AMKASYN
Device description
Controller cards
KU-R02 / -R03 / -R03P
KW-R02 / -R03 / -R03P / -R04

Version: 2022/50
Part no.: 29881
Translation of the "Original Dokumentation"

AMK*motion*

MEMBER OF THE ARBURG FAMILY

AMK*motion*

Imprint

Name: PDK_029881_KUKW_R0x_en

Version:

Version: 2022/50	
Change	**Letter symbol**
• AMKmotion design	LeS

Previous version: 2018/23

Product version:

Product Part no.	Firmware Version (Part no.)
KU-R02 (O671)	-
KU-R03 (O699)	
KU-R03P (O700)	
KW-R02 (O660)	
KW-R03 (O688)	
KW-R03P (O689)	
KW-R04 (O690)	

Reservation: We reserve the right to modify the content of the documentation as well as the delivery options for the product.

Publisher: AMKmotion GmbH + Co KG
Gaußstraße 37-39
73230 Kirchheim unter Teck
Germany

Phone +49 7021 50 05-0
Fax +49 7021 50 05-176

E-mail: info@amk-motion.com

Registration court: AG Stuttgart, HRA 230681, Kirchheim unter Teck,
Tax Id no.: DE 145 912 804

Complementary: AMKmotion Verwaltungsgesellschaft mbH, HRB 774646

Service: Phone +49 7021 50 05-190, Fax -193

For fast and reliable troubleshooting, you can help us by informing our Customer Service about the following:

- Type plate data for each unit
- Software version
- Device configuration and application
- Type of fault/problem and suspected cause
- Diagnostic messages (error messages)

E-mail service@amk-motion.com

Internet address: www.amk-motion.com

Content

1 About this document

The present document describes the plug-in controller cards for the AMKASYN unit series KU and KE/KW.
The controller cards for both unit series are identical in construction and their functionality. They differ only in the dimensions of the front panel. Therefore in the following documentation association with the unit is dispensed with in the naming of the controller card.
All controller cards described below are available both for the unit series KU and also KE/KW.
Excepted is controller card KW-R04, it is not released for KU converter modules.
The name is composed as follows:

Designation = [unit series]-[card generation equipment version]

e.g. KW-R03P=KW   -R03P

Designation	AMK Order No.	Remarks
KU-R02	O671	Will be replaced by KU-R03
KU-R03	O699	Replaces KU-R02 completly
KU-R03P	O700	Integrated PLC on the controller card (CoDeSys platform, IEC61131 programming languages
KW-R02	O660	Will be replaced by KW-R03
KW-R03	O688	Replaces KW-R02 completely
KW-R03P	O689	Integrated PLC on the controller card (CoDeSys platform, IEC61131 programming languages
KW-R04	O690	Controller card with these properties: • Not released for KU module. • Only resolver as motor encoder. • Option slots 1 and 2 are not available for option cards

In the following document all controller cards are designated only as "Controller card" for simplification, provided the description applies for all controller card versions. If properties which apply only for certain controller cards are described, then these are named with the exact designation in the text.

The controller cards are plugged in as plug-in module into the KU or KW basic unit and offer as device unit the functionality described below. Numerous option cards and modules are supported at the slots provided for them for unit extension (e.g. PLC, field bus interfaces, binary IO extensions,...). Option cards can't be used on controller card KW-R04!

2 Function overview

The controller card is plugged into the plug-in unit provided of the AMKASYN unit and has the following functionality:

Functions:

Basic functions

- Vector control (current control)
- U/f mode (voltage / frequency control)
- Encoder evaluation and encoder monitoring
- Torque control, speed control, position control
- Fine interpolator for position and speed controller
- System monitoring and plain language diagnostic messages
- Database parameter administration
- Option card slots (field bus interfaces, binary inputs / outputs), not on controller card KW-R04!
- Controlling external motor holding brake and monitoring brake
- Analog inputs, analog outputs as an option via service module KW-SM1
- Square wave input or output (pulse transmission)
- Binary inputs / output
- ACC bus networking CAN bus with hardware synchronization signal (CANopen protocol)
- PLC function through option card for R02 and R03
- Integrated PLC on the controller card R03P
- RS232 interface for AMKASYN control panel, PC connection, service module

Drive functions

- Homing run
- Spindle positioning
- Synchronous control
- Angle alignment
- Stepping motor simulation
- Absolute / relative positioning
- Electronic cam controller
- Operating mode / parameter set switch-over

Integrated PLC on the controller card R03P

- Programming languages according to IEC61131 on the CoDeSys platform
- AMK libraries for e.g.:
  - Drive basic functions
    Homing, positioning, synchronous mode, speed control...
  - Fast drive functions
    Master value generator, cam controller, table interpolator, PID controller
  - ...
- Application modules
  (Winder, publisher, printing mark control, ...)
- 79 kByte remanent flash memory for PLC program ("local axis")

3 Product description

The AMKASYN series KU and KE/KW are used for controlling AMK AC asynchronous and synchronous motors. The manufacturer / operator of the installation as a whole is responsible for any damage resulting from use in any way other than in the intended manner.

The microcomputer calculates cyclically the instantaneous values of the required currents, which are then impressed in the 3 motor windings in the stator through the inverter, from the given setpoint value, the actual values of the phase currents as well as the rotor position.

The power semiconductors (IGBT) are actuated synchronized with the basic 8 kHz clock pulse width modulated so that the motor windings conduct stationary sinusoidal currents. The entire control is digital. Logic and power section are separated galvanically by optocouplers. The inverter currents are monitored I^2t. The inverter output is protected against overcurrent.

Speed and position control loop are implemented through the microcomputer. The system derives the actual values for speed and position from the motor encoder signals.

The motor encoder signals are monitored. On failure of the encoder the "System ready message" SBM is reset, the clock pulses are blocked, the drive coasts.

2 analog inputs ±10 V (resolution 12 bits) are integrated in the unit. The effect of the analog value is determined by parameters:
Analog input A1 serves as setpoint input (speed, torque), influencing the torque limit is possible through A2 by changing the analog voltage.

Monitoring / switch-on logic

Power input, DC bus and internal supply voltages are monitored for limit values. On exceeding the limits error messages are generated.

After "Power On" the SBM output (system ready) reports run-up free of error. Inverters on is now switched on through binary input "RF". Binary output "QRF" (inverters on handshake) reports the control readiness of the system.

