



AMKASYN

VARIABLE SPEED DRIVES

AMKASYN

Digital inverters in modular construction

Additional card for central module AZ

Programmable controller AZ-PS4-A with ARCNET interface

Important advice:

Touching of the electrical connections on the plug-in card must be avoided, otherwise electronic components could be destroyed through static discharge.

Take plug-in card directly out of packing and insert into option slot 3 in the AZ module without using force. Then secure with screws below the card grip.



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Programmable controller AZ-PS4-A with ARCNET interface

The option card AZ-PS4-A is plugged into slot 3 of central module AZ. Together with the ARCNET interface 2 slots are occupied! It is secured in the front panel by 2 captive screws below the card grip.

The option card AZ-PS4-A must be assigned to slot 3 in ID 32882 „Slot assignment“ in the basic system:

ID 32882: xx xx 81 00 hex.

00 instead of xx if slot 1 and 2 are free.

If additional option cards are used in slot 1/2 the corresponding card codes must be entered instead of xx.

The AZ-PS4-A card is used as a programmable drive interface to solve tasks closely related to the drive. Data communication with the drive system takes place through the internal bus.

Binary and analog inputs/outputs, the ARCNET interface and the external AMK panel AB 202L can be used for process and user level communication.

The AZ-PS4 is programmed in statement list (STL, similar STEP 5). Programming unit is a standard PC with the AMK programming software APROS. The instruction set contains statements for logic operations, counters and timers. Drive setpoint values (torque, speed, position) and parameter changes are commanded via AMK specific function blocks.

Among other things coordinated axis movements can be generated through Fast Functions (cyclic functions) with table interpolation.

The user PS program (max. 48 kB) and non volatile data blocks (max. 15 kB) are stored in the battery-backed RAM memory. The capacity of the Lithium battery is able to maintain the data for at least 5 years.

The storage life of a AZ-PS4 card with stored PS program is limited up to a maximum of 5 years!

If the battery is removed, all stored data are lost!

Description of the display and operator elements at the AZ-PS4-P front panel:

LEDs:

ER: Error LED (red)
During a malfunction (PS state „ERROR“) this LED is blinking with a flashing rate of 1 second.

SP: Stop LED (red)
In PS state STOP this LED is on.

RN: Run LED (green)
In normal operation (PS state „RUN“) this LED is reset after the process image „INPUTS“ is formed and set again before the process image „OUTPUTS“ is transmitted, i.e. the LED brightness is decreasing with increasing PS cycle time.

L1 (green), L2 (red):
Not used, without meaning (for AZ-PS4 software versions < 02.12/1999)

LO (green): Extended function see below.

Switch positions:

- SP:** Stop (notched position)
The cyclic program execution is interrupted.
- RN:** Run (notched position), **switch position for normal operation.**
Normal cyclic PS program execution.
- RS:** Reset (momentary contact)
PS RESET is initiated. Automatic PS START (state RUN) if switch changes back to RN position, (for software versions < 02.12/1999)

From AZ-PS4 software version 02.12/1999:

Extended PS RESET (RS) function 1: Erase of all data blocks in the in battery backed RAM.

Extended PS RESET (RS) function 2: Erase of the actual PS project (and loading of the user PS project stored on the system EPROM, if existing).

The RESET (RS) switch position must be pressed for more than 5s (T1) to initiate these extended functions. After this time the green LED „LO“ is turned on. Now the RESET switch must be released (back to RN position)

By a single operation of the RESET function 1 is selected, by a double operation extended PS RESET function 2 is selected.

LED „LO“ is reset, then extended function 1 is handshaked by a single flash of LED „LO“, extended function 2 by a double flash.

After T2 (20s) is elapsed LED „LO“ is constantly turned on for 10s (T3). The selected extended RESET function is activated by pressing RESET (RS) once more within this time.

A normal PS RESET and restart is initiated if RESET (RS) switch position is pressed for less than 5s or if the times T2/T3 are elapsed without selecting and activating one of the extended RESET functions via RESET (RS) switch.

Backup battery

The AZ-PS4 memory is battery-backed by a 3V Lithium battery Type CR2477 (RENATA). With power on the battery voltage is monitored. If the battery voltage is too low a PS error message is output (Error module: 120, Error-No: 1). From this time the battery capacity is still sufficient to maintain the memory for 1 week! To avoid loss of data the battery must be exchanged immediately!

