AMK

AMKASYN

VARIABLE SPEED DRIVES

AMKASYN

Digital drive systems

Option card AE-PSC

- **Programmable control PS**
- **CAN Interface (CAN-S)**

Option card for AZ/AW systems in the version AZ-CNS
Option card for KU systems in the version KU-PSC

Hardware description

Important notes

Due to possible destruction of components by static discharge, touching the electrical connections on the option card should be avoided.

Please attach option card directly from the packaging in the option slot of the KU or AZ module without exerting force and secure with the screw on the front panel.

AMK Arnold Müller, Antriebs- und Steuerungstechnik GmbH & Co.KG, D-73221 Kirchheim/Teck,
Tel.: 07021/50 05-0, Telefax: 07021/50 05-176

Document overview for option card AE-PSC

The following documentation is available:

1. Product information (AMK part No.:28681)

- What is the AE-PSC?
- By what is the CAN interface of AMK characterized?
- What advantages does the CAN bus have?
- How does CAN work?
- What does integrated PS functionality mean?
- Properties and application examples of the AE-PSC
- How is the CAN network configured?
- Principles for CANopen

2. Hardware description (AMK part No.:28621)

- Short description
- Installation instructions of the option card
- Important notes on handling
- Front panel and board structure
- Interfaces and pin assignment

3. CAN network configuration (AMK part No.:28684)

- Parameter settings in the AMKASYN system
- CANopen principles
- Network configuration with CANconv program
- Example of a configuration
- AMK Tool CANconv
- AMK Tool DVLader

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1 Abbreviations and explanations

AE-PSC	**A**MKASYN **E**xtension **PS C**AN
APROS	AMK PS programming software
Arbitration	Bus access method; method with which access to the bus is regulated. Solution of the conflict if several stations want to send a message at the same time
AZ/AW system	AMKASYN modular drive system, consisting of central module and inverter modules
AZ-CNS	AMKASYN option card for AZ modules
Broadcasting	describes the possibility of addressing all subscribers to the network simultaneously
CAN	**C**ontroller **A**rea **N**etwork
CANconv	AMK Can converter auxiliary program for transferring the CAN network configuration to the master
ccb	**C**AN **c**onfiguration **b**inary file type *.ccb
ccf	**C**AN **c**onfiguration **f**ile *.ccf
CiA	**C**AN **i**n **A**utomation, international users and manufacturers group e.V.
DVLader	AMK auxiliary tool for flash database access
Emergency Service	Bus fault characteristic on failure of one or several subscribers.
Telegram header	Header information of a message (e.g. priority...)
Ident number	(ID No.) Parameter for parameterizing the AMKASYN system
NMT service	Network management service (network initialization, bus error monitoring, status monitoring of the individual devices)
Node Guarding	Network node monitoring, is performed by the NMT master
Parameter	(ID No.) by which the AMKASYN systems are parameterized
KU	AMKASYN digital compact converter
KU-PSC	AMKASYN option card for KU system
Life Guarding	NMT slave monitors whether the network node monitoring of the NMT master is performed.
PDO	**P**rocess **D**ata **O**bject
PS	**P**rogrammable control
R-PDO	**R**eceive **PDO**
SDO	**S**ervice **D**ata **O**bject
T-PDO	**T**ransmit **PDO**

2 Short description

The option card AE-PSC (**A**MKASYN **E**xtension **PS C**AN) is a plug-in type card with integrated programmable control (PS) for programming tasks close to the drive, CANopen functionality as well as CAN-S interface.

The AE-PSC option card exists in 2 versions:

- for the **AZ/AW system**: **AZ-CNS**
- for the **KU system**: **KU-PSC**

The two versions of the AE-PSC option card facilitate the coupling of the AZ/AW system with the KU system through a CAN bus network.

The CAN interface corresponds to the standard CiA CAN 2.0B. To satisfy the tasks of drive systems, the CAN interface from AMK offers apart from the standard CAN data channel a synchronous clock signal as extension and is designated as CAN-S. The clock signals of different bus subscribers are synchronized with one another with CAN-S.