Pending errors must be reset after removal of the cause of error by a pulse (> 100 ms) at the binary input "FL" (delete error) with inverters on RF switched off.

4 For your safety

4.1 Safety rules for handling electrical systems

In particular on drive systems, the instructions pertaining to safety and the following five safety rules have to be kept in the specified sequence:

1. Switch off electrical circuits (also electronic and auxiliary circuits).
2. Secure against being switched on again.
3. Determine that there is no voltage.
4. Ground and short circuit.
5. Cover or close off neighboring parts that are under voltage.

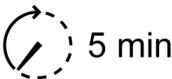Reverse the measures taken in reverse order after completing the work.

4.2 Requirements for the personnel and their qualification

Only authorized and qualified personnel may work on and with the AMKmotion drive systems.

Specialised personnel must:

- Perform mechanical and electrical work that is described in this documentation, such as mounting and connecting
- Observe all information in the documentation accompanying the product in order to work with the product safely and in an error-free manner
- Understand and know hazards that occur when handling the product
- Know connections and functions of the system
- Be familiar with the control concept in order to operate the drive system
- Be authorized to switch circuits and devices on and off, ground and label them
- Observe local specific safety requirements

4.3 Safety notes

⚠ DANGER	
5 min	**Danger to life from electric shock!** LED displays on the front, when indicating OFF, do not mean that the device terminals are voltage-free. After switching off the mains, the buffer capacitors for the DC bus can still have a charge and lead to a life-threatening DC voltage. **Steps to prevent:** • After switching off, expect a discharge time of at least 5 minutes. • Measure the voltage in the DC bus between the UZP / UZN terminals to ensure that the terminals are voltage-free.

⚠ WARNING	
	Hazard due to changing parameters! The incorrect entering of parameters into the controller card significantly influences the drive system characteristics and creates an increased risk of accidents and damages! **Steps to prevent:** • Parameters may not be modified by the machine operator unless consultation takes place with the machine manufacturer. • Change parameters only if you are sure of the meanings and the consequences. If you are unsure, read the parameter documentation or ask the manufacturer or supplier.

NOTICE	
Material Damage!	**Damage to the hardware** Connecting or disconnecting the interface connectors while they are carrying voltage can damage the hardware. **Steps to prevent:** • Only connect or disconnect the interface connectors when the device is switched off.

NOTICE	
Material Damage!	**Electronic components could be destroyed through static discharge!** Therefore touching of the electrical connections (e. g. signal and power supply cable or option and controller cards) must be avoided. Otherwise you can be damaged the components when touching by static discharge. **Steps to prevent:** • Avoid touching electrical connections and contacts. • During handling the electronic component discharge yourself by touching PE. • Pay attention to the ESD-notes (electrostatic discharge).

5 Removal / replacement of the controller card

The option cards are plugged on the controller card. On removal / installation the controller card and the option card(s) must be handled as a unit! (No option cards on KW-R04).

1. Unplug Weidmüller plug and motor encoder plug.
2. Unscrew the mounting screws of the controller card and of the option card(s) completely (2 neck screws each).
3. Pull controller card with option card(s) carefully out from the card slot.
4. Push the controller card with option card(s) to be installed carefully into the card slot until the controller card is plugged safely in the connector.
5. Secure the controller card and option card(s) with the 6 neck screws.
6. Plug in all Weidmüller plugs again correctly assigned.
7. Plug in the D-SUB motor encoder plug X131 (not on KW-R04) respectively resolver plug X130 and tighten the holding screws securely.

Overview diagram
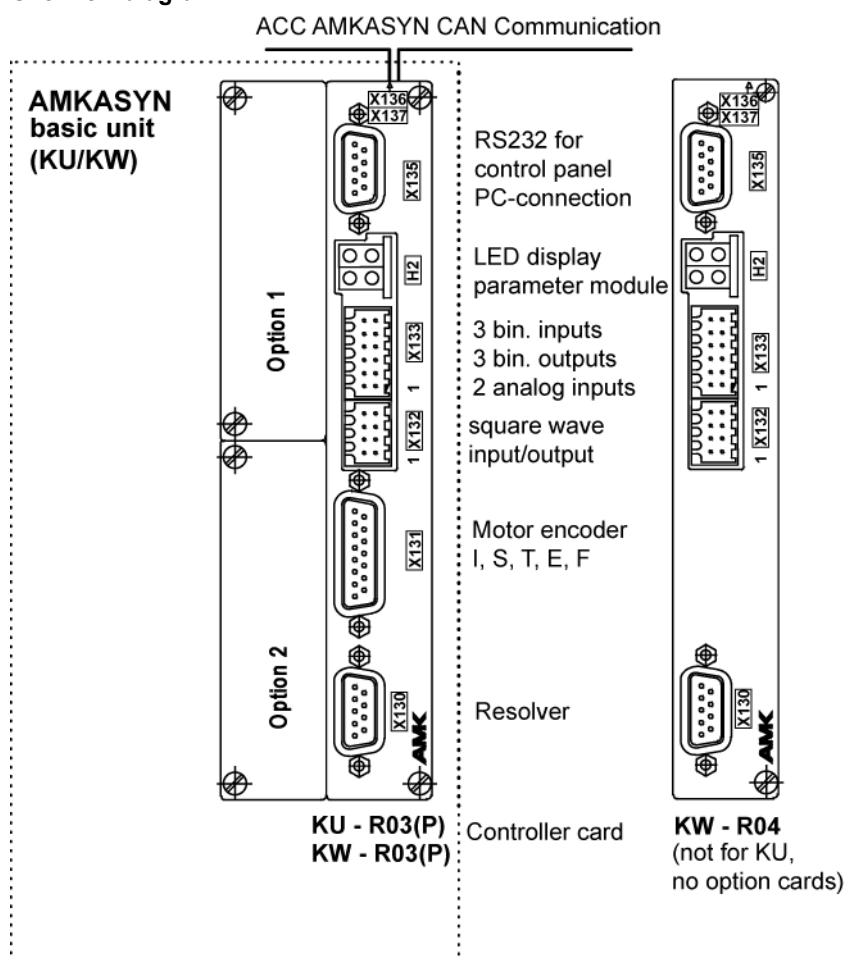
For new devices or after replacement the controller card must be parameterised application-oriented. You find information for parameter setting in the parameter documentation (Part-No. 26249).

