White Ink – Now Available

Universal Inkjet Printer
MK-U Series

The Next Step in Inkjet Printing Technology
Universal Inkjet Printer
MK-U6000

No nozzle clogging
Stable, high quality printing

Easy to use human interface
Field replaceable parts without the need for any tools
Unmatched combination of speed, quality and reliability
Stable operation though efficient design
To achieve continuously flawless printed text, we have reformed the monitoring functions and maintenance mechanisms within the head. This enables stable and perfect printed text, regardless of who uses the device.

The ability of anyone on-site to perform maintenance quickly, minimizes line stoppages and reduces running costs. We have created our system so that this kind of impromptu maintenance is possible.

No matter how advanced a product is, it’s meaningless if no one can fully take advantage of its features. We have created an interface that is easy to use, even for first-time operators of the system.

KEYENCE has seen increasing demand for systems that make printing inspection simple. To that end, the printer can be linked to a vision system with just one cable. This system offers peace of mind through a unique combination of stable printing and reliable inspection.

Our new dual circulation system continuously stirs inside the main tank, which provides stable operation without clogging. Additionally, ink inside the cartridges can be dispersed simply by shaking.
The head’s internal status has a major effect on the quality of the printed text and line operation. The interior of the MK-U head provides functions that protect against environmental conditions and operator error, achieving stable operation under any circumstance.

Ink particles are created by passing through this small hole approximately 60 μm (2.36 Mil) in size. If small particles of dirt or residual ink affix to the nozzle, it will not be possible to send the ink to the gutter accurately, which leads to unstable text.

Ink that is not used for printing is collected in this pipe and is reused. If the ink is deflected incorrectly during collection, the ink may splash and unstable text may occur.

Ink particles ejected from the nozzle pass between these two electrode plates, which deflect the particles by an amount matching their charges. If the electrode plates are dirty, they will not be able to accurately control the paths of the ink particles, which leads to unstable text.

The main focus during development was achieving stable operation while maintaining perfectly printed text.
Advanced technology that enables stable operation

Efficient self-cleaning

**Auto-shower cleaning**

Conventional automatic cleaning only used solvent to clean the ink paths. With the newly installed auto-shower function the MK-U is able to clean the ink path, nozzle, electrode plates, and gutter all at once. Therefore, the amount of solvent exposure to operators is reduced.

Elimination of unstable printing due to temperature changes

**Automatic ink particle optimization**

The optimum ink particle status for printing is always fluctuating due to the ambient temperature and ink thickness (viscosity). The MK-U Series senses the ink particles 10 times per second, which enables it to always maintain the optimum ink particle status. This maintains perfectly printed text at all times, regardless of the environment.

No ink dilution due to cleaning operations

**Conditioning tank system**

The device is equipped with a specialized tank (the conditioning tank) and a viscosity sensor for use in collecting the solvent after cleaning. This prevents ink dilution, stabilizing viscosity and therefore maintaining print quality.

[Three Main Advantages]

- **Powerful cleaning** - Cleaning can be performed without any concerns regarding ink dilution.
- **Dark printed text** - Ensures dark and distinct printed text.
- **Draining unnecessary** - Wasteful draining due to ink dilution is prevented. This creates efficient expenditure of consumables.

* Not available for MK-U2000/MK-U2000SA/MK-U6000PY/MK-U6000PW

During automatic cleaning

After automatic cleaning, the solvent is routed directly to the conditioning tank. This alleviates over-dilution of the ink stored in the main tank.

During viscosity management

The ink dilution in the main tank is measured using the viscosity sensor. Based on this reading solvent is supplied to the main tank from the conditioning tank. Nothing is wasted because priority is given to the conditioning tank.
Easy maintenance reduces line stoppages to an absolute minimum.

Consumable parts such as filters and pumps that require periodic replacements can all be replaced without using a user's manual or tools. The user needs only to follow the illustrated instructions that are outlined in the software, so replacements can be performed easily and accurately even by users who have never performed these operations before.

Replacement of consumable parts requiring no user's manual or tools

Simplifying maintenance creates great savings in terms of time and cost, increasing productivity.
Maintenance that is easy to understand and perform

Simple on-screen instructions

Maintenance guide

If an error occurs, the solution (workflow) can be viewed on the touch panel.
Since the operation procedure is displayed, incorrect troubleshooting is not possible.
Even for previously unseen errors, accurate maintenance can be performed without requiring additional time or effort.

Quick recovery even in the rare event of nozzle clogging

One-touch nozzle replacement

The main cause of problems with inkjet printers is clogging of the nozzle.
With the MK-U Series, the nozzle can be replaced without using any tools. This reduces downtime in the event that a nozzle replacement is required.

