AMKmotion
Software description
Use of the
software package safety
Products:
KW-R07 / KW-R17 / KW-R27
iC / iX / iDT5

Version: 2023/27
Part no.: 204748

Translation of the "Original Dokumentation"

AMKmotion

MEMBER OF THE ARBURG FAMILY

Imprint

Name: PDK_204748_SW-Paket_Safety

Version:

Version: 2023/27	
Change	**Letter symbol**
AMKmotion Design	LeS

Previous version: 2019/03

Product version:

Product (Part no.)	Firmware version (Part no.)	Hardware version (Part no.)
SW package safety	V1.07 2016/11 (47670)	-

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

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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)

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Content

1 About this documentation

1.1 Structure of this document

Topic	Chapter	Chapter number
Validity, use and the propose of the documentation	Imprint	-
	About this documentation	1
Safety	For Your safety	2
Information about the software package	Product overview	3
Information • about installing the software on the PC • about flashing the controller card	PC prerequisites	4
	Determining the actual state	5
	Installation	6
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 Target group

Any person who is entitled and intends to install the software of the software package at hand to the respective target system must read, understand, and observe this document.

1.4 Purpose

This document describes the use of the 'software package safety' (Part no. 47670).
It describes the several files, provides support when determining the actual states, and gives information about installing the software on the PC or flashing the firmware onto the drive controller.

1.5 Display conventions

Display	Meaning
	This symbol points to parts of the text to which particular attention should be paid!
	The arrow indicates points in a software, to which must be clicked.
'Names'	Names are represented with apostrophes e. g. parameters, variables, etc.
'Text'	Menu items and buttons in a software or on a controller, e. g.: Click the **'OK'** button in the **'Options'** menu to call up the 'Delete PLC program' function
>xxx<	Placeholder, variables, e. g. IP address of the controller: >192.168.0.1<
→	Task procedure / operating sequence, e. g. **'Start'** → **'All programs'** → **'Additional'** → **'Editor'** e. g. 0 → 1 edge
See 'chapter name' on page x	Executable cross-reference in electronic output media

1.6 Appendant documents

Device descriptions

Part no.	Title
202744	Controller cards KW-R06 / -R16 / -R07 / -R17
204918	Controller cards KW-R24(-R) / -R25 / -R26 / -R27
203445	Decentralized drive technology iC / iX / iDT5

Functional descriptions

Part no.	Title
204979	Software description AIPEX PRO V3 (PC software for startup and parameterization)
203446	Safety manual; functional safety
205016	Safety manual; functional safety, excerpt for iC / iX / iDT
205092	Safety manual; functional safety
203704	Parameter description KW-R06 / -R16 / -R07 / -R17
203771	Software description ATF - AMK Tool Flasher (PC software for firmware update)
204539	Initial startup KE/KW
204737	Initial startup of decentralized drives

The above mentioned device and functional descriptions are embodied in the 'AMK Online Documentation'.

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 Intended use

The software package safety contains programs and files for flashing the certified version of the safety firmware to the drive controller:

- KW-R07 / KW-R17 / KW-R27
- iC / iX / iDT5

2.4 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

2.5 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	Order number
Software package safety (as CD)	O900
Software package safety (as zip file, alternative to CD)	206598

3.2 Product description

The software package safety as CD (Part no. 47670) as well as the zip file (Part no. 206598) contain the following files:

Item	File name	Description	Version	Part no.
1	AESF1_SW_107_1611_206082.zip	Firmware functional safety	1.07 2016/11	206082
2	AMK-PrmTable_default_206081_ V1.20.prm	Safe default parameter set	1.20 2016/11	206081
3	PDK_203446_Sicherheitshandbuch_KW-R07_de.pdf PDK_203446_Sicherheitshandbuch_KW-R07_en.pdf	Safety manual functional safety excerpt for KW-R07 / -R17 / -R27	2016/31	203446
4	PDK_205016_Sicherheitshandbuch_iX_de.pdf PDK_203446_Sicherheitshandbuch_iX_en.pdf	Safety manual functional safety excerpt for iC / iX / iDT	2016/31	205016
5	PDK_205092_Sicherheitshandbuch_de.pdf PDK_205092_Sicherheitshandbuch_en.pdf	Safety manual; functional safety	2016/31	205092
6	PDK_204748_SW-Paket_Safety_de.pdf PDK_204748_SW-Paket_Safety_en.pdf	Use of the software package safety (document at hand)	2016/11	204748

Item 1:

The file 'AESF1_SW_107_1611_206082.zip' contains the firmware for the safety device. The firmware will be flashed to the safety devices by means of the program 'ATF - AMK Tool Flasher'.

Item 2:

The safe default parameter set will be installed automatically with AIPEX PRO ≥ V3.03 + SP2 or V3.04 + Option SafePMT.

Item 3:

The safety manual contains the AMK product documentation about the functional safety for KW-R07 / -R17 / -R27 drive controllers.

Item 4:

The safety manual contains the AMK product documentation about the functional safety for iC / iX / iDT5 drive controllers.

Item 5:

The safety manual contains the AMK product documentation about the functional safety for all drive controllers.

Item 6:

The software description at hand illustrates the installation of the several software products.

4 PC prerequisites

The PC on which the software will be installed, must at least meet the following prerequisites:

4.1 Operating system

- Operating system Windows XP, SP3
- Microsoft .NET Framework 3.5 SP1 or higher
  (Download under www.microsoft.com/en-us/download/details.aspx?id=25150)

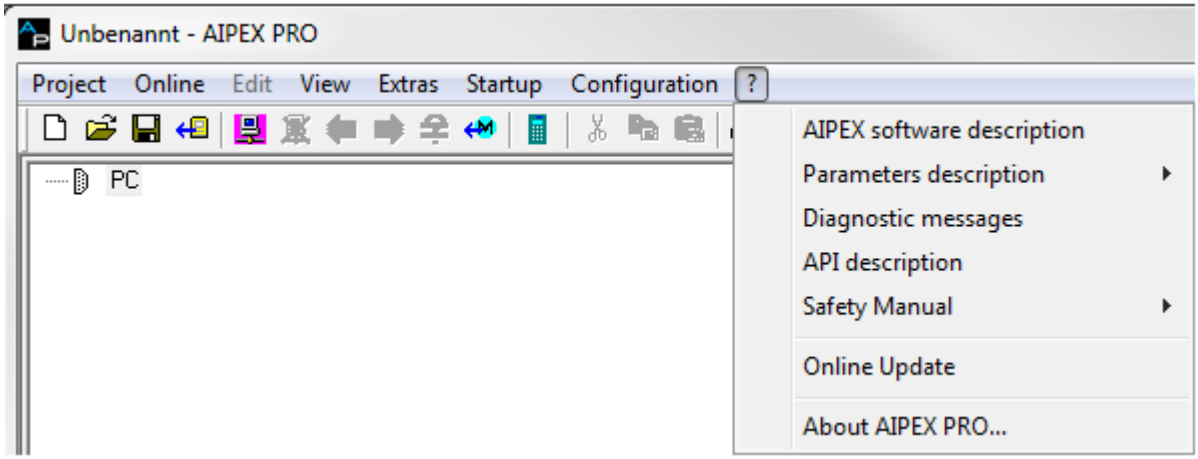
4.2 AMK software product AIPEX PRO

It is necessary to install the AMK software product AIPEX PRO ≥ V3.03 + SP2 or V3.04 (Part no. O907).
AIPEX PRO includes also the software safe parameter editor SafePMT Version V1.20.
The SafePMT is necessary to do the correct settings in the safe parameter set.
If older versions of the SafePMT or AIPEX PRO are already installed, they must be deinstalled first.

