AMKASYN
Device description
Controller cards
 KW-R24(-R), -R25, -R26, -R27

Version: 2023/10
Part no.: 204918
Translation of the "Original Dokumentation"

MEMBER OF THE ARBURG FAMILY

AMKmotion

Imprint

Name:	PDK_204918_KW-R2x

Version:

Version: 2023/10	
Change	**Letter symbol**
New AMKmotion Design + Mail address	LeS
Drive participant address via DIP switch S1 can be set up until address 250 for KW-R26 and KW-R27	LeS

Previous version: 2020/02

Product version:

Product	**Firmware Version (Part no.)**
KW-R24	AE-R24 V2.13 2019/24 (207412)
KW-R24-R	AE-R24-R V2.13 2019/24 (207413)
KW-R25	AE-R25 V2.13 2019/24 (207414)
KW-R26	AE-R26 V2.13 2019/24 (207415)
KW-R27	AE-R26 V2.13 2019/24 (207415) AE-SF1 V1.07 2016/11 (206082)

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

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 documentation

1.1 Where is what?

Topic	Chapter	Chapter number
Validity, use and the propose of the documentation	Imprint	-
	About this document	1
Basic safety information	For your safety	2
Specific safety instructions (thematic safety instructions)	Located in the various chapters	
Information for planning and projecting personnel	Product overview	3
	Environmental conditions	4
	Accessories and options	8
Practice information for startup, operating or maintenance personnel	Assembly / disassembly	5
	Electrical connections	6
	Startup and operation	7
	Service	9
Abbreviations and terms will be explained	Glossary	-

1.2 Keeping this document

This document must permanently be available and readable at the place where the product is in use. If the product is used at another place or changed the owner, the document must be passed on.

1.3 Purpose

This document is addressed to any person who handles the product. It gives information about the following topics:

- Safety messages which are absolutely necessary to take care of during handling the product
- Product identification
- Environmental conditions for storage, transportation and operation
- Assembly
- Electrical connections
- Startup and operation
- Replacement
- Diagnosis
- Decommissioning and disposal

1.4 Target group

Any person that is qualified and intends to work with this product must read, understand and follow this document:

- Transportation and storage
- Unpacking and installation
- Connection
- Parameterization
- Startup
- Service and repair
- Decommissioning and disposal
- Replacement

1.5 Display conventions

Display	Meaning
	This symbol points to parts of the text to which particular attention should be paid!

Display	Meaning
'Names'	Names are represented with apostrophes e. g. parameters, variables, etc.
See 'chapter name' on page x	Executable cross-reference in electronic output media

1.6 Appendant documents

Device descriptions

Part-no.	Title
28932	Servo drives KE/KW

Functional documentations

Part-no.	Title
25786	Diagnostic messages
203446	Safety manual; functional safety excerpt for KW-R07 / -R17 / -R27
203704	Parameter description KW-R24(-R) / -R25 / -R26 / -R27
203771	Software description ATF - AMK Tool Flasher (PC software for firmware update)
	Function descriptions
204539	Initial startup KE/KW
204979	Software description AIPEX PRO V3 (PC software for startup and parameterization)

2 For your safety

2.1 Basic notes for your safety

- At electrical drive systems, hazards are present in principle that can result in death or fatal injuries:
  - Electrical hazard (e. g. electric shock due to touch on electrical connections)
  - Mechanical hazard (e. g. crush, retract due to the rotation of the motor shaft)
  - Thermal hazard (e. g. burns due to touch on hot surfaces)
- These hazards are present while starting up and operating the unit, and also during servicing or maintenance work.
- Safety instructions in the documentation and on the product warn about the hazards.
- Personnel must have read and understood the safety instructions before installing and operating the product. In the documentation about the product the usage warnings pertain to direct hazards and must therefore be followed directly when operating or handling the product by the operator.
- AMKmotion products must be kept in their original order, that means it is not allowed to do a significant constructional change on hardware side and software is not allowed to be decompiled and change the source code.
- Damaged or faulty products are not allowed to be integrated or put into operation.
- Do not start the system in which the AMKmotion products are installed (begin of intended use) until you can determine that all relevant standards, laws, and directives have been complied with, e. g. low voltage directive, EMC directive, and the machinery directive, and possible further product standards. The plant manufacturer is responsible for the compliance with the laws, directives, and standards.
- The devices must be installed, electrically connected and operated as shown in the device description documentation. The technical data and the required environmental conditions must be observed at all times.

2.2 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.

2.3 Presenting safety messages

Any safety information is configured as follows:

⚠ SIGNAL WORD	
Symbol	**Type and source of risk** Consequence(s) of non-observance **Steps to prevent:** • ...

2.4 Class of hazard

Safety and warning messages are graduated into classes of hazard (according to ANSI Z535). The class of hazard defines the potential risk of harm and is described by a single word, if the safety information is ignored. The signal word is followed by a safety alert symbol (ISO 3864, DIN EN ISO 7010). In accordance with ANSI Z535, the following signal words are used to define the class of hazard.

Safety alert symbol and signal word	Class of hazard and its meaning
⚠ DANGER	DANGER indicates a hazardous situation which, if not avoided, **will** result in death or serious injury
⚠ WARNING	WARNING indicates a hazardous situation which, if not avoided, **could** result in death or serious injury
⚠ CAUTION	CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, **could** result in minor or moderate injury
NOTICE	NOTICE is used to address preventions to avoid material damage, but not related to personal injury.

2.5 Safety alert symbols used in this document

Safety symbol	Meaning
⚠	Generic warning!
⚡	Warning against dangerous electrical voltage!

2.6 Intended use

The controller cards are intended for installation into the compact inverters KW and KWD.

2.7 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

2.8 Warranty

- All information in the documents accompanying the product must be complied with for a safe and trouble-free operation.
- The assertion of warranty claims is excluded if the information in the documents is not observed completely.
- Hardware and firmware may not be modified except by personnel authorized by AMKmotion and after consultation with AMKmotion.
- The company AMKmotion GmbH + Co KG is not liable for damages from unintended use, incorrect installation or operation, exceeding rated values and non-observance with the environmental conditions.

3 Product overview

3.1 Product name and ordering data

Product name	Controller card	Option (Communication)		
		SECS **EtherCAT** **SoE**	**SECC** **EtherCAT** **CoE**	**SVNS** **VARAN** **SoV**
	Order number	**O823**	**O948**	**O824**
KW-R24	O901	x	x	x
KW-R24-R	O954	x	x	x
KW-R25	O902	x	x	x
KW-R26	O903	x	x	x
KW-R27	O957	x	x	x

The option (communication) and the firmware are not included in the order number of the controller card and must be ordered separately.

3.2 Scope of delivery

Please check whether the delivered parts correspond with the delivery note. If the delivery is incomplete, please contact your nearest AMKmotion representative.

Check the components for signs of transport damage after their arrival. Do not install and operate any damaged components.

If there is any transport damage, immediately inform the delivering freight carrier and inform your AMKmotion representative.

3.3 Prerequisites

The following prerequisites must at least be met to operate the controller cards.

Hardware revisions of the devices	KW-R24(-R), -R25, -R26	KW-R27
KW	Rev. 3.20	Rev. 3.20
KWD	Rev. 3.20	not possible
KW100	Rev. 4.01	Rev. 4.01

Software version	KW-R24(-R), -R25, -R26, -R27
AIPEX PRO (PC software)	from V3.00 (204905)
Service pack	-
Firmware (controller card)	from AE-R26 V2.00 2013/50 (204909)

3.4 Views and interface overview

The KW-R27 controller card is shown next. In the following table is shown which interfaces are available on KW-R24(-R), -R25 and KW-R26.
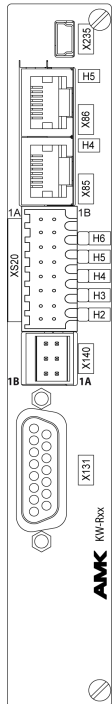
Front side   **Board**
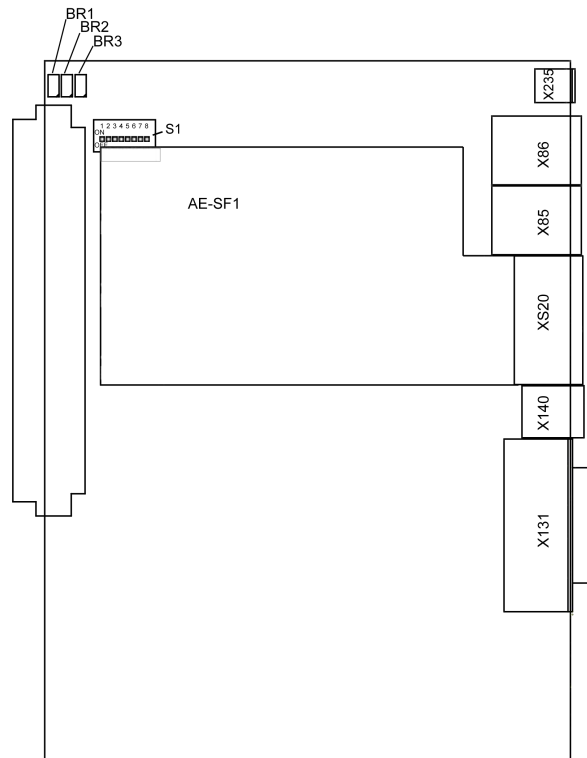
The lettering H4 and H5 next to the terminals X85 and X86 describes that the LEDs H4 and H5 of the LED line H4-H5 are related to X85/X86.

