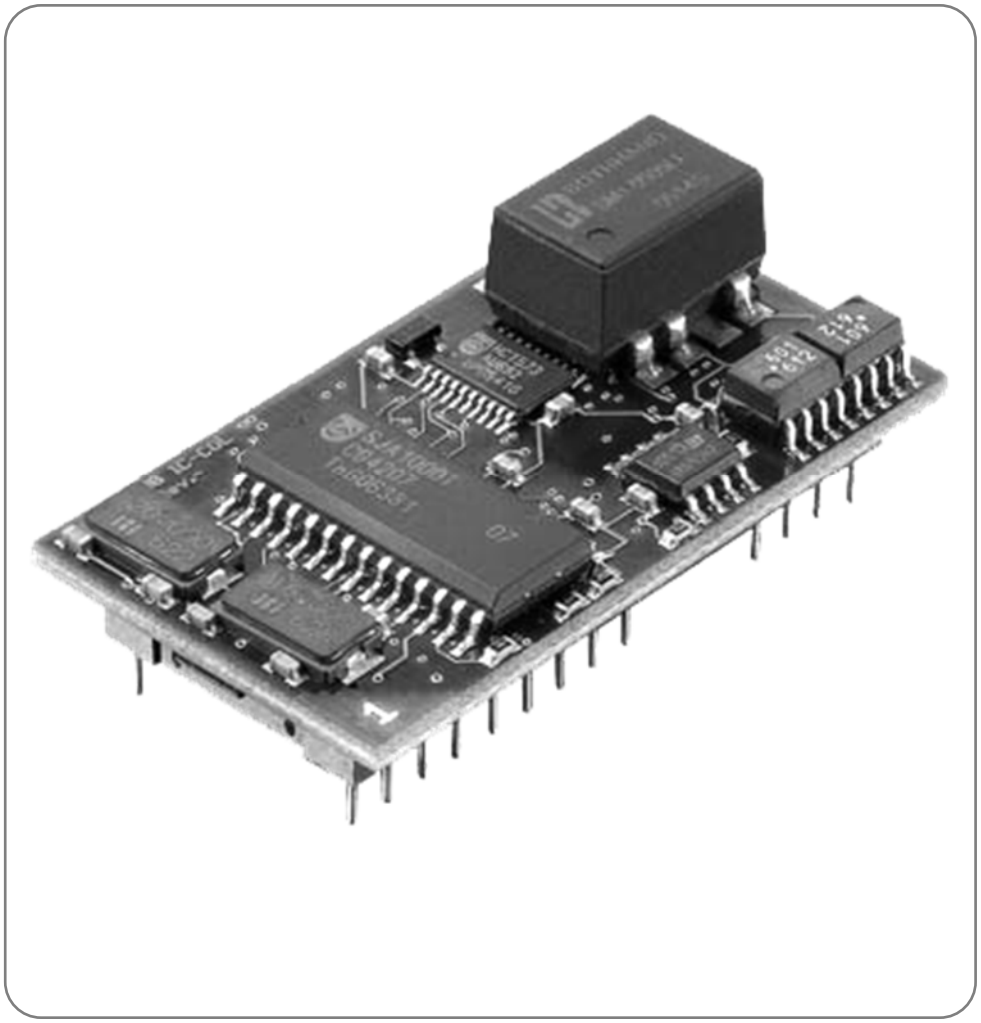
Operating Instructions

PS-AMS1x with Fieldbus-Interface CANopen



Version 2019/10/17

Änderungen vorbehalten!

Content

1. Description

The optional fieldbus-interface CANopen allows operation of the actuator via CANopen network. This interface communicates to the actuator via the standard serial port. The actuator does then not use analogue set values. Feedback from a process sensor to the optionally available PSIC process controller integrated in the actuator is digitally transmitted as well. Command level allows on request to read out all parameters and diagnostics data.

Adjustment of parameters of the actuator is not possible via fieldbus.

Note: The actuator has a single communication port. This is used when the optional fieldbus interface is installed. For parameterisation of the actuator with the communication software PSCS or handheld unit PSC, the position of a switch on the main board of the actuator PS-AMS1x has to be changed, see chapter 2.2. After that, communication with PC is possible via the date cable. After parameterisation, the switch has to be placed to position “Fieldbus” again, to allow communication of the fieldbus module to the actuator.
-> See also Instruction Manual AMS-PSCS

Note: „Digital Set Value“ (in the communication software AMS-PSCS under Operate - Configuration - Set Value & Feedback) must be activated to control the actuator via the fieldbus interface!