Battery change

Battery change is only permissible with system POWER ON!

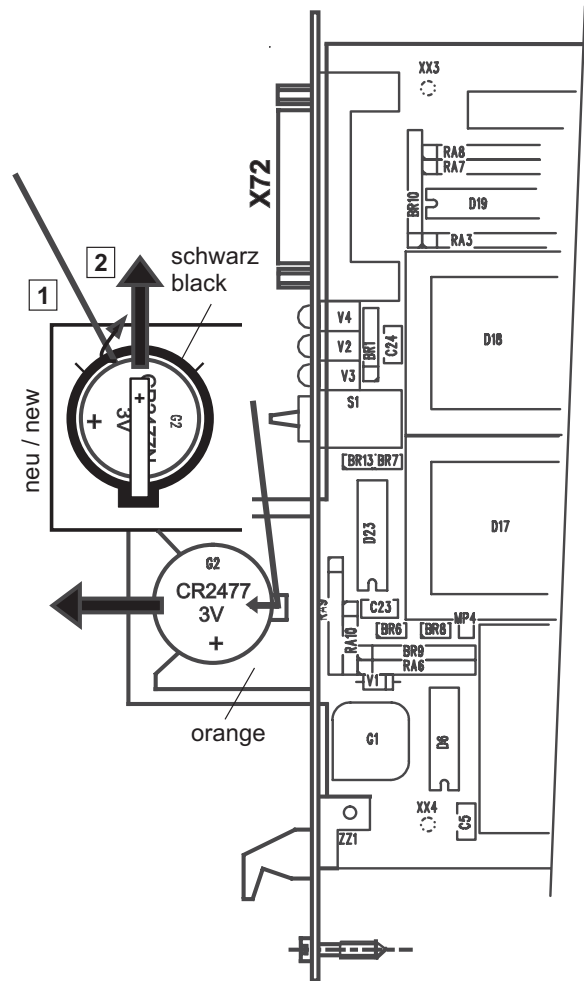
Battery Type: 3V Lithium

CR2477 RENATA

New:

CR2477N RENATA

1. During battery change the power supply must be ON!
2. Carefully press out the battery towards you by applying a suitable screw driver at the notch.
For new battery holder (black):
By a suitable screw driver carefully lift battery above the holder edge, then push it out from under the positive connection clip.
3. Carefully insert the new battery:
Pay attention to battery polarity: The side with the battery designation (CR2477 / N +) must be visible from top. Keep the battery circumference absolutely clean, don't touch it!
Press battery from the front into the holder.
New battery holder (black):
Insert battery skewed from top over the holder edge under the positive connection clip, then push it completely into the holder.
4. Now Power OFF and ON again.