Interfaces	Function	KW-R24	KW-R24-R	KW-R25	KW-R26	KW-R27	KW-R35	KW-R36
LED Hx	Status LEDs: Siehe 'Status LEDs' auf Seite 12.	H2-H5	H2-H5	H2-H5	H2-H5	H2-H6	H2-H5	H2-H5
BR1 [1]		■	■	■	■	■		
BR2	Service jumpers	■	■	■	■	■		
BR3		■	■	■	■	■		
S1	DIP switch: EtherCAT and FSoE address	-	-	-	■	■		
Parameter module	Parameter module	■	■	■	■	■		
X235	USB V1.1 (slave) Connection to the PC for the software AIPEX PRO and ATF 2.0 for firmware update.	■ [2]	■	■ [2]	■ [2]	■ [2]	USB-C	USB-C
X86	Real-time Ethernet OUT (parameter instance 1)	■	■	■	■	■		
X85	Real-time Ethernet IN (parameter instance 1)	■	■	■	■	■		
XS20 (AE-SF1)	Functional Safety: Safety I/Os	-	-	-	-	■		
X140	Binary I/Os	■	■	■	■	■		
X131	Sine encoder input	-	-	■ [3]	■ [3]	■ [3]		
X130	Resolver input	-	■	-	-	-		

1) depending on revision of the controller card
2) from revision V1.02
3) The characteristic of the interface depends on the controller card type. Siehe '[X131] sine encoder' auf Seite 21.
   KW-R25: no Hiperface DSL (Y-encoder) , EnDat 2.2 light (P-/Q-encoder) supported up to 25 m cable length
   KW-R26, KW-R27: supports Hiperface DSL (Y-encoder) and EnDat 2.2 light (P-/Q-encoder) up to 100 m cable length

3.4.1 Status LEDs

| LED	Class	Status	Note
H2	Drive status	Green	System Ready (SBM)
		Green flashing	Drive under control (SBM and QRF)
		Orange flashing	Warning occurs during active controller enable
		Orange	Warning occurs during inactive controller enable / flash mode
		Red	Error with reaction depending on the error number
H3	Bus status (EtherCAT)	Off	Initialisation
		Green flashing	Pre-operational
		Green single flash	Safe-operational
		Green	Operational
		Red flashing	Configuration error
		Red flashing (1 time)	Error-dependent switch back to the Operational, Safe-operational, Pre-operational or Initialising states
H4	Ethernet bus (link status) [X85]	Off	No connection
		Green	Link connection
		Flashing	Link/Activity – connection and data exchange
H5	Ethernet bus (link status) [X86]	Off	No connection
		Green	Link connection
		Flashing	Link/Activity – connection and data exchange
H6	Functional Safety	**After power on**	

Colour	Meaning
LED OFF	Safe parameter set is NOT valid
	The reason can be detected by diagnostic message
Green	Safe parameter set is valid

During transmission of safe parameter set to the device

Colour	Meaning
Green flashing (1 second cycle)	Validation request: Enter the check sum
Orange	Safe parameter set was successfully transmitted Switch the device OFF and ON again
LED OFF	Safe parameter set was NOT transmitted successfully The reason can be detected by diagnostic message

blinking: T_{Ein} = 200 ms, T_{Aus} = 200 ms (2,5 Hz)
single flash: T_{Ein} = 200 ms, T_{Aus} = 1000 ms (0,83 Hz)
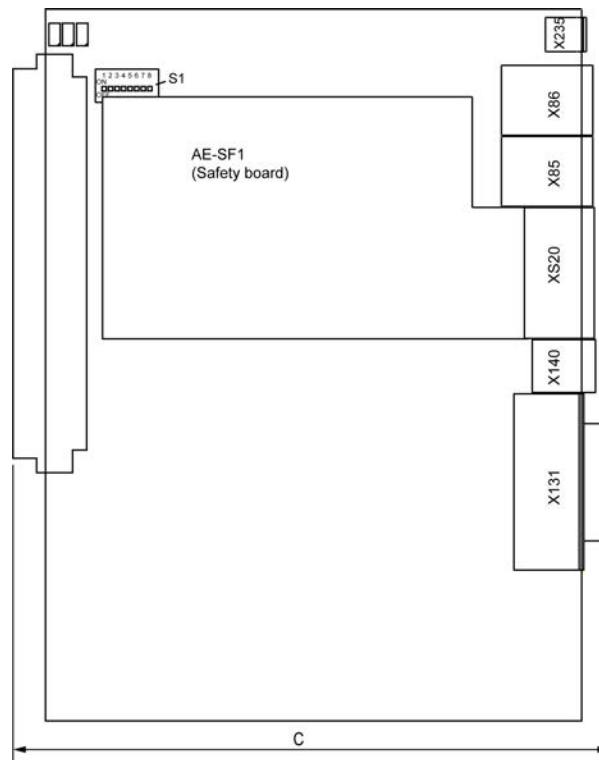
3.5 Dimensions

Shown is a KW-R27 controller card.
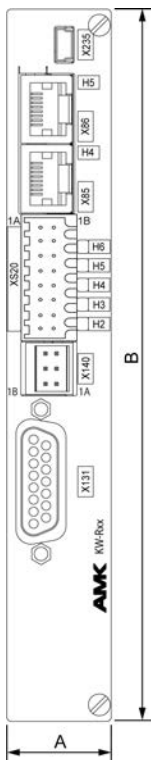
Front side   Board

Dimensions / mm:

	KW-R24 / KW-R24-R / KW-R25 / KW-R26 / KW-R27 /
A	23.8
B	164
C	138

4 Ambient conditions

4.1 Transport

- Any AMKmotion products may only be transported in its original packaging.
- Shocks during transport must be prevented.
- Check the components for signs of transport damage after their arrival. Do not install and operate any damaged components.

4.2 Storage

Ambient temperature	-25 °C up to +75 °C
Maximum relative humidity	95 %
Maximum height	2000 m above NHN
Storage period	up to 1 year
Storage conditions	acc. to EN 61800-2
Storage	in the original packaging, clean, dry
	protected from

- condensation
- weather conditions
- sudden temperature and humidity changes
- salt fog, industrial fumes, corroding liquids
- vermin and mildew

4.3 Operation

Ambient conditions	according to EN 61800-2
Ambient temperature	
Relative humidity	no condensation
Altitude	Up to 2000 m over sea level (NHN).
	For altitudes between 1000 m and 2000 m, the rated data of the converters must be reduced by 1 % per 100 m. The controller cards can be used unrestricted up to 2000 m over sea level.
Shock resistance	15 g for 11 ms according to EN 60068-2-27
Vibration conditions	1 g at 10 - 150 Hz according to EN 60068-2-6

4.4 Disposal

Clarify with your local waste disposal company which materials and chemicals need to be separated and how to dispose of them. Observe the local regulations for disposal.

Examples of materials to be disposed of separately:

Components

- Electronic scrap, e. g., encoder electronics
- Iron scrap
- Aluminium
- Non-ferrous metal, e. g., motor windings
- Insulating materials

Chemicals

- Oils (disposal as hazardous waste, in acc. with the pertinent legislation; in Germany, the Waste Oil Ordinance (AltölV) applies)
- Grease
- Solvents
- Paint residue
- Coolant

5 Assembly / disassembly

5.1 For your safety

⚠ **DANGER**	
⚡	**Danger to life from touching electrical connections!** Electrical terminals and connectors carry voltages that may cause death or serious injury upon contact. The teminals of the DC circuit capacitors on the front panel of the device may retain hazardous DC voltage for up to 5 minutes after switching off the device! **Steps to prevent:** • Provide shock-hazard protection • Prior to any work on the device: Turn off the main switch to disconnect the power supply, and secure switch against being turned on again. • Wait at least 5 minutes for components to discharge. • Connection or disconnection of terminals is only allowed if they are free of voltage. • Measure the terminals voltage to verify that the terminal is de-energized. One suitable measuring point is the DC bus between the terminals. • If the PE connection between the modules is open, avoid touching the casing since dangerous voltages may be present. During the proper operation of the there is an earth leakage current of more than 3.5 mA. In this case, the standard requires that the devices be firmly connected to . The must have a cross section of at least . • Do not connect, disconnect and/or install the electrical lines (terminal cables, plugs, sockets) until they have been electrically de-energized.

5.2 Avoiding material damage

NOTICE	
Material Damage!	**Electronic components could be destroyed through static discharge!** Therefore touching of the electrical connections (e. g. signal and power supply cable) must be avoided. Otherwise you can be damaged the components when touching by static discharge. **Steps to prevent:** • Avoid touching electrical connections and contacts.

5.3 Disassemble the controller card

1. Remove all connectors on the front side and the top side of the controller card.
2. Remove all connections on the optional card if there are any.
3. Loosen the collar screw below of the controller card and of the optional card is existing (2 collar screws each).
4. Pull the controller card and optional card as a unit out of the card slot.
5. Place the card(s) only on a non-conducting, padded surface.

5.4 Installing the controller card

1. If you have mounted an optional card on the controller card, remove the blind cover of the optional card slot with a screwdriver.
2. Carefully insert the controller card with any existing optional card as a unit into the card slot and guide rail.
3. Slide the card(s) into the device until the controller card is plugged in securely into the connector.
4. Make sure the front panel of the controller card and the optional card rest on the device casing.
5. Fasten the controller card and the optional card with 2 collar screws each.
6. You can assign the connections of the controller card now.

ⓘ The controller card needs to be parameterised on new devices or after an exchange according to the application.

