AMKASYN
Servo inverter AN/AZ/AW
Option card AZ-PS5-P
Programmable Controller
with PROFIBUS-DP interface

Version: 2000/37
Part No.: 28246

AMK

Table of contents

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 the option slot in the AZ module without using force. Then secure with screw below the card grisp.

1 Programmable controller AZ-PS5-P

The option card AZ-PS5-P normally is plugged into slot 3 of central module AZ. It is secured in the front panel by a captive screw below the card grip against inadverted loosening.

The option card AZ-PS5-P then must be assigned to slot 3 in ID 32882 “Slot assignment” in the basic system:

ID32882: xx xx 81 xx 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.

Technical data: INTEL Processor 80960JT100, 100MHz
2 Mbyte Flash-ROM
128 kbyte Boot-Flash
512 kbyte RAM
512 kbyte battery-backed RAM
RS422 / RS485 interface (15-pole SUB-D)
RS232 Debug interface (USB)
Internal field bus interface

The AZ-PS5-P 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 and the AMK panel AB 202L can be used for process and user level communication. Optional fieldbus interface cards provide fieldbus communication capability.

The AZ-PS5-P is programmed in statement list (STL, similar STEP 5). Programming unit is a standard PC with the AMK PS 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 with table interpolation.

The user PS program (max. 96 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-PS5-P card with stored PS program is limited up to a maximum of 5 years!
If the battery is removed, all stored data are lost!

2 Description of the display and operator elements at the AZ-PS5-P front panel:

L1 (green): Not used
L2 (red): CPU Error
ER (red): PS Error
During a malfunction (PS ERROR state) this LED is blinking with a flashing rate of 1 second.
SP (red): STOP
In PS STOP state this LED is on
LO (green): see below
RN (green): RUN
In normal operation (PS RUN state) this LED is reset after the process image “INPUTS” is formed and set again before the process image “OUTPUTS” is transmitted, i.e. with increasing PS cycle time the LED brightness is decreasing. In PS STOP state LED “RN” is off.

2.1 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, then automatic PS START (state RUN)

2.2 Additional PS RESET (RS) Functions

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

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).

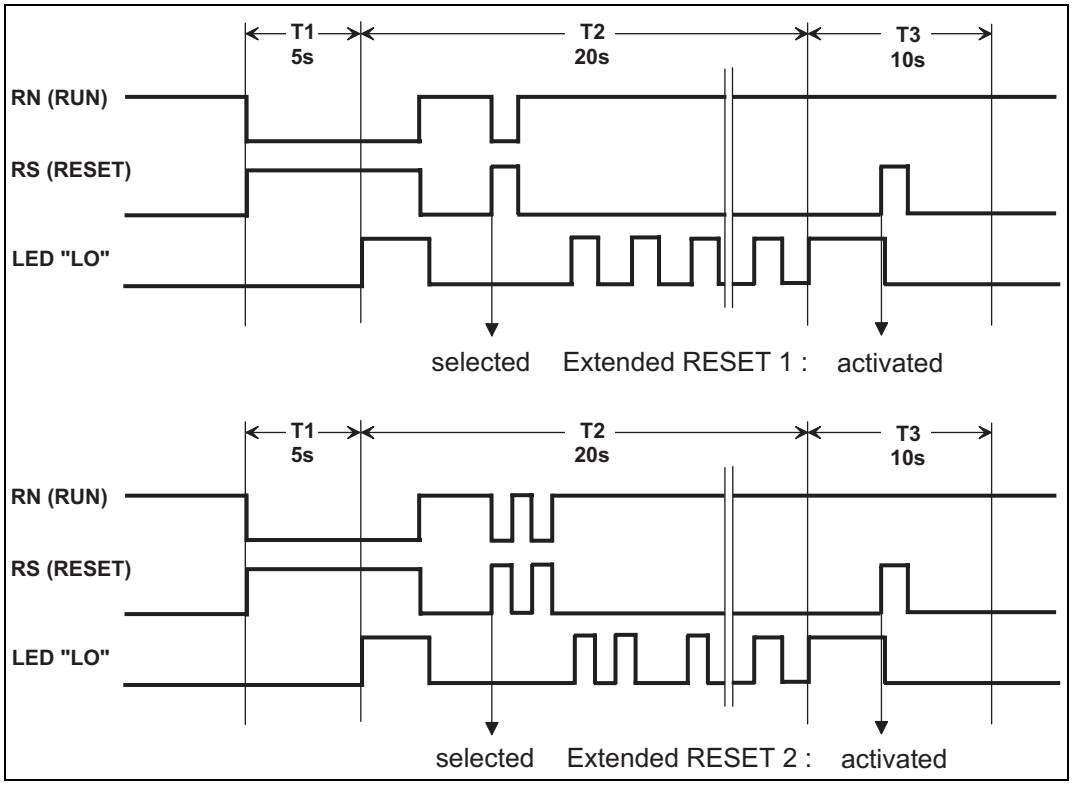
The RESET (RS) switch position must be pressed for more than 5s (T1) to initiate these extended functions. After this time the green LED “LO” is turned on. Now the RESET switch must be released (back to RN position)

