Operating Instructions
PS-AMS1x with
Fieldbus-Interface PROFINET 2Port
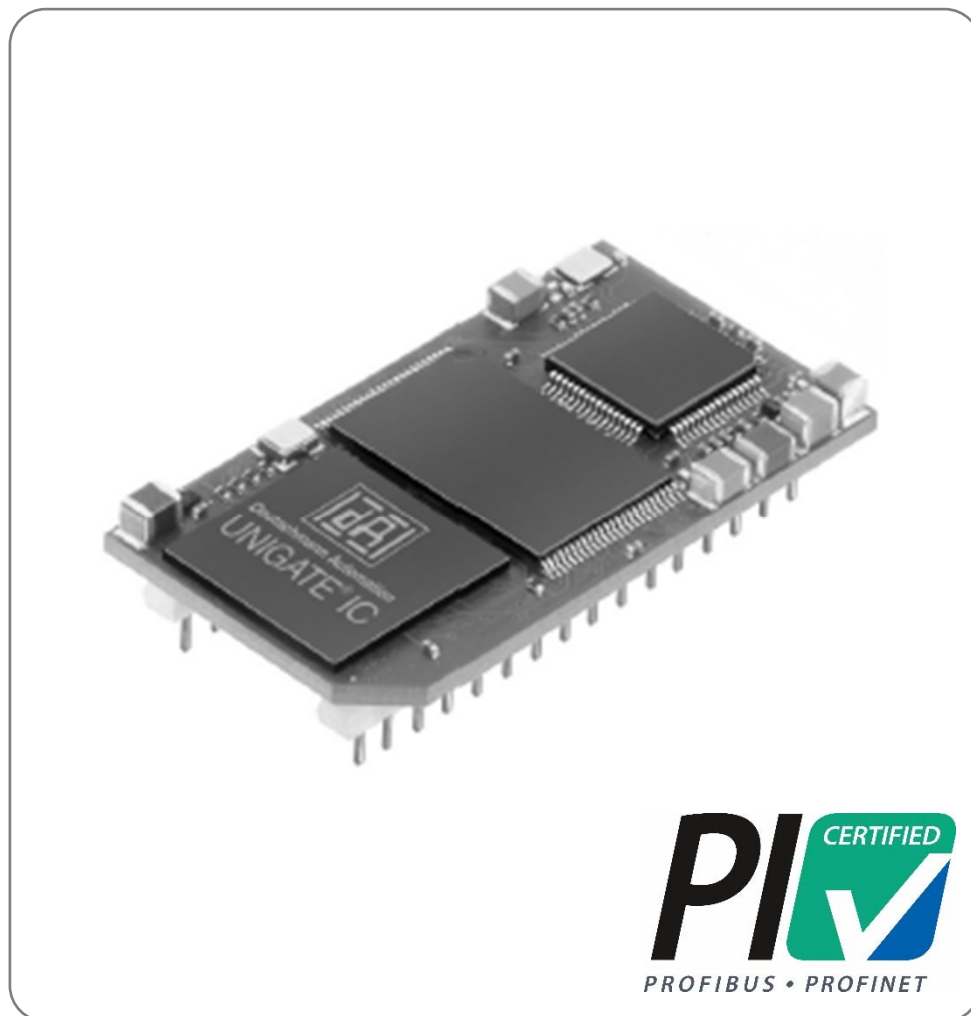
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1. Description

The optional fieldbus-interface PROFINET 2Port allows operation of the actuator via Profinet fieldbus. This interface communicates to the actuator via the standard serial port. The actuator does not use analogue set values in this case. Feedback from a process sensor to the optionally available process controller PSIC integrated in the actuator is digitally transmitted as well. Command level allows on request to read out all parameters and diagnostics data. Adjustment of parameterisation 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 local control PSC.2, the position of a switch on the main board of the actuator PS-AMS1x has to be changed, see chapter 2.3 Slide switch for selecting the communication interface. 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 Operating Instruction PSCS-USB

Note: „Digital Set Value" (in the operating instruction of the communication software PSCS-USB under Operate - Configuration – Set value & actual value signals) must be activated to control the actuator via the fieldbus interface!

Note: During PC communication unreasonable data may appear in the process image.

2. Connecting the Fieldbus

Caution: When working at or on the actuator's processor board, proper grounding 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 Plug & Socket

The actuator has two M12-D flange sockets on the outside of the housing, the M12-D cable connector is used for connection to the fieldbus for port 1 and port 2.

