

Advance Optima Continuous Gas Analyzers

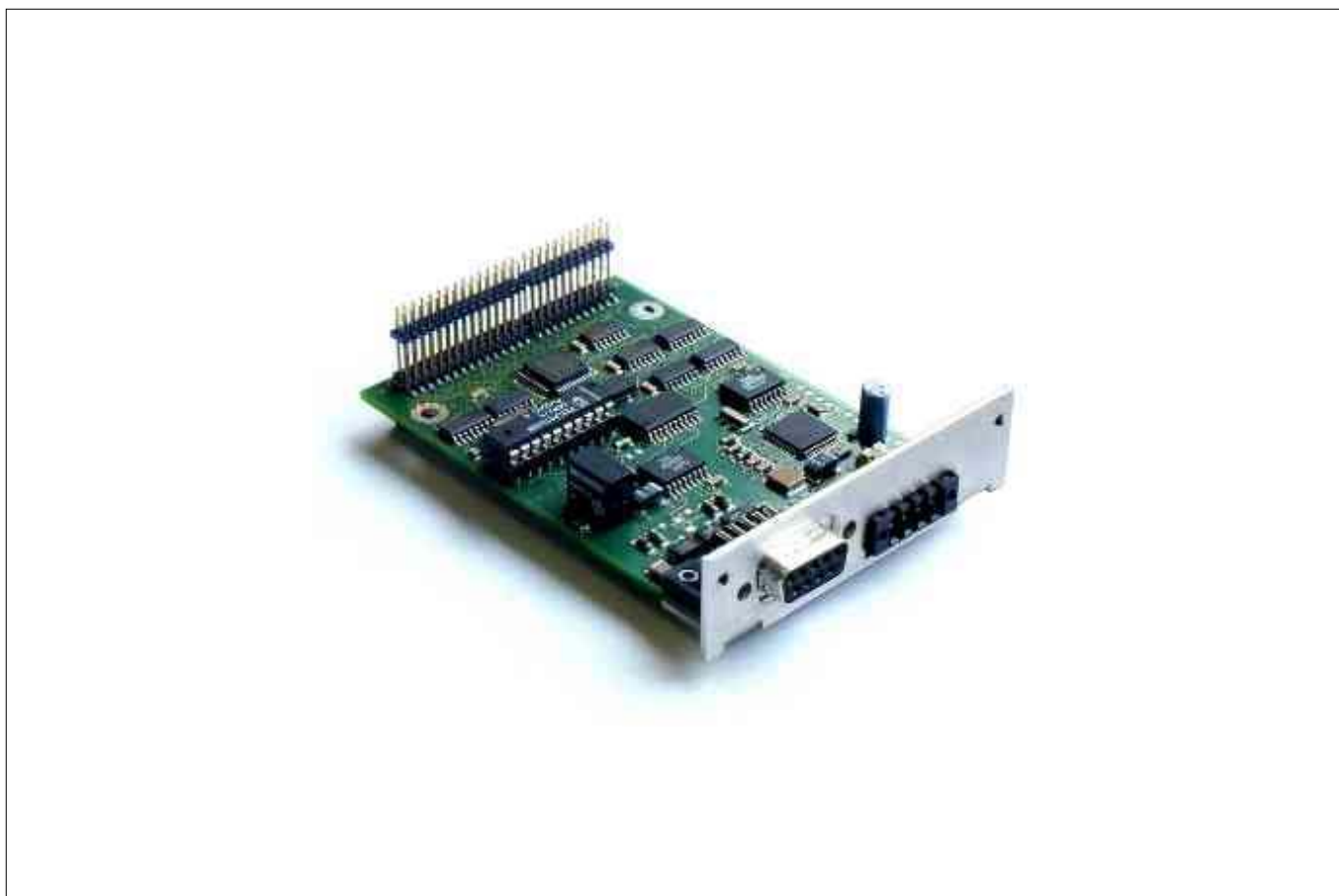
AO2000 Series

PROFIBUS DP/PA Interface

Software Version 5.1

Technical Information

30/24-315 EN Rev. 2



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Preface

This Technical Information describes exclusively the AO2000 PROFIBUS Interface from ABB. Using this interface requires a general knowledge of PROFIBUS.