6 Connections and signal description

ACC-Bus connectors

X136 6 5 4 3 2 1

View on the terminal X136 and X137 on the top of the Controller card

X137 6 5 4 3 2 1

IEEE-1394

X136

Pin	
1	N.C.
2	GND
3	SYNC_H
4	SYNC_L
5	CAN_H
6	CAN_L

X137

Pin	
1	N.C.
2	GND
3	CAN_H
4	CAN_L
5	SYNC_H
6	SYNC_L

X135 — D-SUB-9

N.C.	9
SBF	8
I2C Data	7
I2C CLK	6
GND	5
N.C.	4
PC_TxD	3
PC_RxD	2
12V	1

Cable shield grounded via DSub shell

RS232
Serial interface for
KW Control panel
Servicemodule KW-SM1
Industrial PC

X133

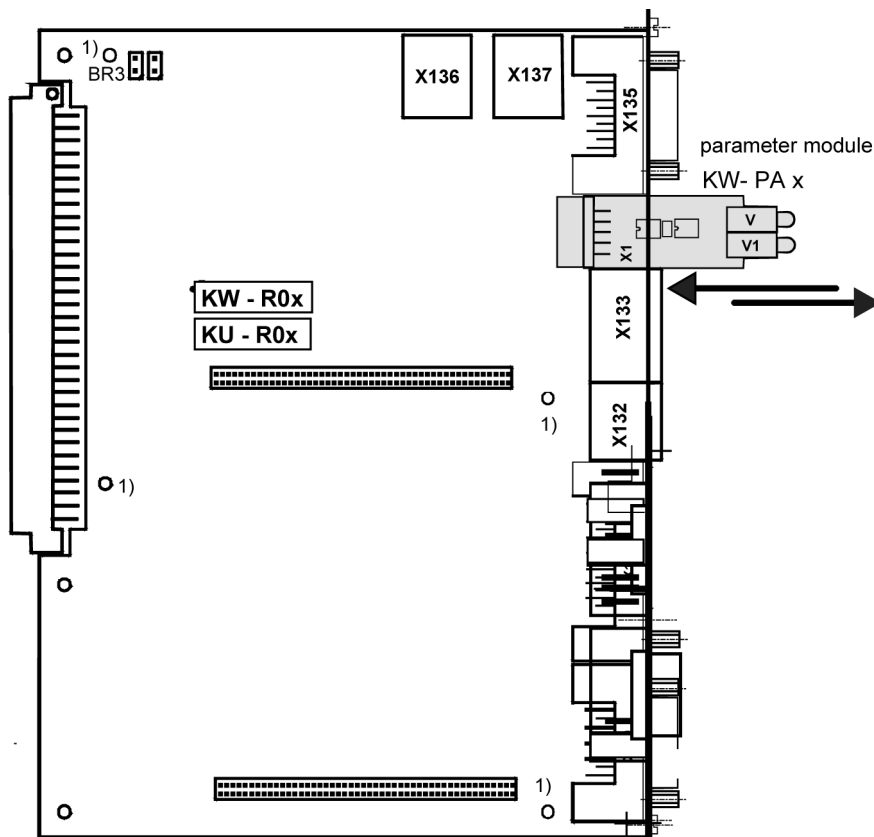| B			A	
(BR) BA3	6		BE3 (NK)	
(SBM) BA2	5		BE2 (FL)	
(QRF) BA1	4		BE1 (RF)	
(+24Vext) BVCC	3		BGND	(0Vext)
A2I	2		A1I	
A2N	1		A1N	

Cable shield grounded on housing

3 Binary inputs
3 Binary outputs
2 Analog inputs

X132

B			A
GND	4		5V
IG2N	3		IG2I
IG1N	2		IG1I
IG0N	1		IG0I

Cable shield grounded on housing

Square-wave signals
Input / Output

X131 — D-SUB-15

9V	15
GND	14
5V	13
+EN_CLK	12
-EN_CLK	11
+RS485 /+EN_DAT	10
-RS485 /-EN_DAT	9
GND	8
5V	7
G2N	6
G2I	5
G1N	4
G1I	3
G0N	2
G0I	1

Cable shield grounded via DSub shell

I/S/E/T/F Encoder
not on KW-R04!

X130 — D-SUB-9

N.C.	9
-UREF	8
+UREF	7
-COS	6
+COS	5
-SIN	4
+SIN	3
N.C.	2
N.C.	1

Cable shield grounded via DSub shell

Resolver   R

Basic inverter KW / KU

Controller card signal connections

6.1 Parameter module KW-PAx

1) holes for the standoff-pillar between controller card and option card

The parameter module is a component of each controller card. It has 4 LEDs for status indication and a remanent memory for the system parameters.

Controller cards KU/KW-R02 / -R03 and KW-R04 contain a parameter module KW-PA1. The KW-PA2 parameter module, implemented with the KU/KW R03P controller card, features an additional memory (79 KB) for the PLC program.

The double AC inverter module KWD contains two KW-R0x controller cards (A and B), each equipped with a KW-PAx parameter module. At delivery, the parameter module contains the AMK default parameter set and the serial number of the KW module.

The user enters the parameters of the system at commissioning by PC or operating panel (service interface X135) and these are permanently stored in the KW-PAx module.

When exchanging an inverter module the KW-PAx module can be unplugged from the original controller card and plugged into the controller card of the new inverter module. All parameters of the old inverter module including the communication parameters are thereby transferred to the new module.
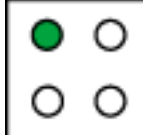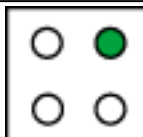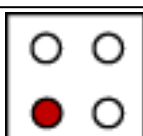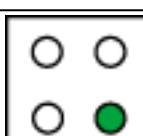
Now that the old parameter module is plugged into the controller card in the new KW module the error no. 1440 ("Data record changed") is signalled in the KW when booted the first time. "Delete error" resets this message and transfers the new KW series number into the EEPROM on the parameter module.

> ❗ The stand of the Firmware must be equal at the original and the replacement controller card. The replacement of the PA1 module may be performed only with the system switched off.

6.2 LED status indication / diagnostics

The current operational status is indicated by an LED field on the parameter module in the compact converter system KW, allowing for a quick and simple device analysis.