The CAN-S interface consists of the CAN data channel and a synchronous clock signal with which all bus subscribers are synchronized exactly to a master clock.

The compact converters KU with integrated programmable control (PS) can be connected with one another as decentralized single-axis drives with widely differing tasks in the CAN network. This network offers real time data transmission such as a synchronous control value and the associated current actual values of the participating axes.

The network can be extended or reduced by subscribers in a simple manner.

Technical data for the AE-PSC:

Processor	C16x technology
RAM	256 KBytes
ROM (Flash)	external 512 kBytes (100000 PGM cycles, data, PS applications, ...)
ext. interfaces	CAN-S (CAN), RS422, 1 galvanically separated binary input

3 Installation of the option card KU-PSC / AZ-CNS

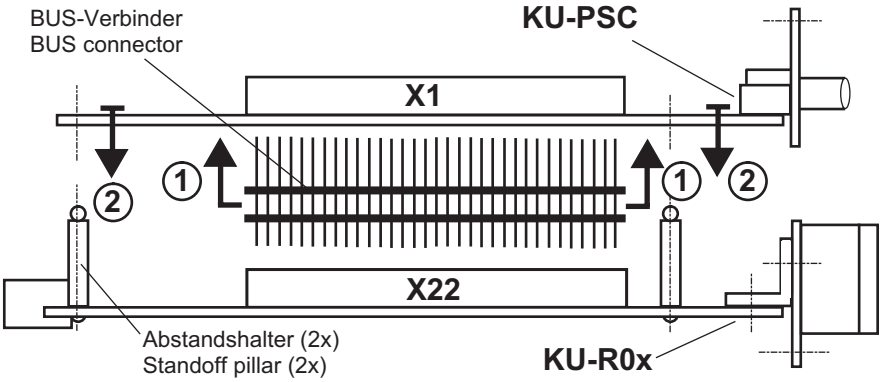
3.1 Important notes on handling

Because of possible destruction of components by static discharge, touching the electrical connections and the contacts on the solder and mounting side of the option card must be avoided. Discharge by touching PE must be caused before handling the option card.

3.2 Installation instructions for KU-PSC

The option card must be plugged onto the KU controller card and inserted in slot 2 (lower card shaft) (this place is covered by a blind panel on delivery):

1. Ensure that the AMKASYN system is disconnected from the power supply.
2. Remove the lower blind panel by loosening the two neck screws.
3. After loosening the two neck screws (on the right edge) withdraw the controller card KU-R01. If slot 1 is also equipped, loosen the neck screws on the left edge of the front panel and carefully withdraw controller card KU-R01 with the option card as a unit. Place the withdrawn option card only on a non-conductive, padded surface.
4. Press the two snap-in plastic standoff pillars in the corresponding holes on the controller board.
5. Press the bus connectors with the longer pins fully into the jacks of the card KU-PSC.
6. Insert the bus connectors on the KU-PSC with the short pins into the jacks on the controller card KU-R01 and at the same time press the standoff pillars into the holes of the board KU-PSC.



7. Push the controller card KU-R01 with KU-PSC card as a whole carefully into the card shaft until the controller card is plugged securely in the mating connector.
8. Tighten the neck screws of the controller card and of the KU-PSC card.

3.3 Installation instructions for AZ-CNS

The option card must be plugged on the AZ-PS5 option card and inserted in slot 4 (card shaft).

1. Ensure that the AMKASYN system is disconnected from the power supply.
2. Loosen neck screws of the controller card AZ-R01 and remove the card from the AZ module.
3. Place the withdrawn option card only on a non-conductive, padded surface.
4. Press the two snap-in plastic standoff pillars into the corresponding holes on the controller board AZ-R01.
5. Press the bus connectors with the longer pins fully into the jacks of the card AZ-CNS.
6. Insert the bus connector on the AZ-CNS with the short pins into the jack on the controller card AZ-R01 and at the same time press the standoff pillars into the holes of the board AZ-CNS.
7. Push the controller card AZ-R01 with AZ-CNS card as a whole carefully into the card shaft until the cards are securely plugged in the mating connector.
8. Tighten neck screws of the controller card and of the AZ-CNS card.

