AMKASYN KU
Digital Single-Axis
Servo Drive
In international competition, flexibility and economy are nowadays elementary for success.

With the compact servo drives KU you are well prepared for the requirements of the market. They offer the ideal solution for a wide range of motion control applications.

These drives can operate a variety of AC-motors, from standard induction to permanent-magnet AC-servo motors. Single motor drive applications can be realized efficiently and with greater flexibility according to customer specifications.

Standard software modules allow easy programming of system solutions directly in the new, drive-integrated PLC according to IEC 61131-3.

Application specific motion profiles can be created fast and with minimum amount of training.
**Interface overview KU with KU-R03 or KU-R03P**

**Features**
- Output power 0.5 - 60kVA continuous
- Input voltages to 230V single phase, 230V 3-phase, 380…480V 3-phase
- Line regenerative braking optional
- Various encoder technologies available: standard feedback inputs for resolver, square-wave encoder, sine-wave encoder, EnDat®, Hiperface®
- Pulse transmission
- Multifunctional interconnection via efficient ACC bus
- PLC functionality optional
- Field busses
  - SERCOS
  - Profinet
  - CAN
  - Ethernet

**Standard functions**
- Torque control
- Speed control
- Position control
- Machine homing routines in many variations
- Synchronous control
- Electronic line shafting
- Brake control

**Applications**
In all areas of machine design incl.
- injection molding machines
- printing presses
- packaging machines
- tobacco processing machines
- paper machines
- machine tools
- handling systems

**The most important advantages at a glance**
- Compact components reduce control cabinet space
- Cost savings through possible integration of the control cabinet as a part of the machine
- Design of complex, interconnected machines utilizing AMK’s real-time synchronization
- Simple implementation of Motion Control functions through the integratable PLC
- Menu-assisted setup saves startup time
- Extensive diagnostic features with event logging
The CPU cards are inserted into the card plug-in slot of the compact servo drive module KU. The entire control of the drives including all monitoring and communication, is realized via the digital signal processor on the card.

The CPU cards KU-R03 and KU-R03P offer 2 connectors for option cards (e.g. I/O card, field bus card, SERCOS-interface, PLC card...). The option cards are connected using a bus connector in the appropriate position on the CPU card.

**General functions:**

- Field orientation / Current regulation
- Parameter management
- ACC bus communication
- Torque control
- Speed control
- Position control
- Absolute/Relative positioning
- Spindle positioning
- Machine homing
- Angle synchronous operation
- Stepping motor simulation

**CPU cards.**
Functionality made to measure.
CPU card KU-R03
(AMK Part No. O699)

Interfaces:
- Resolver input (D-SUN, 9-pole)
- Sine-wave encoder input incremental, singleturn, multturn, EnDat® Hiperface® (D-SUB, 15-pole)
- Pulse generator input/output
- 2 probe inputs
- Binary output for control of a holding brake Imax=2A
- Monitoring of holding brake
- 2 analog inputs
- Serial interface RS232 (D-SUB, 9-pole for PC/operator panel/service module)
- ACC bus connector (2x FireWire)
- KW-PA1 parameter module (pluggable)
  saves the drive parameters, with LED status display
- 2 option slots

CPU card KU-R03P
(AMK Part No. O700)

Interfaces: see KU-R03

Integrated PLC functionality:

PLC programming in compliance with IEC 61131-3. The CPU card KU-R03P requires the parameter module KU-PA2 with an additional 79 kByte program memory for the PLC program.

Multiple function blocks from the AMK library support the program when creating the PLC program, e.g. through Motion Control components for faster functions such as electronic cam switch, electronic cam motion profile, set-point generator and virtual master or through application modules such as winders, print-mark control and many more.
Option cards.
Individual function enhancement.

**KU-EA2**
(AMK Part No. O684)
This option card paves the way for a low-cost enhancement of the KU system with binary inputs and outputs, which can also be used to control motion profiles.

**Features:**
- 12 binary 24V inputs in compliance with VDI 2880
- 8 optically isolated 24V outputs each rated at 100mA
- Short-circuit monitoring of the outputs
- Bit information within the drives configurable for outputs.
- Triggering of various drive functions configurable through inputs.
- With "Configurable Control PLC", the I/O can be used as PLC inputs and outputs.

**KU-SC1**
(AMK Part No. O567)
The interface card KU-SC1 transforms the drive into a SERCOS interface® slave. This slave is based on the SERCOS interface® Version V 1.02. in compliance with DIN EN / IEC 61491.