Note: During PC communication there may unreasonable data appear in the (fieldbus-based) process data objects.

2. Connecting the Fieldbus

Caution: When working at or on the actuator’s processor board, proper earthing of the worker has to be ensured. As a makeshift it will help to firmly touch the actuator housing with bare hands before working on the actuator, to create an equalisation of potential.

2.1 Wiring to terminal block

There are two specific metal cable glands for insertion of the fieldbus cables. These allow connection of the shielding as shown in Figure 1.

Figure 1 EMC cable gland with earthing cones

Wiring of the fieldbus cables is made to a terminal block on the AMS main board. The two wires each of the fieldbus have to be wired to to the terminals (see Figure 3) as per the attached table.

Signal	Terminal	
CAN_High	B1	B2
CAN_Low	A1	A2

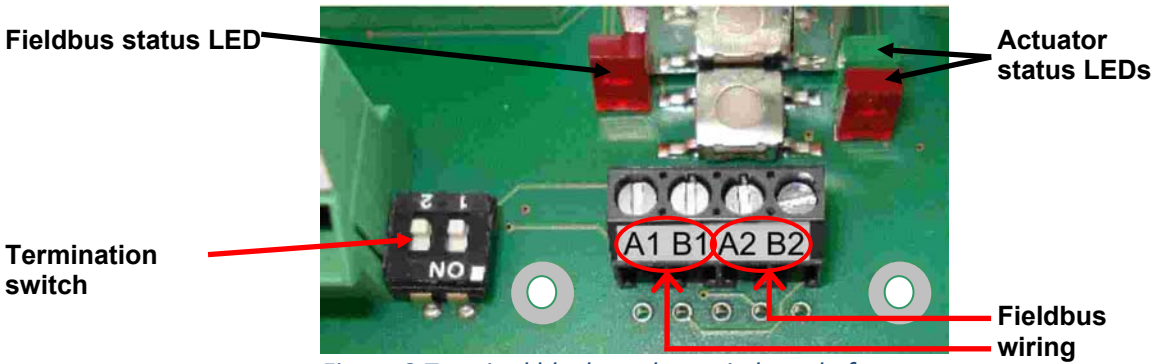
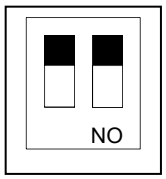


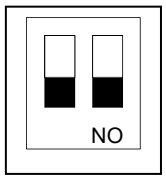
Figure 2 Terminal block on the main board of an actuator for fieldbus

2.1.1. Terminierung

Termination of the bus is possible with the termination switch next to the terminal block, see **Fehler! Verweisquelle konnte nicht gefunden werden.**. Both switches have to be put to the same position mandatorily.



Termination OFF



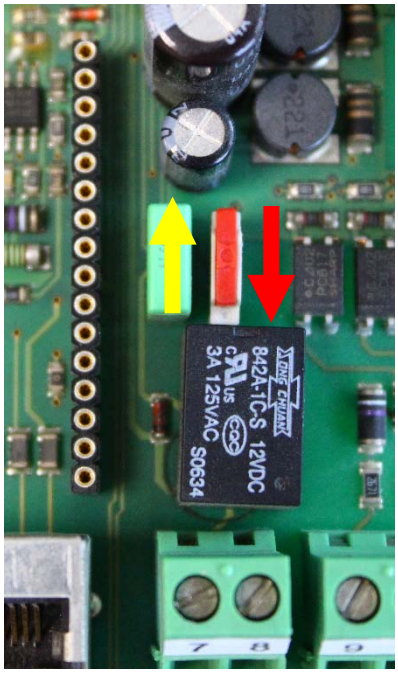
Termination ON
(end of bus)

2.1.2. Fieldbus-Status-LED

There is one single red LED next to the terminal block for signalling the status of the fieldbus, see picture 2.

LED Off = Mode „data exchange“
LED blinking = No connection to the fieldbus

2.2. Slide switch for selecting the communication interface



A On the main board inside the actuator there is a slide switch for selecting the interface, see Figure 3.
For normal operation, i.e. when the actuator is controlled via the fieldbus, put the switch to lower position (red arrow).
For adjustment work, parameterisation, etc. with the communication software PSCS the interface has to be put in upper position to allow PC-communication (yellow arrow).