New structure prevents clogging and hardening

“Triple solenoid valve” reduces nozzle clogging

Conventional

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Triple solenoid valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salvage path</td>
<td>Ink</td>
</tr>
<tr>
<td>Noodle</td>
<td>The ink components remaining in the salvage path flow backward</td>
</tr>
</tbody>
</table>

Clogging occurs when ink particles remaining in the salvage path after cleaning move to the surface due to temperature change. A solenoid valve was added to the MK-U’s salvage path to block ink particles so that nozzle clogging does not occur.

“Diaphragm” prevents hardening of the solenoid valves

Conventional

<table>
<thead>
<tr>
<th>Conventional</th>
<th>Diaphragm type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ink</td>
<td>Solenoid valve</td>
</tr>
<tr>
<td>Solvent</td>
<td>Electro-magnet</td>
</tr>
<tr>
<td>Electro-magnet</td>
<td>Electro-magnet</td>
</tr>
<tr>
<td>Electro-magnet</td>
<td>Press Next</td>
</tr>
</tbody>
</table>

A diaphragm type solenoid valve was introduced to prevent ink from touching the moving part of the solenoid valve. The solenoid valve does not harden even after long-term operation.
A touch panel that is easy to use and understand.

Devices with high functionality are difficult to use, and the functionality of simple devices is not sufficient. KEYENCE has designed an intuitive interface that makes all of the system’s functionality accessible to the most novice users.

EASIER OPERATION

Easily forgettable items, such as the cartridge levels and the remaining life of each part, are displayed in an easy-to-understand manner. This screen displays the internal status of the device at a glance, which provides the user with peace of mind.

Operation screen

Convenient touch panel

The touch panel easily attaches to and detaches from the controller. This makes it easy to perform operations while checking the product.
Simple operation

Visually-aided line conditions

**Line adjustment**
Entering accurate line conditions was one of the most troublesome operations for inkjet printers in the past. Now, our device provides a visual aid of the line so that measurements are easily understood and recorded accurately.

Quick and easy diagnostics

**Path check**
The monitor can be used to check not only the open/closed status of the solenoid valves, but also the optimum ink viscosity for the current temperature. Because sensors are used to check information in real time, errors can be detected immediately, which greatly contributes to proactive maintenance.

Easily prevent operator access

**Operator lock**
Passwords can be used to lock the functions that are not used on a daily basis. This prevents incorrect operations and contributes to reductions in time spent managing the device. This feature is essential in eliminating human error.
**04 INTEGRATED INSPECTION**

**OCR inspection with a single cable**

Printing → inspection. Because KEYENCE has experience with both printers and vision systems, we can provide a system that is both easy to use and reliable.

- **Single cable**
  - Simply connect the printer (MK-U) and the vision system (CV-X) with a single LAN cable to enable easy use without any external devices.

- **Trigger sharing**
  - Printing and image capturing can be performed with a single trigger.

- **Screen linking the MK-U and CV-X**
  - The MK-U touch panel displays both the message and the judgment results.

**Intuitive, Auto-Teaching, Machine Vision System CV-X Series VERIFY**

**Universal Inkjet Printer MK-U Series PRINT**

**Self-contained CMOS Laser Sensor LR-Z Series TRIGGER**

**Universal Inkjet Printer MK-U Series PRINT**

**Trigger sharing**
- Printing and image capturing can be performed with a single trigger.

**Single cable**
- Simply connect the printer (MK-U) and the vision system (CV-X) with a single LAN cable to enable easy use without any external devices.
Easy connection with CV-X Series vision systems

Prevents mistakes when choosing setting

Confirmation of printed text (character recognition)

The MK-U and CV-X can easily be linked just by connecting them with a single LAN cable.
Both the MK-U and CV-X can be operated from the MK-U touch panel. The MK-U is equipped with many useful functions, such as a function that synchronizes the print settings and inspection settings. The OCR dictionary has been prepared in advance with the MK-U’s specialized fonts, so no further settings are required after installation. In addition, no external devices are required, so anyone can easily perform inspections of printed text.

Peace of mind during setup and support

Comprehensive support by a single manufacturer

If a problem occurs during setup or support of an inkjet printer and vision system sold by different manufacturers, it may be unclear where the responsibility lies. As a comprehensive factory automation manufacturer, KEYENCE provides full integration support.

The functions of the vision system improve the quality of inspections

Inspection history can be retained

“VisionDatabase”, an exclusive database, makes it possible to save images captured during inspection for a set period. Even when a problem occurs, you can check the inspection results by searching by data or lot number.