WT = white
YL = yellow
BL = blue
OR = orange
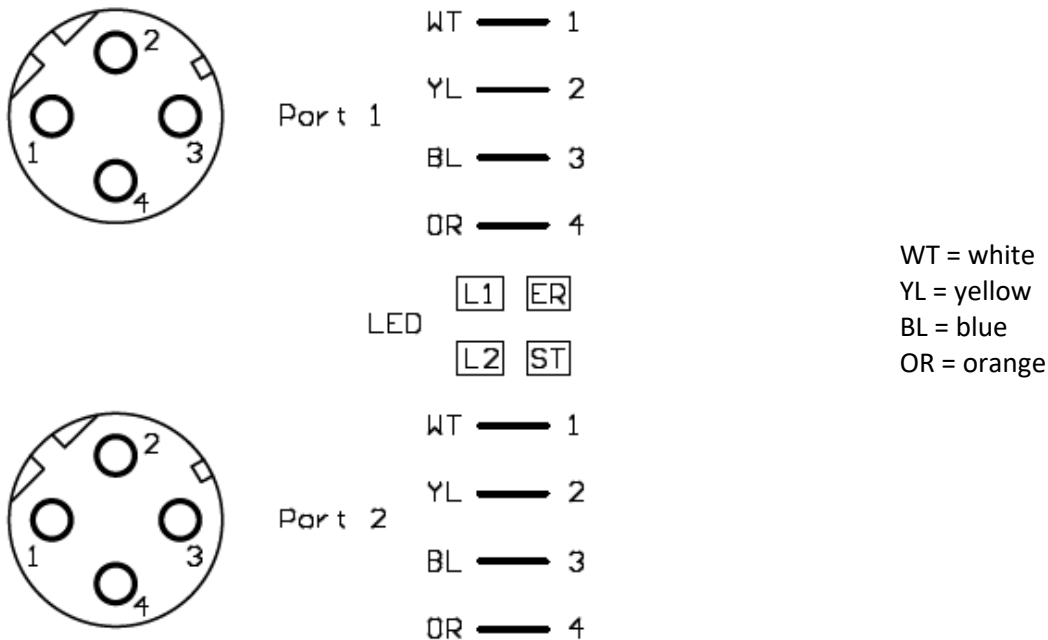
Caution: In order to ensure the IP protection, the protective caps must be screwed on unused flange sockets!

2.2 Fieldbus status LED's

The fieldbus status LEDs are located in the connection area between the connections for port 1 and port 2. The housing cover must be removed for diagnosis or PROFINET user flash test.

2.2.1 LINK ACT1 (L1)

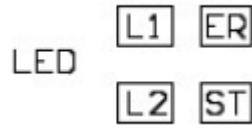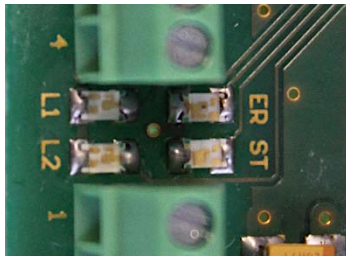This LED is triggered directly by the PROFINET processor and lights up when the gateway is on port 1 on a working network (link pulses are received) and flickers on network traffic

2.2.2 LINK ACT2 (L2)

This LED is triggered directly by the PROFINET processor and lights up when the gateway is on port 1 on a working network (link pulses are received) and flickers on network traffic.

2.2.3 State LED (ST)

OFF	Fieldbus not started
Blinking 10Hz	Error
Blinking 2Hz	Fieldbus started, waiting for connection / configuration mode
ON	Connected

2.2.4 Error LED (ER)

OFF	No error
Blinking	PROFINET user flash test
ON	Error

2.3 Slide switch for selecting the communication interface
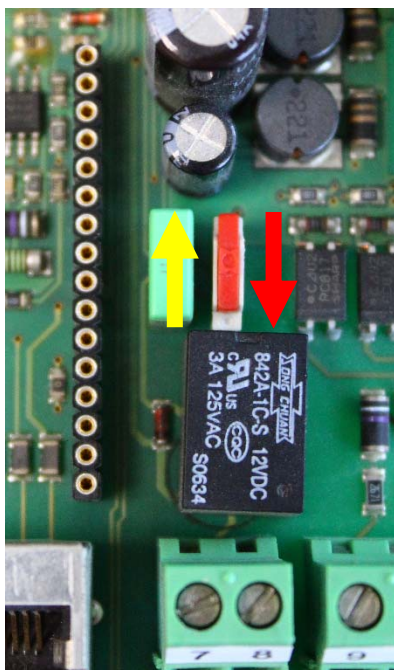
On the main board inside the actuator there is a slide switch for selecting the interface, see Figure 1.
For normal operation, i.e. when the actuator is controlled via the fieldbus, put the switch to lower position (red arrow).
For adjustment work, parameterisation, etc. the interface has to be put in upper position to allow PC-communication (yellow arrow).

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

yellow = PC-communication
red = fieldbus-communication

Figure 1: Slide switch for selecting the interface

3. PROFINET address allocation

Note: In the delivery state, the gateway does not have an IP address yet!
In normal operation (data exchange mode), the IP address is usually assigned to the gateway of the PROFINET-IO-Controller (SPS).