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, than 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.



RE_LO

2.3 Jumpers

The on-board jumpers have no meaning for the user.

3 Backup battery

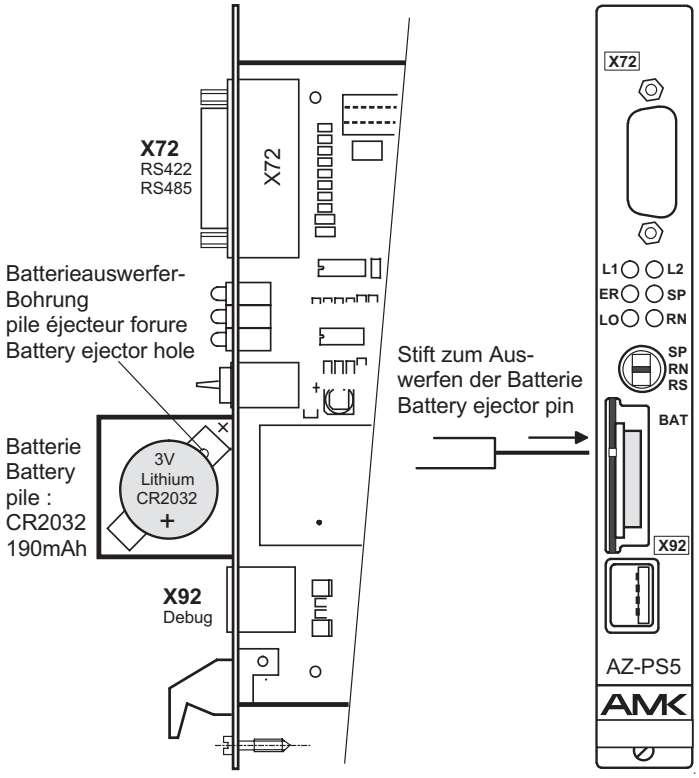
The AZ-PS5-P memory is battery-backed by a 3V Lithium battery Type CR2032.
With power on the battery voltage is monitored. If the battery voltage is too low a PS error message is output:
Error code 2816 “PS option error”, PS Error module: 120, Error-No: 1.
From this time the battery capacity is still sufficient to maintain the memory for 1 week! To avoid loss of data the battery must be exchanged immediately!

3.1 Battery change

Battery change is only permissible with system POWER ON!

Battery Type:
3V Lithium CR2032

1. During battery change the power supply must be ON!
2. Carefully press out the old battery with a suitable ejector pin. Carefully press in the new battery into the holder. Pay attention to battery polarity: The battery designation (CR2032 +) must be visible. Keep the battery circumference absolutely clean, don’t touch it!
3. Now Power OFF and ON again.



