4-wire</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>LIN1020JF +</td>
<td></td>
<td>Single phase 2-wire/3-wire</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>OP01-LIN1020JF</td>
<td>*3</td>
<td>Three phase 3-wire/4-wire</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Impedance Value</td>
<td></td>
<td>Single phase 2-wire</td>
<td>0.4 Ω +Jn0.25 Ω(Z3)</td>
<td>0.4 Ω +0.37 mH(Z1)</td>
<td>0.38 Ω +0.46 mH(Z2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Single phase 3-wire</td>
<td>0.24 Ω +Jn0.15 Ω</td>
<td>0.19 Ω +0.23 mH</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three phase 3-wire</td>
<td>(0.16 Ω +Jn0.1 Ω for N phase)</td>
<td>(0.21 Ω +0.14 mH for N phase)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Three phase 4-wire</td>
<td>0.19 Ω +0.23 mH</td>
<td>0.19 Ω +0.23 mH</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.19 Ω +0.23 mH for N phase)</td>
<td>(0.19 Ω +0.23 mH for N phase)</td>
<td></td>
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</tr>
</tbody>
</table>
Harmonic / Flicker Analyzer

KHA SERIES

Accessories and others

- **Multi-outlet (20 A or less single phase)**
  - **OT01-KHA**
  
  This unit allows you to connect various types of plugs used around the world.

- **Rack mount brackets**
  - [For KHA3000/1000]
    - KRB4 (inch)
    - KRB200 (millimeter)
  - [For OT01-KHA]
    - KRB2-TOS (inch)
    - KRB100-TOS (millimeter)

- **Ethernet port [Factory-set option]**
  *Specify when ordering.* Only Model KHA1000
  
  You can print on the network printer directly from the ethernet port. Easy to build a harmonic test system without the use of a PC.

Daily pre-test checker

**OP02-KHAS(SPEC40425)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation mode</td>
<td>Harmonic mode / Flicker mode</td>
</tr>
<tr>
<td>Control type</td>
<td>Resistive load method (forced air cooling)</td>
</tr>
<tr>
<td>Input voltage range</td>
<td>Single-phase 100 VAC to 240 VAC</td>
</tr>
<tr>
<td>Input voltage type</td>
<td>Single-phase two-wires</td>
</tr>
<tr>
<td></td>
<td>Single-phase three-wires (change by per phase)</td>
</tr>
<tr>
<td>Input current</td>
<td>2.3 A ± 5% when at the setting voltage of 230 V</td>
</tr>
<tr>
<td></td>
<td>1.0 A ± 5% when at the setting voltage of 100 V</td>
</tr>
<tr>
<td>Allowable current for the external load connecting terminal</td>
<td>Approx. maximum 10 A</td>
</tr>
<tr>
<td>Harmonic generation method</td>
<td>Phase control</td>
</tr>
<tr>
<td>Phase angle variation range</td>
<td>Approx. 10 to 170 (when at the setting voltage of 100 V or 230 V)</td>
</tr>
<tr>
<td>Thermal protection</td>
<td>Yes (ALARM lights on, a buzzer sounds)</td>
</tr>
<tr>
<td>Flicker generation method</td>
<td>Square-wave ON/OFF control by the electronic timer</td>
</tr>
<tr>
<td>Flicker frequency setting range</td>
<td>Approx. 0.5 Hz to 20 Hz</td>
</tr>
<tr>
<td>Warm-up time</td>
<td>Approx. 10 minutes</td>
</tr>
<tr>
<td>Power supply for the activation</td>
<td>Single-phase 86 VAC to 264 VAC, less than 75 W (possible for common use of the measurement circuit)</td>
</tr>
<tr>
<td>Withstanding voltage</td>
<td>Between the Input and FG (Frame Ground) 1830 V, less than 5 mA</td>
</tr>
<tr>
<td>Dimensions</td>
<td>214(W)×124(H)×400(D)mm (Excluding the projected components)</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 6 kg</td>
</tr>
</tbody>
</table>

Calibration of ISO/IEC17025: Provided with calibration/data (measuring equipment in use)

In order to meet the customers’ request for traceability of the calibration of KHA Series for ISO/IEC17025, we have established the “traceability system” as shown in the figure below. (It is used for the production and inspection of KHA1000/3000.)