KW status indication H2		**„ACC communication active"**
		LED for 50ms for each message sent by the unit.
		PLC information [1]
H2: LED 1, 2, 4: green LED 3 :red ERROR		**„Error" LED On [2]** **„Warning" LED flash [3]** (see document "Diagnostic messages" AMK Part Nr. 25786)
		„Logic voltage present" Flashing (2Hz for 3s) signals every writing access to the database of the KW module. ACC Master flashes with 10Hz 2 times every 10s

1) KU/KW R03 → LED 2 off

   KU/KWR03P → LED 2 flashes depending on the cycle time of the PLC program.
            The frequency slows as the cycle time gets longer.

   KU/R03P → LED 2 off
   with active PLC
   option card

2) Error → LED 3 on

       The red status LED in field H2 indicates a malfunction.
       As long as the drive can still be regulated it is braked down to "0" speed.

       Once the cause of the error has been removed the error message needs to be reset, for instance by a pulse at the binary input "Delete error" or by the program AIPEX or CoDeSys. Successful "Delete error" resets LED 3.

3) Warning → LED 3 flash

       Cause 1:

       The drive is affected directly (local axis)

       Example:

       Error warning 1074 error. Temperature external component.

       The temperature sensor at the braking resistance has triggered. After the end of the warning time 4 sec. the system is transferred to the error 1041. Thus the control can react to the warning before the drive brakes the speed to "0".

       Cause 2:

       The master issues a warning signal to signal that the collective ready message (SBM) has be withdrawn from a slave.

       It can be read out by the "DIAGNOSIS" menu item at the operating panel or by a PC program (AIPEX, CoDeSys) and be reset at any time by "Delete error".

6.3 [X130] Resolver connection (D-SUB, 9-pin socket)

Pin	Type	Resolver
1	I/O	N.C.
2	O	N.C.
3	I	+SIN
4	I	-SIN
5	I	+COS
6	I	-COS
7	O	+UREF
8	O	-UREF
9	O	N.C.

I: Input O: Output
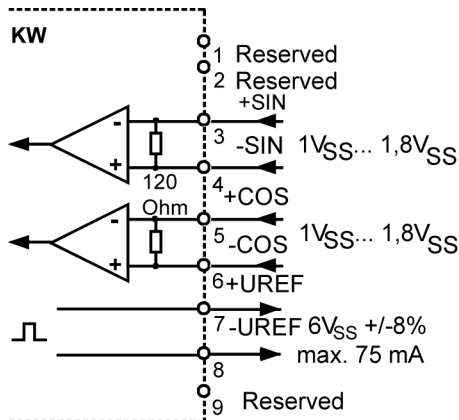
Connection through shielded cable (twisted pair). The cable shield must be tied at both ends.

6.4 [X131] Encoder connection for types I / S / E / T/ F

(D-SUB, 15-pin socket)

X131 Pin:	I encoder	S-/T encoder Hiperface	E/F encoder (EnDat)	
1	G0I			
2	G0N			
3	G1I	G1I	G1I	
4	G1N	G1N	G1N	
5	G2I	G2I	G2I	
6	G2N	G2N	G2N	
7	5V		5V	5V: maximum 350 mA
8	GND	GND	GND	
9		-RS485	DAT-	
10		+RS485	DAT+	
11			CLK-	
12			CLK+	
13			5V	
14			GND	
15		9V		9V: maximum 400 mA
Housing	Shield	Shield	Shield	

The maximum input frequency of the motor encoder is 100 kHz.

Connection through shielded cable (twisted pair). The cable shield must be grounded to PE at both ends.

6.5 [X132] Square wave pulse input/output (pin bar, 4-pin, 2-row)

Assignment: View from the front panel:

Pin	B	A
4	GND	5V
3	IG2N	IG2I
2	IG1N	IG1I
1	IG0N	IG0I

Signal	Use
IG0I	Pulse generator track 0 (REF) (inverted)
IG0N	Pulse generator track 0 (REF) (not inverted)
IG1I	Pulse generator track 1 (inverted)
IG1N	Pulse generator track 1 (not inverted)
IG2I	Pulse generator track 2 (inverted)
IG2N	Pulse generator track 2 (not inverted)
GND	Reference ground
5V	+5Volt / 200mA supply
PE	

The square wave channel X132 is potential bonded!

Input impedance 180 ohms (max. input current £ 20 mA).

It is configured through parameter ID32964 whether the channel is used as square wave pulse input or as square wave pulse output (for pulse forwarding).

The connection is made through a shielded cable (twisted pair). The cable shield must be grounded to the housing front of the KW module.

ⓘ   If units are coupled through square wave pulse output / input, they must have the same reference potential. This is not absolutely guaranteed in critical applications. For troublefree operation the output signals must then be galvanically decoupled.
For this purpose the option module KW-PIW can be switched between the square wave output on the controller card and the square wave pulse input on the receiver side.
The potential separation on this card is achieved by optocouplers.

In use as square wave pulse input, the differential inputs IG1N, IG1I, IG2N, IG2I enable the actual position to be acquired by an external distance measuring system with square wave pulse output or pulse-shaped setpoint input (e.g. setpoint pulses from a stepping motor control, master pulses for synchronous control).
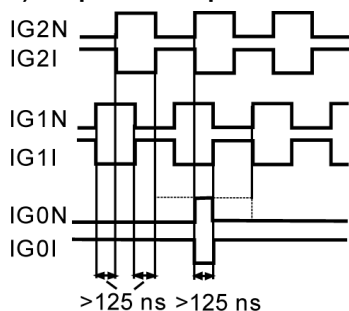The encoder side must be designed with differential outputs (line drivers according to RS422).

On the KW side a voltage of 5V (max. 250 mA) is made available for the external pulse generator.

It is determined by ID32799 'Converter standard periphery' in which form the signal is evaluated.

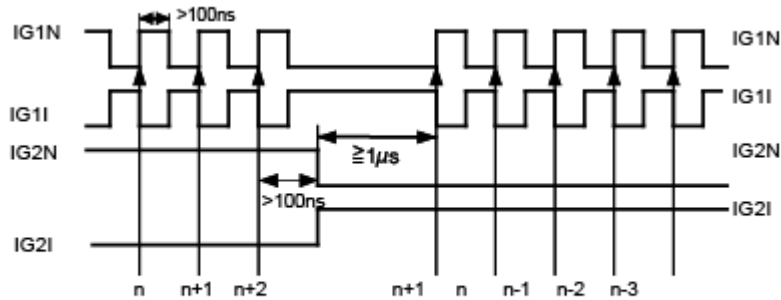The following signal forms can be processed:

a) 2 square wave pulses offset by 90°

The maximum input frequency is 1 MHz.