3.2 AZ-PS5-P Serial interface: RS422 (RS485 capable)

X72 Connector pin assignment:
(15 pole female SUB-D)

Pin	Signal	Line	Type	Meaning
1	PE			Shield
2	TxD-	O	RS422	Transmit Data-
3	RxD-	I	RS422	Receive Data-
4	RTS	O	RS422	Request to Send+
5	CTS	I	RS422	Clear to Send+
6	TxD-	O	RS422	Contact for RS485: TxD- → RxD-
7	GND			Signal Ground
8	TxD	O	RS422	Contact for RS485: TxD → RxD
9	GND			Signal Ground
10	5P			5 Volt supply
11	MP3	I	TTL	Disable RS485 termination
12	TxD	O	RS422	Transmit Data+
13	RxD	I	RS422	Receive Data+
14	RTS-	O	RS422	Request to Send-
15	CTS-	I	RS422	Clear to Send-

3.3 RS485 operation

For RS485 operation bus termination is required at the beginning and at the end of the transmission line. An on-board analog switch is prvided to activate the bus termination resistors at the last bus station. For the remaining bus stations the bus termination must be disabled. For this in SUB-D connector X72 Pin 11 (MP3) must be connected to +5V (Pin 10 / 5P). Without this jumper (default) the bus termination is always active.

DEBUG interface X92
(4 pole, male USB plug connector,
AMK interface cable, part No.: 28265)

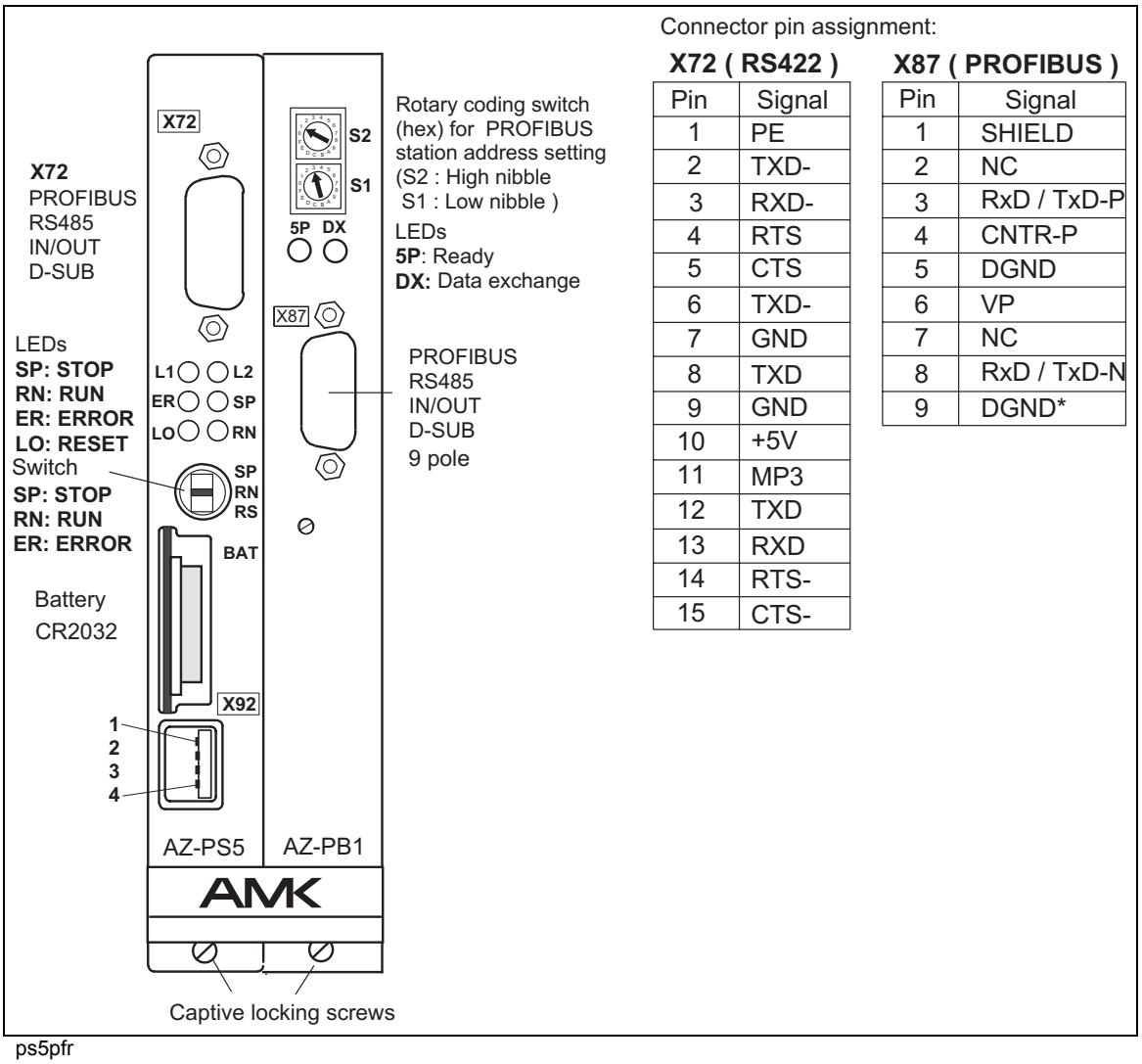
Only for AMK development / service use.