3.4 Front panel and board structure

Figure 3-1 KU-PSC front panel and board structure

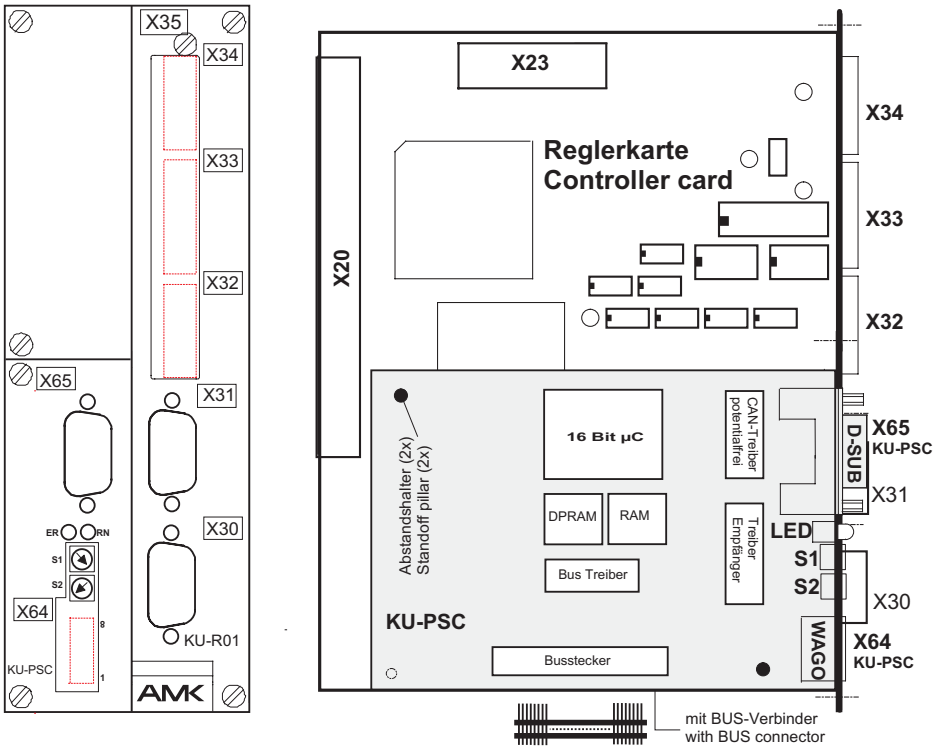
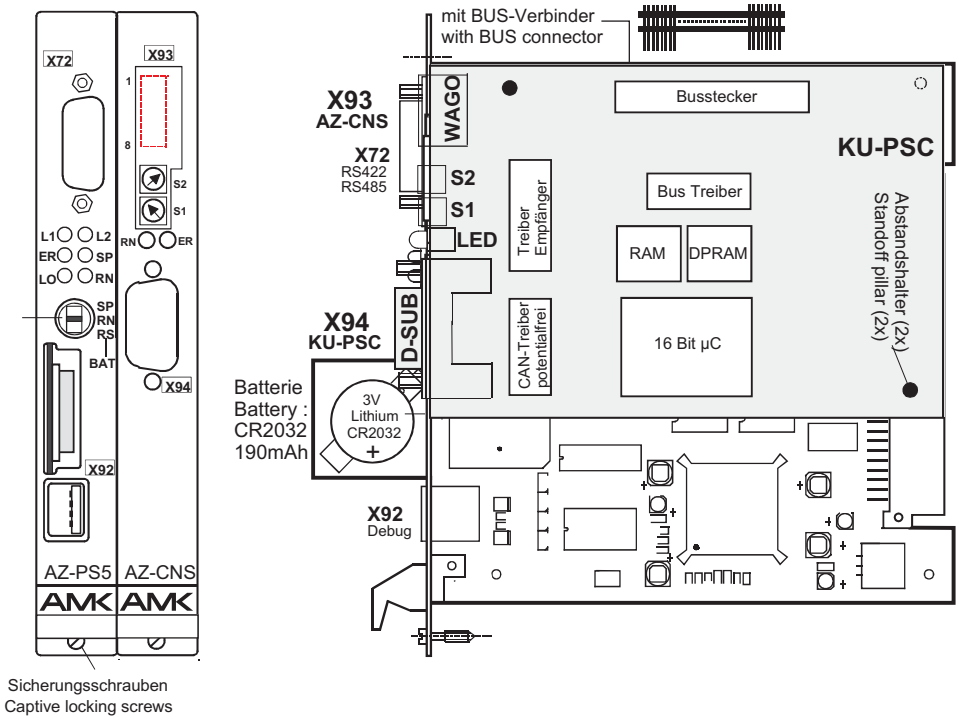