The encoder signals are evaluated 4-fold by the KW unit.

b) Counting pulses encoder track 1, direction signal encoder track 2

Counting direction: forwards   reverse

The maximum input frequency is 4 MHz.

This type of setpoint pulse input permits only 1-fold evaluation of the pulses.

c) Forwards pulses on encoder track 1

Reverse pulses on encoder track 2
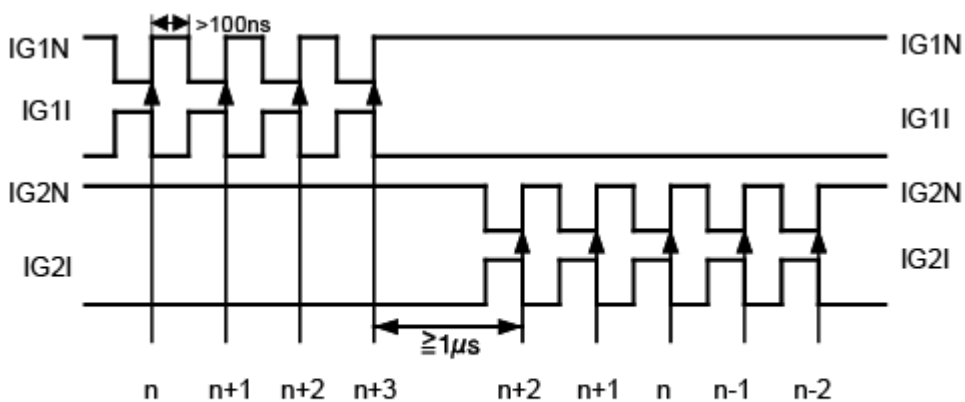

Counting direction: forwards   reverse

The maximum input frequency is 4 MHz.

This type of setpoint pulse input permits only 1-fold evaluation of the pulses.

In operation as a pulse forwarding 2 tracks with square wave pulses are issued with offset by 90 ° . The maximum output frequency is 2 MHz.

6.6 [X133] Analog inputs, binary inputs/outputs (pin bar, 6-pin, 2-row)

Assignment (seen on the front panel):

Pin	B	A
6	BA3	BE3
5	BA2	BE2
4	BA1	BE1
3	BVCC	BGND
2	A2I	A1I
1	A2N	A1N

Signal	Use
A1N (A/B)	Analog channel 1 (not inverting)
A2N (A/B)	Analog channel 2 (not inverting)
A1I (A/B)	Analog channel 1 (inverting)
A2I (A/B)	Analog channel 2 (inverting)
BGND (A/B)	External reference potential
BVCC (A/B)	External supply +24V
BE1 (A/B)	Binary input 1
BA1 (A/B)	Binary output 1 (24V / 100mA)
BE2 (A/B)	Binary input 2
BA2 (A/B)	Binary output 2 (24V / 100mA)
BE3 (A/B)	Binary input 3
BA3 (A/B)	Binary output 3 (24V / 2A)
PE	Shield ground

a) Analog inputs A1, A2:

Input voltage:Nominal 0...± 10V

Input current:Maximum 10 mA

A maximum input voltage of ± 12V is permitted at the differential analog inputs!

The resolution is 12 bits for ± 10V. The query by the microcomputer is performed cyclically every 250 µs.

A torque or a speed setpoint can be input through analog input A1, depending upon the selected operating mode.

The torque limit can be influenced by varying the analog voltage through the analog input A2.

Connection through shielded cable (twisted pair). The cable shield must be grounded on the KW housing.
The GND potential of the setpoint source may deviate by maximum ± 10V compared with the PE.
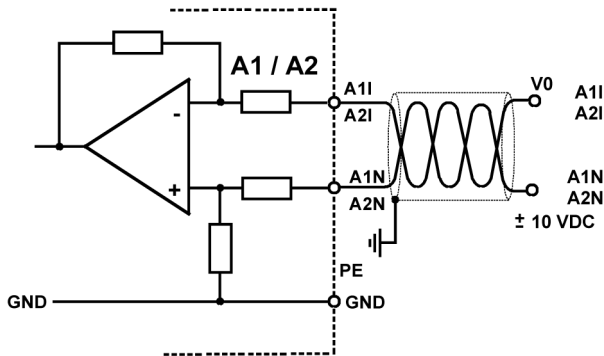
b) Binary inputs / outputs X133

Potential separated through optocoupler

Input nominal voltage:+24V

Output nominal voltage:+24V

Input nominal current:8 mA

Output nominal current BA1, BA2:100 mA, continuously short circuit-proof

Output nominal current BA3:2A, continuously short circuit-proof

Sampling rate for binary I/O:1 ms

Connection through shielded cable. The cable shield must be grounded to the KW housing.

Pin A3:BGND	Reference potential $0V_{ext.}$ of the external control voltage $+24V_{ext.}$ for supplying the binary inputs and outputs.
Pin A4: RF	"Inverters on" input, edge-controlled (BE1 freely configurable)
	Input voltage of $+24V_{ext.}$ at RF releases the clock pulses in the inverter. The motor is energized, the control is active.
	Prerequisite:
	Successful system run-up after power on, acknowledged with SBM = 1.
	DC BUS voltage present, power output enable EF is set.
	If one of these conditions is lacking, the system goes to fault. The "System ready SBM" message is reset and an error message generated.
	Removal of the inverters on (RF = 0) in operation causes the rotating motor to be decelerated according to a braking ramp, which is set by ID32782. At standstill the clock pulses are then blocked for the power outputs, the motor has no torque (QRF = 0).
	On emergency off the actuation RF must be interrupted on the hardware side by a contact of the emergency off circuit.
Pin A5: FL	"Delete error" input (BE2 freely configurable)
	Prerequisite: RF inverters on inactive.
	In the case of an error the inverter module must be run up again by "Delete error" after removal of the cause of error, to set SBM again. For this purpose a pulse (³ 100 ms) at input "FL" can be used or the error is deleted through the KW control panel (optional) or through the connected field bus system.
Pin A6: NK	"Cam" input (free configurable).
	Default: NK: "Cam" (reference point switch) (see also "Parameter description")

Pin B3: BVCC Common power input of the external supply voltage +24V$_{ext.}$ for the binary outputs.

Pin B4: QRF "Inverters on handshake" output (free configurable)

The output QRF is set if after RF = 1 the drive is in control. The drive system is now ready to process setpoints.