For information on the configuration of PROFIBUS networks see the brochure "PROFIBUS solutions from ABB" (Publication No. 30/FB-10). Additional information can also be found with the PROFIBUS User Organization (PUO) on the Internet at <http://www.PROFIBUS.com>.

Application

Via the PROFIBUS module the AO2000 System can be connected to the PROFIBUS network as a PROFIBUS slave. The PROFIBUS module provides one RS485 and one MBP interface (non-intrinsically safe).

Via the PROFIBUS, information from the AO2000 Series gas analyzers is transferred to a PC, PLC or process control system, thus providing measured values, status signals as well as signals of the analog and digital inputs for further processing.

Compatibility

The PROFIBUS interface described in Revision 2 of the Technical Information at hand can be used as from AO2000 software version 5.1.2. Revision 1 of the Technical Information remains valid for former software versions.

Communication

AO2000 uses the „Profile for Process Control Device Version V 3.01“, with Amendment 2 „Condensed Status und Diagnostic Messages V 1.0“ and Amendment 3 „Identification Maintenance Functions (I&M Function for PA) V 1.0“.

AO2000 supports the RS485 and MBP (non-intrinsically safe) transmission technology.

The PROFIBUS specification differentiates between cyclic and acyclic services. With the cyclic services the process data (e.g. measured values, control commands and status information) is transferred between master and slaves, whereas the acyclic services provide online access to field instruments for parameter setting, operation, observation and alarm handling.

A DTM for configuration and parameter setting via the PROFIBUS is presently not available due to the variety of the gas analyzers. It is strongly recommended to execute the configuration of the AO2000 device at the HMI.

The PROFIBUS device profile is a device-specific supplement for data communication. In this device profile, parameters typical for the device family, as for instance measurement ranges or alarms have been specified as binding.

PROFIBUS DP/PA Module

The electronic module in the AO2000 System provides the possibility to insert a PROFIBUS DP/PA module in slot –X20/–X21. The module can be ordered in 2 variants:

- PROFIBUS DP/PA module for direct cabling
- PROFIBUS DP for Ex (hazardous areas) with cabling via isolating relay for use in a central housing in category 2G.