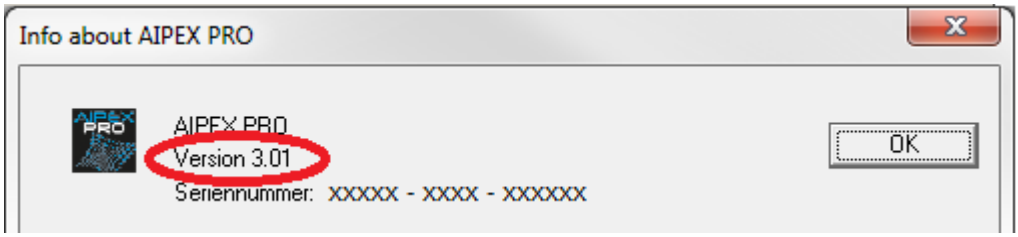
5 Determining the actual state

5.1 Determining AIPEX PRO version

1. Start AIPEX PRO
2. Select **'?' → 'About AIPEX PRO'**



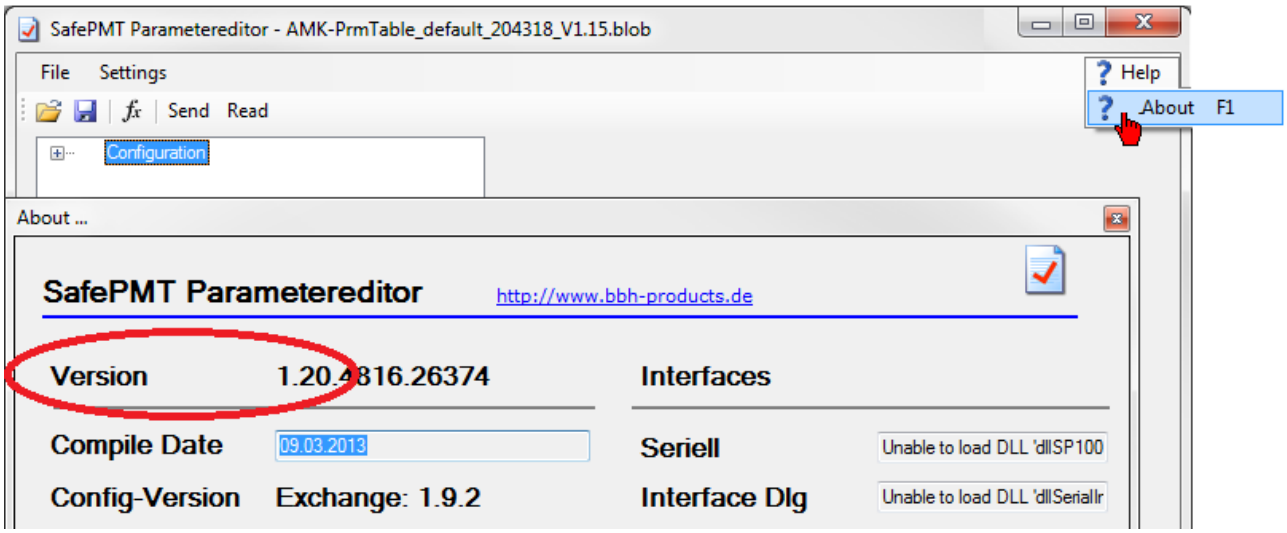
3. Check the version at hand:



- If version V3.03 + SP2 or V3.04 or higher is installed, you do not need any update.

5.2 Determining SafePMT version

1. Start SafePMT (z. B. Software AIPEX PRO → **'Direct mode' → 'Functional Safety' → 'Start PMT'**)
2. Select **'? Help' → '? About F1'**
3. Check the version at hand:



- If version 1.20 is installed, you do not need any update.

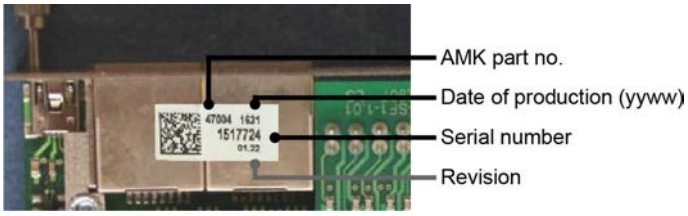
5.3 Hardware revision

5.3.1 Hardware revision: KW-R07 / KW-R17 / KW-R27

Controller card	Order number	Revision
KW-R07	O807	≥ 1.16
KW-R17	O873	≥ 1.11
KW-R27	O957	≥ 2.12

(Example: KW-R07)

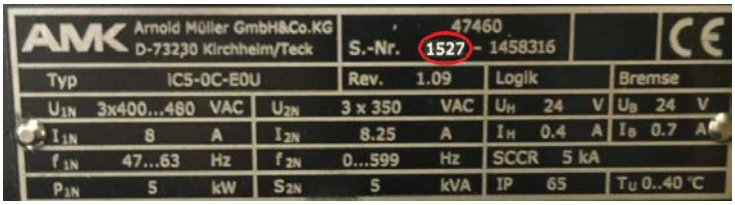
On the connectors X85 / X86 of the controller card, you will find a label showing the AMK part-no., date of production, serial number and hardware revision.



- If your controller card is of a lower hardware revision as above mentioned, please contact your AMK representative.

5.3.2 Hardware revision iC / iX / iDT5

Device	Order number	Date of manufacture acc. to the nameplate
iC	depends on the device type	≥ 1536 → year 2015, week 36 The manufacturing date is part of the serial number on the nameplate: Example: 1527 - Year: 2015, Week: 27
iX		
iDT5		



5.4 Firmware version

5.4.1 Firmware version: KW-R07 / KW-R17 / KW-R27

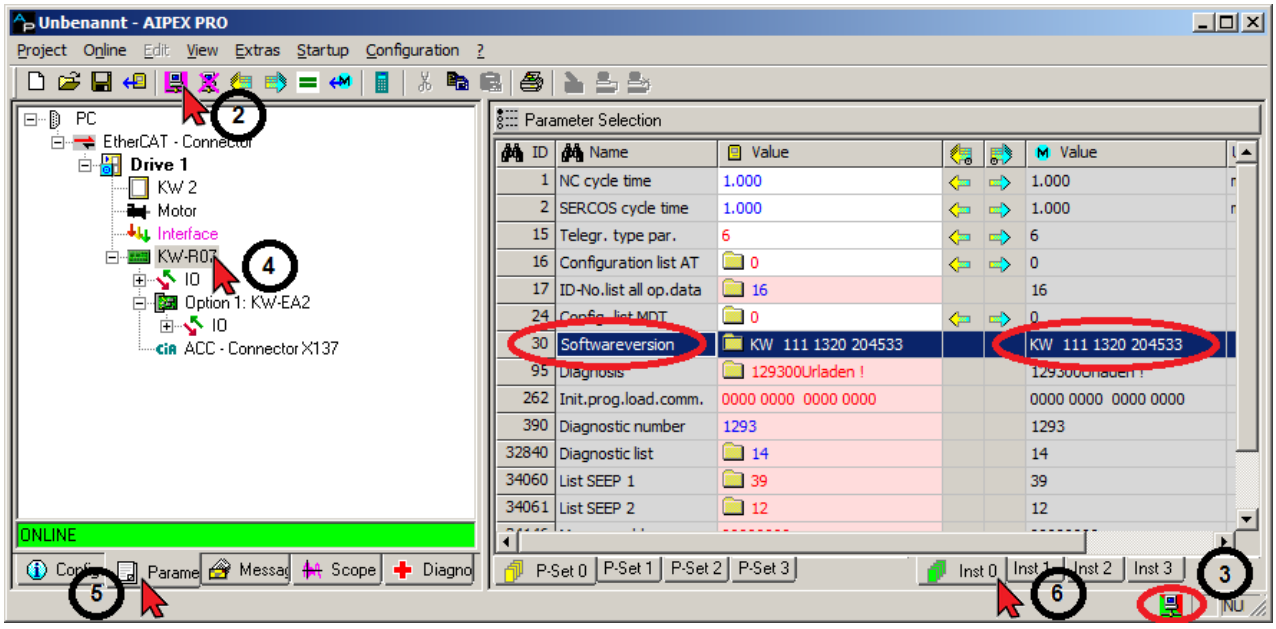
Function	Firmware name	Version	Part no.	Display in AIPEX PRO (ID30) example
Controller card (KW-R07 / KW-R17)	AER5-6_SW	≥ 01.11 2013/20	204533	KW 111 1320 204533
Controller card (KW-R27)	AER26_SW	≥ 02.12 2018/40	207284	-
Safety board safety firmware	AESF1_SW	1.07 2016/11	206082	MON 105 S107 206082