After removal of RF (RF = 0) the drive is decelerated with the "Deceleration time for RF inactive" (ID32782). If the speed "0" is reached, QRF is reset, the motor then has no torque.

Pin B5: SBM System ready output KW (free configurable)

Output SBM is set as long as no error status is detected in the inverter module.

In the error status SBM is reset directly and reacts depending upon the type of error (see "AMKASYN diagnostic messages").

The motor is decelerated according to ramp ID32782 or it coasts.

Errors e.g. in the power supply, in the computer or in the motor encoder lead directly to removal of the internal inverters on as well as to blocking the control pulses in the power supply. The motor coasts.

Thermal errors generate warnings, a warning bit that can be assigned to a binary output is set internally. After 4s the warning is always transferred into the error status (SBM is reset) and the stop process initiated (decelerating according to ID32782). Within the warning time it is possible for the higher level control to introduce the required measure through the setpoint input.

Pin B6: BR **Brake control output (free configurable)**

For the direct control of a holding brake (+24V, maximal 2A), open emitter output with potential separation. Supply +24V$_{ext.}$ through Pin B3/X133 (BVCC).

Monitoring:

If the output current exceeds the value of 50mA at controller enable (RF) is set, then this is interpreted as correct energization of the brake and reported to the system. in this condition a cable breakage can be monitored if ID32901 Bit 7 = 1. (From firmware AER3 V3.04 2003/41 (200301)

This output doesn´t contain a minimum current monitoring so also currents less than 50mA could be interpreted as correct controlled motor brake by the system. For currents less than 50 mA or if the signal controller enable is off, a cable breakage will not be recognised.

At a brake current less 2A the error message "1100" is not generated. The cable (shielded) for the holding brake must be run separately, shield connection at both ends to PE.

6.7 [X135] Control panel / PC / service module (D-SUB 9-pin, socket)

Service interface:

This interface serves for the parameterization and diagnosis of the drives by control panel option, by external PC or by AMK service module KW-SM1. The output of internal variables as analog value is possible with the AMK service module. The AMK parameterizing software must be installed for the communication with the PC.

Access to certain data is protected by password. Status and diagnostic messages can be selected and displayed.

The power supply in the PC must be designed with "safe electrical separation" according to EN 50178.

X135/PIN	CODE	Use
1	12P	+12V supply (max. 100mA)
2	PC_RxD	Receive Data (RS232)
3	PC_TxD	Transmit Data (RS232)
4	N.C.	AMK internal use
5	GND	Signal Ground
6	I2C CLK	I2C-Bus CLK
7	I2C Data	I2C-Bus Data
8	SBF	Hardware recognition bit 0 = Control panel nc = SBUS / not connect
9	N.C.	AMK internal use
Housing	SSS	Shield grounded through plug housing

The connection cable to the PC may contain only the leads RXD, TXD and GND!

A commercially available zero modem link cable may not be used. There can be defects at the PC input when such a cable is used!

6.8 [X136 / X137] [X236 / X237] Bus connection

The system networking is performed through the connectors X136 and X137 (KW) or through X236* and X237*.

The standard fire-wire cables according to IEEE1394, which are used here exclusively, are connected crossed. Thus the connectors X136 to X137 are also crossed to one another internally. The cabling must be performed as follows:
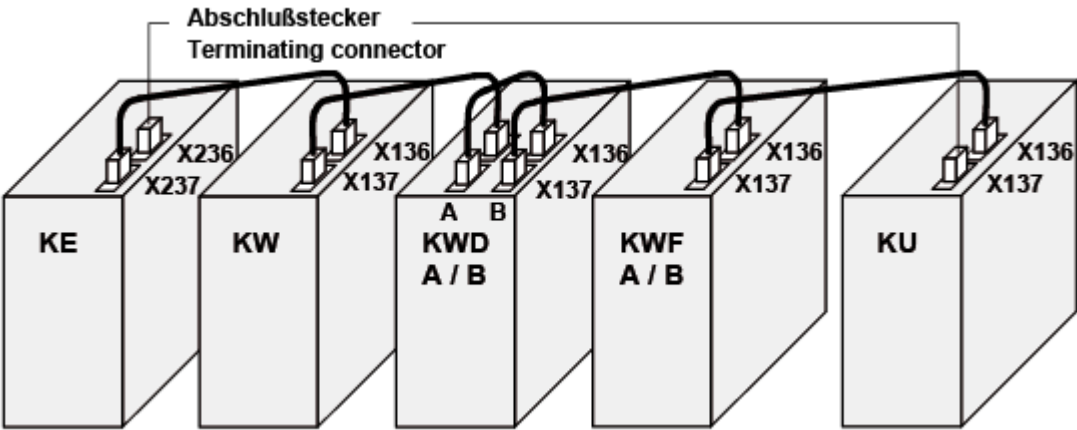
A BUS terminating plug (120 ohms) must be set in each case at the start and at the end of the cable.

The double inverter module KWD contains two inverters A and B. In the ACC BUS these form two independent BUS subscribers and must also be cabled correspondingly (see drawing above).

ACC assignment X137/X237		
Pin	**X137**	**Remarks**
1	N.C.	AMK internal
2	GND	Ground
3	CAN_H	CAN High
4	CAN_L	CAN Low
5	SYNC_H	SYNC High
6	SYNC_L	SYNC Low
Housing	PE	Shield

ACC assignment X136/X236		
Pin	**X136**	**Remarks**
1	N.C.	AMK internal
2	GND	Ground
3	SYNC_H	SYNC High
4	SYNC_L	SYNC Low
5	CAN_H	CAN High
6	CAN_L	CAN Low
Housing	PE	Shield

* on compact power supply modules KE

7 Switch-On and -Off Diagram

Before switching on the devices/system, the installation needs to be inspected for faults:

1. Check of the wiring and connections if they are correct and have a fault-free electrical connection.
2. Check all the screw and terminal connections.
3. All cables have to be installed with strain relief (shielding terminal). The shields of all motor cables have to be connected to PE at both ends.
4. The motor PTC thermistor is connected to the compact inverter connection X12 (RT1/RT2).
5. Make sure that all protection and safety equipment as well as the emergency-off circuit in the system are functioning.
6. In case available in the drive: Check whether the motor brake releases when activated. Careful with hanging axles! Attach safety stop for the test and then remove again.
7. On motors with external fans: Check whether the fan motor runs.
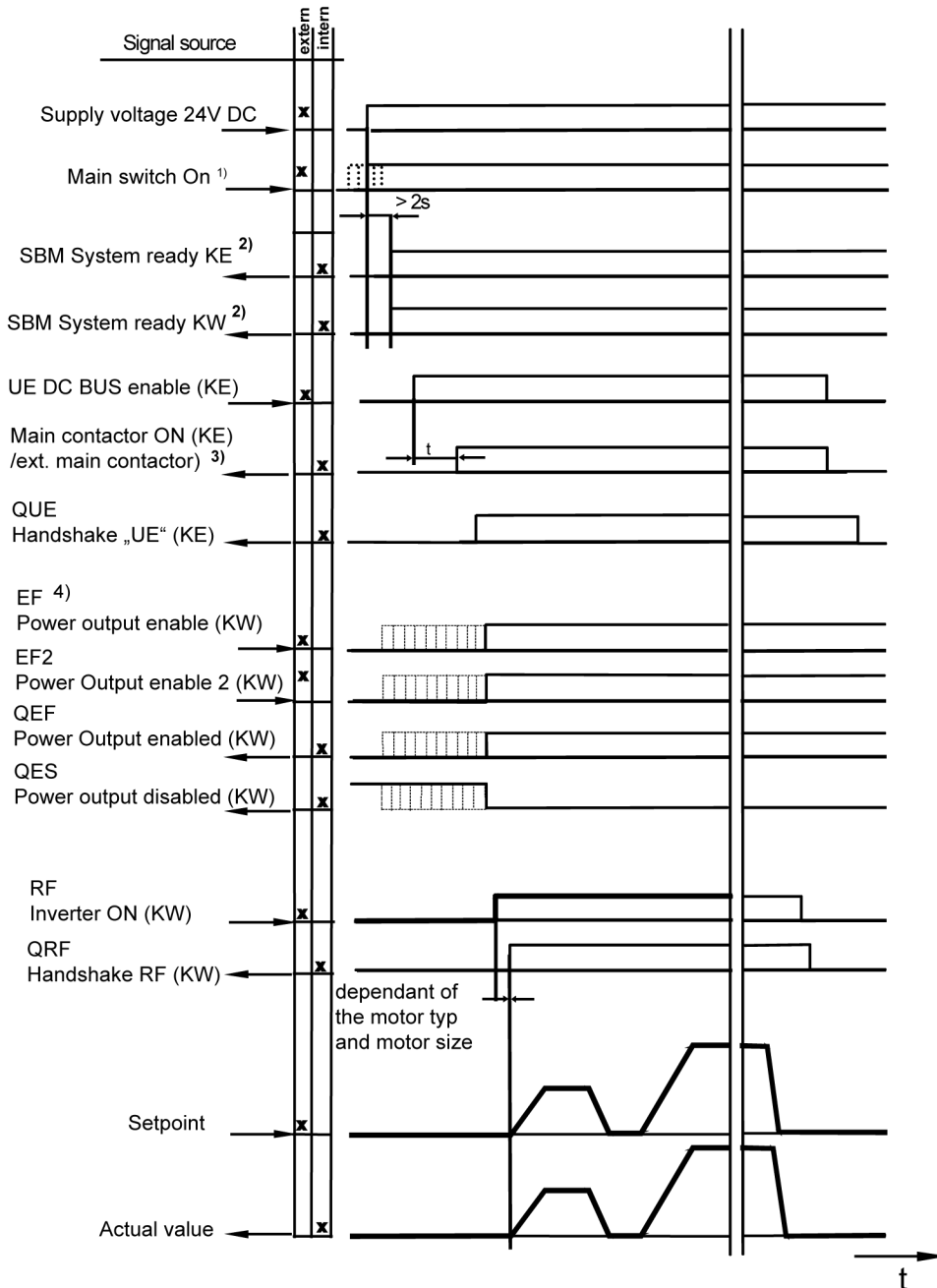
1) The mains voltage and the supply voltage 24V DC can be applied independently from each other.
2) The module specific "System Ready Message" (SBM=1) for KE and KW signal the fault-free status of the modules. Monitoring these messages needs to be done by the superordinate controller.
3) Only for devices with external main contactor.
4) Only for devices with EF logic

8 Option modules

2 option modules are available for the controller card:

SM1   **Service module SM1**

3 analog outputs are made available by this service module.

The module is plugged on D-SUB connector X135 (serial interface RS232) on the controller card.

SM2   **Service module SM2**

The address of the ACC BUS station (instance 0) can be set with the service module SM2. The module is plugged on D-SUB connector X135 (serial interface RS232) on the controller card.

9 Option cards

The controller card supports two option slots of the SAME TYPE. As option one of the additional cards listed below can be inserted per slot in slot 1 or 2. On controller card KW-R04 no option cards can be used!

Option card		Short description
KU	**KW**	
KU-PB1	**KW-PB1**	Profibus DP slave option card (AFP protocol for drive command) or data exchange with the AMK-PLC
KU-CN1	**KW-CN1**	CAN save (CANopen DS301 V4.01, AFP protocol for drive command) CAN Bus interface galvanically connected [1]
KU-CN2	**KW-CN2**	CAN Slave (CANopen DS301 V4.01, AFP protocol for drive command) CAN Bus interface galvanically isolated
KU-SC1	**KW-SC1**	SERCOS interface (slave) galvanically connected
KU-SC2	-	SERCOS interface (slave) galvanically isolated
KU-PLC1	**KW-PLC1**	PLC programming IEC 61131-3 with CAN Bus (CANopen) und hardware synchronization signal The option card is provided with an NVRAM in which the data (e.g. from the programmable controller) can be stored latching [2,3]
KU-PLC2	**KW-PLC2**	PLC programming IEC 61131-3 with CAN Bus (CANopen) und hardware synchronization signal The option card is provided with an NVRAM in which the data (e.g. from the programmable controller) can be stored latching [2]
KU-EA2	**KW-EA2**	Binäry input / output card (12 inputs, 8 outputs)
-	**KW-EN1**	Encoder Interface (Second EnDat- / Sine wave encoder interface for actual position feedback)
-	**KW-EC1**	EtherCAT Slave option card. Protocol "IEC 61491 Servo Drive Profile over EtherCAT" (SoE)
KU-PIW	**KW-PIW**	Potential separated pulse forwarding (FAN-OUT = 2)
-	**KW-ARC**	ARCNET slave option card (AFP-protocol for drive command)
-	**KW-SSI**	The option card KW-SSI forwards the actual position value via SSI interface for an higher ranking controller.
SM1	**SM1**	Service module for connection to X135 serial interface, use of 3 analog outputs
SM2	**SM2**	Service module for connection to X135 serial interface, setting the ACC bus subscriber address to address switch