**Features:**
- SERCOS Class C
- Communication cycle time minimum 0.5 ms
- Transfer rate up to 16Mbit/s
- Broadcast Message to all drives available
KU-PLC1
(AMK Part No. O711)
KU-PLC1 is a programmable logic controller (PLC) in compliance with IEC 61131-3 that can be used for the implementation of all complex machine control functions including visualization as well as the execution of axis-specific tasks.

In addition, the option card offers a hardware synchronous CANopen interface called CAN-S for connecting to a CAN bus network.

Features:
• Comprehensive AMK Motion Control libraries available with drive functions such as positioning function, table interpolation, PID controller, cam controller, print-mark control etc.
• 2 fast binary inputs with a resolution of up to 200 ns for the realization of measuring functions, print-mark control and much more.
• RS422 MODBUS interface for data exchange between PLC and an external operator panel/visual display unit
• CAN bus status display via LEDs
• CAN address preselection via rotary encoding switch possible
• Approx. 3500 commands/ms
• 127 kByte program memory (not volatile)
• 128 kByte data memory (volatile)
• 32kByte RETAIN memory, non-volatile data memory for application data which should be retained in the event of a power failure

KU-PB1
(AMK Part No. O566)
The interface card KU-PB1 PROFIBUS-DP allows communication between a PROFIBUS master and the drive via the AMK field bus protocol AFP for drive commanding.

Features:
• Connection of the inverter to a PROFIBUS-DP MASTER in compliance with DIN 19245, Part 3
• Maximum 32 slaves per line (can be enhanced to max. 122 slaves with repeater)
• Baud rate 12Mbit/s
• Address assignment via rotary encoding switch
• Max. 48 input and 48 output bytes
• AFP driver component for Siemens S7 PLC available
AIPEX
Start-up and parameter setting.
Fast, simple, intelligent.

With AIPEX, even a complex KU system can easily be configured and put into operation using a standard PC.

AIPEX also allows full access to all the devices within the machine via the ACC bus master. The number of individual devices in the machine is not limited.

AIPEX can handle all combinations of KE, KW, KWD, KWF and KU devices.
Parameter processing

- Full support for projects which can be created online or offline
- A project file for the complete machine with simple data management (save, duplicate, archive)
- Full access to all parameters of the individual devices via ACC master
- Support wizards
- Extensive diagnostic possibilities with online help
- Integrated motor database

ACC bus message configurator

- Creation of the communication links between the bus devices at the click of the mouse button
- Automatic PDO mapping
- Automatic generation of CCF and CCB files

Start-up/Debugging tool

- Internal setpoint generator with sine-wave, triangle, trapezoid and step generators for torque, speed and position setpoints
- Temporary parameter access for the online tuning of all control parameters
- Integrated oscilloscope
  - Measurement of all internal data such as position values, speed values, currents, torques, binary I/O voltages etc.
  - Up to 8 variables can be recorded per device
  - Diverse trigger (flank, event, level)
  - Cursor measuring function (time, absolute value, difference)
  - Hold function for measured data
  - 4 different views possible for each device
  - Saving and exporting of measured values
## Technical Data