Identifying the controller firmware version

1. Install the controller card into the compact inverter where it will run (Already installed at the factory).
   Connect your PC with the USB interface X235 or the Ethernet interface X85 of the controller card.
2. Start the software AIPEX PRO and log on to the controller.
   Information about the use of AIPEX PRO you can get from the Software description AIPEX PRO V3 (Part no. 204979).
3. The monitor display downright changes from red to green background.
4. Select the controller card from the device tree.
5. Change to the parameter list.
6. Select Inst 0.
   The parameter ID30 'Software version' in instance 0 displays the version of the controller firmware:

Instance 0: version of the controller firmware

KW vvv yyww nnnnnn [1)]



1) vvv - version
yyww - year and calendar week of the version
nnnnnn - Part no. of the controller firmware

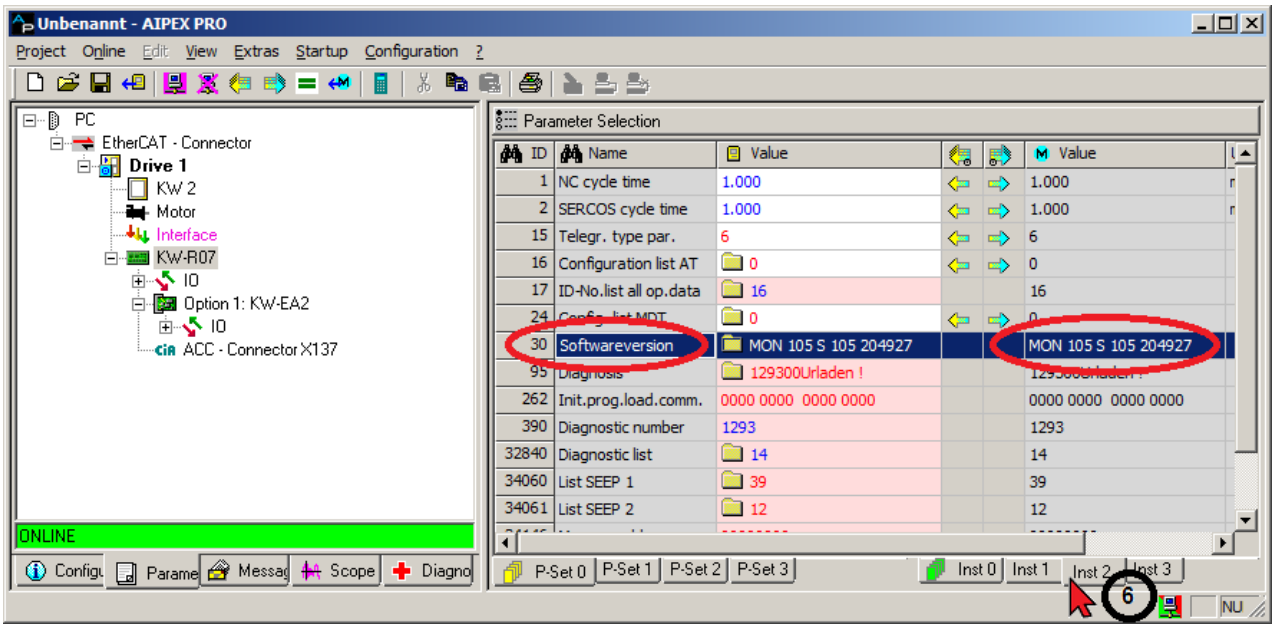
- If a lower version is installed on the controller card as above mentioned, please contact your AMK representative.

Identifying the safety firmware version

6. Select Inst 2.
   The parameter ID30 'Software version' in instance 2 displays the version of the safety firmware:

Instance 2: version of the safety firmware

MON xxx S vvv nnnnnn [2)]



*) MON xxx - version of the boot monitor (xxx ≥ 105)
S vvv - version of the safety firmware
yyww - year and calendar week of the version
nnnnnn - Part no. of the safety firmware

- If a lower version of the safety firmware as above mentioned is installed on the controller card, please update it.
Siehe 'Controller card KW-R07 / KW-R17 / KW-R27' auf Seite 17.

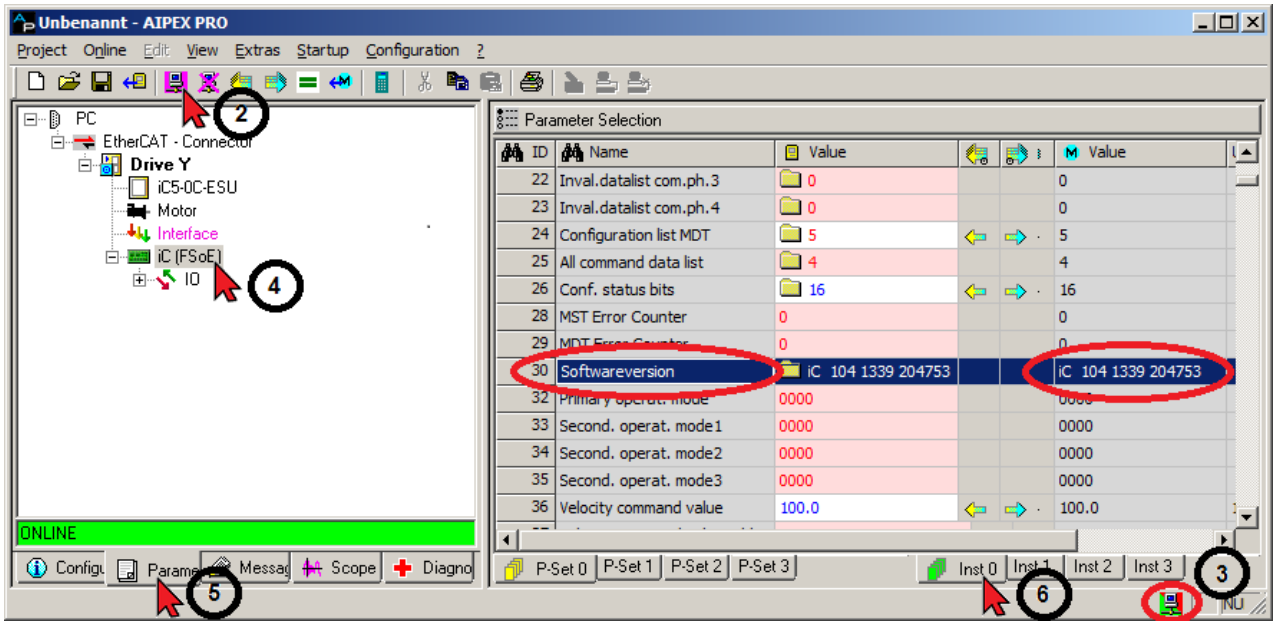
5.4.2 Firmware version: iC / iX / iDT5

Firmware	Firmware name	Version	Part no.	Display in AIPEX PRO (ID30) example
iC	iX_SW	≥ 104_1339	204753	iC 104 1339 204753
iX				iX 104 1339 204753
iDT5				iDT_104 1339 204753
safety device	AESF1_SW	1.07 2016/11	206082	MON 107 S105 206082

Identifying the controller firmware version:

1. Connect your PC to tghe device with the real-time Ethernet interface (EtherCAT) X85.
2. Start the software AIPEX PRO and log on to the controller.
   Information about the use of AIPEX PRO you can get from the Software description AIPEX PRO V3 (Part no. 204979).
3. The monitor display downright changes from red to green or green/red background.
4. Select the controller from the device tree.
5. Change to the parameter list.
6. Select Inst 0.
   The parameter ID30 'Software version' in instance 0 displays the version of the controller firmware:

   Instance 0: version of the controller firmware
   <device> vvv yyww nnnnnn [1)]



1) vvv - version
yyww - year and calendar week of the version
nnnnnn - Part no. of the controller firmware