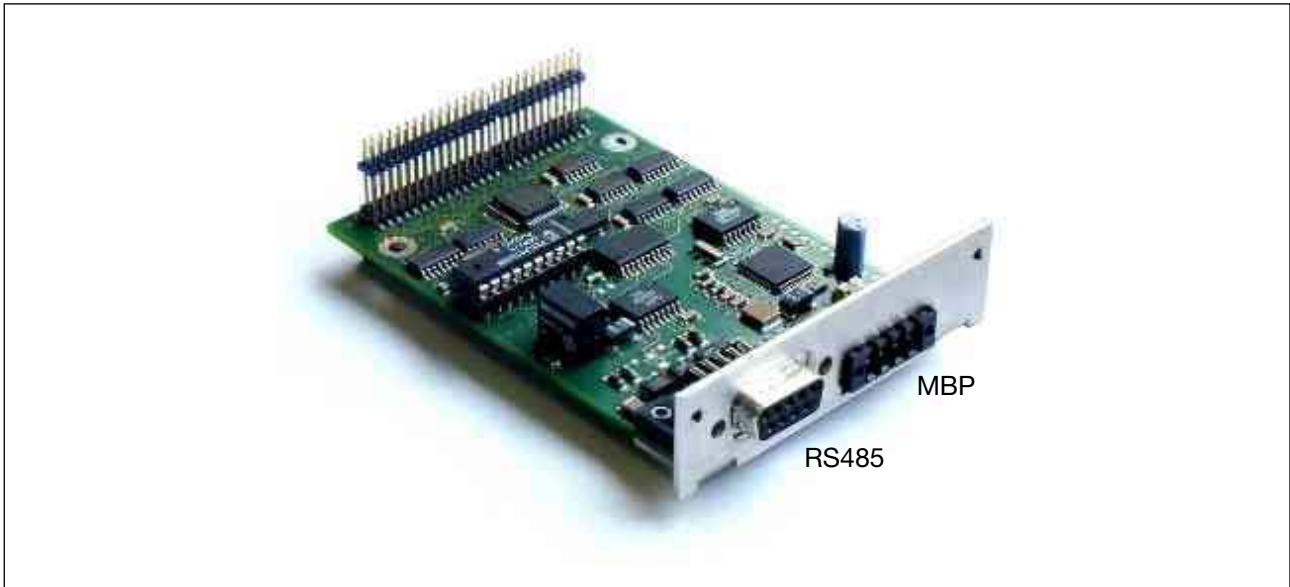


Figure 1 PROFIBUS DP/PA Module

The PROFIBUS DP/PA module provides two interfaces:

- RS485 interface
Via the RS485 interface an AO2000 System can be integrated into a PROFIBUS DP network.
- MBP interface
Via the MBP interface an AO2000 System can be integrated into a non-intrinsically safe PROFIBUS PA network.

Firmware

Current firmware version of the AO2000 System: V 5.1.2.

Integration into PROFIBUS Networks

The AO2000 System can be integrated into existing PROFIBUS DP or PROFIBUS PA networks by using the PROFIBUS DP/PA module. The PROFIBUS PA shown in the figure below is situated in a non-hazardous area.

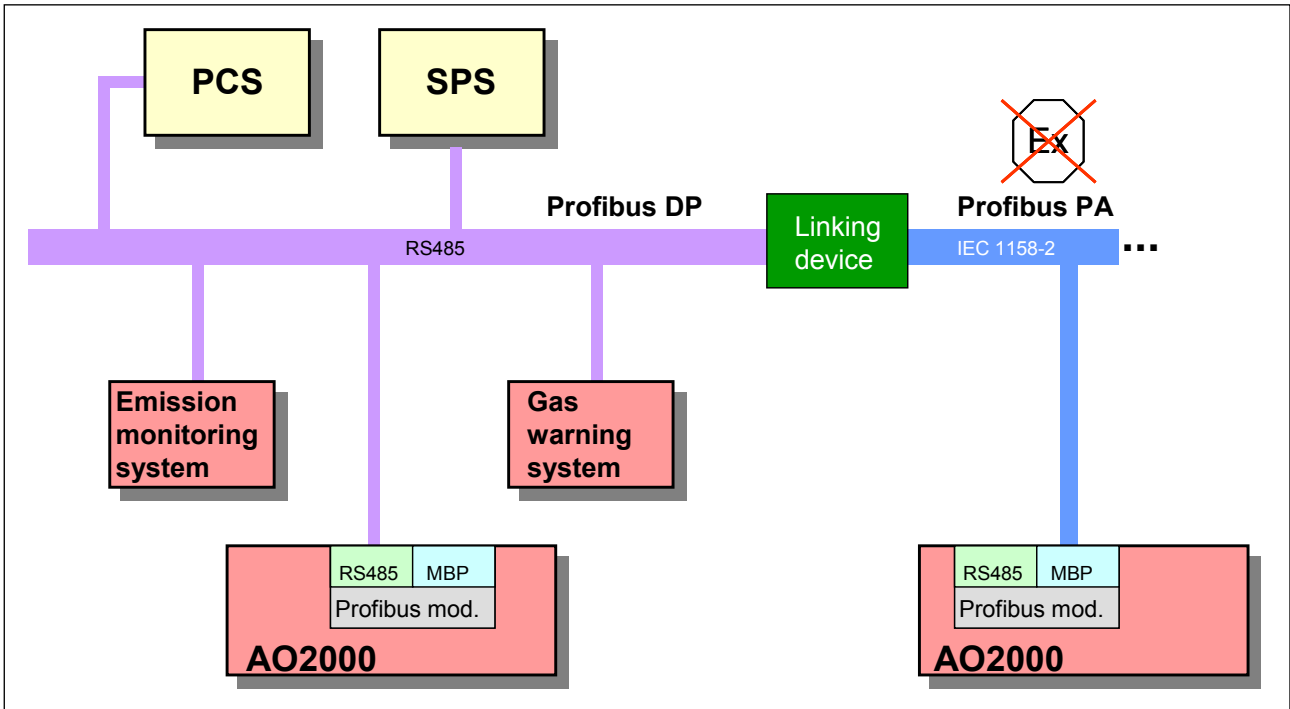


Figure 2 AO2000 analyzers coupled to a PROFIBUS DP and PA (non-intrinsically safe)