6 Electrical connections

6.1 [XS20] safety I/O

Description

- 3 safe input pairs
- 2 secure short-circuit proof output pairs
- Parameterizable dynamic sampling
- Electrically isolated
- Two-channel
- Dynamic sampling signal via SDYN1 and SDYN2 outputs available

Technical data
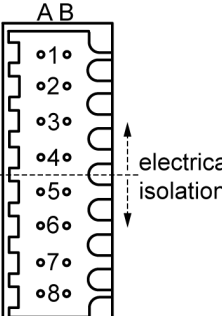
- Norm IEC 61131-2 type 3 digital inputs:
  Rated input voltage 0-30 VDC, maximal input current at 30 VDC = 15 mA
  Level 0-5 VDC: low, 11-30 VDC: high
  Electrically delay of T_{on} = 3-8 µs, T_{off} = 48-57 µs
- Norm IEC 61131-2 digital outputs:
  Rated output voltage 24 VDC, rated output current maximal 0.5 A, short-circuit safe, electrically isolated, electrically delay of T_{on} 8-20 µs, T_{off} = 50-55 µs at 200 mA load
- Reference potential: PE bus bar
- Maximal cable length: 30 m

Design

Type	Poles	Class
Connector with spring connection	16	2-row pin strip

Assignment

[XS20]	Connection	Signal	Description
front view, device side	A1	SA1.1	Binary output SA1.1/SA1.2 500 mA, High Side min. 20 mA on differential load.
	A2	SA2.1	Binary output SA2.1/SA2.2 100 mA, High Side
	A3	SDYN1	Dynamic sampling output 1 100 mA, High Side
	A4	SGND1	Reference potential 0 V for SVCC1
	B1	SE1.1	Binary input SE1.1/SE1.2 24 V, I_{max} = 15 mA
	B2	SE2.1	Binary input SE2.1/SE2.2 24 V, I_{max} = 15 mA
	B3	SE3.1	Binary input SE3.1/SE3.2 24 V, I_{max} = 15 mA
	B4	SVCC1	Supply SVCC1, 24 V ± 20 %
	-- Potential separation --		
	A5	SA1.2	Binary output SA1.1/SA1.2 500 mA, High Side and Low Side
	A6	SA2.2	Binary output SA2.1/SA2.2 100 mA, High Side
	A7	SDYN2	Dynamic sampling output 2 100mA, High Side
	A8	SGND2	Reference potential 0 V for SVCC2
	B5	SE1.2	Binary input SE1.1/SE1.2 24 V, I_{max} = 15 mA
	B6	SE2.2	Binary input SE2.1/SE2.2 24 V, I_{max} = 15 mA
	B7	SE3.2	Binary input SE3.1/SE3.2 24 V, I_{max} = 15 mA
	B8	SVCC2	Binary supply SVCC2, 24 V ± 20 %

Connection

Mating connector	Weidmüller socket connector, 16-poles AMK part no. 202020
Cable	16-wire, shielded
Cross-section min.-max.	0,2 mm^2 - 1 mm^2 AWG 28 - AWG 18
Shield connection	Shield on one side on the module housing
Note	The supply must be carried out mandatorily as a PELV power supply acc. to IEC/EN 60950 which provides at least 3 A.

Circuit principle
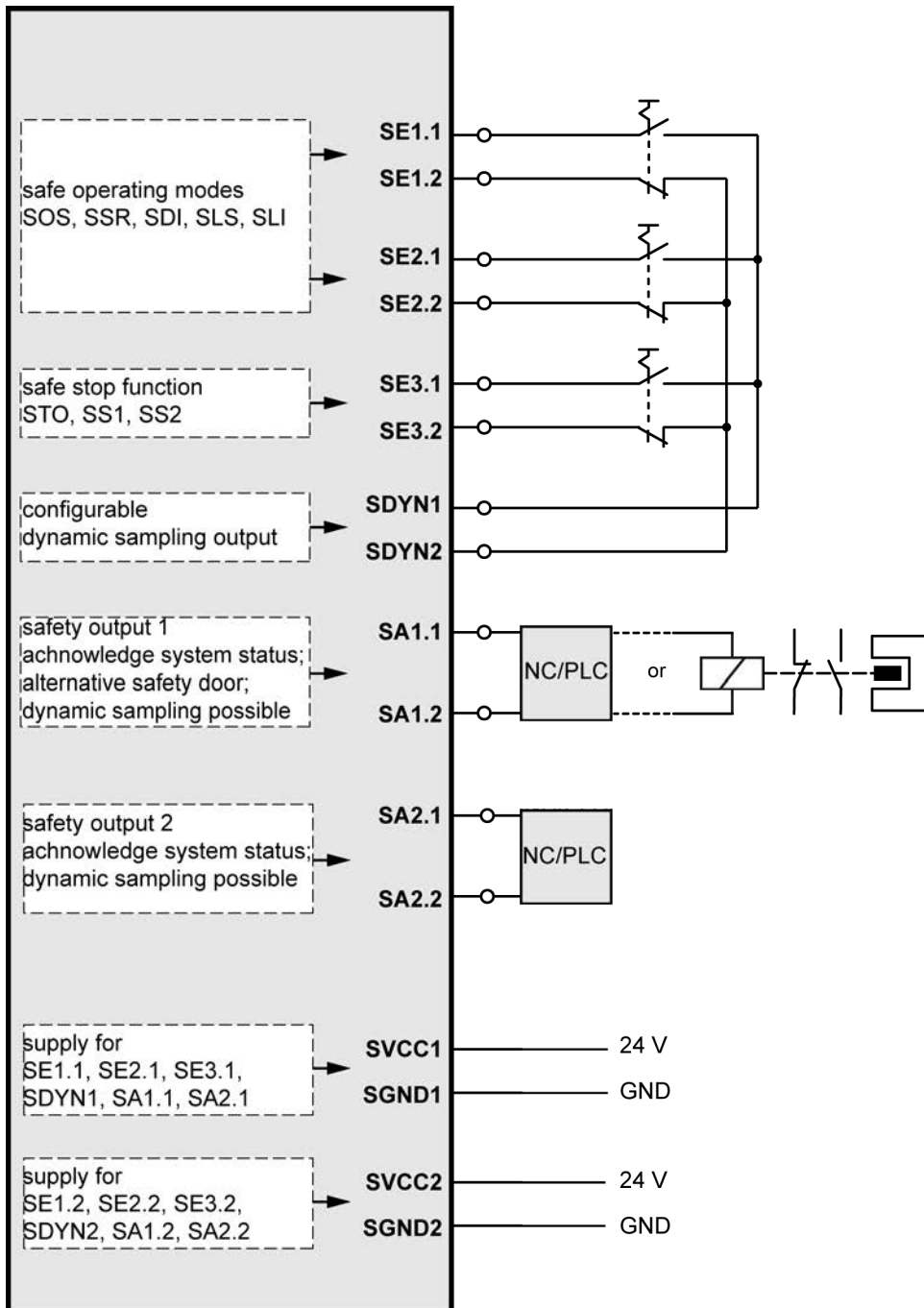
(Example for dynamic sampling of the safe inputs)

ⓘ Application examples how to use the safe inputs can be found in the document Functional safety, application examples (AMK part no. 204364)

6.2 [X85/X86] real-time Ethernet

Description

The interface is constructed as a real-time Ethernet interface and supports the following protocols:

- EtherCAT SoE (Servo Drive Profile over EtherCAT according to IEC 61800-7-300)
- EtherCAT CoE (Drive profile CiA 402 according to IEC 61800-7-201/301)
- EtherCAT EoE (Ethernet over EtherCAT)
- EtherCAT FoE (File Access over EtherCAT)

- VARAN SoV (Servo Drive Profile over VARAN (SoV) according to IEC 61800-7-300)
- VARAN EoV (Ethernet over VARAN)

X85: Connection master or previous node

X86: Connection next node
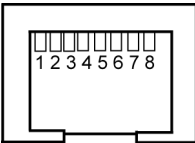
Technical data

- 100BASE-T 100 Mbit/s Ethernet standard
- Data frame and assignment of the RJ45 socket acc. to IEEE802.3
- Maximum line length: 50 m (industrial environment)

Design

Type	Poles	Class
RJ45	8	Socket

Assignment

[X85] / [X86]	Connection	Signal	Description
front view, device side	1	Tx+	Transmit data +
	2	Tx-	Transmit data -
	3	Rx+	Receive data +
	4	-	Reserved
	5	-	Reserved
	6	Rx-	Receive data -
	7	-	Reserved
	8	-	Reserved

Connection

Cable	Patch cable of the category min. CAT5, shielded
Shield connection	Both sides
Cable assembly	RJ45 connector, prefabricated cables: Siehe 'Ethernet cable' auf Seite 32.

6.3 [X130] resolver

Description

This connection supports following encoder types: R
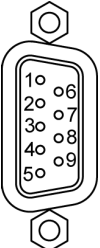
Technical data

- Maximum encoder line length: 100 m

Design

Type	Poles	Class
D-SUB	9	Socket

Assignment

[X130]	Connection	Signal
front view, device side	1	-
	2	-
	3	+SIN
	4	-SIN
	5	+COS
	6	-COS
	7	+UREF
	8	-UREF
	9	-

Connection

Cable	$4 \times 2 \times 0.25$ mm^2 twisted pair + 4×0.5 mm^2 shielded
Shield connection	Shield on both sides
Cable assembly	D-SUB connector 9-pin with metalized housing
Note	The shield of the cable has to be grounded by the screw connection in the plug housing on the motor side. The shield mesh is everted over the terminal insert. After screwing together, the shield is placed over the contact spring and the plug housing on the mass.

Controller input circuit
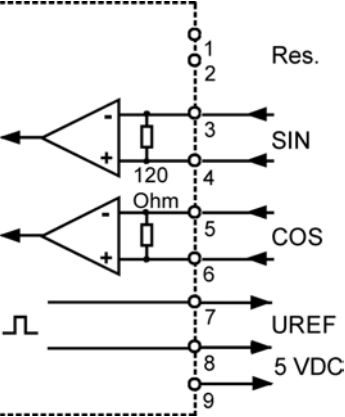
Requirements to the encoder

Encoder evaluation according ID32953		R-encoder
Data	**Units**	**Resolver**
Excitation signal		
Primary voltage	**VDC**	6 ± 8 %
Input current without load	**mA**	max. 75
Frequency [kHz]	**kHz**	8
Output signals		
Transmission ratio		0.5 ± 5 %
Number of pole pairs [1]		1
Output voltage	V_{SS}	1 - 1.8

1)   Resolvers / Hall encoders with one pole pair are exclusively permitted!