Caution: After finishing adjustment work, make sure that the switch is in lower (red) position. In upper (yellow) position the interface does communicate to the bus, but not to the actuator's electronic!

yellow = PC-communication

red = fieldbus-communication

Figure 3 Slide switch for selecting the interface

3. Adjustment of fieldbus address & transmission rate

The actuator is supplied with address 0 adjusted. At commissioning the user can modify the address and the transmission rate using the two turn-coding switches, see Figure 4. After this modification, switch the actuator off for a short period and on again to adopt the change.

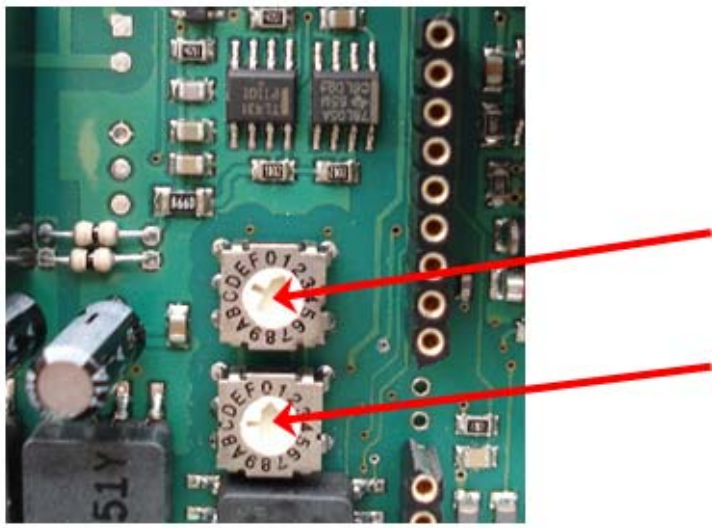


Figure 4 Turn coding switches for adjusting address and transmission rate

Adjustment of addresses (0 to 63) and of transmission rate is made as per table below:

Code switch	S302				S301			
	HIGH 0 ... F				LOW 0 ... F			
00 ... FF	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Adjustment of address			Node ID [00...63]					
Adjustment of transmission rate	0	0	500 kBaud					
	0	1	250 kBaud					
	1	0	125 kBaud					
	1	1	50 kBaud					

4. Process data object

See table „Process data object CANopen“ in the annex.

4.1. Process data object „Bus-Input“

The process data object “Bus Input” shows the details how control of the actuator (as slave) is done.

4.1.1. Byte 0 - Set Value High-Byte

Bit 7 (MSB) defines the input to be in percent (MSB = 0) or in tenth of percent (MSB = 1).

4.1.2. Byte 1 - Set Value Low-Byte

Input has to be made as per MSB of Byte 0.

4.1.3. Byte 2 - Process Sensor High-Byte

Bit 7 of Byte 2 (MSB) defines the input to be in percent (MSB = 0) or in tenth of percent (MSB = 1).

Caution: When using an analogue process sensor, Byte 2 and Byte 3 have to be set to „0xFF“!

4.1.4. Byte 3 Process Sensor Low-Byte

Input has to be made as per MSB of Byte 2.

Caution: When using an analogue process sensor, Byte 2 and Byte 3 have to be set to „0xFF“!

4.1.5. Byte 4 - Command

Use the command byte to read / write data from / to the memory of the actuator.

0x00 = no action

0x20 = send data for RAM
0x21 = read data from RAM

0x1D = send data for E²PROM
0x1E = read data from E²PROM

Caution: To ensure that a command is sent to the correct address with the correct data, follow this procedure when writing to the process data object:

Write 0x00 to command Byte 4
Write address (Byte 5), Data-High (Byte 6) and Data-Low (Byte 7)
Write the actual command, e.g. 0x1E
As result the command will be sent to the actuator for one time. To send another command, the command byte 0x00 has to be sent again.

Note: At reading of data, these will be available at Byte 4 and Byte 5 of the process data object “Bus Input” after 250 msec.

4.1.6. Byte 5 - Address

Address for memory access.

4.1.7. Byte 6 - Data-High

High-Byte of data to be written.

4.1.8. Byte 7 - Data-Low

Low-Byte of data to be written.

4.2. Process data object „Bus-Output“

The process data object “Bus Output” shows the details of the feedback of the actuator (as slave).

4.2.1. Byte 0 - Actual Value High-Byte

Feedback is scaled in line with the set value, as adjusted under 4.1.1.

4.2.2. Byte 1 - Actual Value Low-Byte

Feedback is scaled in line with the set value, as adjusted under 4.1.1.

4.2.3. Byte 2 - Working Condition / Error Code of the Actuator

The below table lists the messages that can appear during operation.