The required MAC address is printed on the nameplate of the actuator.

4. PROFINET device name

Note: In the delivery state, the gateway does not have a device name yet!
The device name can be assigned to the gateway via the configuration software.

According to the PROFINET specification, the following rules apply to the device name:
* One or more names separated by a dot.
* The total length is 1 to 240 characters.
* The length of one name part is 1 to 63 characters.
* A name part consists only of lowercase letters, numbers and the hyphen.
* Neither the first nor the last character of a name part is a hyphen.
* The first part of the name does not start with "port-xyz" or "port-xyz-abcde",
where a, b, c, d, e, x, y, and z are digits.
* It does not have the form "k.l.m.n", where k, l, m and n are numbers between 0 and 999.

5. Process Image
See table „Process Image AMS PROFINET " in the annex

5.1 Process Image OUTPUT
The process image OUTPUT shows the details how control of the actuator (as slave) is done.

5.1.1 Byte 1 - Set Value High-Byte
Bit 7 of Byte 1 (MSB) defines the input to be in percent (MSB = 0) or in tenth of percent (MSB = 1).

5.1.2 Byte 2 - Set Value Low-Byte
Input has to be made as per MSB of Byte 1.

5.1.3 Byte 3 - Process Sensor High-Byte
Bit 7 of Byte 3 (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 3 and Byte 4 have to be set to „0xFF"!

5.1.4 Byte 4 - Process Sensor Low-Byte
Input has to be made as per MSB of Byte 3.

Caution: When using an analogue process sensor, Byte 3 and Byte 4 have to be set to „0xFF"!

5.1.5 Byte 5 - 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 image:

Write 0x00 to command Byte 5
Write address (Byte 6), Data-High (Byte 7) and Data-Low (Byte 8)
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 5 and Byte 6 of the process image INPUT after 250 msec.

5.1.6 Byte 6 - Address
Address for memory access

5.1.7 Byte 7 - Data-High
High-Byte of data to be written

5.1.8 Byte 8 - Data-Low
Low-Byte of data to be written

5.2 Process Image INPUT
The process image INPUT shows the details of the feedback of the actuator (as slave).

5.2.1 Byte 1 - Actual Value High-Byte
Feedback is scaled in line with the set value, as adjusted under 5.1.1 Byte 1 - Set Value High-Byte

5.2.2 Byte 2 - Actual Value Low-Byte
Feedback is scaled in line with the set value, as adjusted under 5.1.2 Byte 2 - Set Value Low-Byte

5.2.3 Byte 3 - Working Condition / Error Code of the Actuator

The below table lists the messages that can appear during operation. Messages referring to the fieldbus interface will be covered under „5. Diagnosis".

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.

5.2.4 Byte 4 - Address
Address for memory access

5.2.5 Byte 5 - Data-High
High-Byte of data to be read

5.2.6 Byte 6 - Data-Low
Low-Byte of data to be read

6. Diagnosis

In the case of errors, the fieldbus interface of this actuator provides specific diagnosis data. These diagnosis data refer to the fieldbus interface only.

Error Nr. [dec]	Description of Error
0	Reserved
1	Hardware error
2	Error at E²PROM
3	Internal save error
4	Hardware error of Fieldbus
5	Script error
6	Reserved
7	RS transmit-buffer overflow
8	RS receive-buffer overflow
9	RS Time-out
10	General error of Fieldbus
11	Parity- or Frame-Check-Fehler
12	Reserved
13	Fieldbus configuration error
14	Fieldbus data-buffer overflow
15	Reserved

Note: Information about operating condition and error codes are available at Byte 3 of the process image INPUT only.

7. Technical Data

Communication protocol	UDP/IP, TCP/IP
Fieldbus baud rate	100 MBaut
Process image OUTPUT	8 Byte
Process image INPUT	6 Byte

8. GSD-File

The GSD file is a data-technical description of the PROFINET field device, which contains all information for the data traffic and the engineering.

You can download the configuration file from our homepage www.ps-automation.com in the section „Downloads" under „More Downloads".

9. 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.

10. Annex: Process Image PROFINET-DP in PS-AMS

Process image INPUT

Byte 1 — Feedback High-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 2 — Feedback Low-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 3 — Operating condition/Error codes

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 4 — Address

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 5 — Data High-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 6 — Data Low-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Process image OUTPUT

Byte 1 — Set value High-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
MSB [% / ‰]							

Byte 2 — Set value Low-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 3 — Process sensor High-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
MSB [% / ‰]							

Byte 4 — Process sensor Low-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 5 — Command

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 6 — Address

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 7 — Data High-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

Byte 8 — Data Low-Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

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