Encoder signal

Resolver
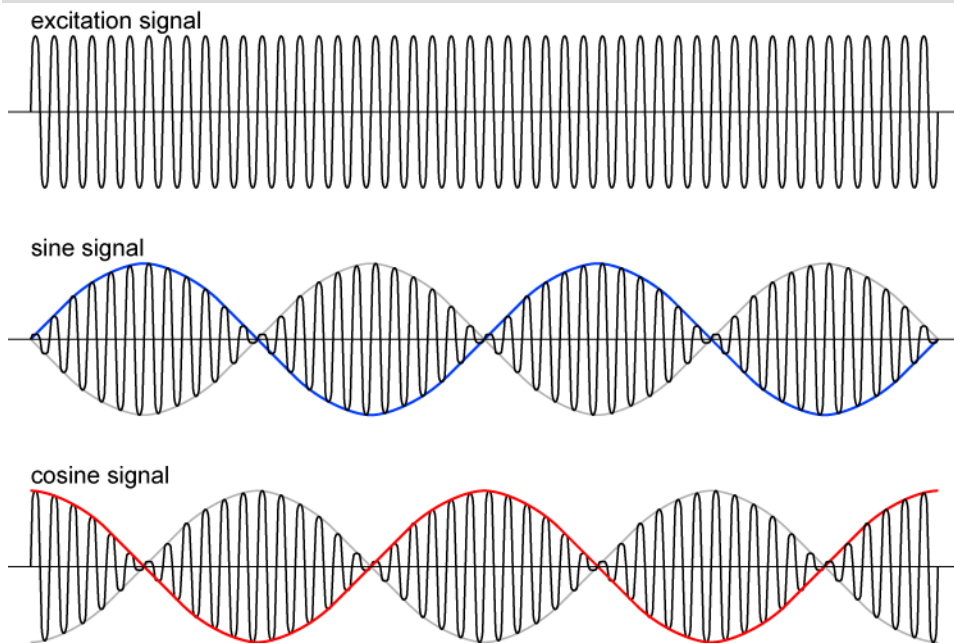
excitation signal

sine signal

cosine signal

Encoder signal evaluation

In ID32953 'Encoder type' is defined how to evaluate the incoming encoder signals.

6.4 [X131] sine encoder

Description

This interface supports the following encoder types:
E, F, I, P, Q, S, T, U, V, Y (Y only KW-R26 and KW-R27)

Technical data

- The maximum input frequency is 200 kHz
- Input signals according to RS485 specification
- Encoder line length:

Encoder designation	ERN 1380 ERN 1381	ECN 1113 ECN 1313 EQN 1125 EQN1325	ECN 113*)	ECI 119 ECI 1118 ECI 1319 EQI 1130 EQI 1331	SKS 36 SRS 50 SKM 36 SRM 50	SEK 37 SEL 37	EKS 36 EFS 50 EKM 36 EFM 50
AMK Encoder designation	I	E / F		P / Q	S / T	U / V	Y
max. Encoder line length [m]	100	100 KW-R25: 25 m	25	100 KW-R25: 25 m	100	100	100 at AWG 22 30 at AWG 26

*) The encoder ECN113 does not have a extended voltage range and can therefore only be employed with line lengths up to a maximum of 25 m. The encoder is built into the following motors:

- DT7-28-20-EOO-2600-B5 (part no.: A1216AD)
- SKT7-55-20-EBW-5200-DB-B9 (part no.: A1706ED)
- SKT7-55-20-EOW-5200-DB-B9 (part no.: A1706ED)
- SKWS13-150-6-EOW-800-B5 (part no.: A1024AC)
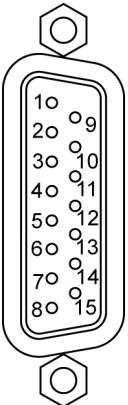- SKWS13-150-6-EOW-800-B5*AT (part no.: D611AC)

The above mentioned line lengths are valid only with the specified voltage ranges and the cable cross-sections recommended by AMKmotion.

Design

Type	Poles	Class
D-SUB	15	Socket

Assignment

[X131]	Connection	I-encoder	E- / F- encoder	P- / Q- encoder	S- / T-, U- / V- encoder	Y- encoder
front view, device side	1	-REF	-	-	-	-
	2	+REF	-	-	-	-
	3	-COS	-COS	-	-COS	-
	4	+COS	+COS	-	+COS	-
	5	-SIN	-SIN	-	-SIN	-
	6	+SIN	+SIN	-	+SIN	-
	7	5 VDC [1]	5 VDC [1]	5 VDC [1]	-	-
	8	GND	GND	GND	GND	-
	9	-	-EN_DAT	-EN_DAT	-RS485	-
	10	-	+EN_DAT	+EN_DAT	+RS485	-
	11	-	-EN_CLK	-EN_CLK	-	-
	12	-	+EN_CLK	+EN_CLK	-	-
	13	-	5 VDC[1]	5 VDC[1]	-	-
	14	GND	GND	GND	GND	-DSL [3]
	15	-	-	-	9 VDC [3]	+DSL [3]

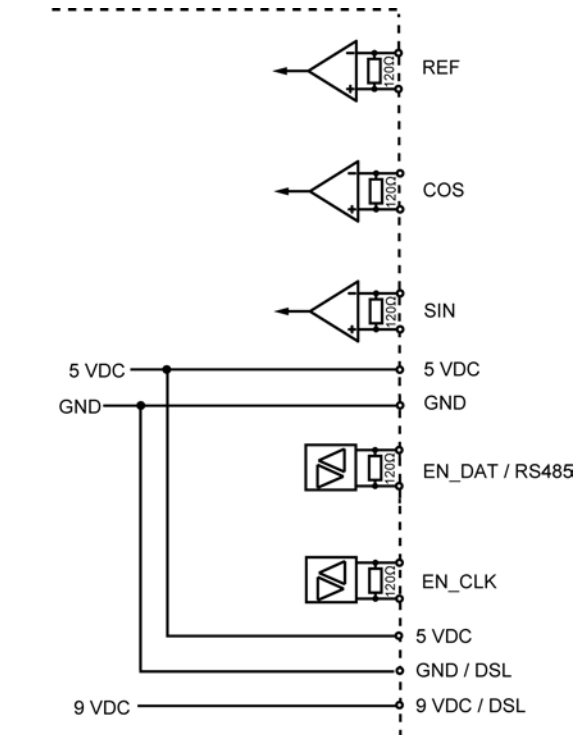1)   5 VDC ±5 % max. 350 mA

3)   KW-R26 / KW-R27 /

         9 VDC ±15 % at load, max. 400 mA, short-circuit-proofed

Connection

	E- / F- / I- /P- / Q- / S- / T- / U- / V-encoder	Y-encoder
Cable	E- / F- / P- / Q- encoder: 4 x 2 x 0.25 mm^{2}twisted pair, + 4 x 0.5 mm^2 shielded I- / S- / T- / U- / V-encoder: 4 x 2 x 0,5 mm^2 twisted pair shielded	Hybrid cable DSL: twisted pair, shielded 4 x 1,5 mm^2+(2 x 0,75 mm^2)+(2 x AWG22 or AWG26) 4 x 0,5 mm^2+(2 x 0,75 mm^2)+(2 x AWG22 or AWG26) z. B. HELUKABEL and Tecni
Shield connection	Shielded on both sides	Shielded on both sides
Cable assembly	D-SUB connector 15-pin with metallized casing Assembly instruction: Siehe 'Assemble cable with D-SUB connector' auf Seite 27., Prefabricated cables: Siehe Encoder cable auf Seite 31.	
Note	The shield of the cable has to be grounded by the screw connection in the plug housing on the motor side. The shield mesh is everted over the terminal insert. After screwing together, the shield is placed over the contact spring and the plug housing on the mass.	

Controller input circuit

Requirements for the encoder

| Encoder evaluation in accordance with ID32953		I-encoder	E- / F-encoder	S- / T-, U- / V-encoder	P- / Q-encoder	Y-encoder
Data		Sine encoder	EnDat 2.1	Hiperface	EnDat 2.2 light (digital) [3]	Hiperface DSL
Voltage supply to the encoder						
Input voltage	VDC	5 ±5 % [1]	5 ±5% [1]	9 ±15% [2]	5 ±5% [1]	9 VDC ±15% [4]
Output signals of the analog tracks						
Output voltage	V_{SS}	0.6 - 1.1			-	-
Offset	V	2.5 ±0.5			-	-
Output signal of the homing track						
Resting value	mV	200	-	-	-	-
Signal width	° el.	90 ... 270	-	-	-	-

1)   5 VDC ±5 % max. 350 mA

2)   9 VDC ±15 % at load; max. 400 mA, 12 VDC ±20 % in idle

3)   EnDat 2.2 light means, that the encoder supports EnDat 2.2, which is used only with the commands of EnDat 2.1 from the AMK controller.
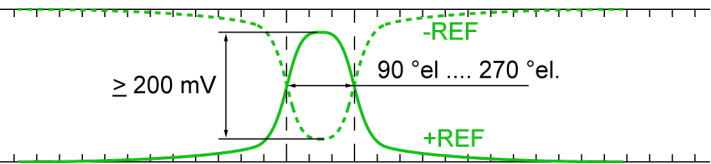
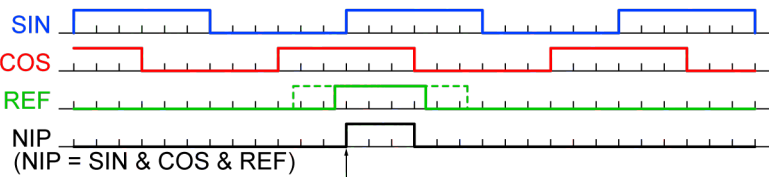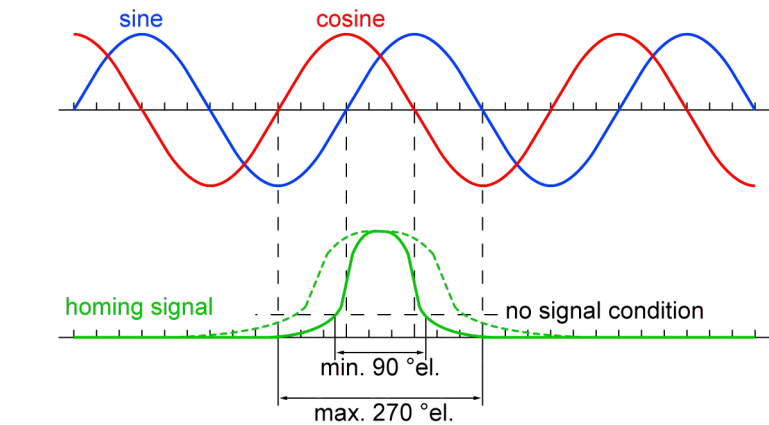4)   9 VDC ±15 % at load, max. 400 mA, short-circuit-proofed

Encoder signal

Analog tracks
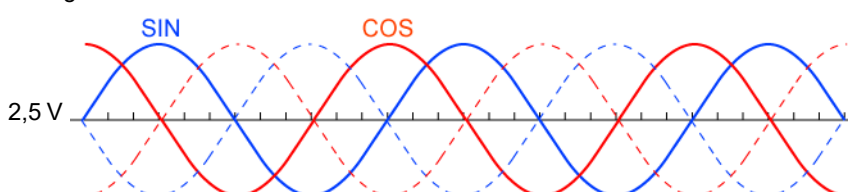
Homing signal

To receive a unique signal, the homing signals (+REF and -REF) must overlap by at least 200 mV. The overlap range must be at least 90 °el. and maximum 270 °el. long.