Figure 3-2 AZ-CNS front panel and board structure



4 Interfaces and pin assignment

4.1 CAN bus interface

KU-PSC: X65
AZ-CNS: X94

SUB-D-9 connector

Pin	Code	Signal	Definition
1	-	n.c.	Standard
2	CAN_L	CAN-Low	Standard
3	GND	GND	Standard
4	CAN_S_L	CAN-S-Low	AMK, Standard n.c.
5	-	optional Shield	Standard
6	-	optional GND	Standard
7	CAN_H	CAN-High	Standard
8	CAN_S_H	CAN-S-High	AMK, Standard n.c.
9	-	optional supply	Standard
10,11	PE	PE	Standard

4.2 Serial interface RS422

KU-PSC: X64
AZ-CNS: X93

WAGO terminal 8-pin

Pin	Code	Signal
1	TERM	Termination for RS422 if jumper with pin 6, then a bus termination is made (RS422)
2	GND	Signal Ground
3	TxD+	RS422 Transmit Data positive
4	TxD-	RS422 Transmit Data negative
5	RxD+	RS422 Receive Data positive
6	RxD-	RS422 Receive Data negative
7	E1	Binary input 1
8	E-	Reference point for binary input 1

The serial interface is designed physically as RS422 [1)]. After switching on the operating voltage it is initialized for the S-BUS communication.

KU-PSC
The connection between the AMK program "APROS" and PS can be made through the RS422 interface. The interface can be reprogrammed into another communication mode (e.g. RK512 for an external ABK-02 operator panel) by the PS user program. This mode is valid up to switching off the operating voltage or up to changing the PS user program.

1) RS485 software connection in preparation

AZ-CNS
The CAN configuration file is transferred from the PC to the start-up memory area of the option card through the RS422. The PS is programmed through the serial interface of the AZ-PS5 option card.

4.3 Binary input 1

The binary input is an interrupt-capable input which offers the possibility of reacting to a signal in a very short time (e.g. printing mark pulse for printing mark control).

4.4 Rotary coding switch

The bus subscriber address can be set on the front panel using hexadecimal rotary coding switches from 0 to 127. The set numerical value is recognized as bus subscriber address on bus initialization and transferred into the parameter ID34023.

S1 → low Nibble S2 → high Nibble

If both switches are set to 0, then the value in ID34023 bus subscriber address is valid. The slave addresses 2...127 are permitted (address 1 reserved for master). The selected addresses must agree with those in the CAN configuration file (see AMK program "CANCONV → CCF-Ffile" and "DVLADER" in the CAN Network configuration documentation).