Pin	Signal	Typ	Verwendung
1	5P	Power	5 Volt Versorgung
2	RxD	RS232	Receive Data
3	TxD	RS232	Transmit Data
4	GND	GND	Signal Ground
5,6	PE	Shield	Abschirm

AMK Fieldbus interface X2

The optional interface card for PROFIBUS-DP, is connected to the AZ-PS5-P via bus connector X2.

3.4 AZ-PS5-P front panel (from Rev. 1.06)



ps5pfr

Connector pin assignment:

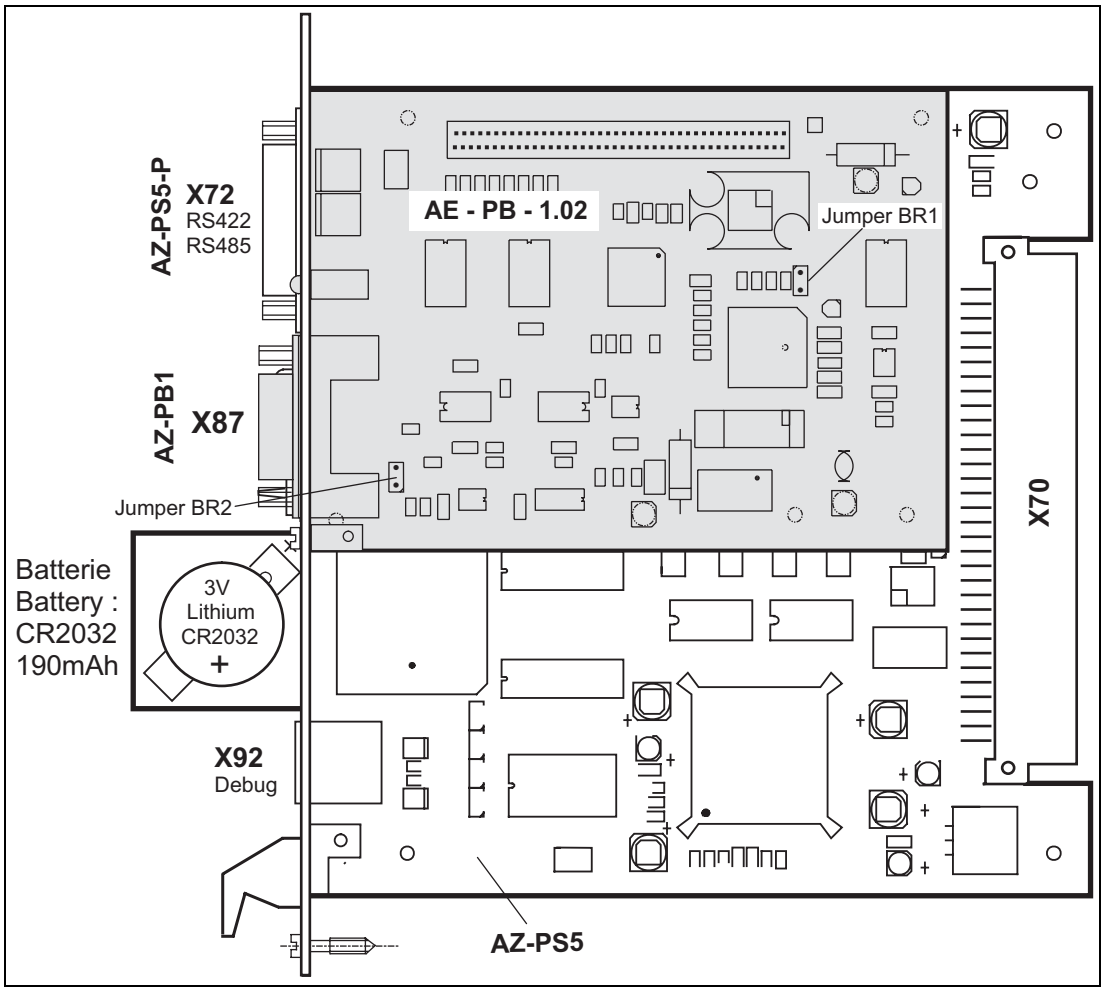
X72 (RS422)