The zero pulse NIP is determined in the controller. A logic AND link of SIN, COS and REF results in the NIP signal. The positive edge (for right-turning motor) is evaluated for exact determination of the zero pulse.

Encoder signal evaluation

In ID32953 'Encoder type' is defined how to evaluate the incoming encoder signals.

6.5 [X140] binary inputs and outputs (BI/O)

Description

The controller card supports 3 multifunctional BI/O (BI/O1 to 3) at terminal X140. Each BI/O can be used either as binary input or binary output. Inputs and outputs can be mixed up, e.g. BI/O1 and BI/O2 are inputs, BI/O3 is configured as output.

If the binary inputs not used, then must the open binary inputs be parametrized with 0.

Preassignment of the binary inputs and outputs

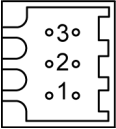| BI/O	Pin	Port	Parameter	Code	Meaning
BI/O1	BI1	3 bit 0	ID32978	32904	RF (Controller enable)
	BO1	3 bit 0	ID32865	0	-
BI/O2	BI2	3 bit 1	ID32979	0	-
	BO2	3 bit 1	ID32866	33029	SBM (System ready message)
BI/O3	BI3	3 bit 2	ID32980	0	-
	BO3	3 bit 2	ID32867	33052	Motor brake control

Technical data

- Norm IEC 61131-2 type 3 digital inputs:
  Rated input voltage 0-30 VDC, maximal input current at 30 VDC = 15 mA
  Level 0-5 VDC: low, 11-30 VDC: high
  Electrically delay of T_{on} = 3-8 µs, T_{off} = 48-57 µs
- Norm IEC 61131-2 digital outputs:
  Rated output voltage 24 VDC, rated output current maximal 0.5 A, short-circuit safe, electrically isolated, electrically delay of T_{on} 8-20 µs, T_{off} = 50-55 µs at 200 mA load
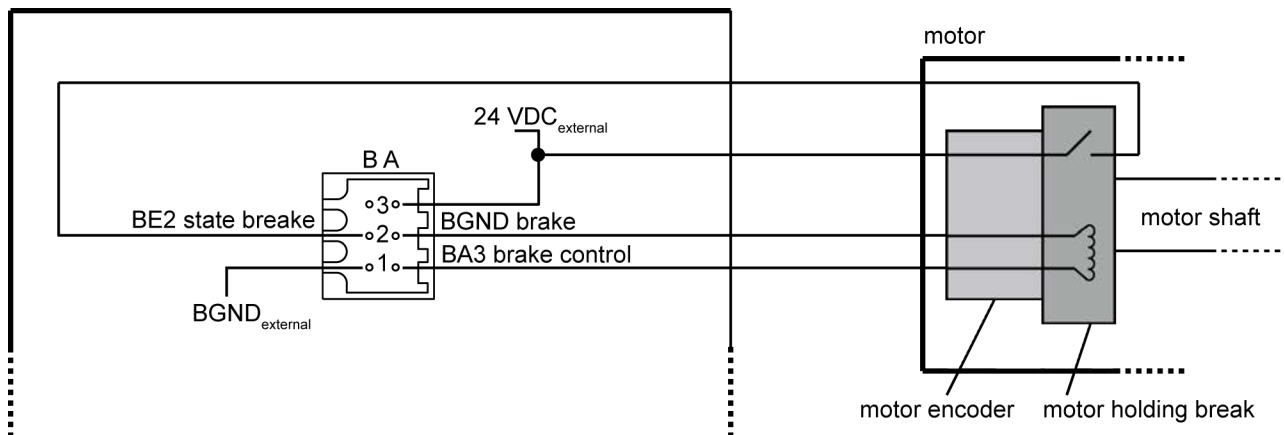
Design

Type	Poles	Class
Connector with spring connection	6	2-row pin strip

Assignment

[X140]	Connection	Signal	Description
front view, device side	1A	BI/O3	Binary input 3, 24 VDC ± 15 %, max. 10 mA, potential separated, e.g. probe input
			Binary output 3, 24 VDC, 2.5 A [1]), potential separated, permanent-short-circuit proofed, e.g. to control a motor holding brake [2]).
	1B	BGND	Reference potential 0 V for supply of the binary inputs and outputs
	2A	BGND	Reference potential 0 V for supply of the binary inputs and outputs
	2B	BI/O2	Digital input 2, 24 VDC ± 15 %, max. 10 mA, potential separated
			Digital output 2, 24 VDC, 100 mA, potential separated, permanent-short-circuit proofed
	3A	BVCC	Supply of the binary outputs 24 VDC ± 15 %
	3B	BI/O1	Digital input 1, 24 VDC ± 15 %, max. 10 mA, potential separated
			Digital output 1, 24 VDC, 100 mA, potential separated, permanent-short-circuit proofed

1) Motor holding brakes with higher power requirements, must be controlled with an external auxiliary relay.

2) Example wiring motor holding brake with acknowledgment. Functional description see: FKT_Ansteuerung_der_Motorhaltebremse_en

Connection

Cable	6 x 8 mm² (max.) /AWG 18, shielded
Shield connection	Shield on one side on the module housing
Cable assembly	Weidmüller socket connector, 6-poles (Designation: B2L 3.5/6 SN SW) AMK part no. 202700 (0.08 mm^2 - 1.0 mm^2 / AWG 28 - AWG 18) optional Weidmüller socket connector, 6-poles (Designation: B2CF 3.50/06/180 SN OR BX) AMK part no. 207746 (0.14 mm^2 - 1.5 mm^2 / AWG 26 - AWG 16)

Circuit principle

Binary Outputs
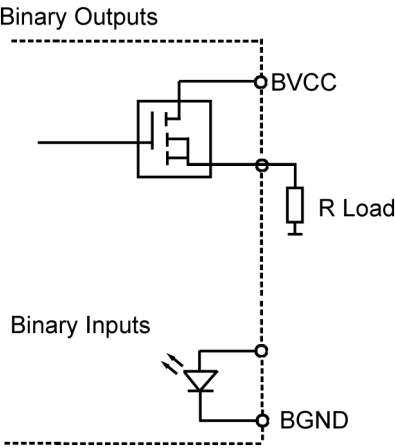
6.6 [X235] USB

Description

Via the mini-USB interface, the controller card can be connected to a PC and the software AIPEX PRO for startup and diagnosis.
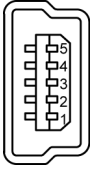
Technical data

USB V1.1 Slave

Design

Type	Poles	Class
USB V1.1 type A to mini-USB type B	5	Socket

Assignment

[X235]	Connection	Signal	Description
front view, device side	1	5 VDC	External 5 VDC supply from USB master, max. 50 mA current consumption
	2	D–	Data –
	3	D+	Data +
	4	5 VDC	Reserved for AMK
	5	GND	Reference potential

Connection

Cable	0.08 mm² / AWG 28 Data+ and Data- twisted pair, shielded
Shield connection	Attached on both sides
Cable assembly	Prefabricated cables: Siehe 'Cable for PC connection' auf Seite 32.
Note	Maximum 3 m length permitted for USB cable! With active USB repeater, longer cable lengths are possible.

6.7 Assemble cable with D-SUB connector

1. Metallic D-SUB casing with a side cable output have to be used. The cable shield is earthed through the D-SUB casing on the KE/KW module.

2. Remove outer cable insulation (to about 21 mm for 9-pin D-SUB connector).

3. Evert cable shield over the outer insulation sheath.

4. Fix and insulate the shield with heat-shrinkable sleeve so that a blank shielding edge of about 7 mm width remains.

5. Connect the plug.

6. Relieve the cable with strain relief clamp and securely connect the everted blank shield edge with the metallic plug casing.

7. After plugging the corresponding plug pedestal into the casing, the D-SUB connector has to be screwed onto the pedestal.

8. If shielded cables have to be interrupted by a plug connector, a continuing shield connection has to be ensured by placing the shield onto the connector casing. The shield may not lead over connector contacts.

9. Cables leading into the casing have to be secured with grounding cable screw connections with which the cable shield is directly attached to the casing of the screwed cable gland.
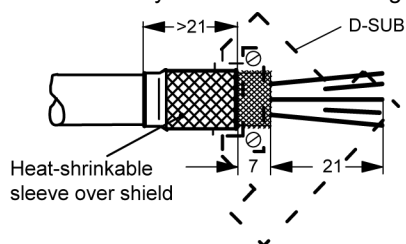
7 Startup and operation

The startup includes the parameterization and optimization of the drives and is supported by the PC software AIPEX PRO (from Version V3.00 2013/50 (204905)). AIPEX PRO supports a central access to the drive controller cards via controller with active bus communication or via point-to-point connection to the USB interface X235 of the controller card. The procedure during startup is described in the following document:

See document Initial startup KE/KW(Part no. 204539)

7.1 For your safety

⚠ DANGER
Danger to life! The controller cards / KW-R27 are safety modules according to the Machinery directive MRL 2006/42/EG. Before the cards are put into operation, the executing person must have read and understood the device description and the safety manual. During the startup, all information in these documentation must be taken into account.