Error Nr. [dec]	Description of Status
Working condition	
0	Normal operation
1	Actuator doing auto-commissioning
2	Actuator not commissioned to the valve
14	Actuator not in AUTO mode (in conjunction with local control unit PSC.2)
Peripheral errors	
3	Set value error
4	Torque error
5	Fail Safe-action is started
6	Set value error of the process sensor
12	Position passed over
13	Position nor reached
11	Undervoltage at supply
Errors in actuator	
7	Mechanical / positioning error
8	Critical / maximum temperature reached
9	Electronics error / CRC
10	Limit of wear reached
Communication error	
32	No communication to actuator possible

Note: Error Nr. 32 may be displayed twice during commissioning of the actuator to the valve: when either end position is reached and the measured values are stored inside the actuator. During normal operation, this error signals a malfunction if it is displayed longer than 10 sec

4.2.4. Byte 3 - Address

Address for memory access.

4.2.5. Byte 4 - Data-High

High-Byte of data to be read.

4.2.6. Byte 5 - Data-Low

Low-Byte of data to be read.

5. Technical Data

Communication protocol	CANopen V4	
Fieldbus baud rate	adjustable up to 500 kBaud	(on request up to 1 MBaud)
Cycle time for data refresh	250 ms	
Cycle time for data transfer	250 ms	
Process data object „Bus Input“	8 Byte	Rx PD01
Process data object „Bus Output“	6 Byte	Tx PD01

6. Parameter Storage Addresses

RAM-Parameter					
Address	Data high	Data low	Range	Unit	Description
000	x	x	0...1000	% / ‰	present digital set value
001	x	x	0...1023	digit	present set value
002	x	x	0...1023	digit	present feedback
005	x	x	0...1000	% / ‰	present digital feedback
Diagnosis data					
185	x	x	0...65536	starts x 50	Number of motor starts
186	x	x	0...65536	starts	Number of motor starts at excess temperature
187	x	x	0...65536	h x 2	Operation time of actuator
188	x	x	0...65536	min x 6	Operation time of motor
189	x	x	0...65536	min	Operation time of motor at excess temperature

Basically all data are accessible that are displayed in the communication software PSCS. The required addresses are available on request.

Note: The current layout does not allow writing parameters to the actuator via the fieldbus.

7. Service data objects (SDO) as per CANopen specification DS-301

Object address	Sub index	Value	Description
0x1800	0x0		Number of entries
0x1800	0x1		COB-ID used by PDO
0x1800	0x2	0x0	Transmission type: synchronous data transfer
		0xff	Transmission type: asynchronous data transfer
0x1800	0x3	0x0	Inhibit time: each 15 ms a TxPDO is sent
		0x2710	Inhibit time: appr. 1 s (resolution: 100 µs)

Uni-Gate ID Daten

Object 2000
Bus Input
mapped to
RxPDO1

Byte 0								Byte 1								Byte 2								Byte 3							
MSB [% / ‰]								Set Value High-Byte								MSB [% / ‰]								Process Sensor High-Byte							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Object 2000
Bus Input
mapped to
RxPDO1

Byte 4								Byte 5								Byte 6								Byte 7							
Command								Address								Data High-Byte								Data Low-Byte							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Object 2001
Bus Output
mapped to
TxPDO1

Byte 0								Byte 1								Byte 2								Byte 3							
Feedback High-Byte								Feedback Low-Byte								Operating condition / Error codes								Address							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Object 2001
Bus Output
mapped to
TxPDO1

Byte 4								Byte 5							
Data High-Byte								Data Low-Byte							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Our representatives:

Italy
PS Automazione S.r.l.
Via Pennella, 94
I-38057 Pergine Valsugana (TN)
Tel.: <+39> 04 61-53 43 67
Fax: <+39> 04 61-50 48 62
E-mail: info@ps-automazione.it

India
PS Automation India Pvt. Ltd.
Srv. No. 25/1, Narhe Industrial Area,
A.P. Narhegaon, Tal. Haveli, Dist.
IND-411041 Pune
Tel.: <+ 91> 20 25 47 39 66
Fax : <+ 91> 20 25 47 39 66
E-mail : sales@ps-automation.in
www.ps-automation.in

To find out more about all our sales partners and subsidiaries please scan the QR code below or visit our website:

https://www.ps-automation.com/locations/?lang=en

PS Automation GmbH
Philipp-Krämer-Ring 13
D-67098 Bad Dürkheim

Phone: +49 (0) 6322 94980-0
E-mail: info@ps-automation.com
www.ps-automation.com