# AMK

# AMKASYN
## VARIABLE  SPEED  DRIVES

# AMKASYN

## Digital inverters in modular construction

## Additional card for central module AZ

## Programmable controller AZ-PS4-P
## with PROFIBUS-DP interface
**(from Rev. 1.06)**

**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.**

**ACHTUNG**
Nur geschultes Personal
darf die Verpackung öffnen

Elektrostatisch gefährdete
Bauelemente (EGB)

**ATTENTION**
Observe Precautions
for Handling

Electrostatic Sensitive
Devices

Rights reserved to make technical changes

## Programmable controller AZ-PS4-P

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

The option card AZ-PS4-P must be assigned to slot 3 and 4 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-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, the PROFIBUS-DP interface and the 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 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
During a malfunction (PS state „ERROR") this LED is blinking with a flashing rate of 1 second.

**ST:**   Stop LED
In PS state STOP this LED is on.

**RN:**   Run LED
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:**

**ST:** 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, 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.

selected    Extended RESET 1 :    activated

selected    Extended RESET 2 :    activated
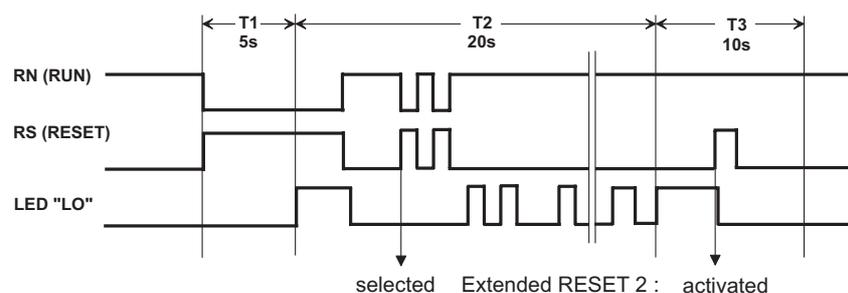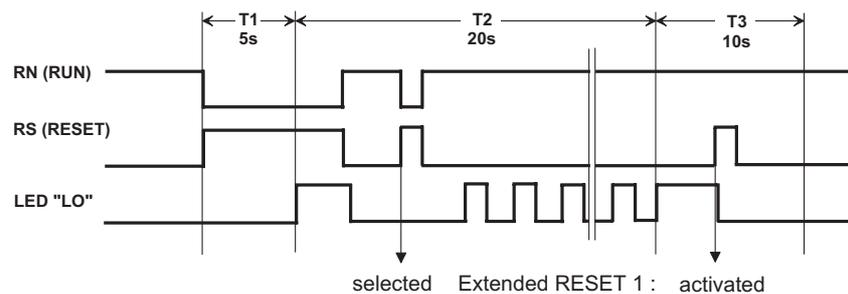
## Backup battery

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.
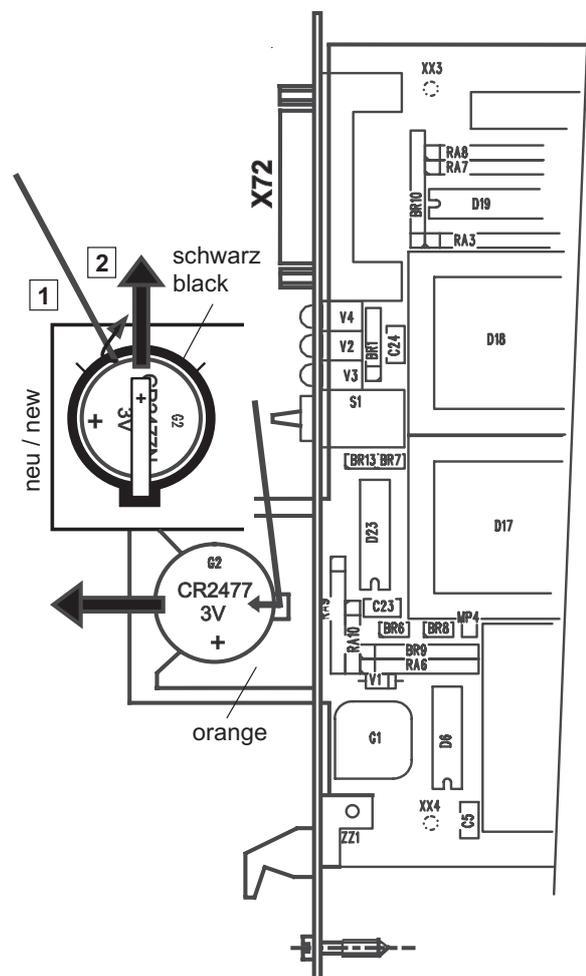
**AZ-PS4-P front panel (from Rev. 1.06)**