⚠ DANGER
Motor shaft movement (rotating parts)! Hair, body parts and clothes can be captured and wrapped by rotating parts and people result suffer fatal injuries. Hazardous motor movement occurs when the motor shaft moves in an uncontrolled or unintentional manner. Even the intended drive movement may be hazardous, if persons remain inside the range of movement. **Uncontrolled motor shaft movement** occurs when the motor is no longer controllable. may have lethal consequences. Possible causes include the following: - Faulty wiring, e.g., faulty phase sequence while connecting motor   - Faulty components   - Faulty motor parameters   - Software error   **Unintended motor shaft movement** is caused by errors in the motor control. may have lethal consequences. Possible causes include the following: - Operator errors   - Controller or application program faults   - Faulty setpoint specification and scaling   - Improper operating mode   The monitoring devices in the drive system are capable of detecting various fault states. However, the monitoring devices by themselves are not sufficient to completely and reliably prevent uncontrolled movement. Uncontrolled movement cannot be prevented completely, even if it occurs only for a brief period of time before a monitoring device trips and shuts down the drive or switch off power supply. **Steps to prevent:**   - Always ensure that the is fully de-energized before commencing work on the .   - Check the limit values for torque, speed, and position, as well as the acceleration and deceleration ramps.   - Specify the maximum permissible process speed and set ID113 accordingly.

7.2 Avoiding material damage

NOTICE	
Material Damage!	**Material damages due to erroneous parameterization!** The drive configuration lies in the responsibility of the machine manufacturer. The entry of erroneous parameters can lead to malfunctions and thereby to faults and damages in the system. **Steps to prevent:** • Only personnel trained by AMK may configure the drives.

7.3 Drive addressing

Within a machine, the higher-ranking controller acts as fieldbus master. The subordinated drives are slaves.

The addressing of the drives can either be done automatically by the master, or the address can be set by dip switch or by parameter.

Fieldbus	Addressing possible by ...			Range
	Bus master (automatic)	DIP switch S1	Parameter	
KW-R24(-R) **KW-R25**				
EtherCAT Slave (SoE, CoE)	■	-	ID34023 Instance 1	$1 \leq \text{ID34023} \leq 65535^{1)}$
VARAN Slave	■	-	-	The VARAN master will assign addresses to the slaves; no address presetting is possible
KW-R26				
EtherCAT Slave (SoE, CoE)	■	■	ID34023 Instance 1	$1 \leq \text{ID34023} \leq 65535^{1)}$ $1 \leq \text{S1} \leq 250^{2)}$
VARAN Slave	■	-	-	The VARAN master will assign addresses to the slaves; no address presetting is possible
KW-R27				
EtherCAT Slave (SoE, CoE)	■	■	ID34023 Instance 1	$1 \leq \text{ID34023} \leq 65535^{1)}$ $1 \leq \text{S1} \leq 250^{2)}$
VARAN Slave	■	-	-	The VARAN master will assign addresses to the slaves; no address presetting is possible
FSoE	-	■	ID33201	See document Safety manual; functional safety, Part no. 203446

1) with firmware V2.12 2018/40, the participant address must be in the range 1 to 63 via ID34023 'BUS address participant'.

2) From firmware V2.14 2021/13, the node address with DIP switch S1 can be in the range 1 to 250.

7.3.1 EtherCAT: Automatic addressing

On delivery ex works AMK, the DIP switch S1 as well as the parameter ID34023 'BUS address participant' are set to 0 in all instances.
In this case the EtherCAT master will assign an address automatically to each bus participant in order to start communication between master and slaves.

The slave addresses correspond to the physical slave positions in the EtherCAT bus.

Within the PLC, the bus participants are identified by their addresses. If you change the system configuration, e.g. adding, changing, removing bus participants, the EtherCAT master sets new addresses to the bus participants.

Therefore, the addresses of the bus participant change.

This means that an EtherCAT master with EtherCAT configuration file (ID1204 ff) generate at start up 'Error EtherCAT configuration 2727 Info1 = 2'.

Then the slaves change to state 'Pre-Operational'. In the state 'Pre- Operational', it is possible to get access to the slaves (ID read and ID write). The used addresses are given by the EtherCAT master. In this case the PLC accesses, via the service channel a wrong bus participant.

The bus address can be set as fix address by DIP switch S1 or by Parameter ID34023 'BUS address participant'.

Automatic addressed devices can not be marked as 'optional' bus participant in the AIPEX PRO software.

7.3.2 EtherCAT: Addressing by parameter ID34023 'BUS address participant'

If the DIP switch S1 is set to 0, the address can be set by parameter ID34023 'BUS address participant'.
The setting of the parameter can be done by means of software AIPEX PRO via the EtherCAT master without connecting point-to-point to each single device.
(See document Software description AIPEX PRO V3 (Part no. 204979), chapter 'Direct mode', function 'Communication'.)

7.3.3 EtherCAT and FSoE: Addressing by DIP switch S1

Relevant for any type of drive controller:

NOTICE	
Material Damage!	On the open unit a dry, non-conductive pollution may only occur. The penetrating pollution into the open housing may not affect the functionality of the device (EN 61800-5-1, pollution degree 1). Ensure that no objects fall into the housing when working on the open housing. Foreign objects can cause short-circuits during operation and thereby destroy the device.

By means of the DIP switch, the EtherCAT and FSoE address of the controller will be set **simultaneously**.

The address setting by DIP switch is prior to addresses via parameter ID34023 'BUS address participant'.

Address range up to 250
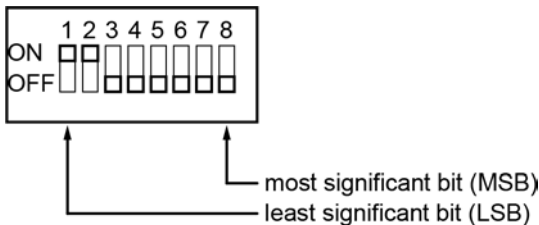
Example: address = 3

If you change a fieldbus participant which is addressed by DIP switch, make sure that the address is set correctly to the new device.

8 Accessories and options

8.1 Encoder cable

Designation	AMK part no.:	Description
AG-GD15S+T-KW...M	101612	S+T-encoder, connector straight
AG-GD15E+F-KW...M	101613	E+F+P+Q-encoder, connector straight
AG-WD15S+T-KW...M	101614	S+T-encoder, angular connector
AG-WD15E+F-KW...M	101615	E+F+P+Q-encoder, angular connector
AG-GD15I	101763	I-encoder, connector straight
AG-WD15I	101764	I-encoder, angular connector
Hybrid cable Q1,5 DSL	403549	Y-encoder, connector straight M23 8-poles, power lead 1.5 mm^2 [1]
Hybrid cable Q0,5 DSL	403550	Y-encoder, connector straight M15 8-poles, power lead 0.5 mm^2 [1]

1) Lead marking:

8.1.1 Hybrid cable for Hiperface DSL encoder (Y-encoder)
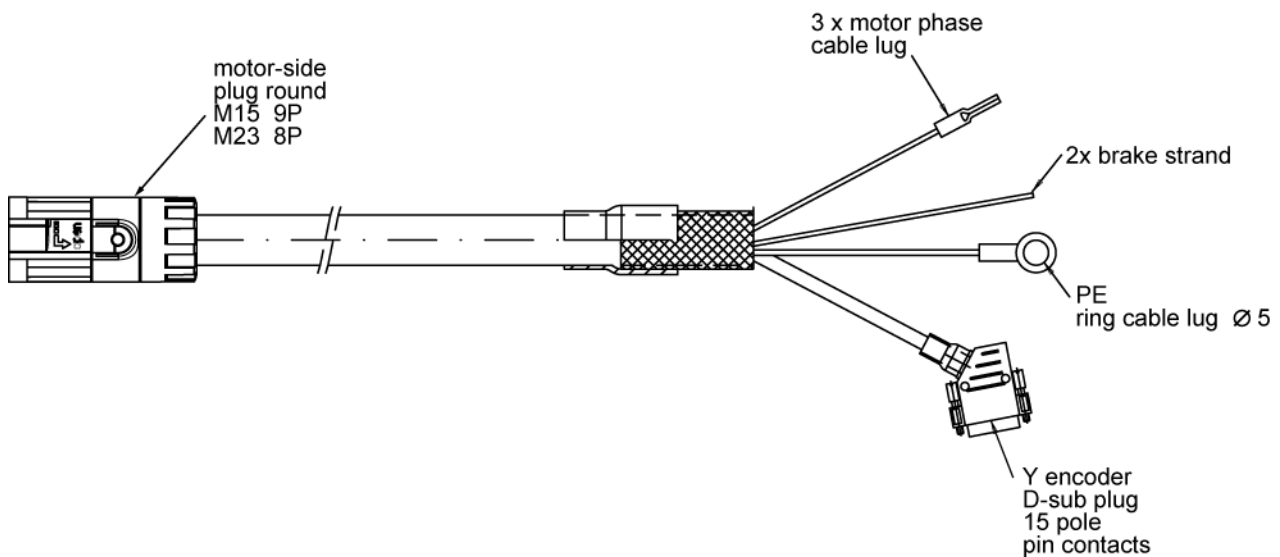
Hybrid cable Q1,5 DSL	Hybrid cable Q0,5 DSL	Lead	Function	Pin D-SUB
AMK part-no. 403549	AMK part-no. 403550			
Pin M23	Pin M15			
⏚	⏚	green/yellow	PE	
1	A	1	U	
4	B	2	V	
3	C	3	W	
D	1	5	+BR	
A	2	6	-BR	
C	3	blue	+DSL	15
B	4	white	-DSL	14

The signal of the temperature sensors inside the motor winding is transmitted via the DSL cable to the converter. The connector for the motor temperature sensor (motor winding) on the converter keeps not connected.