4.5 Light emitting diodes

The two LEDs attached to the front panel indicate the current state of the software:

LED	Colour	Meaning
1	red	Software in error state
2	green	System RUN

5 Parameter settings

Overview:

System / module	Cycle time	Transmission rate	Addressing	Selected function (CAN or PS)
KU	ID2	ID34024	Switch S1, S2 or ID34023	ID32799
AZ	ID2	-	-	-
AZ-CNS	ccf → ID2	ccf → ID34024	Switch S1, S2	On AZ-CNS only CAN master in association with AZ-PS5 implemented
	↑ equal values	↑ equal values	↑ unequal values	

For the synchronization of a CAN master with the slaves, all drives must comply with the same time conditions. This is guaranteed if in all subscribers the Ident number ID2 SERCOS cycle time and ID34024 bus transmission rate are occupied with the same values. This is agreed in the AZ-CNS in the "CAN Configuration File" (ccf file).

Parameters which are set application and system dependently are located in the **Parameter KU/AZ** documentation.

5.1 Parameters in the KU

The following parameters must be set correspondingly for operating the KU-PSC.

5.1.1 ID32799 Configuration of peripherals

This parameter determines:

- squarewave pulses input X34
- activation/deactivation of PLC functionality
- activation/deactivation of Fieldbus functionality

ID 32799=00**ab**00**cc hex**

0 0 **a b** 0 0 **c c hex**

cc - setting code for squarewave pulses input (X34)

Entry	Meaning
0	2 squarewave pulses in quadrature (90° offset between track1 and 2)
1	Counting pulses track 1, direction signal track 2
2	Forward pulses track 1, backward pulses track 2

b - PLC function

Entry	Meaning
0	function deactivated (default) If KU-PSC is plugged in error message **1376** is generated, hint to activate or deactivate required function
1	PLC active
2...E	reserved
F	function deactivated, no error message will be generated

a - function fieldbus

Entry	Meaning
0	fieldbus deactivated (default) If KU-PSC is plugged in error message **1376** is generated, hint to activate or deactivate required function
1	fieldbus active (e.g.. CAN, ...)
2...E	reserved
F	fieldbus deactivated, no error message will be generated

Example:

ID32799 = 0x 00 11 00 00

- squarewave pulses in quadrature (90° offset between track1 and 2)
- fieldbus active
- PLC active

Caution: All pulse encoder inputs must be at defined levels, otherwise the described functions are not guaranteed.

5.1.2 Communication parameters

See also ID32799 configuration peripherie for activate/deactivate fieldbus and/or programmable controller PS functionality.

ID-Number	Name	Value	Designation
ID34023	BUS participant address	e.g.5h	e.g. 5h [1]
ID34024	BUS transmission rate [kbit/s]		range:10kBaud-1MBaud [3]
ID34025	BUS mode	0h 2h	1: CAN-slave 2: CAN-master [2]
ID34026	BUS mode attribute		[4]

1) The BUS participant address is valid, if the hexadecimal rotary coding switches S1 and S2 on the option card KU-PSC/PLC are set to zero. Is the value unequal to zero the value of S1, S2 will be set to ID34023. The range of participant addresses is (01h to 7Fh) 1...127. The address 1 is reserved for the CAN BUS master.

2) ID34023 and the rotary coding switches S1 and S2 are ignored. Entry of value 2h sets this axis as CAN BUS master with paricipant address No. 1.