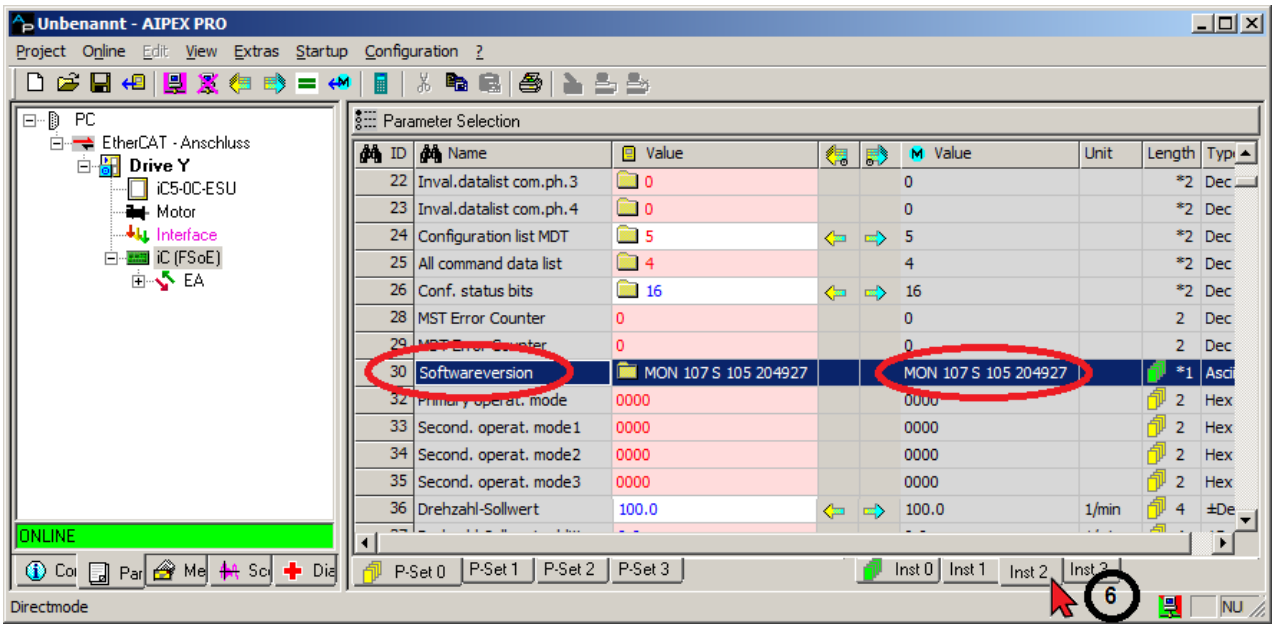
- If a lower version is installed on the controller card as above mentioned, please contact your AMK representative.

Identifying the safety firmware version

6. Select Inst 2.
   The parameter ID30 'Software version' in instance 2 displays the version of the safety firmware:

Instance 2: version of the safety firmware

MON xxx S vvv nnnnnn [2)]



*) MON xxx - version of the boot monitor (xxx ≥ 105)
S vvv - version of the safety firmware
yyww - year and calendar week of the version
nnnnnn - Part no. of the safety firmware

- If a lower version of the safety firmware as above mentioned is installed on the controller card, please update it.
Siehe 'Controller card KW-R07 / KW-R17 / KW-R27' auf Seite 17.

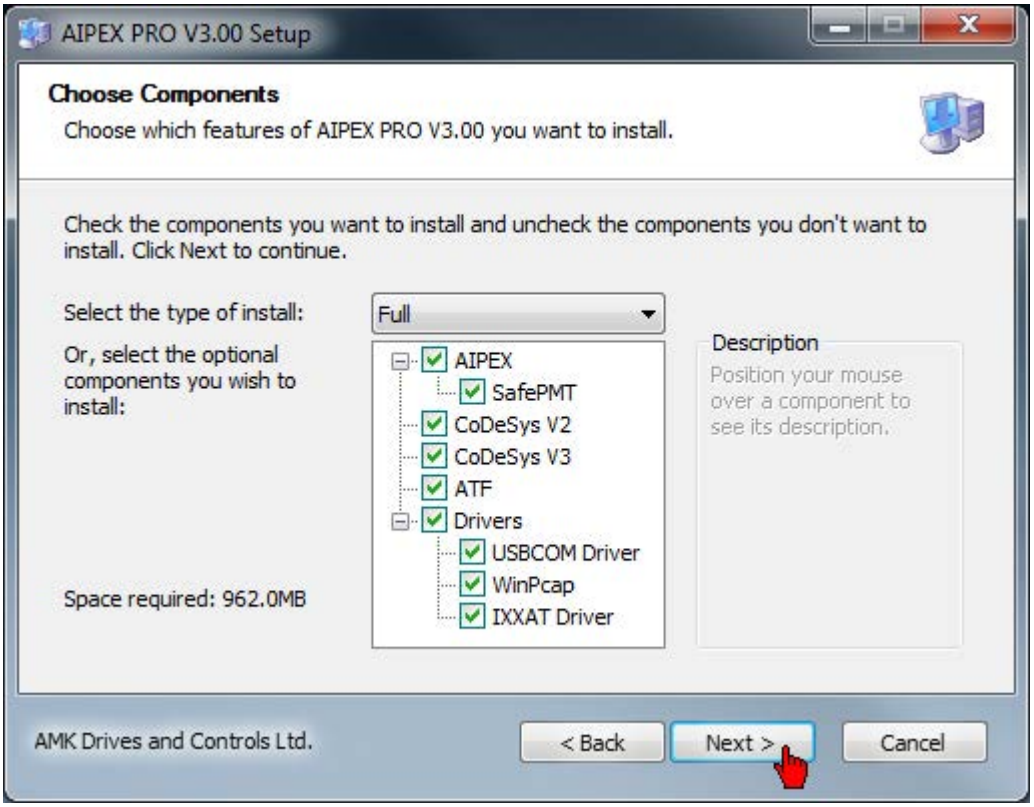
6 Installation

6.1 Installations on the PC

6.1.1 AIPEX PRO ≥ V3.03 + SP2 Option SafePMT

Installation instructions for AIPEX PRO V3 can be found in the Software description AIPEX PRO V3 (Part no. 204979).

Option SafePMT must be selected when installing AIPEX PRO version ≥ V3.03 + SP2 or V3.04.



6.1.2 Safe default parameter set AMK-PrmTable_default

When installing the safe parameter editor, the safe default parameter set will automatically be copied to the directory C:\programs\common files\AMK\Safety

Hint for Windows 7

Dependent onto the personal user rights, it might not be possible to read and write into the directory C:\programms\common files\AMK\Safety\.

In this case, you have to copy the SafePMT default-parameter set to a directory with read and write access. The path ‘Templates‘ in the SafePMT settings must be obligatory linked to this directory.

6.2 Flashing the functional safety firmware and loading save parameter set

6.2.1 Controller card KW-R07 / KW-R17 / KW-R27

Preparations

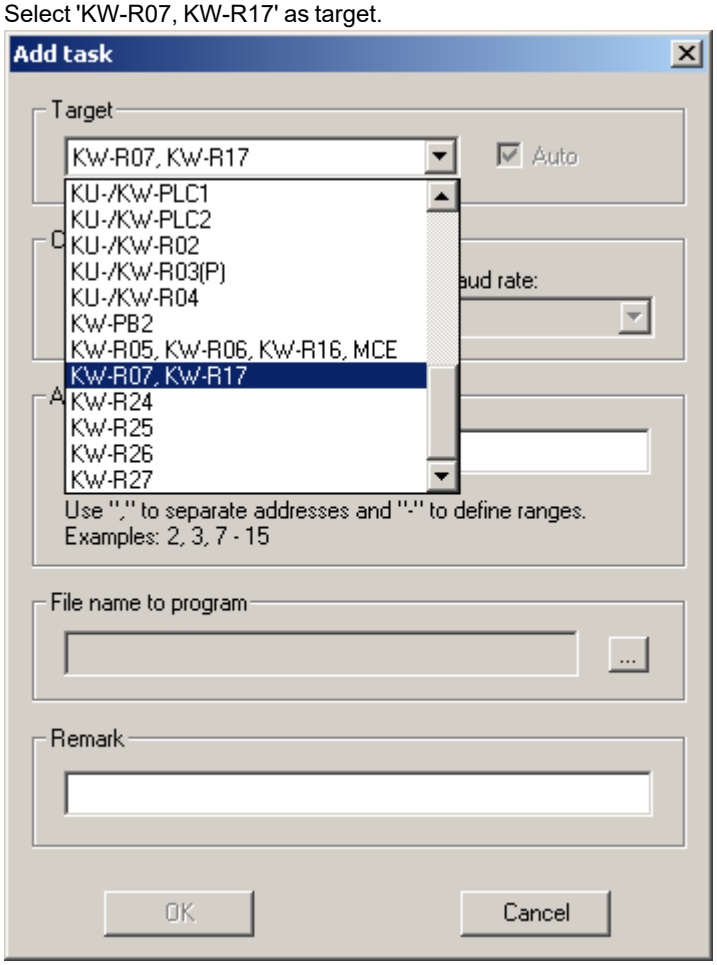
1. If the controller card KW-R07 / KW-R17 / KW-R27 is already built into the compact inverters, follow point 2 of the preparation. Step 1 must be done only if the controller card KW-R07 / KW-R17 / KW-R27 will be replaced. Install the new controller card KW-R07 / KW-R17 / KW-R27 into the compact inverter in which it will operate.
2. Connect your PC via point to point connection to the USB interface X235 or to the Ethernet interface X85 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 document Software 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).