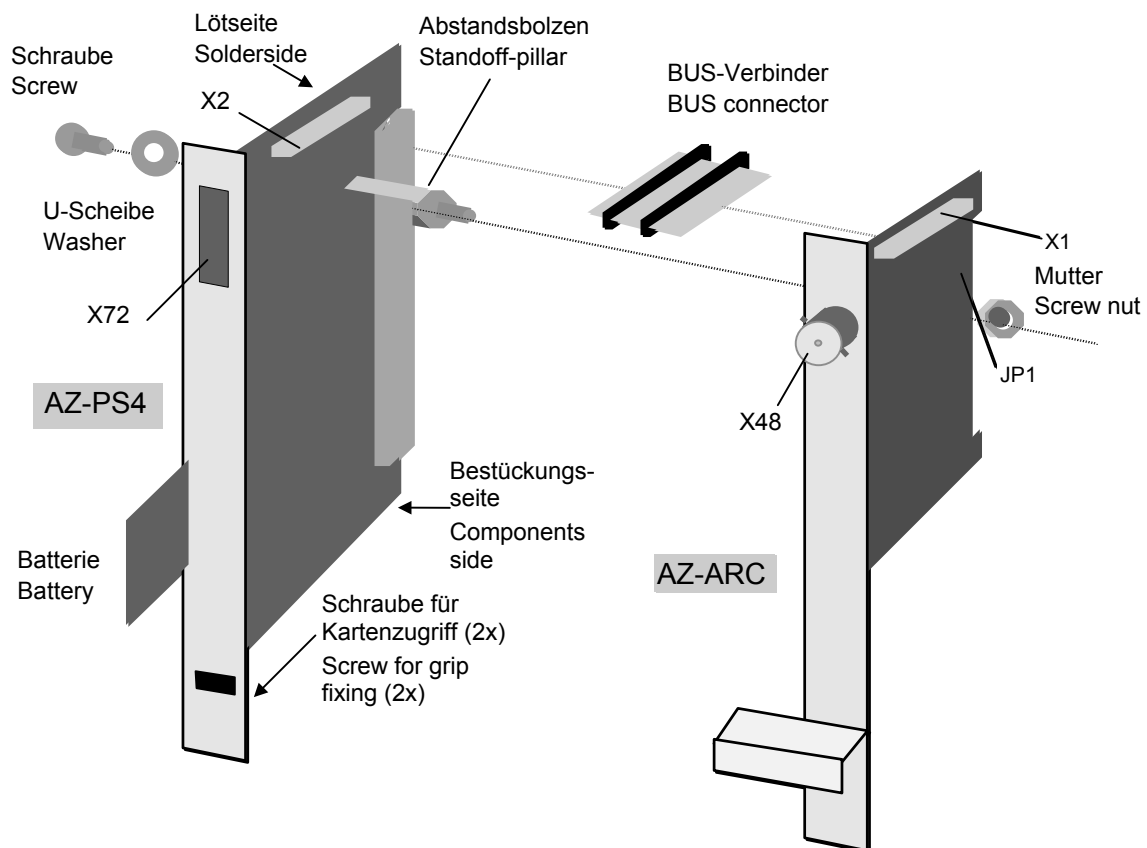


Connector pin assignment X72:

Serial interface RS422 (AZ-PS4-A):

Pin	Signal	Pin	Signal
1	PE	9	GND
2	TXD-	10	+ 5V
3	RXD-	11	+ 5V
4	RTS	12	TXD
5	CTS	13	RXD
6	TXD-	14	RTS-
7	GND	15	CTS-
8	TXD		

Assembly: AZ-PS4 and AZ-ARC as AZ-PS4-A module



AZ-PS4-A ESD-PROTECTION / INSTALLATION:

Please do not touch the electrical connections or the exposed contacts on the front or backside of the plug-in circuit boards. Static-electricity due to handling of the boards can destroy the boardlevel components. Please make sure the person handling the boards has proper PE-ground connection to reduce static-electricity.

Please insert the plug-in board directly from the packaging into slot 3 in the AZ-module without using force and secure the board with the captive screws underneath the card-holder.

Inappropriate handling of the board can lead to a short-circuit in the battery power supply, which could cause a loss of stored data in the user program.

- Never lay the board on a conductive surface (metal table top).
- Avoid touching the front or back side of the board.
- During the insertion of the plug-in board into the slot of the AZ-module it is imperative that the solder side of the board does not make contact with the frontcover of already inserted boards. If necessary remove the other board first before installing the AZ-PS4-A card.

Sequence for exchange procedure of the AZ-PS4-A card:

1. Make sure the AMKASYN-system is without power.
2. Remove front cover on AZ-module.
3. Remove external connections to the to be exchanged AZ-PS4-A card (slot 3 and 4).
4. If existing: Remove external connections to the plug-in board in slot 2.
5. Unscrew the captive screws which hold the boards in place (slot 2, 3 and 4).
6. Remove the plug-in board from slot 2 by the card holder and lay it on a nonconductive surface (bubble wrap etc.).
7. Remove the AZ-PS4-A card by the card holder and lay on a nonconductive surface (bubble wrap etc.).
8. Take the new AZ-PS4-A card out of the packing. Only handle it by the front card holder or by the front cover.
9. Insert this new AZ-PS4-A card into slot 3 in the AZ-module and secure it with the captive screws.
10. Replace the other option card again, if removed under 6.
11. Connect all external connections removed under 3. and 4. again and secure the wiring.
12. Download user PS program to AZ-PS4-A via programming software APROS (only if new card was inserted without PS program).

ARCNET

Messages (PDUs: Process Data Units) are used for communication with the AMKASYN system via ARCNET. These PDUs have to comply with the SBUS protocols specified by AMK.