8.2 Ethernet cable

Designation	AMK part no.:	Description
Cable RJ45 CAT5e PUR 0.20 m	202665	0.20 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 0.30 m	202666	0.30 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 0.40 m	202667	0.40 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 1.00 m	202668	1.00 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 2.00 m	202669	2.00 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 5.00 m	202670	5.00 m length with straight plug, snap in
Cable RJ45 CAT5e PUR 10.00 m	202671	10.00 m length with straight plug, snap in

8.3 Cable for PC connection

Designation	AMK part no.:	Description
USB cable	47058	USB type A acc. to mini-USB type B, length 3 m with ferrite shell

8.4 Software

Designation	AMK part no.:	Description
Program system AIPEX PRO V3	O907	PC software AIPEX PRO V3 (for startup, parameterisation, optimisation, diagnosis and programming) USB cable assembled (USB type A acc. to mini-USB type B) 3 m with ferrite shell

9 Service

9.1 Controller card exchange

When exchange the controller card, the application specific data (parameters) have to be transferred to the new controller card. With the PC software AIPEX PRO the parameter can be read out of a controller card, can be saved on the PC and can be transferred from PC to the new controller card.

See document Software description AIPEX PRO V3 (Part no. 204979).

9.2 Diagnostics

Diagnostic messages can be error messages or warning messages and are generated automatically. Existing diagnostic messages are displayed by the LEDs on the front of the controller card. In case of warning messages, the drive remains in regulated operation.

In case of malfunctions, the SBM is withdrawn and an attempt is made automatically to brake the drive to a standstill and to withdraw the controller enable afterwards. If no braking can be carried out successfully, the power output stage enable is withdrawn automatically and the drive runs out.

If an error causes a coasting motor (e. g. EF is withdrawn while RF is active or encoder error) the brake output will be set and a potential motor holding brake engages.

In order to avoid brake wear, the application has to ensure in cases of errors with previous warning that the drive is braked before EF is withdrawn.

Diagnostic messages can be read out by AIPEX PRO or the superordinate controller via the fieldbus and are described in the 'PDK_025786_Diagnose' documentation.

9.3 Loading firmware

NOTICE
Firmware Download
Due to downloading a firmware, application specific parameter settings are overwritten and become invalid!
Steps to prevent:
• Before you download a new firmware, please make really sure that application specific data is saved as backup.

The controller card operates with a firmware that has been installed in the factory.
A new firmware can be loaded by means of the AMK software ATF, which can be installed together with AIPEX PRO.
From ATF version 2.12

Preparations

1. Install the controller card into the compact inverter where it will run.
2. Connect your PC with the USB interface X235 of the controller card.
   Connect the compact inverter to the 24 VDC supply voltage.
   Wait until the compact inverter is run-up.
   ○ LED H2 green continuous light: SBM (system ready message)
   ○ LED H2 red continuous light: Error
3. If LED H2 displays an error, you may read it with AIPEX PRO.
   Start AIPEX PRO and log on to the drive. (See documentSoftware description AIPEX PRO V3, Part no. 204979).
   In the tab 'Diagnostics', you will see some error messages which are based on the new combination of compact inverter and controller card.
   You may initially ignore these messages.
   Log out and close AIPEX PRO.

4. Start the program ATF - AMK Tool Flasher
   You will get information about the use of this software from the document Software description ATF - AMK Tool Flasher (Part no. 203771).

> For using the ATF software:
> See document Software description ATF - AMK Tool Flasher, Part no. 203771

1. step: selecting target hardware and firmware

1. Select 'Task' -> 'Add...'
2. Select e. g.'KW-R05, KW-R06, KW-R16, MCE' or 'KW-R07, KW-R17' as target.

3. With 'Communication', select USBCOM as interface.

4. With 'File name to program', select the firmware file:

KW-R24	AER24_SW_vvv_yyww_nnnnnn.zip [1]	controller firmware
KW-R24-R	AER24R_SW_vvv_yyww_nnnnnn.zip [1]	controller firmware
KW-R25	AER25_SW_vvv_yyww_nnnnnn.zip [1]	controller firmware
KW-R26	AER26_SW_vvv_yyww_nnnnnn.zip [1]	controller firmware
KW-R27	AER26_SW_vvv_yyww_nnnnnn.zip [1]	controller firmware
	AESF1_SW_vvv_yyww_nnnnnn.zip [1]	firmware for functional safety [2]

1) vvv - version
   yyww - year and calendar week
   nnnnnn - Part no.

2) Flashing and properties of functional safety: See document Safety manual; functional safety, Part no. 203446
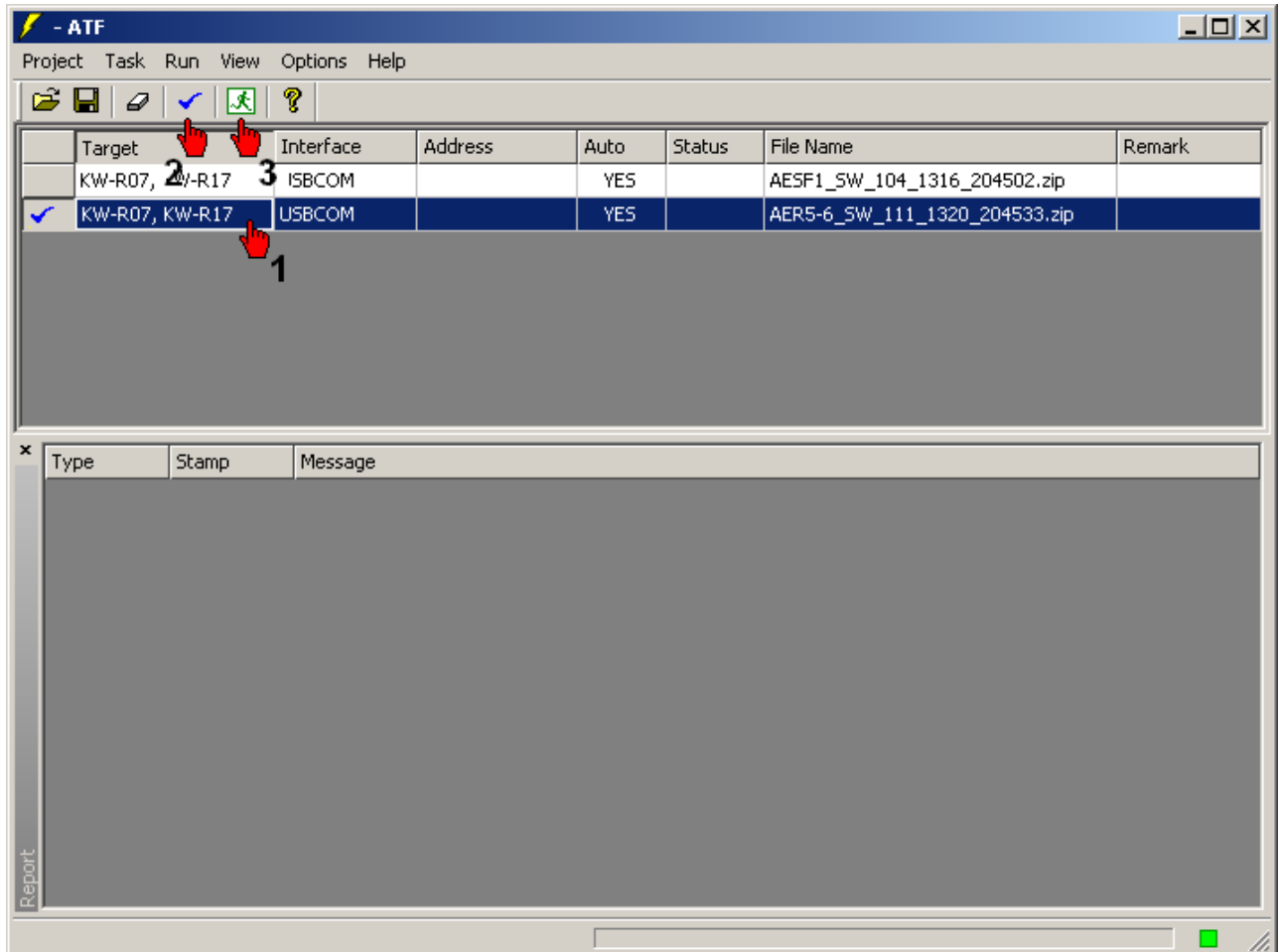