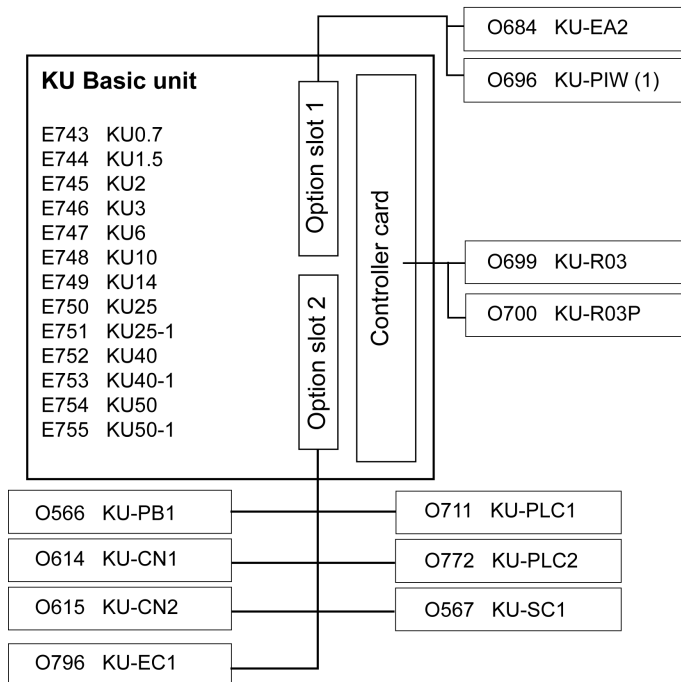1) Drive commanding is through the AMK field bus protocol AFP

2) The PLC integrated on the controller card R03P is deactivated automatically if a PLC option card is plugged in
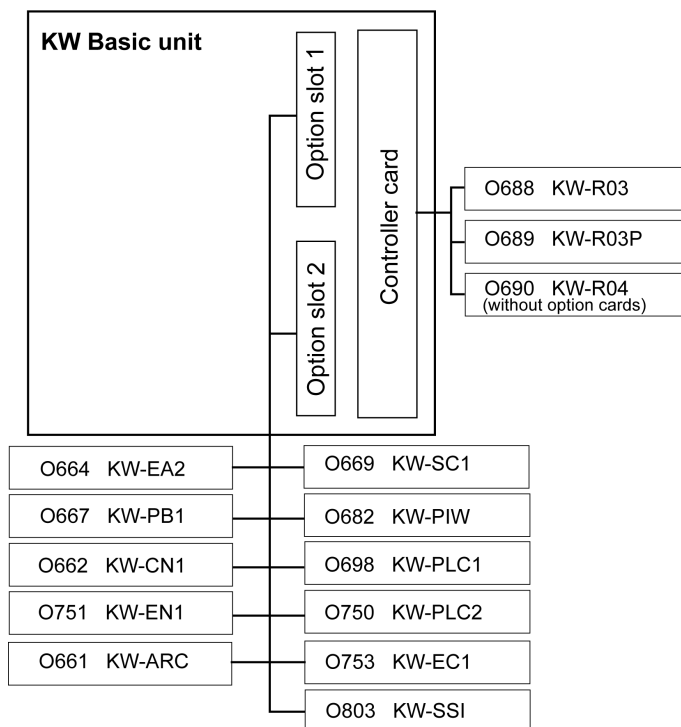
3) Not for new applications

The "active" option cards (KU/KW-CN1, KU/KW-PLC1, KU/KW-PLC2) are not allowed to combine. It is only allowed to use the same option card KW-EA2 card two times in one unit.

Slot assignment for AMKASYN inverters KU series

KU Basic unit

E743 KU0.7
E744 KU1.5
E745 KU2
E746 KU3
E747 KU6
E748 KU10
E749 KU14
E750 KU25
E751 KU25-1
E752 KU40
E753 KU40-1
E754 KU50
E755 KU50-1

Option slot 1

Option slot 2

Controller card

O684 KU-EA2

O696 KU-PIW (1)

O699 KU-R03

O700 KU-R03P

O566 KU-PB1

O614 KU-CN1

O615 KU-CN2

O796 KU-EC1

O711 KU-PLC1

O772 KU-PLC2

O567 KU-SC1

Slot assignment for AMKASYN KW series

KW Basic unit

Option slot 1

Option slot 2

Controller card

O688 KW-R03

O689 KW-R03P

O690 KW-R04
(without option cards)

O664 KW-EA2

O667 KW-PB1

O662 KW-CN1

O751 KW-EN1

O661 KW-ARC

O669 KW-SC1

O682 KW-PIW

O698 KW-PLC1

O750 KW-PLC2

O753 KW-EC1

O803 KW-SSI

10 Supplementary documentation

- Unit description KE/KW
- KU/KW option modules
- Parameter description
- Diagnostic messages
- Product description KU
- Safety instructions KU
- Connection conditions KU
- Start-up KU
- Control panel KUB
- External brake resistors
- IEC61131-3 AMK PLC programming with CoDeSys

Your opinion is important!

With our documentation we want to offer you the highest quality support in handling the AMKmotion products.

That is why we are now working on optimizing our documentation.

Your comments or suggestions are always of interest to us.

We would be grateful if you take a bit of time and answer our questions. Please return a copy of this page to us.

e-mail: Documentation@amk-motion.com

or

fax no.: +49 7021/50 05-199

Thank you for your assistance.
Your AMKmotion documentation team

1. How would you rate the layout of our AMKmotion documentation?

    (1) very good (2) good (3) satisfactory (4) less than satisfactory (5) poor

2. Is the content structured well?

    (1) very good (2) good (3) moderate (4) hardly (5) not at all

3. How easy is it to understand the documentation?

    (1) very easy (2) easy (3) moderately easy (4) difficult (5) extremely difficult

4. Did you miss any topics in the documentation?

    (1) no (2) if yes, which ones:

5. How would you rate the overall service at AMKmotion?

    (1) very good (2) good (3) satisfactory (4) less than satisfactory (5) poor

AMKmotion GmbH + Co KG

Phone : +49 7021/50 05-0, fax: +49 7021/50 05-199

E-Mail: info@amk-motion.com

Homepage: www.amk-motion.com