Product type differentiation and dirt can be inspected at the same time

The CV-X series can inspect both printed text and defects at the same time.
No hardening
No clogging
White ink cartridge

This white pigment ink does not harden or clog, supporting the usability and high maintainability of the MK-U Series.
White pigment ink with no hardening or clogging

**Simply shake to disperse for use**

**Pigment ink that easily disperses**

To disperse the ink with conventional inkjet printers, mixing by hand using a stirring rod was required. With the MK-U Series, the ink can easily be dispersed and used by simply shaking the cartridge.

**Reduction of ink precipitation during operation**

**Dual circulation system**

The MK-U has a newly designed tank optimized for pigment inks. The dual circulation system reduces precipitation during operation. Inks which disperse easily along with the dual circulation system prevent clogging of the ink path and achieve stable operation.

**Periodic circulation during long periods of inactivity**

**Sleep mode function**

The device is equipped with a function that performs automatic circulation periodically, even when it is stopped. This prevents precipitation without wasting ink. This sleep mode can prevent nozzle clogging and hardened valves even when standard inks are used.
Features Designed with Working Conditions in Mind

**IP55 Rating**
The MK-U is IP-55 rated, indicating excellent dustproof and watertight properties. This indicates that the device can even be used confidently in harsh environments. From the heavy moisture of a food packaging facility, to excess oil mist from auto-manufacturing, the MK-U can be operated in multiple environments.

![MK-U with IP55 rating](image)

* The print head does not support this ingress protection rating.

**Cartridges**
Cartridges are used to replenish the ink and solvent. These cartridges can be used cleanly, without any risk of the user’s hands getting dirty. Also, the MK-U is equipped with dedicated sensors that ensure that the ink and solvent are always used to the last drop.

![Cartridge replenishment](image)

**LED pointer**
The MK-U is equipped with an LED pointer that indicates the print location. This makes it easy to align the print position on the line. This feature is extremely useful for lines that undergo retooling and/or product changeover.

![LED pointer](image)

* Not available for MK-U6100

**Direct connection with barcode readers**
Registering the barcode of a product in advance makes it possible to easily switch between product types just by reading the barcode. This function prevents human error when handling a large variety of product types.

![Barcode reader](image)

**Head direction switching**
The direction of the head cable can be changed by 90 degrees. This removes the inconvenience in cable routing, and makes it easy to install the device in a wide variety of lines.

![Head direction switching](image)

**Long-distance mode**
Printing can be performed with the print head located up to 35 mm 1.38" away from the target. The long-distance mode can be used to reduce variations in character size. This is useful when printing on bags and other workpieces that present varying print distances.
The MK-U can be used to change the messages on and control multiple units at the same time from a single touch panel. This is useful when printing the same content on both sides of cardboard boxes and in similar situations.

The print settings can be edited and saved from a computer in the same manner as the touch panel. Settings can also be copied to and from spreadsheets, which is extremely useful when creating multiple settings.

Commercially available USB memory devices can be used. Settings can be backed up and various histories can be saved, which provides storage when expanding lines or reinstating lost data.

Establishing an Ethernet connection to the MK-U makes it possible to easily monitor the operating statuses of multiple devices from an office or location that is removed from the site. This provides peace of mind even for automated lines in which no operators are present.

This feature increases the speed with which peripherals are connected and reduces the amount of wiring required during these connections. It can also be used to operate on-site devices and check messages from a remote location. Time synchronization over the Internet is also supported.

Batch control of multiple units

Equipment with Ethernet interface

Printer status monitoring software

PC setup software

Print history management function

USB interface
## Practical Examples

**MK-U6000 Series (Normal ink type: Use ink MK-10)**

<table>
<thead>
<tr>
<th>![Image]</th>
<th>![Image]</th>
<th>![Image]</th>
</tr>
</thead>
</table>

- **Yellow ink MK-30**
  This yellow pigment ink provides clear printing on various dark workpieces, and has relatively high maintainability for a pigment ink. This achieves clear printing on dark coated automotive parts, and resin-molded products.

<table>
<thead>
<tr>
<th>![Image]</th>
<th>![Image]</th>
<th>![Image]</th>
</tr>
</thead>
</table>

- **White ink MK-33**
  This is a white pigment ink with remarkably improved maintainability. Perfect for those having difficulties managing white ink and inkjet printers.