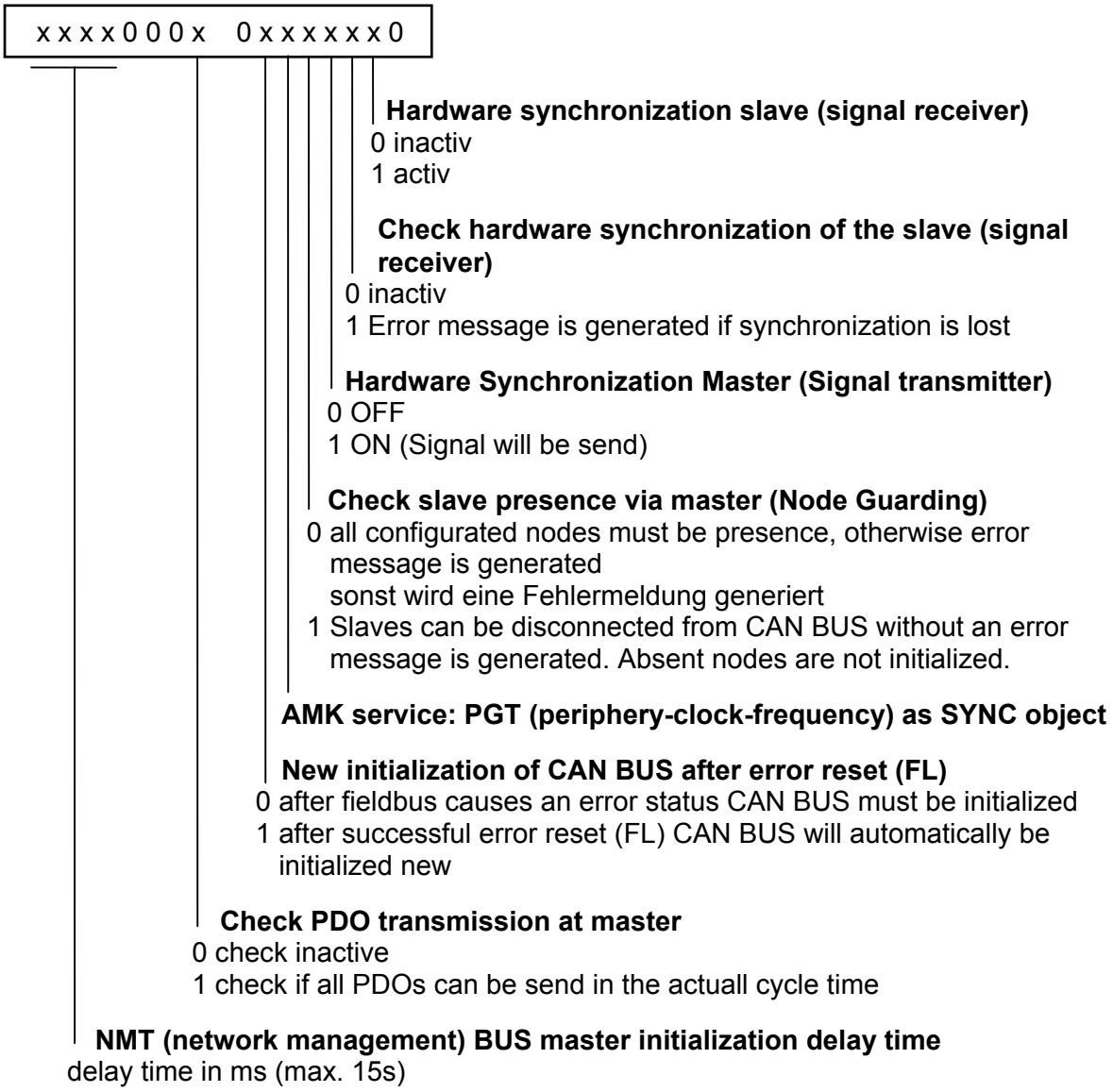
3) permissible values:

1000,00	1Mbaud;
800,00	800kbaud;
500,00	500kbaud;
250,00	250kbaud;
125,00	125kbaud;
50,00	50kbaud;
20,00	20kbaud;
10,00	10kbaud;

If invalid value is entered the transmission rate will be set to the defaut value of 20 kbaud.

4) **ID34026 "Bus mode attribute"**

this parameter defines the differentiating features of the CAN BUS.



reserved bits are preassigned with 0.

Example:

Master:

ID34026 = 3048h
- 3 sec. Delay time for initialization
- all configured nodes are cheked of presence
- new initialization of the bus after error reset
- hardware synchronization ON

Slave:

ID34026 = 6h
- Hardware synchronization slave ON
- Check synchroization slave ON

5.2 Parameters in the AZ

All settings in the AZ module for the use of the AZ-CNS option card must be made through the "CAN Configuration File" (*.ccf file). (See Description CAN Network configuration).