RS422
D-SUB
15 pole

LEDs :
**SP : STOP**
**RN : RUN**
**ER : ERROR**

Switch :
**SP : STOP**
**RN : RUN**
**RS : RESET**

BAT

3V
Lithium
battery
CR2477
RENATA

Rotary coding switch
(hex) for  PROFIBUS
station address setting
(S2 : High nibble
 S1 : Low nibble )

PROFIBUS
RS485
IN/OUT
D-SUB
9 pole

AZ-PS4 | AZ-PB1

**AMK**

Captive locking screws
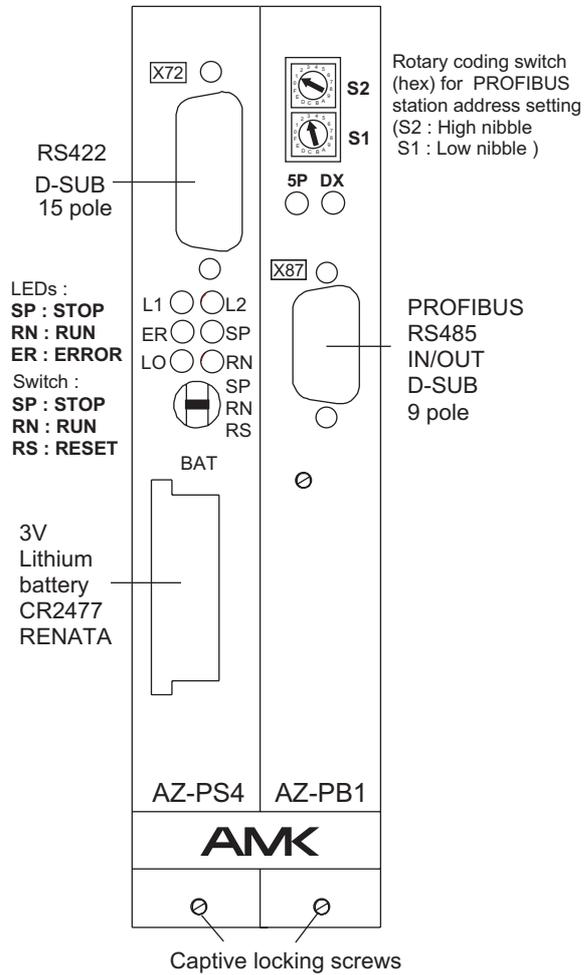
Connector pin assignment:

| **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 | +5V |
| 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* |

## AZ-PS4-P component mounting diagram
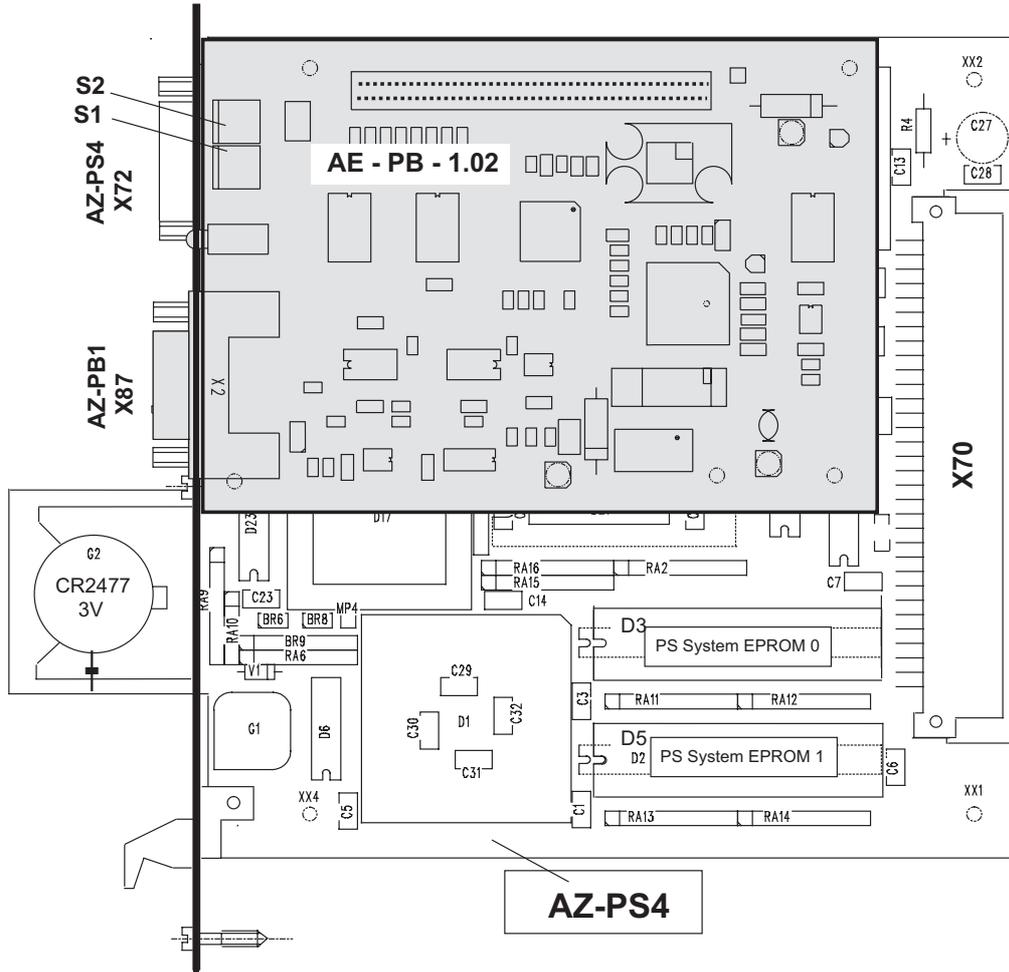
## AZ-PB1 PROFIBUS DP interface (subprint)