When the “Certificate of traceability with Calibrator Data” is requested, a copy of the “Calibration Certificate” can be also attached as an chargeable option. (issued by the organizations shown in ▲.)

Calibration of KHA Series is carried out using the measuring instruments calibrated in compliance with ISO/IEC17025.

Note that KIKUSUI cannot calibrate KHA1000/3000 in compliance with ISO/IEC17025.

Thus, the calibration data for KHA Series that can be provided at the moment does not contain “the Expression of Uncertainty.”

A copy of the data that contains “the Expression of Uncertainty” for the measuring instruments used for calibration can be attached as a chargeable option.

If you need data issued by accredited calibration laboratories (with the logos), please contact our sales representatives.
Specifications

**KHA3000**

**Common input specifications**
- Maximum input voltage: 600 Vrms / 900 Vpeak (CAT I), 400 Vrms (CAT II)
- Maximum input current: 40 Arms / 100 Apeak, whichever is smaller 160 Apeak (within 20 ms)
- Number of input channels: 3 channels for both voltage input and current input (L1, L2 and L3)
- Voltage measurement input switching: Single-phase 2-wire, single-phase 3-wire, three-phase 3-wire and three-phase 4-wire
- Rated voltage for the range
  - 150 V/300 V

**KHA1000**

**Current measurement function**
- Rated current for the range
  - 0.5 A/1 A/2 A/5 A/10 A/20 A
- Accuracy
  - ± (0.4 % of reading + 0.2 % of range)

**Voltage measurement function**
- Rated voltage for the range
  - 150 V/300 V
- Accuracy
  - ± (0.3 % of reading + 0.2 % of range)

**Power measurement function**
- Effective power accuracy
  - ± 0.2 %
- Effective power factor
  - 0.5 A to 20 A range: 4, 20 A range: 2.5

**Frequency measurement function**
- Frequency measurement range:
  - 45 Hz to 65 Hz ± (0.15 % of reading + 2 digits) ± 0.001 Hz
- Measurement frequency range
  - 45 Hz to 65 Hz ± (0.15 % of reading + 2 digits) ± 0.001 Hz

**Phase measurement function**
- Measurement item
  - TrueRMS and ±peak
- Measurement range/resolution
  - 0.00° to 360.99° / 0.1°

**Harmonic current measurement function**
- Conforming standard
  - IEC 61000-3-2 Ed4.0, IEC 61000-3-3 Ed2.0, IEC 61000-3-2 Ed3.0, IEC 61000-3-3 Ed4.0
- Requirements for measuring instrument standard
  - IEC 61000-3-2 Ed1.0, IEC 61000-3-2 Ed2.2, IEC 61000-3-2 Ed4.0
- Cutoff frequency
  - 6 kHz, 4 th Butterworth type (HA mode), 15 kHz 4 th Butterworth type (Other mode)

**Phase measurement function**
- Measurement item
  - Voltage/current phases, line voltage phase "2" and harmonic phase
- Measurement range/resolution
  - 0.00° to 360.99° / 0.1°

**Flicker/voltage fluctuation analysis function**
- Conforming standard
  - IEC 61000-3-3 Ed3.0 Ed1.0 (2002), IEC 61000-3-3 Ed2.0 (2002), IEC 61000-3-3 Ed4.0
- Requirements for measuring instrument standard
  - IEC 61000-3-3 Ed2.0 (2002), IEC 61000-3-3 Ed4.0
- Cutoff frequency
  - 6 kHz, 4 th Butterworth type (HA mode)

**Environmental conditions**
- Operating temperature and humidity ranges
  - 0 °C to +40 °C (+32 °F to +104 °F), 20 % to 80 %rH (no condensation)

**Accessories**
- Power cord, voltage sensing terminal plug and short-circuit wire kit (with a dedicated screwdriver), spare fuse and operation manual

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**Outside Dimensions**

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**Products and specifications**
- All products contained in this catalogue are equipment and devices that are premised on use under the supervision of qualified personnel, and are not designed or produced for home-use or use by general consumers.
- Specifications, design and so forth are subject to change without prior notice to improve the quality. Product names and prices are subject to change and production may be discontinued when necessary.
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