<table>
<thead>
<tr>
<th>Size</th>
<th>Unit</th>
<th>KU 0,5</th>
<th>KU 0,7</th>
<th>KU 1,5</th>
<th>KU 2</th>
<th>KU 3</th>
<th>KU 6</th>
<th>KU 10</th>
<th>KU 14</th>
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<td>380 - 480 ±10% / 3 PH</td>
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<td>380 - 480 ±10% / 3 PH</td>
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<td>Peak output current/time</td>
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<td>Radiated/Mains interference</td>
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<tr>
<td>Switching control</td>
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<tr>
<td>Switching frequency</td>
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<tr>
<td>Dimensions, Height</td>
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<td>356</td>
<td>358</td>
<td>538</td>
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<td>200</td>
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<td>358</td>
<td>538</td>
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<tr>
<td>Dimensions, Depth</td>
<td>mm</td>
<td>227</td>
<td>294</td>
<td>356</td>
<td>227</td>
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<td>356</td>
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<td>356</td>
</tr>
<tr>
<td>Dimensions, Width</td>
<td>mm</td>
<td>110</td>
<td>70</td>
<td>130</td>
<td>220</td>
<td>250</td>
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## Accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Type</th>
<th>AMK Part No.</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC commissioning tools</td>
<td>AIPEX</td>
<td>46600</td>
<td>AMK start-up and parameter explorer</td>
</tr>
<tr>
<td></td>
<td>Flash Tool</td>
<td>46629</td>
<td>For updating firmware</td>
</tr>
<tr>
<td>Optional modules</td>
<td>KU-CN1</td>
<td>O614</td>
<td>CAN interface</td>
</tr>
<tr>
<td></td>
<td>KU-PIW</td>
<td>O696</td>
<td>Isolated pulse processing, interface x132</td>
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<td></td>
<td>KW-SM1</td>
<td>O677</td>
<td>AMK service module: 3 x D/A converter for interface X135 (RS 232) ±10V, 12 bit</td>
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<td></td>
<td>KW-SM2</td>
<td>O676</td>
<td>AMK service module: Bus device addressing</td>
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<tr>
<td>Operator panel</td>
<td>KU-BF1</td>
<td>E628</td>
<td>Operator panel</td>
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<table>
<thead>
<tr>
<th>Accessories</th>
<th>Typ</th>
<th>Produkt-Nr.</th>
<th>Remark</th>
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</thead>
<tbody>
<tr>
<td>Line reactors</td>
<td>ALN 36/1000</td>
<td>O727</td>
<td>(3x500V AC, 36A) for KU 25</td>
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<tr>
<td></td>
<td>ALN 63</td>
<td>O728</td>
<td>(3x500V AC, 63A) for KU 40</td>
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<td></td>
<td>ALN 85</td>
<td>O729</td>
<td>(3x500V AC, 85A) for KU 50, KU 60</td>
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<tr>
<td>DC Bus Choke</td>
<td>ALZ 14</td>
<td>25975</td>
<td>for KU 14</td>
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<tr>
<td>Braking resistors</td>
<td>AR 45</td>
<td>O536</td>
<td>110 Ohm for all supply modules</td>
</tr>
<tr>
<td></td>
<td>AR 4000-20-0</td>
<td>E591</td>
<td>20 Ohm, 0.6kW for KU 25</td>
</tr>
<tr>
<td></td>
<td>AR 4000-20-F</td>
<td>E593</td>
<td>20 Ohm, 1.5kW for KU 25</td>
</tr>
</tbody>
</table>

## General technical data

- **Input power:**
  General operating requirements in compliance with 61800-2 Chap. 4.1.1 and EN 60204-1 Chap. 4.3
  - Symmetrical three-phase input voltage, max. permitted voltage asymmetry 3%
  - TN- and TT-network, grounded neutral
  - Suitable for IT networks

- **Reference potential:**
  PE, circuit GND of low voltage circuit is connected internally with the frame ground.

- **Power supply unit for supply voltage**
  24VDC ± 15%, ripple max. 5%, with integrated starting current limitation.

- **Limit values for radio interference voltage**
  in compliance with EN 61800-3: (2003) in accordance with Section 6.3.2 Tab. 11 and Tab.12

## Ambient conditions

- **Protection type in compliance with EN 60529:**
  IP 20, contamination level 2

- **Storage / transport temperature:**
  -25°C to +75°C

- **Ambient temperature:**
  +5°C to +40°C

- **Relative humidity:**
  5% to 85%, without condensation

- **Setup height:**
  Up to 1000 m above sea level. In the case of altitudes over 1000 m up to max. 2000 m, the ratings must be reduced by 1% per 100 m.

- **Shock resistance:**
  15g for 11ms in compliance with EN 60068-2-27

- **Vibration stress:**
  1g at 10...150Hz in compliance with EN 60068-2-6

## Directives and standards

- **EN 50178 "Electronic equipment for use in power installations"**
- **EN 61800-2 "Adjustable speed electrical power drive systems - Part 2: General"**
- **EN 61800-3 "Adjustable speed electrical power drive systems, EMC product standard"**
- **UL 508C "Power Conversion Equipment"**
- **CSA C22.2 "Industrial Control Equipment"**

**Machine standards:**
- **Machine Directive 89/392/EEC**
- **EMC Directive 89/336/EEC**
- **EN 60204 "Electrical equipment of machines"**
Control your Motion.

- Intelligent Motion Control Technology
- Multi-axis controller
- CNC controller
- Linear-motion drives
- Geared motors
- Built-in motors
- Custom-designed special motors
- Frequency inverters