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.

- Setting of a two-digit user address number is possible via two hexadecimal coded rotary switches S1/S2. The useful address range is 00...7Ehex (0...126). The least significant digit is set at S1, the most significant digit at S2.
  If setting of the user address is required by software then on the rotary switches „13"hex must be selected (S2: 1, S1: 3). The user address number must be entered into ID34023.

For version AZ-PB1 in connection with AZ-PS4 (AZ-PS4-P) AZ-PS4 system software
≥ V02.08 is required.
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-PS4-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 ps4dp01.gsd (see section "AZ-PB Unit Master Data).

## 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 | 3 = Default | LOW NIBBLE = 3hex |
| | 0-F else | LOW NIBBLE in hex |
| S2 | 1 = Default | HIGH NIBBLE = 1hex |
| | 0-F else | HIGH NIBBLE in hex |

**Rotary coding switch setting**

For downward copatibility reasons, the default setting is S2 = 1 and S1 = 3 ("13" hex).
In this case the user address must be defined by DW24 in PS system data block DBO.

**AZ-PS4-P assembly from AZ-PS4 and AE-PB1 (from Rev. 1.06):**
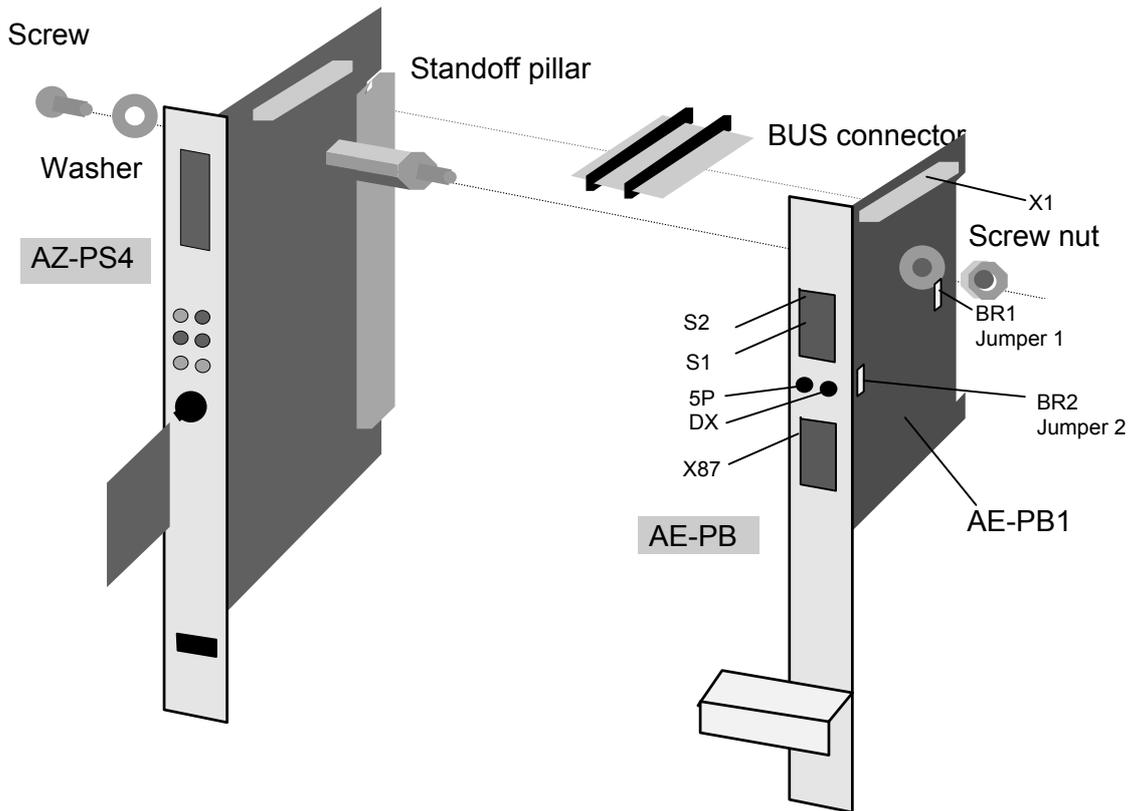
## Filter connector for transmission rates from 3 Mbit/s to 12 Mbit/s