Device-Specific Data File (GSD File)

Using the PROFIBUS PA profile V 3.01 not only makes devices interoperable – that is devices of different manufacturers can be physically connected to a single bus and are able to communicate with each other –, but also makes them interchangeable, which means devices of different manufacturers can be exchanged one for another.

In order to ensure this interchangeability ABB provides a GSD file (device-specific data file) for system integration.

The manufacturer-specific GSD file “ABB_3401” is included on the CD-ROM “Software-Tools and Technical Documentation” which is part of the scope of supply of the gas analyzer. You will find a description of the GSD file in the Appendix (see page 36).

Setting the Bus Address

If there is no customer specification regarding the bus address, it is set to “126” at delivery. During commissioning of the AO2000 System the address must be set within the valid range (1–125). The set address must not be assigned more than once in the segment.

The setting can be made directly at the gas analyzer.

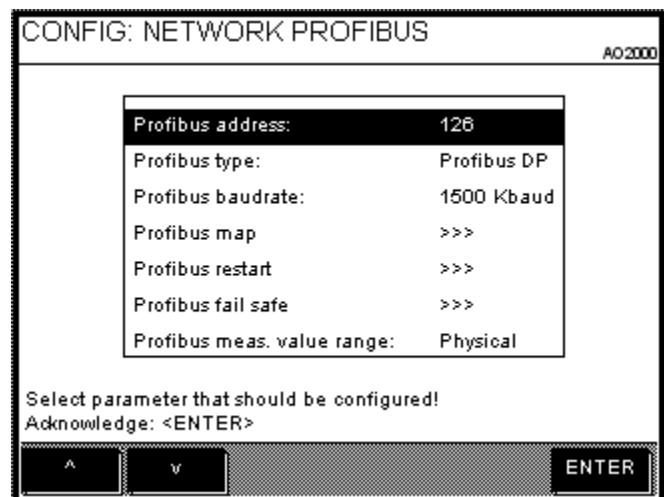


Figure 3 Setting the PROFIBUS address

PROFIBUS Map

After having logged on all analyzer modules and I/O boards to the system, the PROFIBUS map can be created using the software tool “SMT-Light”. To this effect a System Overview is read out. In the menu System the PROFIBUS map can be saved to a data carrier.

The configuration of a PROFIBUS map is in more detail described in chapter 3 (see page 9)

An example of a PROFIBUS map is shown in the Appendix (see page 49).

Device Type Manager (DTM)

A DTM for configuration and parameter setting via the PROFIBUS is presently not available.

Line Lengths

The admissible line length within the segment including all stub lines depends on the cable type and the set Baud rate.

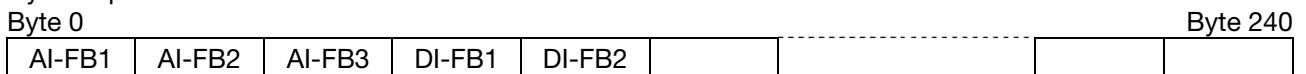
More detailed instructions for planning and design can be found in the brochure "PROFIBUS solutions from ABB" (Publication No. 30/FB-10). For additional information see our homepage at <http://www.abb.de> as well as the homepage of the PROFIBUS User Organization at <http://www.PROFIBUS.com>.