<table>
<thead>
<tr>
<th>![Image]</th>
<th>![Image]</th>
<th>![Image]</th>
</tr>
</thead>
</table>

**MK-U6000PY/PW Series (Yellow ink type: Use ink MK-30, White ink type: Use ink MK-33)**

<table>
<thead>
<tr>
<th>![Image]</th>
<th>![Image]</th>
<th>![Image]</th>
</tr>
</thead>
</table>

- **Standard ink MK-10**
  This is a standard type of industrial ink that can be used for general purposes in a variety of industries.

<table>
<thead>
<tr>
<th>![Image]</th>
<th>![Image]</th>
<th>![Image]</th>
</tr>
</thead>
</table>

- **Yellow ink MK-30**
  This yellow pigment ink provides clear printing on various dark workpieces, and has relatively high maintainability for a pigment ink. This achieves clear printing on dark coated automotive parts, and resin-molded products.
**MEK free ink MK-14**

MEK is not included in the ink components, which reduces bothersome smell, and provides an alternative ink for compliance with certain safety standards. Drying speed is remarkably improved compared to conventional alcohol based inks.
## Printing examples (actual size)

### Standard ink MK-U6000

<table>
<thead>
<tr>
<th>5 dots</th>
<th>7 dots</th>
<th>9 dots</th>
<th>10 dots</th>
<th>12 dots</th>
<th>14 dots</th>
<th>16 dots</th>
<th>24 dots</th>
<th>32 dots</th>
</tr>
</thead>
</table>
| 012345  
A B C D E F | 012345  
A B C D E F | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C |

### Four-line printing

**BAKED FRESH** 製造年月日 20XX: 02. 08
ON SEP. 01 製造期間 20XX: 03. 05
BEST IF USED 0. 7 歳月 1234567ABC
BY NOV. 01 出廠時間 13: 41: 26

### Logotype

![Logotype Image]

### Unique-character languages

![Unique-character languages Image]

### Barcode

![Barcode Image]

### 40 μm 1.57 Ml nozzle (small character type) MK-U6100

<table>
<thead>
<tr>
<th>5 dots</th>
<th>7 dots</th>
<th>9 dots</th>
<th>10 dots</th>
<th>12 dots</th>
<th>14 dots</th>
<th>16 dots</th>
<th>24 dots</th>
<th>32 dots</th>
</tr>
</thead>
</table>
| 012345  
A B C D E F | 012345  
A B C D E F | 0123  
A B C | 0123  
A B C | 0123  
A B C | 0123  
A B C | 0123  
A B C | 0123  
A B C | 0123  
A B C |

### Four-line printing

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### Barcode

![Barcode Image]

### White ink type MK-U6000PW

<table>
<thead>
<tr>
<th>5 dots</th>
<th>7 dots</th>
<th>9 dots</th>
<th>10 dots</th>
<th>12 dots</th>
<th>14 dots</th>
<th>16 dots</th>
<th>24 dots</th>
<th>32 dots</th>
</tr>
</thead>
</table>
| 012345  
A B C D E F | 012345  
A B C D E F | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C |

### Four-line printing

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### Barcode

![Barcode Image]

### Yellow ink type MK-U6000PY

<table>
<thead>
<tr>
<th>5 dots</th>
<th>7 dots</th>
<th>9 dots</th>
<th>10 dots</th>
<th>12 dots</th>
<th>14 dots</th>
<th>16 dots</th>
<th>24 dots</th>
<th>32 dots</th>
</tr>
</thead>
</table>
| 012345  
A B C D E F | 012345  
A B C D E F | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C | 123  
A B C |