Pin	Signal
1	PE
2	TXD-
3	RXD-
4	RTS
5	CTS
6	TXD-
7	GND
8	TXD
9	GND
10	+5V
11	MP3
12	TXD
13	RXD
14	RTS-
15	CTS-

X87 (PROFIBUS)

Pin	Signal
1	SHIELD
2	NC
3	RxD / TxD-P
4	CNTR-P
5	DGND
6	VP
7	NC
8	RxD / TxD-N
9	DGND*

3.5 AZ-PS5-P component mounting diagram



azps5p

4 AZ-PB1 PROFIBUS DP interface (subprint)

Through the PROFIBUS-DP (DP: decentralized peripheral) interface card AZ-PB1 the AMKASYN system is connected to a PROFIBUS master (according to
DIN 19245, section 3).

Instead of parallel I/O wiring PROFIBUS is using a serial linkage for I/O acquisition with the following characteristics:

- Line topology, two-wire connection according to RS485, terminated at both ends with a surge impedance (no resistors on board).
- Max. 32 useres per line (with Repeater expansion to 4 lines → max. 122 users).
- Max. baud rate = 12 Mbit (automatic adaption to master baud rate).
- Cable length depending on cable type and baud rate (see DIN 19245, section 3, e.g. 200m for cable type A and 1,5 Mbit)
- Filter connectors must be used for baud rates > 3 Mbit/s. The PROFIBUS terminating connector from ERNI, ID-No. 103648 is recommended.
- Up to 256 user addresses can be set via 2 rotary coding switches (HEX coded). For downwards compatibility reasons the coding switches are not evaluated with the default setting "13" (hex). In this case the user address is defined by software.

The AZ-PB1 is a PROFIBUS slave interface with max. 48 input bytes and 48 output bytes.

Start address for I/O bytes: EB 16 / AB 16, if the AZ-PS5-P card is plugged in slot 3.

User address and number of I/O modules (1 I/O module corresponds to 8 I/O bytes) can be configured via system data block DB 0 and through jumper Br1.

Default setting (DB 0 not specified by the user):

Without BR1 jumper: User address 2
With BR1 jumper: User address 3
Default number of I/O modules: 2 (16 I/O bytes).

All required identifiers for the master configuration according to the PROFIBUS standard are described in file ps4dp02.gsd (see section "AZ-PB Unit Master Data).

4.1 Profibus-DP interface (AZ-PB1)

- Two-wire bus connection, electrically isolated, via 9 pole socket connector (X87):

Pin assignment X87: RS 485 IN/OUT

PIN	Signal	Meaning
1	SHIELD	Shield / Protective earth [1)]
2	N.C.	Not used
3	RxD/TxD-P	Receive/Transmit data P
4	CMTR-P	Control signal repeater
5	DGND	Data reference potential
6	VP	Positive supply voltage
7	N.C.	Not used
8	RxD/TxD-N	Receive/Transmit data N
9	DGND*	Control signal repeater (via 300 Ohm to DGND)

1) Only if jumper BR2 is set, else N.C.

LED

Designation	Colour	Meaning
DX	green	User data exchange
5P	green	Ready

Jumper

Designation	Status	Meaning
BR1	open	Module No. = 1
	set	Module No. = 2
BR2	open	X87, PIN 1 not connected
	set	X87, PIN 1 connected to AE-PB shield