Boundary Conditions/Limits

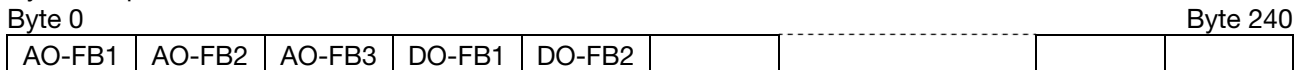
In cyclic data communication, when communication is started between master and slave, a configuration string (CFG string) is exchanged. This CFG string defines the sequence of the PROFIBUS function blocks (FB) in the cyclic data communication. The CFG string must not exceed 240 bytes.

Each FB participating in the cyclic data communication requires 4 bytes in the CFG string. This means the maximum number of PROFIBUS function blocks is 60 ($240 / 4 = 60$). The next restriction is that there are 240 bytes input data and 240 bytes output data available for cyclic data communication.

Cyclic input data:



Cyclic output data:



The analog FBs require 5 bytes (4 bytes value + 1 byte status).

The digital FBs require 2 bytes (1 byte value + 1 byte status).

This means:

- Number of AI-FB x 5 + number of DI-FB x 2 must not exceed 240 bytes.
- Number of AO-FB x 5 + number of DO-FB x 2 must not exceed 240 bytes.
- Number of AI-FB + number of DI-FB + number of AO-FB + number of DO-FB must not exceed 60 (limit of the CFG string).

Example:

only AI: $240 \text{ bytes} / 5 \text{ bytes} = 48 \text{ FB} < 60 \Rightarrow$ permitted

only DI: $240 \text{ bytes} / 2 \text{ bytes} = 120 \text{ FB} > 60 \Rightarrow$ not permitted

If the permissible limits are exceeded (i.e. there are more I/Os than can be mapped) the function blocks are arranged according to a pre-defined priority list (see Section "Mapping in cyclic data communication", page 18).

Chapter 3 Configuration of a PROFIBUS Map into AO2000 and into PROFIBUS Master

General

Each AO2000-System has an individual configuration regarding the number of analog and digital inputs and outputs. An existing AO2000 system, which is to be embedded as Slave into the PROFIBUS network, is fixed however by its structure of hardware, i.e. by the number of analyzers, the number of measuring components as well as the number of the installed digital modules and analog modules.

The standard PROFIBUS map such of a system contains all inputs and outputs, which are possible with the respective hardware configuration. Typically it is not necessary to transfer all available inputs and outputs to the PROFIBUS Master. In the adapted PROFIBUS map the inputs and outputs are to be contained only, which the PROFIBUS Master should have actually access.

Provide an individual PROFIBUS Map into AO2000

Task

Provide an individual PROFIBUS map for the following example configuration:

- 1 Analyzer module Uras26 with 2 measuring components (CO, CO₂)
- 1 Digital module in X24
- 1 Analog module in X26

Description of a standard PROFIBUS Map

The associated standard PROFIBUS map to the system specified above consists of 45 modules:

Profibus map							
IP-Address: 10.1.221.155		AQ2000-Version: V4.0.1.0		Conf. blocks: 25% free Inputs: 60% free Outputs: 76% free			
No	Profibus	Component/IO	Offset	Discription	Unit	Modul text	
1	AI	Measurements	0	CO	ppm	Uras 26 Anlz. 1	
2			5	CO2	Vol%	Uras 26 Anlz. 1	
3		Bus analog outputs	10	Bus AO1		SYSCON: BUS IO	
4			15	Bus AO2		SYSCON: BUS IO	
5			20	Bus AO3		SYSCON: BUS IO	
6			25	Bus AO4		SYSCON: BUS IO	
7			30	Bus AO5		SYSCON: BUS IO	
8			35	Bus AO6		SYSCON: BUS IO	
9			40	Bus AO7		SYSCON: BUS IO	
10			45	Bus AO8		SYSCON: BUS IO	
-		Analog inputs	-	--	-	--	
11		Analog outputs	50	CO (X26:AO1)	mA	AIO:X26 IO-Module 4	
12			55	CO2 (X26:AO2)	mA	AIO:X26 IO-Module 4	
13	DI	Digital inputs	60	Purge		SYSCON: SYST. CPU	
14			62	D inp 1 (X24:DI1)		DIO:X24 IO-Module 3	
15			64	D inp 2 (X24:DI2)		DIO:X24 IO-Module 3	
16			66	D inp 3 (X24:DI3)		DIO:X24 IO-Module 3	
17			68	D inp 4 (X24:DI4)		DIO:X24 IO-Module 3	
18			Bus digital outputs	70	Bus DO5		SYSCON: BUS IO
19				72	Bus DO6		SYSCON: BUS IO
20				74	Bus DO7		SYSCON: BUS IO
21	76	Bus DO8			SYSCON: BUS IO		
22		Bus analog inputs	78	Bus DO1		SYSCON: BUS IO	
23			80	Bus DO2		SYSCON: BUS IO	
24			82	Bus DO3		SYSCON: BUS IO	
25			84	Bus DO4		SYSCON: BUS IO	
26			Digital outputs	86	D out 1 (X24:DO1)		DIO:X24 IO-Module 3
27				88	D out 2 (X24:DO2)		DIO:X24 IO-Module 3
28				90	D out 3 (X24:DO3)		DIO:X24 IO-Module 3
29				92	D out 4 (X24:DO4)		DIO:X24 IO-Module 3
30	AO	Bus analog inputs	0	Bus AI1		SYSCON: BUS IO	
31			5	Bus AI2		SYSCON: BUS IO	
32			10	Bus AI3		SYSCON: BUS IO	
33			15	Bus AI4		SYSCON: BUS IO	
34			20	Bus AI5		SYSCON: BUS IO	
35			25	Bus AI6		SYSCON: BUS IO	
36			30	Bus AI7		SYSCON: BUS IO	
37			35	Bus AI8		SYSCON: BUS IO	
38	DO	Bus digital inputs	40	Bus DI8		SYSCON: BUS IO	
39			42	Bus DI1		SYSCON: BUS IO	
40			44	Bus DI2		SYSCON: BUS IO	
41			46	Bus DI3		SYSCON: BUS IO	
42			48	Bus DI4		SYSCON: BUS IO	
43			50	Bus DI5		SYSCON: BUS IO	
44			52	Bus DI6		SYSCON: BUS IO	
45			54	Bus DI7		SYSCON: BUS IO	

Continued on next page

Description of a standard PROFIBUS Map, *continued*

From the view of the PROFIBUS-Master there exist:

- 12 Analog input modules (No. 1...12),
- 17 Digital input modules (No. 13...29),
- 8 Analog output modules (No. 30...37)
- 8 Digital output modules (No. 38...45)

In Advance Optima are (see Figure 6, page 15, too):

- PROFIBUS analog inputs:
Measured values, Bus analog outputs , Analog inputs, Analog outputs
- PROFIBUS digital inputs:
Digital inputs, Bus digital outputs, digital outputs,
- PROFIBUS analog outputs:
Bus Analog Inputs
- PROFIBUS digital outputs:
Bus digital inputs

Configuration

1. Specify the number of the desired PROFIBUS inputs and outputs, which the PROFIBUS-Master is to access.

Example:

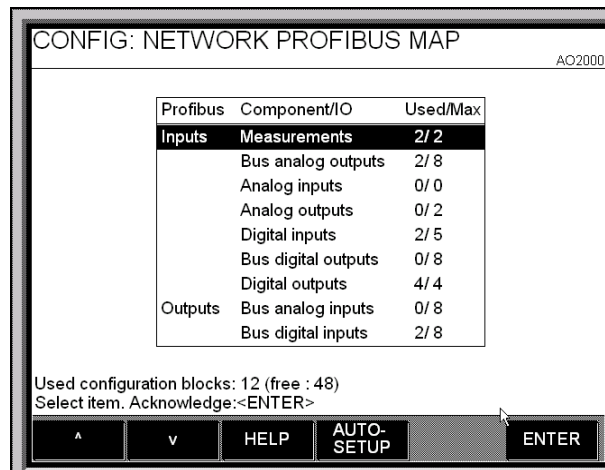
From the Uras26 the measured values of the two measuring components (CO, CO₂), 2 bus analog outputs, 2 digital inputs, 4 digital outputs and 2 bus of digital inputs are to be transferred, altogether thus 12 modules (parameters).