SBUS protocol structure

All PDU messages via SBUS are structured as follows:

Byte No.			
0	empf_phys	Physical PDU receiver	\
1	empf_log	Logical PDU receiver	
2	send_phys	Physical PDU transmitter	
3	send_log	Logical PDU transmitter	> PDU head
4, 5	pdu_len	PDU length (head + user data)	
6	komm_code	Commanding code	
7	attribut	Supplementary information	/
n	User data	Command specific parameters	PDU data
n + 8			

General structure of a SBUS PDU

A PDU always consists of PDU head (8 byte length) and an optional user data part, which can be up to 132 bytes long (maximum PDU length: 8 + 132 bytes = 140 bytes). The PDU head contains communication specific data as receiver address, transmitter address, length, etc.

Each address (receiver and transmitter) is partitioned in the „physical“ and the „logical“ component. The physical receiver is always the node (SBUS station) to which the message is addressed. Within a physical station several logical users can exist. They are client and server, message transmission then is between logical users.

PDUs are differentiated by the user through the command code. The attribute contains different supplementary information. User data and supplementary information can only be developed out of the command code assigned to the logical user.

The AMKASYN system is one ARCNET station (node). It contains the following logical users:

- Basic drive system with
 - drive diagnostic
 - drive commanding
 - drive data/parameter management
 - drive data indication (actual/setpoint values, messages, status bits, manufacturer data, operating hours counter, ...)
- Option card AZ-PS4 with PS I/O / Flag / Data block management

The AMK „SBUS documentation“ supplies additional SBUS related information.

AMK specific function block FB213 on AZ-PS4-A is supporting SBUS-PDU transmission and reception (c.f. PS documentation „FB213 Transmit/Receive of SBUS-PDUs“).

The documentation „PS Server, SBUS protocols“ contains the SBUS protocols for I/O / Flag / Data block management, used on the AZ-PS4-A for ARCNET communication.

SBUS-PDU Transmission via ARCNET

In „short“ telegrams the SBUS-PDUs are transmitted via ARCNET as user data.

Two variants have been realized to embed the SBUS-PDUs into the ARCNET protocol (c.f. section „Parameter setting for interface“, bit „0“):

- Transmission of the pure SBUS-PDU via ARCNET
- SBUS-PDUs embedded into the ARCNET 7FH protocol.

ARCNET telegram structure for pure SBUS-PDUs transmission:

Byte No:			
0	SID	ARCNET transmitter address	
1	DID	ARCNET Receiver address	
2	CNTS		
	:		
	:		
	:		
	:	with: n = PDU length	
256-n	empf_phys	Physical SBUS receiver	\
256-n+1	empf_log	Logical SBUS receiver	
256-n+2	send_phys	Physical PDU transmitter	
	send_log	Logical PDU transmitter	> SBUS
	pdu_len	PDU length (head + user data)	PDU head
	komm_code	Command code	
	attribut	Supplementary information	/
		SBUS	SBUS
	User data	Command specific parameters	PDU-data
255			
256			

ARCNET telegram structure for pure SBUS-PDUs transmission

With the second variant the SBUS protocol is embedded into a specific protocol frame (7FH protocol). ARCNET telegram structure for 7FH protocol:

Byte No:			
0	SID	ARCNET transmitter address	
1	DID	ARCNET receiver address	
2	CNTS		
	:		
	:		
	:		
	:	with: n = PDU length + 7	
256-n	7F identifier	7FH identifier	\
256-n+1	job number	Job number (2 byte)	7FH-
256-n+3	direction	Direction	
256-n+4	type	Telegram type	> Protocol-
256-n+5	length	length (2 byte)	head
			/
256-n+7	empf_phys	Physical SBUS receiver	\
256-n+8	empf_log	Logical SBUS receiver	
256-n+9	send_phys	Physical PDU transmitter	
	send_log	Logical PDU transmitter	> SBUS
	pdu_len	PDU length (head + user data)	PDU head
	komm_code	Command code	
	attribut	Supplementary information	/
	User data	SBUS Command specific parameters	SBUS PDU data
255			
256			

ARCNET telegram structure for 7FH protocol

Parameters for ARCNET communication

ARCNET user addressing

ARCNET users communicating with the AMKASYN system can have each node address (Node-ID) between 1 and 255. For the AMKASYN system itself only **node addresses between 12 and 255** are permissible. **ID32949** is used to define the node address for the AMKASYN system. With jumper „JP1“ not set, node address must be entered into byte 3, if jumper „JP1“ is set, the node address must be entered into byte 2. A maximum of 32 ARCNET stations may communicate with the AZ-PS4-A card.