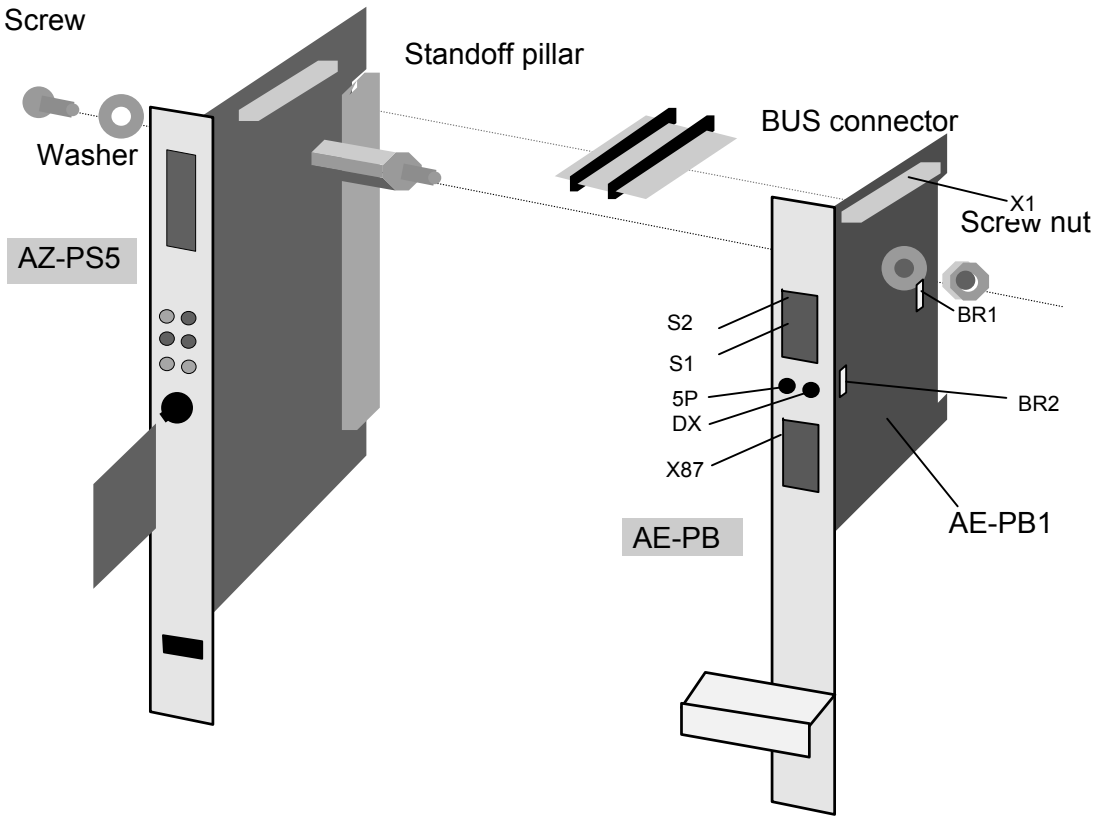
Rotary coding switch

Designation	Setting	Meaning
S1	1 = Default	LOW NIBBLE = 0x1
	0-F else	LOW NIBBLE in hex
S2	3 = Default	HIGH NIBBLE = 0x3
	0-F else	HIGH NIBBLE in hex

4.2 Rotary coding switch setting

For downwards copatibility reasons, the default setting is S2 = 1 and S1 = 3 ("13" hex). In this case the user address is defined by the software. For user address 13 (hex) the value "9" (→ 13 hex) must be entered into data word 24 Right Byte (DR24) or data word 24 Left Byte (DL24) in PS System Data Block DB0.

4.3 AZ-PS5-P assembly from AZ-PS5 and AE-PB1



4.4 Filter connector for transmission rates from 3 Mbit/s to 12 Mbit/s

Filter connectors must be used for transmission rates > 3 Mbit/s to minimise reflexion and radiation noise.

Recommended filter connector:

ERNI: ERBIC BUS SYS PROF HO
ID-No.: 103649, Part-No.: 26913

5 AZ-PB-Unit Master Data (ps4dp02.gsd)

```
;===============================================================
; AZ-PB-Gerätestammdaten
;===============================================================
; Datum:        29.04.1998
; Anmerkung:  AZ-PS4 V02.10/0498
; Firma:        AMK, Arnold Müller GmbH & Co. KG
; Ort:          73230 Kirchheim/Teck
;===============================================================

#Profibus_DP

; Device identification
Vendor_Name = "AMK"
Model_Name = "AZ-PS4 + AZ-PB"
Revision = "V2.10/0498"
Ident_Number = 0x1355
Protocol_Ident = 0
Station_Type = 0
FMS_Supp = 0
Hardware_Release = "V1.00"
Software_Release = "V1.01"
; AB_GSD_Revision = "*"
; Supported baudrates
9.6_supp = 1
19.2_supp = 1
93.75_supp = 1
187.5_supp = 1
500_supp = 1
1.5M_supp = 1
3M_supp = 1
6M_supp = 1
12M_supp = 1

; Maximum responder time for supported baudrates
MaxTsdr_9.6 = 60
MaxTsdr_19.2 = 60
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150
MaxTsdr_3M = 250
MaxTsdr_6M = 450
MaxTsdr_12M = 800

; Supported hardware features
Redundancy = 0
Repeater_Ctrl_Sig = 0
24V_Pins = 0

; Supported of DPM2 responder features
Freeze_Mode_Supp = 1
Sync_Mode_Supp = 1
Auto_Baud_Supp = 1
Set_Slave_Add_Supp = 0
```

```
; Maximum length of user parameter
User_Prm_Data_Len = 0

; Maximum polling frequency
Min_Slave_Intervall = 10
Modular_Station = 1
Max_Module = 6
Max_Input_Len = 48
Max_Output_Len = 48
Max_Data_Len = 96

; Definition of all available physical modules
; Modul ‘8 Byte E/A, Modul-konsistent’          Module consistent ”8 byte I/O module”
Module = ”8B-EA-M” 0xB7
EndModule
; Modul ‘8 Byte E/A, Byte-konsistent’           Byte consistent ”8 byte I/O module”
Module = ”8B-EA-B” 0x37
EndModule
; Modul ‘ 4 Worte E/A, Modul-konsistent’        Module consistent ”4 words I/O module”
Module = ”4W-EA-M” 0xF3
EndModule
; Modul ‘ 4 Worte E/A, Wort-konsistent’         Word consistent ”4 words I/O module”
Module = ”4W-EA-W” 0x73
EndModule

; Allen-Bradley-Profibus Manager specific parameters
;AB_Icon_File = "res\slave.ico"
;AB_Bitmap_File = "res\slave.bmp"
;AB_Attach_Offset = 9
;AB_Description = "PS4-8EA"
```

6 AZ-PS5-P 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-PS5-P card.

6.1 Sequence for exchange procedure of the AZ-PS5-P 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-PS5-P 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-PS5-P card by the card holder and lay on a nonconductive surface (bubble wrap etc.).
8. Take the new AZ-PS5-P card out of the packaging. Only handle it by the front card holder or by the front cover.
9. Insert this new AZ-PS5-P 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. Set correct PROFIBUS user address again via rotary coding switches S1/S2.
13. Download user PS program to AZ-PS5-P via programming software APROS (only if new card was inserted without PS program).

7 Imprint

Title **PDK_028246_Option_AZPS5P_en**

Purpose **Hardware description option card AZ-PS5-P**

Part number **28246**

History

Publication date
2000/37

Reservation Modifications to the content of the documentation and the delivery options for the products are reserved.

Service Tel. no. **+49/(0)7021 / 5005-191, Fax -193**

Office hours:
Mon.-Fri. 7:30 - 16:30, on weekends and public holidays the phone number of the standby service personnel is available on the answering machine.

You can assist us in finding a fast and reliable solution for the malfunction by providing our service personnel with the following:

- Information located on the ID plate of the devices
- The software version
- The device setup and the application
- The type of malfunction, suspected cause of the failure
- The diagnostic messages (error codes)

Publisher AMK Arnold Müller Antriebs- und Steuerungstechnik GmbH & Co. KG
Gaußstraße 37 – 39, 73230 Kirchheim/Teck

Tel.: 07021/5005-0, Fax: 07021/5005-176
E-mail: info@amk-antriebe.de

Additional information www.amk-antriebe.de

AMK Arnold Müller GmbH & Co. KG
Antriebs- und Steuerungstechnik
Gaußstrasse 37 – 39
D-73230 Kirchheim/Teck
Telefon: +49 (0) 70 21 / 50 05-0
Telefax: +49 (0) 70 21 / 50 05-199
info@amk-antriebe.de
www.amk-antriebe.de