From the view of the PROFIBUS-Master these are:

- 4 PROFIBUS analog inputs:
2 measured values: CO ppm, CO₂ Vol% (measurements) and
2 Bus analog outputs
 - 6 PROFIBUS digital inputs:
2 Digital inputs: X24, DI1 and DI3 and
4 Digital outputs: X24, DO1,2,3,4
 - no PROFIBUS analog output
 - 2 PROFIBUS digital outputs:
2 Bus digital inputs: Bus DI1 and DI2)
2. Configure the PROFIBUS inputs and outputs either directly at the analyzer or with the help of the HMI software remotely (*Menu* → *Configuration* → *System* → *Network* → *PROFIBUS*).
Not necessary components are to be deactivated. This avoids bus load without utilizable contents and increases the clarity.

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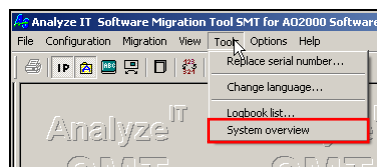
PROFIBUS map in the AO-HMI after the deactivation not necessary inputs and outputs:



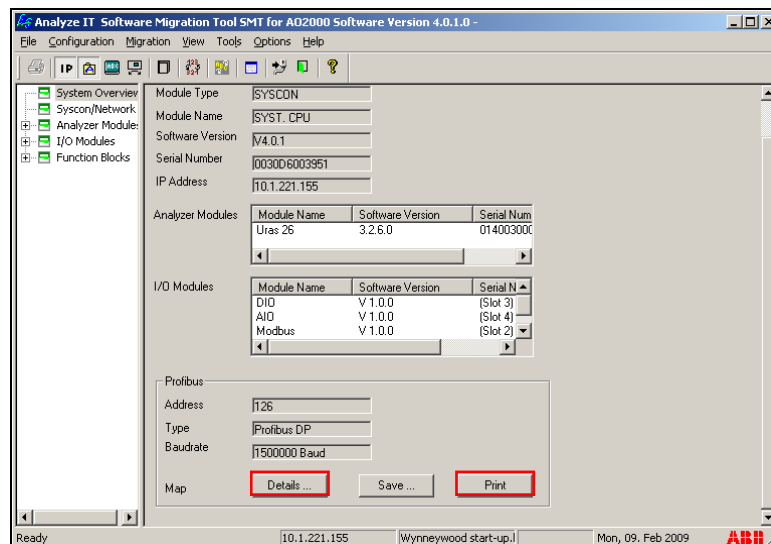
Read/Print

This PROFIBUS map can be read and printed with the help of the SMT software.

1. Start SMT-Software and set IP-Address of the analyzer .
2. Load the configuration of the system with *Tools* → *System overview* .