Implementation

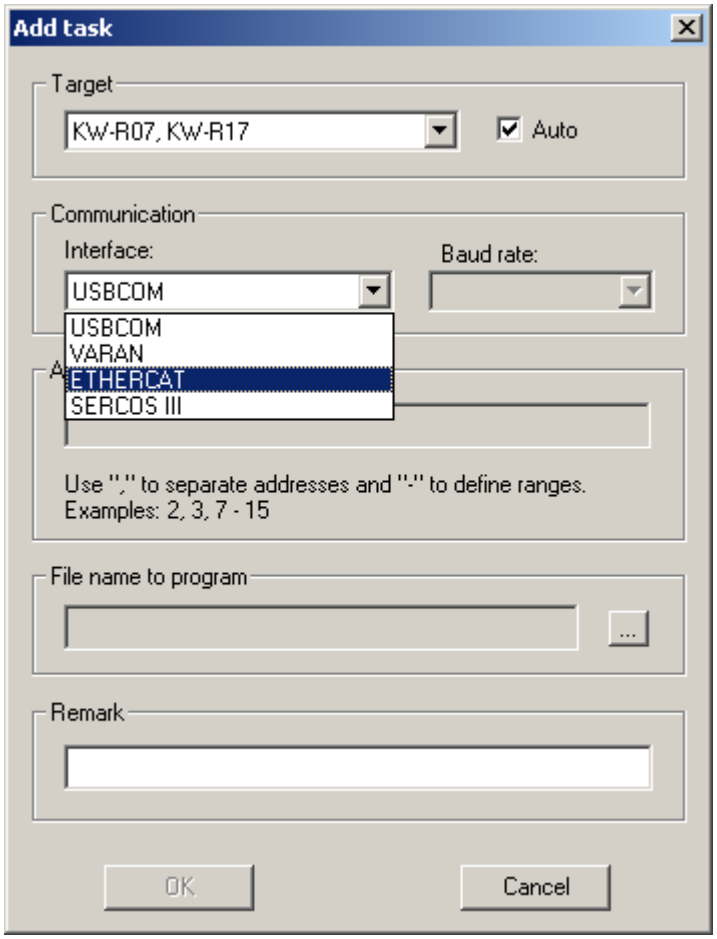
(Example KW-R07)

1. step: selecting target hardware and firmware

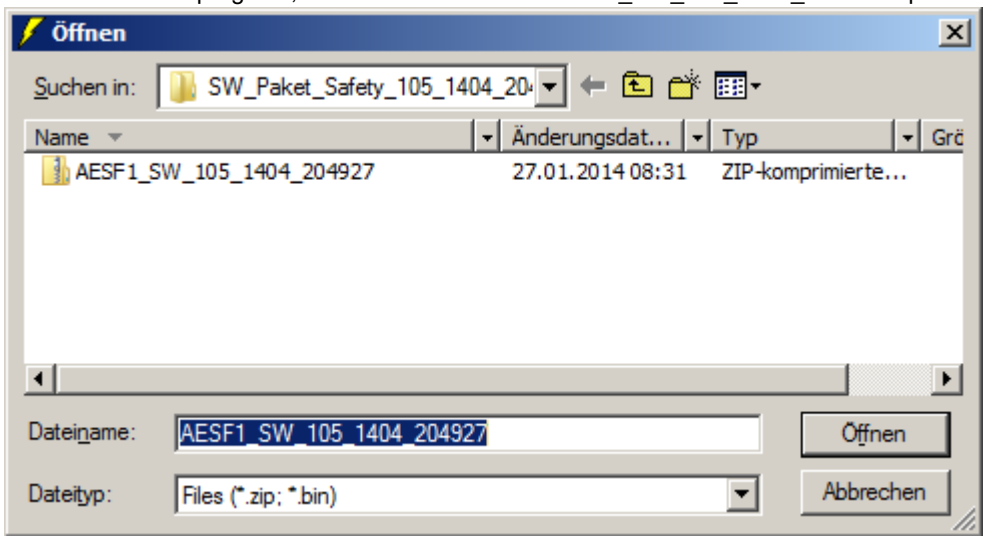
1. Select **'Task'** -> **'Add...'**
2. Select 'KW-R07, KW-R17' as target.