ID32949::

Byte 3	Byte 2	Byte 1	Byte 0
ARCNET Node ID, if JP1 not set	ARCNET Node ID, if JP1 is set		

Parameter setting for interface

Through **ID32941** different interface parameters can be set for ARCNET:

Bit 0 = 0: ARCNET pure SBUS-PDU transmission

1: ARCNET 7F Protocol selection

Bit 3/2/1: ARCNET transfer rate:

Bit 3	Bit 2	Bit 1	Description
0	0	0	Transfer rate 2,5 Mb/s (Default)
0	0	1	Transfer rate 1,25 Mb/s
0	1	0	Transfer rate 625 Kb/s
0	1	1	Transfer rate 312,5 Kb/s
1	0	0	Transfer rate 156,25 Kb/s
1	0	1	reserved
1	1	0	reserved
1	1	1	reserved

Bit 4 = 0: No RESET of the ARCNET interface module after reconfiguration

1: RESET of the ARCNET interface module after 4 reconfiguration attempts, caused by this module

Bit 5 = 0: reserved

Bit 6 = 0: Timeout during transmission after 128 (Default) negative acknowledgements (NACK)

1: Timeout during transmission after 4 negative acknowledgements (NACK)

Bit 7 = 0: reserved

PS4 Image

If the ARCNET interface card AE-ARC is used linked to the programmable controller AZ-PS4 the ARCNET interface is initialized and monitored independently by the system program according to the settings in ID32941 and ID32949. Via a status flag byte the state of the communication interface is transferred to the PS user program. Depending of jumper JP1 the following flag bytes are used:

JP1 not set: MB 227 is status flag byte

JP1 set: MB 226 is status flag byte

For healthy condition of the communication interface the content of the used status flag byte is „0“.

Flag bits meaning on status flag byte for ARCNET interface status:

Bit 0 = 1: Connection error

Bit 1 = 1: Transmission error

Bit 2 = 1: Timeout during transmission (RESET through user required!)

Bit 3 = 1: This ARCNET interface module confuses the network as a whole. Therefore it was separated from the network.

Bit 4 = 1: ARCNET controller error

Bit 5 = 1: SBUS telegram received via ARCNET is longer than 140 bytes

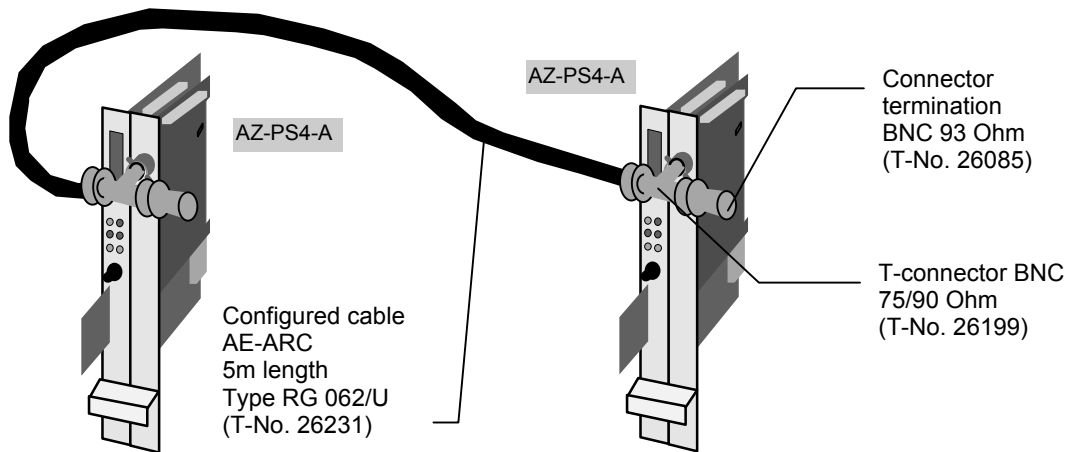
Bit 6 = 1: Node address ID32949 is invalid or already existing in the network

Bit 7 = 1: ARCNET initialization error

Reconfigurations initiated by this interface module are indicated by the AZ-PS4 in output word AW 200.

Bus Topology

On the drawing below two AMKASYN systems with option card AZ-PS4-A each are linked together using a bus cable with two T-adapters. The bus has to be terminated with 93 Ohm resistors.



ARCNET Topology