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

ERBIC-filter connector on AZ-PS4-P:
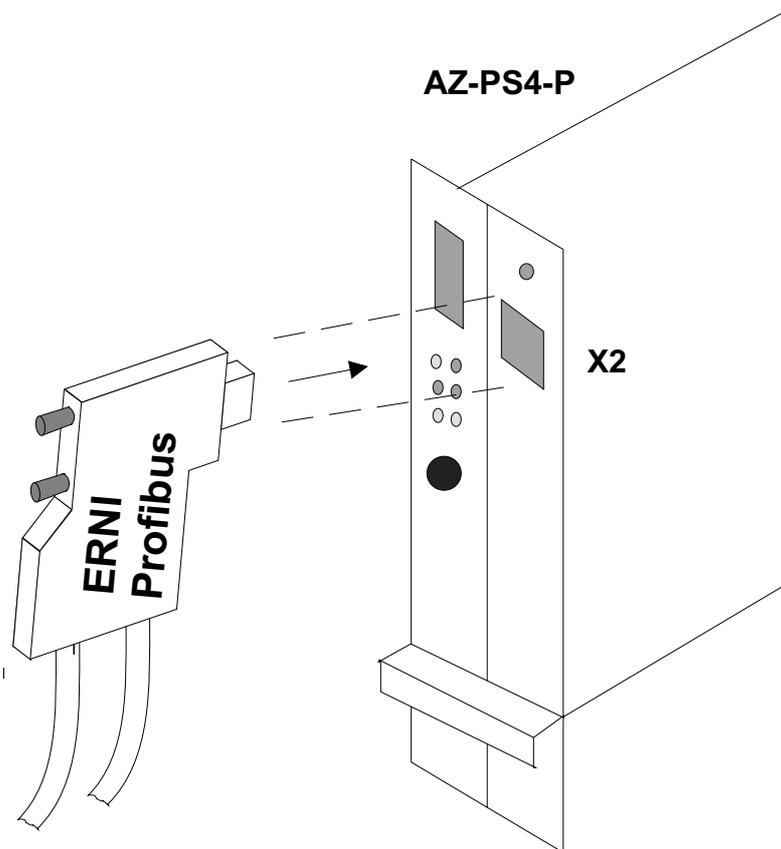
- **AZ-PB-Unit Master Data**

```
;============================================================
; AZ-PB-Gerätestammdaten
;============================================================
; Datum:      23.09.1996
; Anmerkung:  AZ-PS4 V02.08/3696
; 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 = "V2.08/3696"
Ident_Number = 0x1355
Protocol_Ident = 0
Station_Type = 0
FMS_Supp = 0
Hardware_Release = "V1.00"
Software_Release = "V1.00"
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
; Module 'PS4-8EA'
Module = "PS4-8EA" 0xB7
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"
```

## AZ-PS4-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-PS4-P card.

**Sequence for exchange procedure of the AZ-PS4-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-PS4-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-PS4-P card by the card holder and lay on a nonconductive surface (bubble wrap etc.).
8. Take the new AZ-PS4-P card out of the packaging. Only handle it by the front card holder or by the front cover.
9. Insert this new AZ-PS4-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-PS4-P via programming software APROS (only if new card was inserted without PS program).