3. With 'Communication', select an interface.



4. With 'File name to program', select the firmware file AESF1_SW_105_1404_204927.zip.

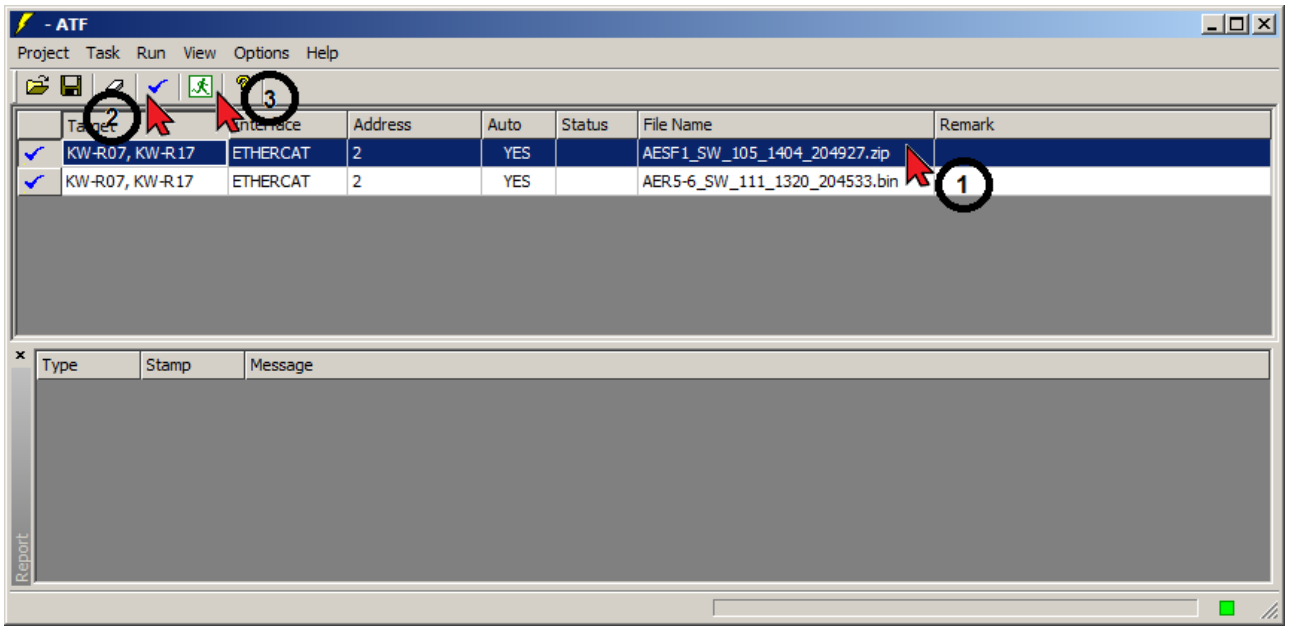


5. Confirm all entries with **'OK'**

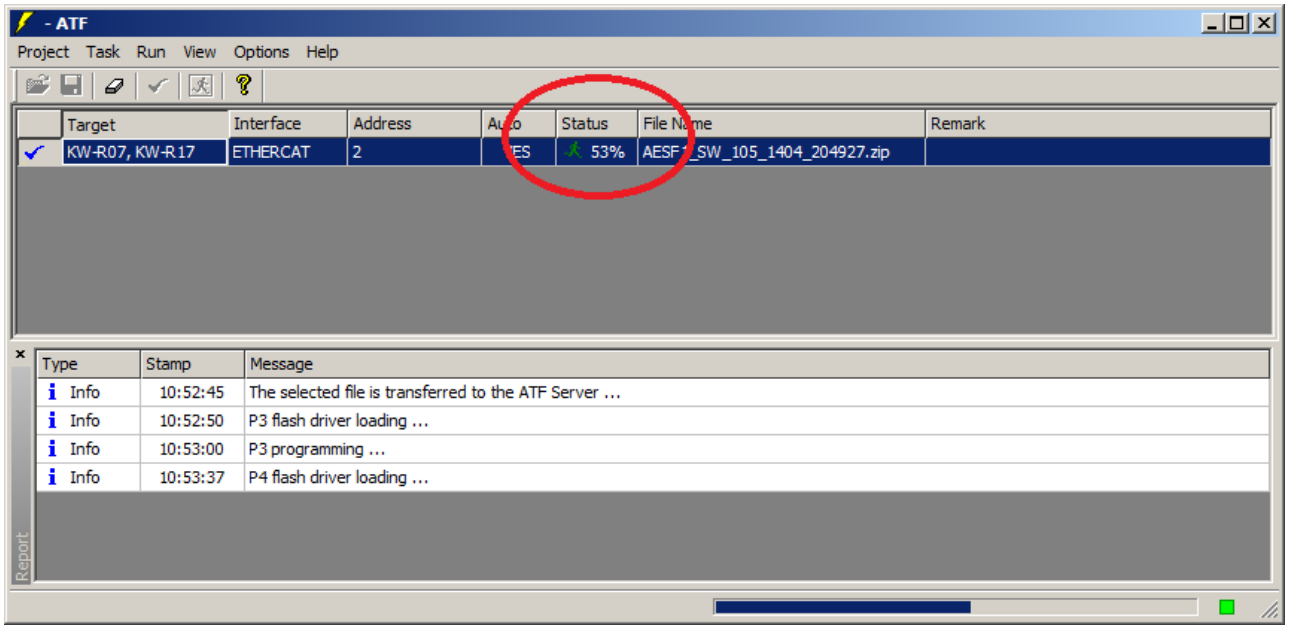
2. step: transferring the firmware to the controller card

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

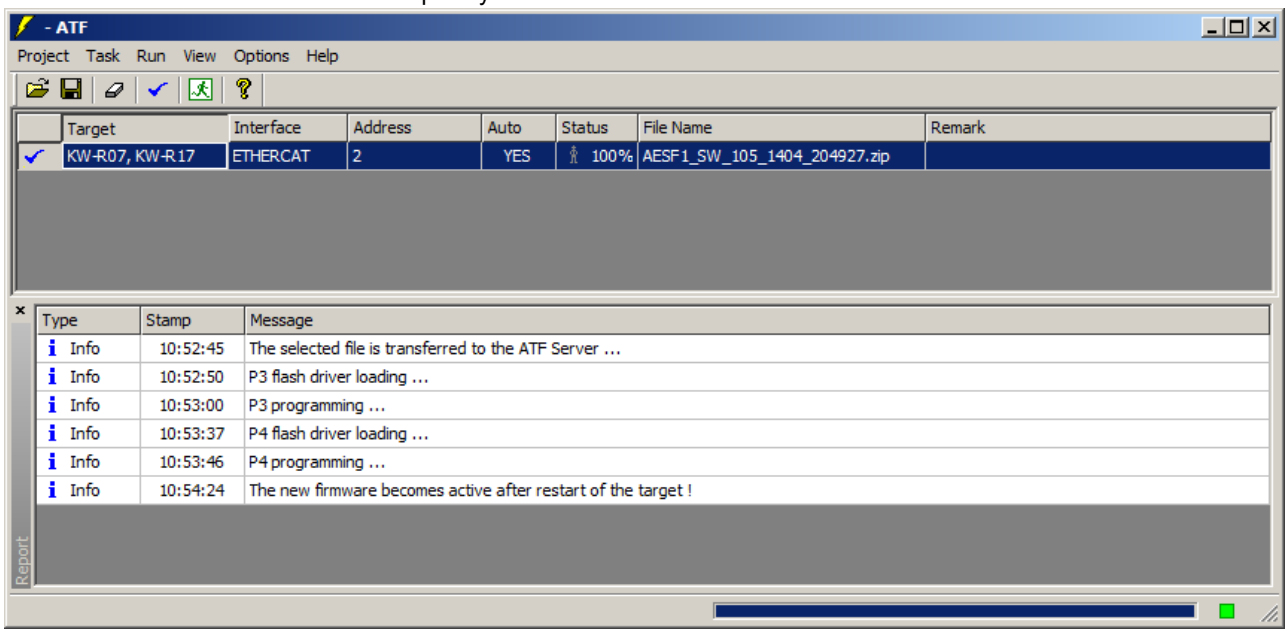
3. Start the update with  .



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



5. Exit the ATF after the firmware was completely transferred.



6. Switch the controller off and on again. The new firmware will be activated.

If you want to flash the controller firmware, too, you can do it subsequently without switching the controller off. Therefore, add a new task with the respective controller firmware (≥ AER5-6_SW_111_1320_204533)

3. step: transferring the safe parameter set to the drive

1. By installation of the new safety firmware, the check sum CRC of the safe parameter set becomes invalid.
   When restarting the controller card, the LED H6 will stay off.
   You will get the error message 3609 'Safety - Faulty parameter transfer' which can be read with AIPEX PRO.

2. Parametrise the functional safety
   - If there is an existing parameter set (file >drive_name<.blob):
     Load this parameter set to the SafePMT, transfer it to the drive and validate it.
     See documentSafety manual; functional safety, chapter startup, subtopic Parameterisation, Step 5 ff.
   - If you do not have access to the safe parameter set, newly parametrise the functional safety of the drive.
     See documentSafety manual; functional safety, chapter Startup, subtopic Parameterisation.

3. Generate the parameterisation report.

Completion

1. Check the not safe drive parameters:
   - If you got a backup file >drive_name<.aipex, transfer it to the drive by means of AIPEX PRO.
   - If there is no existing parameter file, startup the drive as described in the document Initial startup KE/KW (Part no. 204539).
2. If you connected your PC to the controller card via Ethernet interface, remove this connection and re-integrate the device to its network.

6.2.2 Decentralize Drives iX / iC / iDT5

Preparations

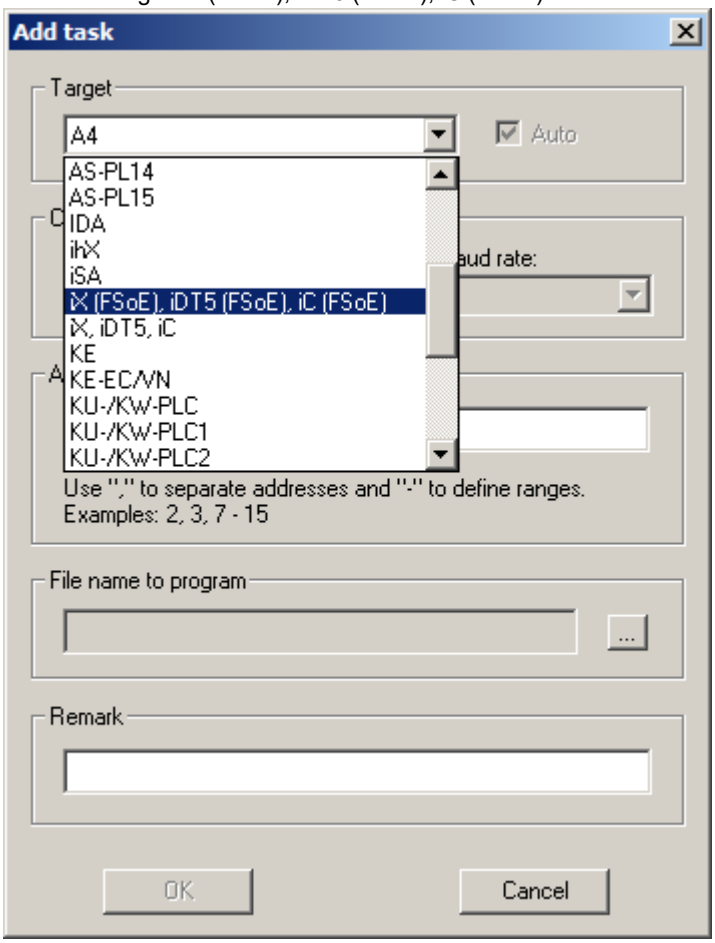
1. Connect your PC via point to point connection with the the Ethernet interface X85.
   Connect the drive to the 24 VDC supply voltage.
   Wait until the drive is initialized.
   - LED H1 green continuous light: SBM (system ready message)
   - LED H2 red continuous light: Error