5. Confirm all entries with **'OK'**

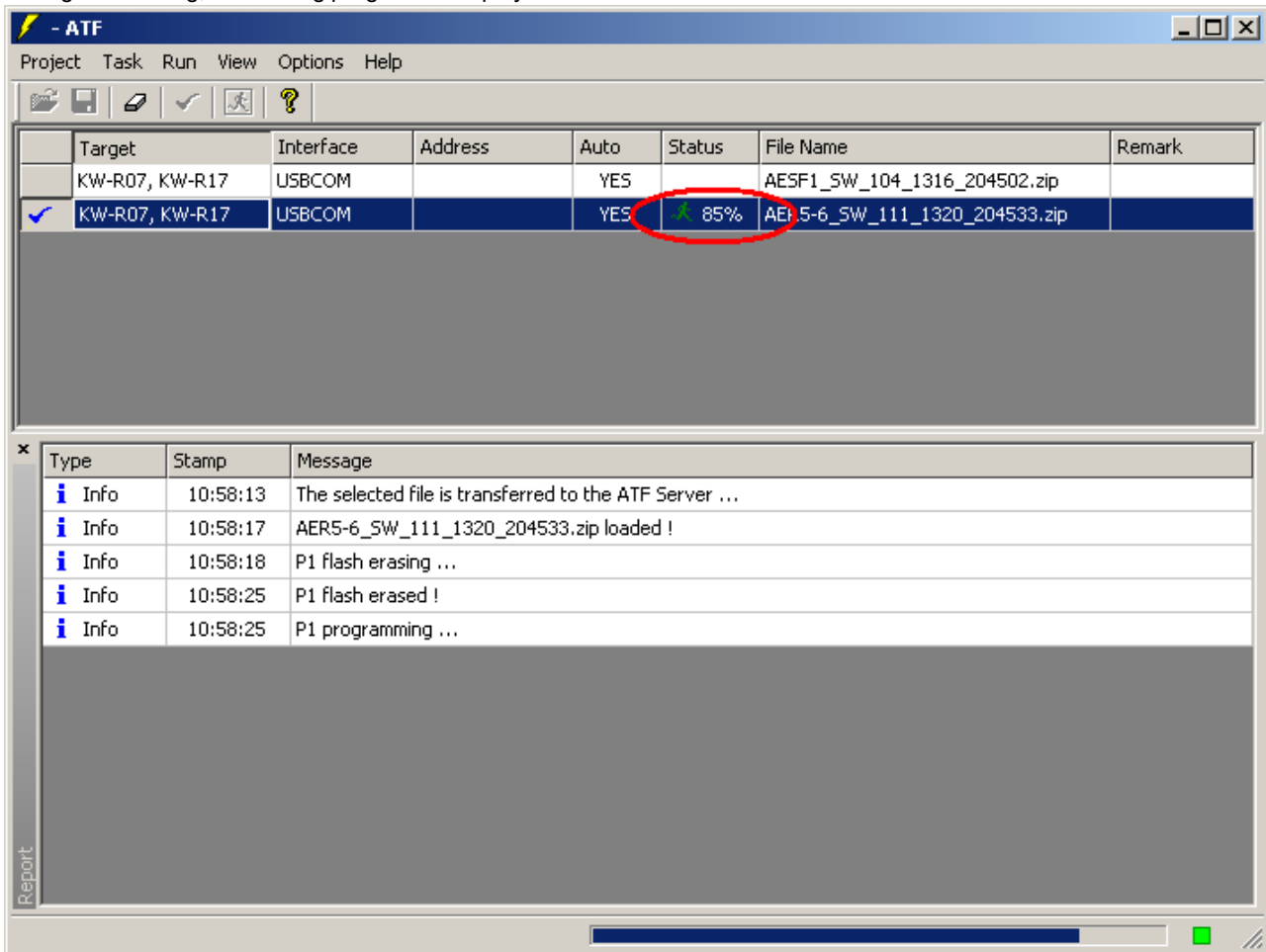## 2. step: transferring the firmware to the controller card

1. Select the task to flash by clicking into the respective line.

2. Activate the task by clicking the button [✓].

3. Start the update with [🏃].

4. During the flashing, the loading progress is displayed.

Do not interrupt the flashing sequence!

5. Exit the ATF after the firmware was completely transferred.
6. Switch the controller off and on again. The new firmware will be activated.

Depending on the compatibility class of the old and new firmware, it may be that you are prompted to do an initial program loading by the diagnostic message 1293 'Boot strap EEPROM'. Execute the function and then transfer the application-specific data to the controller card using your backup copy. If you are not prompted to initial program loading, all application-specific settings are kept.

Setting the controller card to boot mode manually

If the flashing sequence was interrupted, e.g. because the USB cable was removed of the 24 VDC supply was interrupted, the controller card must be set to boot mode and the flash procedure must be repeated.

Therefore, plug the service jumper BR3 and BR1 if present (Siehe 'Views and interface overview ' auf Seite 11.).

Re-install the controller card to its compact inverter, connect it to your PC and switch on the 24 VDC supply.

Again, transfer the firmware to the controller card (see step 2).

Afterwards, remove the service jumper(s).

Glossary

A

A1
Analog input 1

AIPEX
AMK startup and parameterizing software (PC software):
Programming, parameterization, configuration, diagnosis,
oscilloscope, status information

ASCII
American Standard Code for Information Interchange

AT
Drive telegram from slave to master

ATF
AMK Tool Flasher (PC software for transferring firmware to
device)

AWG
American Wire Gauge (Coding of wire diameter)

B

BI
Digital input

BIN
Binary (digital)

BI/O
Digital input / output

BO
digital output

C

CRC
Cyclic redundancy check (Checksum)

CMD
Commanding

D

DO
Digital output

Default
Factory setting

DEZ
Decimal

DRIVE
Drive-specific parameter (Value is valid inside only one
parameter set)

DSL
Digital Servo Link (Hiperface DSL encoder interface with single
cable solution)

DZR
Speed control

DI
Digital input

E

EnDat 2.2
Motor encoder interface protocol of the company Heidenhain

EnDat 2.1
Motor encoder interface protocol of the company Heidenhain

EtherCAT
Real-time Ethernet bus

EF2
Power output stage enable

EF
Power output stage enable

E-encoder
Absolute encoder, singleturn, EnDAT 2.1 with additional sine
and cosine track

F

F-encoder
Absolute encoder, multiturn, EnDAT 2.1 with additional sine and
cosine track

FIPO
Fine interpolator

Firmware
System software, loaded by AMK

FORMAL
Formal parameter

Formal parameter
Formal parameters don't have remanent values in parameter
handling

FSoE
Fail-Safe over EtherCAT

FTP
File transfer protocol

AMKmotion

G

GLOBAL
Global parameter; valid for all parameter sets

GND
Ground potential

H

Hiperface DSL
Motor encoder interface protocol of the company Sick Stegmann

Hiperface
Motor encoder interface protocol of the company Sick Stegmann

HEX
Hexadecimal, 0x...

I

I
Input

I/O
Input / output

i²t
Integral of the squared current over time

ID
Parameter identification numbers acc. to SERCOS Standard

I-encoder
Incremental encoder, optical encoder with sine and cosine track and zero pulse

IGBT
Power electronic component, e. g. transistor

Instance
Parameters, depending on the fieldbus, are instanced. For each bus, different values can be parameterized (bus depending participant address, transmission rate etc.). Field bus interfaces and slots where field bus option cards can be installed are allocated to instances (see product documentation)

IPO
Interpolator

K

KTY
Type of a temperature sensor

KW-Rxx
AMKASYN controller card for installation into compact inverter

Kv
Position loop factor

KW
AMKASYN compact inverter

KP
Proportional gain (speed control, PID controller)

KWD
AMKASYN compact double inverter to control two motors

KE/KW
Modular AMK drive system (contains compact power supply KE, compact inverter KW with controller card and applicable option card)

L

LSB
Least Significant Bit

LR
Position control

M

MHB
Motor holding break

M(N)
Nominal torque

Modulo
Modulo processing of position setpoint and actual values

MPU
Measuring steps of the encoder per revolution (digital value for P- and Q-encoders)

MSB
Most Significant Bit

MST
Master synchronization telegram

MDT
Master Data Telegram from master to slave

N

n
Speed

n(act)
Actual speed value

NHN
Heights measured above the base height levelReference plane for heights over the sea level for Germany since 1992. The reference plane is located in Germany on the church in Wallenhorst.

NIP
Zero pulse of encoder

NK
Cam switch

O

O
Output

Operational
In state operational, data are transferred cyclically via fieldbus

P

PDK_xxxxxx_abcdefgh
Product documentation; xxxxxx - AMK part no. , abcdefgh - name

PELV
Protective Extra Low Voltage

P-encoder
Absolute encoder singleturn, EnDAT 2.2 light

PGT
Periphery basic clock Fetch cycle in the basic device to which the drive controller is synchronized (The cycle time is according to ID2)

Pre-operational
In pre-operational state, the controller can access the bus participants via the service channel. No cyclic data is exchanged.

PTC
PTC resistor

PWM
Pulse width modulation

Parameter
Identification number acc. to SERCOS standard

Q

QUE
Acknowledgment DC bus on; shows that DC bus is loaded

Q-encoder
Absolute encoder multiturn, EnDAT 2.2 light

QBR
Acknowledgment motor holding brake

QRF
Acknowledgment controller enable; the drive is controlled in the activated operation mode

R

Resolver
Absolute angle encoder singleturn (1 sine and cosine track per rotation)

RF
Command 'Controller enable'; the drive is energized and will be controlled depending on the selected operation mode. Controller enable can only be set if the device is error-free (SBM = TRUE) and acknowledgement DC bus on is set (QUE = TRUE).Acknowledgement controller enable (QRF) is set.

S

SAK
Following distance error compensation

SA
Safe output

SWC
Software commutation

STO
Safe torque off (Safety function acc. to DIN EN 61800-5-2)

SS1
Safe Stop 1 (Safety function acc. to DIN EN 61800-5-2)

SW
Software

SERCOS
Standardized digital interface for communication between controller and field bus participants.

S-encoder
Absolute encoder, singleturn, RS485 Hiperface with sine and cosine track

SEEP
Device-internal memory, serial EEPROM

SE
Safe input

SBM
System ready message; shows that the device is error-free In case of error. SBM will be reset

SoE
Servodrive Profile (SERCOS) over EtherCAT (Acc. to IEC 61800-7-300)

T

T-encoder
Absolute encoder, multiturn, RS485 Hiperface with sine and cosine track

Tn
Integral-action time in speed control (PID controller)

TR
Rotor time constant

Td
Differentiating time in speed control (PID controller)

U

U/f
Voltage / frequency control (open loop)

V/f
Voltage / frequency control (open loop)

U-encoder
Absolute encoder, singleturn, RS485 Hiperface with sine and cosine track

UE
Command 'DC bus on' control signal to load the DC bus e.g. in KE. DC bus on can only be set if the device is error-free (SBM = TRUE). After the DC bus is loaded, the acknowledgement message QUE is set.

V

V-encoder
Absolute encoder, multiturn, RS485 Hiperface with sine and cosine track

Y

Y-encoder
Absolute encoder, singleturn or multiturn, RS485 Hiperface DSL

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.

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Thank you for your assistance.
Your AMKmotion documentation team

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

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