### Four-line printing

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### Barcode

![Barcode Image]
### Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>MK-U6000</th>
<th>MK-U6000MF</th>
<th>MK-U6000FPY</th>
<th>MK-U6000PW</th>
<th>MK-U6100</th>
<th>MK-U2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Touch panel console</td>
<td>PC software*3</td>
<td>PC software*3</td>
<td>PC software*3</td>
<td>PC software*3</td>
<td>PC software*3</td>
<td>PC software*3</td>
</tr>
<tr>
<td>Character height</td>
<td>1 to 12 mm 0.04&quot; to 0.47&quot;</td>
<td>0.6 to 7 mm 0.024&quot; to 0.275&quot;</td>
<td>1 to 12 mm 0.04&quot; to 0.47&quot;</td>
<td>0.6 to 7 mm 0.024&quot; to 0.275&quot;</td>
<td>1 to 12 mm 0.04&quot; to 0.47&quot;</td>
<td>0.6 to 7 mm 0.024&quot; to 0.275&quot;</td>
</tr>
<tr>
<td>Ink model</td>
<td>Standard ink MK-10</td>
<td>MEK-free ink MK-14</td>
<td>Yellow ink MK-30</td>
<td>White ink MK-33</td>
<td>Standard ink MK-10</td>
<td>Standard ink MK-10</td>
</tr>
<tr>
<td>Ink color</td>
<td>Black</td>
<td>Yellow</td>
<td>White</td>
<td>White</td>
<td>Black</td>
<td>Black</td>
</tr>
<tr>
<td>Maximum number of printable lines</td>
<td>6500 characters</td>
<td>2350 characters</td>
<td>2525 characters</td>
<td>2350 characters</td>
<td>1672 characters</td>
<td>2525 characters</td>
</tr>
<tr>
<td>Dot configuration (vertical)</td>
<td>6, 7, 8, 10, 12, 14, 16, 24, 32 dots</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Font</td>
<td>Original, Mincho, Gothic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Character types</td>
<td>Alphabetic characters, numbers, katakana, hiragana, symbols, kata (JIS levels 1 and 2), Chinese (GB2312), Latin characters, logotypes, custom characters (fonts created by users)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barcodes</td>
<td>CODE39, IF, IN7 (Codabar), 2of5, CODE128, JAN18, PDF, check digit addition function (except for 2of5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2D codes</td>
<td>GR code models 1 and 2, micro QR, DataMatrix (EC200), USS DataMatrix</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head distance</td>
<td>15 mm 0.59&quot; (24 dots or less), 20 mm 0.79&quot; (25 dots or more), 25 mm 1.38&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head direction</td>
<td>All directions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning guide</td>
<td>Guide printing, guide beam emission</td>
<td>Guide printing, guide beam emission</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. printing speed*2</td>
<td>2525 characters/s</td>
<td>2349 characters/s</td>
<td>2525 characters/s</td>
<td>2349 characters/s</td>
<td>2525 characters/s</td>
<td></td>
</tr>
<tr>
<td>*3 Usable size: 65 × 25 × 18 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions

**Print head**

- **Controller**: MK-P4
- **Controller**: MK-HB2 (MK-BUILDER2)
- **Print head cable length**: 4 m
- **Console cable length**: 4 m

**Controller**

- **Interface**: RS-232C, Ethernet (100Base-TX/10Base-T)
- **Output (NPN/PNP)**
  - Printing start, encoder (A, B), setting number selection, setting number switching, printing start disabling, printing stop, printing direction switching, counter/group reset, counter increase (startup), counter decrease (shutdown), error clearing
- **Input (NPN/PNP)**
  - Maintenance functions
  - Automatic nozzle cleaning, ink draining, internal cleaning, jet operation (nozzle and gutter suction, intermittent spraying), error display, error history, maintenance history, internal path monitor, maintenance guidance, error clearing guidance, auto-shower, sleep mode, path recovery
- **Power consumption**: 190 VA
- **Ambient operating temperature**: 41 to 104°F (5 to 40°C)
- **Ambient operating humidity**: 0 to 90% RH
- **Housing**: Stainless steel
- **Enclosure rating**: IP56/54
- **Dimensions**: 466 × 369 × 499 mm 18.31" × 15.39" × 19.65" (W × D × H)

**Console**

- **Controller**: MK-U6000
- **Controller**: MK-U6000MF
- **Controller**: MK-U6000PY
- **Controller**: MK-U6000PW
- **Controller**: MK-U6100
- **Controller**: MK-U2000
- **PC software*1**: MK-HB2 (MK-BUILDER2)
- **Console cable length**: 4 m
- **Console display language**: English, Japanese, Chinese, Portuguese, Spanish
- **Print data registration**: 500 settings
- **Touch panel console**: MK-P4
- **Print head**: MK-10 MEK free ink MK-14 Yellow ink
- **Ink model**: MK-30 White ink
- **Ink model**: MK-33 White ink
- **Ink color**: Black Yellow White Black
- **Character height**: 1 to 12 mm
- **Head distance**: 15 mm 0.59" (24 dots or less), 20 mm 0.79" (25 dots or more), 25 mm 1.38"
- **Head direction**: All directions

**Print head**

- **Print head cable length**: 4 m
- **Console cable length**: 4 m

**Controller**

- **Head direction**: All directions
- **Positioning guide**: Guide printing, guide beam emission
- **Max. printing speed**: 2525 characters/s
- **Print data registration**: 500 settings

**Dimensions**

- **Unit**: mm

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*1 Supported OS: Windows Vista/7/8 (Windows is a registered trademark of Microsoft Corporation.) *2 5-dot character, 1-line printing with 1-dot character spacing
*3 Usable size: 65 × 25 × 18 mm 0.88" × 0.98" × 0.71" (W × D × H) max. *4 The print head does not support this ingress protection rating. For details on its installation, see the instruction manual.