2. If LED H2 displays an error, you may read it with AIPEX PRO:
   Start AIPEX PRO and log on to the drive. (See document Software description AIPEX PRO V3, Part no. 204979).
   You may initially ignore these messages.
   Log out and close AIPEX PRO.
3. 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).

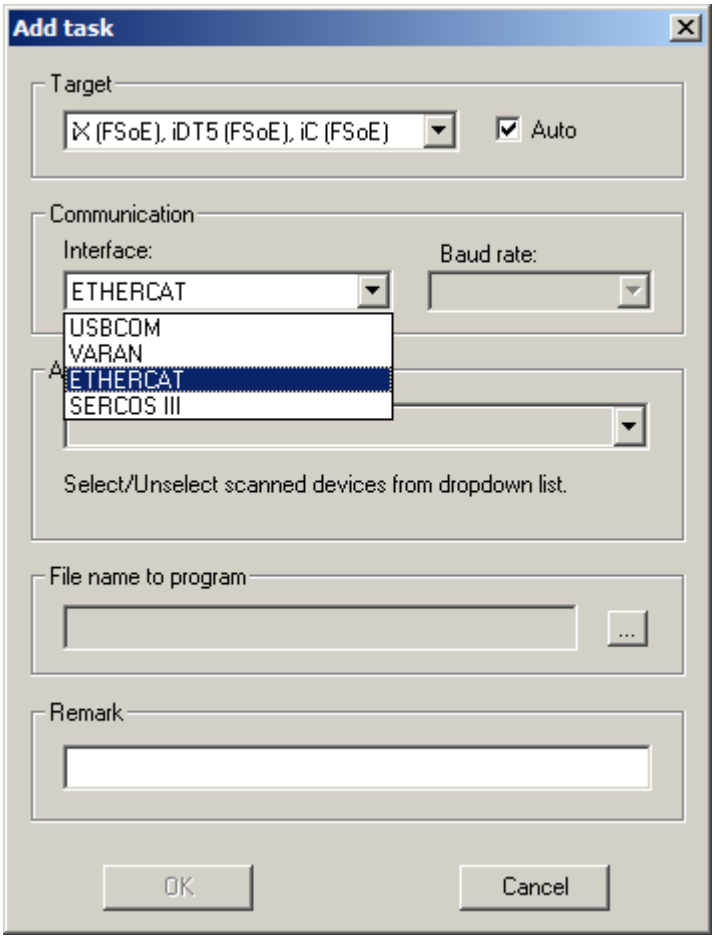
Implementation

1. step: selecting target hardware and firmware

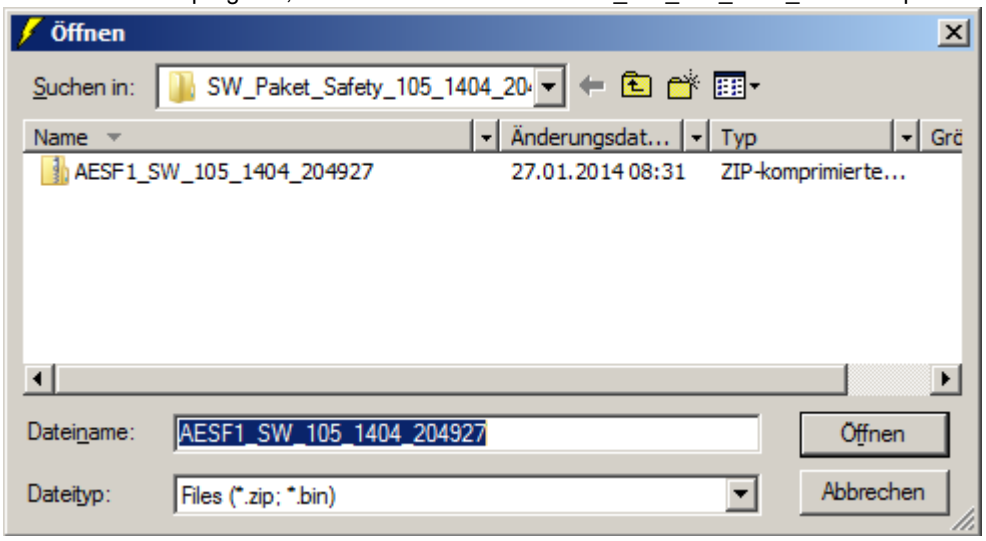
1. Select **'Task'** -> **'Add...'**
2. Select the target 'iX (FSoE), iDT5 (FSoE), iC (FSoE)'.



3. With 'Communication', select an interface.



4. With 'File name to program', select the firmware file AESF1_SW_105_1404_204927.zip.

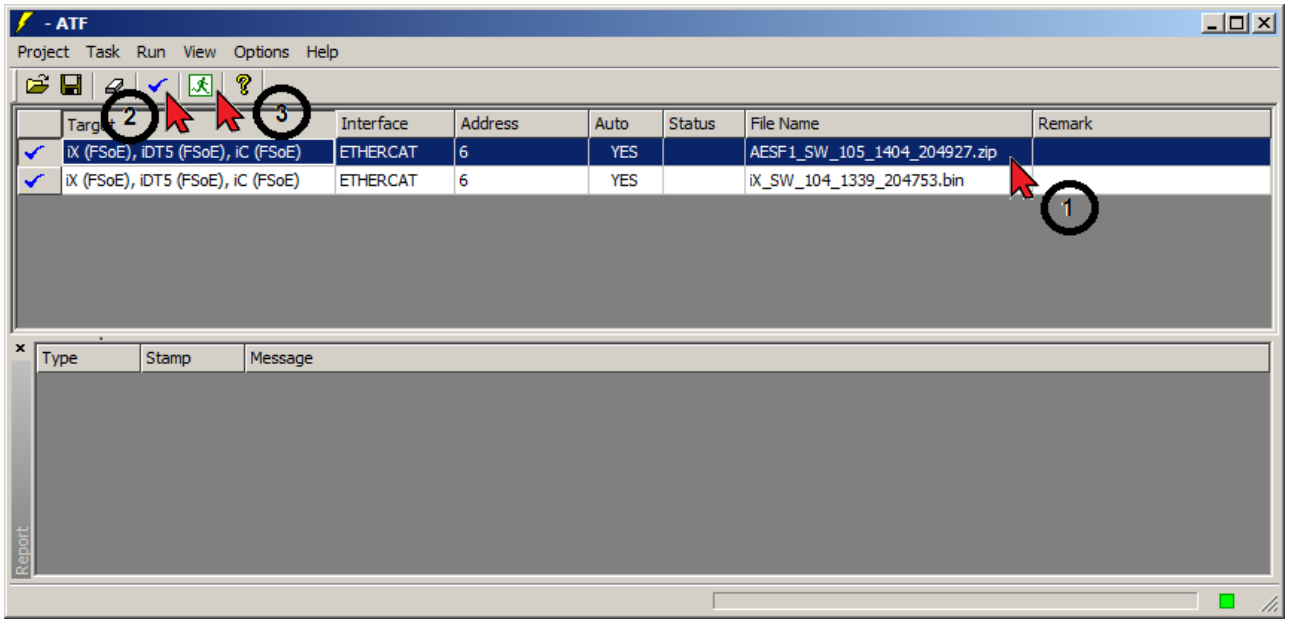


5. Confirm all entries with **'OK'**

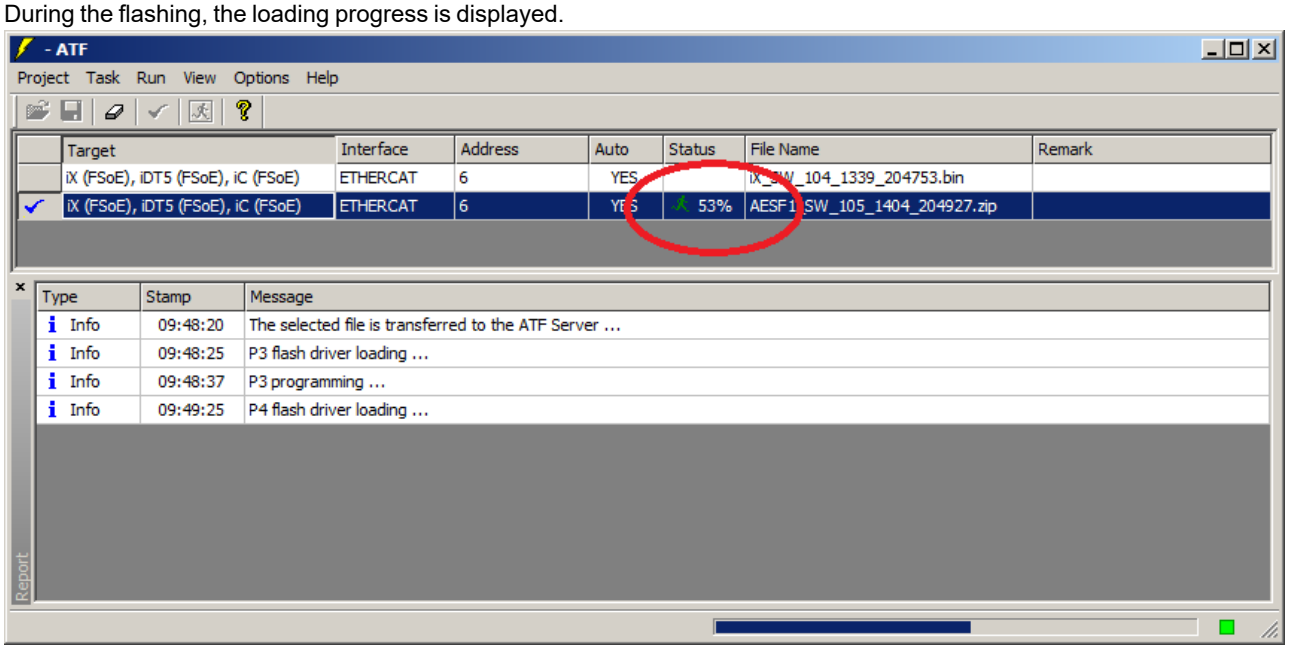
2. step: transferring the firmware to the controller card

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

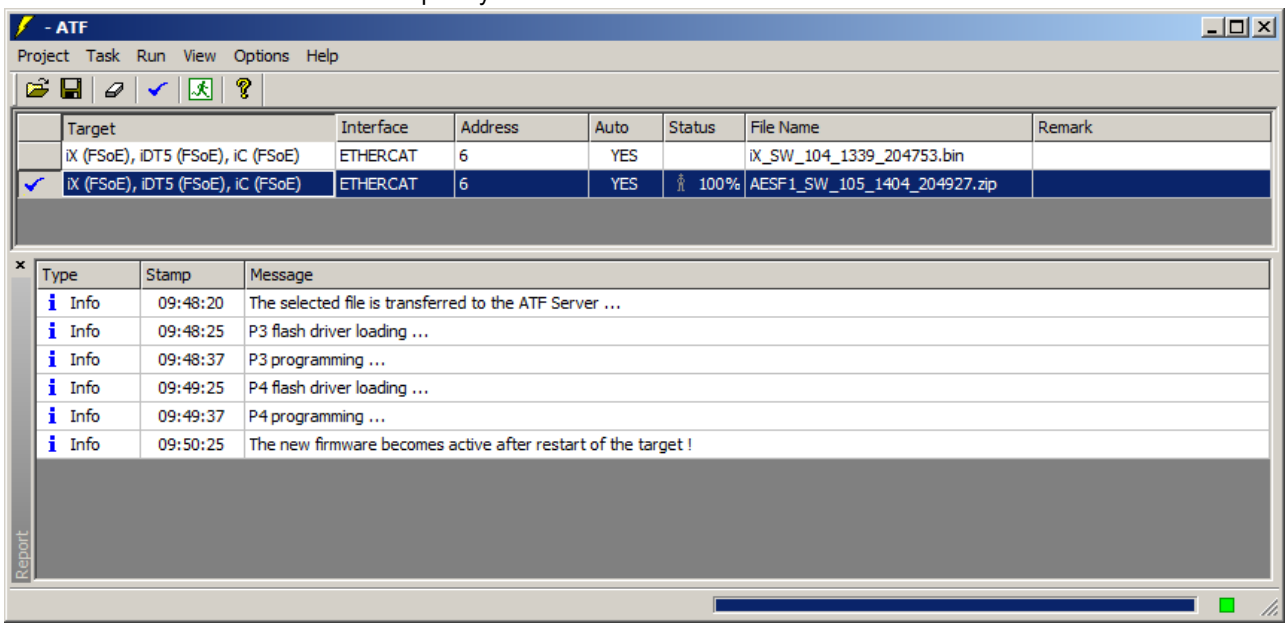
3. Start the update with  .



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



5. Exit the ATF after the firmware was completely transferred.



6. Switch the controller off and on again. The new firmware will be activated.

If you want to flash the controller firmware, too, you can do it subsequently without switching the controller off. Therefore, add a new task with the respective controller firmware (≥ iX_SW_104_1339_204753).

3. step: transferring the safe parameter set to the drive

1. By installation of the new safety firmware, the checksum CRC of the safe parameter set becomes invalid.
   When restarting the drive, the LED H2 of the decentralize drive will stay off.
   You will get the error message 3609 'Safety - Faulty parameter transfer' which can be read with AIPEX PRO.
2. Parametrise the functional safety
   - If there is an existing parameter set (file >drive_name<.blob):
     Load this parameter set to the SafePMT, transfer it to the drive and validate it.
     See documentSafety manual; functional safety, chapter startup, subtopic Parameterisation, Step 5 ff.
   - If you do not have access to the safe parameter set, newly parameterise the functional safety of the drive.
     See documentSafety manual; functional safety, chapter Startup, subtopic Parameterisation.
3. Generate the parameterisation report.

Completion

1. Check the not safe drive parameters:
   - If you got a backup file >drive_name<.aipex, transfer it to the drive by means of AIPEX PRO.
   - If there is no existing parameter file, startup the drive as described in the document Initial startup KE/KW (Part no. 204539).
2. If you connected your PC with the drive via the real-time Ethernet interface, remove this connection and re-integrate the device to its network.

Glossary

A

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

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

D

Default
Factory setting

DI
Digital input

DO
Digital output

E

EMV
Electromagnetic compatibility

EMC
Electromagnetic compatibility

EnDat 2.1
Motor encoder interface protocol of the company Heidenhain

EnDat 2.2
Motor encoder interface protocol of the company Heidenhain

EtherCAT
Real-time Ethernet bus

F

Firmware
System software, loaded by AMK

FSoE
Fail-Safe over EtherCAT

I

iX
AMKASMART decentralized inverter

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

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)

ID
Parameter identification numbers acc. to SERCOS Standard

iC
AMKASMART decentralized inverter with power supply

iDT
AMKASMART Servo motors with integrated inverter

K

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

KW
AMKASYN compact inverter

KW-Rxx
AMKASYN controller card for installation into compact inverter

M

Modulo
Modulo processing of position setpoint and actual values

N

NK
Cam switch

P

Parameter
Identification number acc. to SERCOS standard

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

Q

QBR
Acknowledgment motor holding brake

S

SafePMT
Safe parameter editor

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

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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or
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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

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