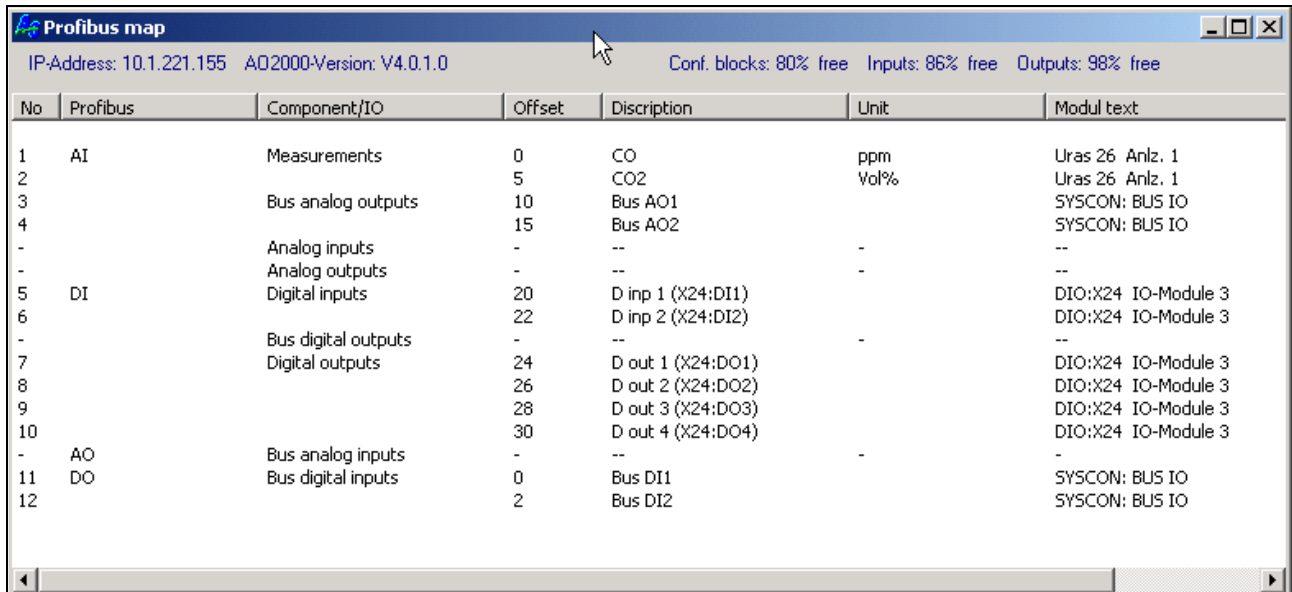
3. To print-out the adapted PROFIBUS map, actuate *Print*.
If no printer is present, actuate *Details* to show the adapted PROFIBUS map at the monitor.
Followed you can create a screenshot.



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Provide an individual PROFIBUS Map into AO2000, *continued*

Instead of that originally 45 modules are contained 12 modules of now only in the PROFIBUS map:



The screenshot shows a window titled "Profibus map" with the following information at the top: IP-Address: 10.1.221.155, AO2000-Version: V4.0.1.0, Conf. blocks: 80% free, Inputs: 86% free, Outputs: 98% free. The main content is a table with the following columns: No, Profibus, Component/IO, Offset, Discription, Unit, and Modul text.

No	Profibus	Component/IO	Offset	Discription	Unit	Modul text
1	AI	Measurements	0	CO	ppm	Uras 26 Anlz. 1
2			5	CO2	Vol%	Uras 26 Anlz. 1
3		Bus analog outputs	10	Bus AO1		SYSCON: BUS IO
4			15	Bus AO2		SYSCON: BUS IO
-		Analog inputs	-	--	-	--
-		Analog outputs	-	--	-	--
5	DI	Digital inputs	20	D inp 1 (X24:DI1)		DIO:X24 IO-Module 3
6			22	D inp 2 (X24:DI2)		DIO:X24 IO-Module 3
-		Bus digital outputs	-	--	-	--
7		Digital outputs	24	D out 1 (X24:DO1)		DIO:X24 IO-Module 3
8			26	D out 2 (X24:DO2)		DIO:X24 IO-Module 3
9			28	D out 3 (X24:DO3)		DIO:X24 IO-Module 3
10			30	D out 4 (X24:DO4)		DIO:X24 IO-Module 3
-	AO	Bus analog inputs	-	--	-	-
11	DO	Bus digital inputs	0	Bus DI1		SYSCON: BUS IO
12			2	Bus DI2		SYSCON: BUS IO

Example:

From the Uras26 the measured values of the two measuring components (CO, CO₂), 2 bus analog outputs, 2 digital inputs, 4 digital outputs and 2 bus of digital inputs are be transferred, altogether thus 12 modules (parameters).

Modules 1–10: Input data from Slave to Master
Offset 0 to 30 = 32 Byte

Modules 11–12: Output data from Master to Slave
Offset 0 to 2 = 4 Byte

Provide the Map into PROFIBUS Master

The map in the PROFIBUS Master must be provided with accurately the same components and data types as for the AO2000.

Note:

The sequence AI, DI, AO, DO is to be observed absolutely!

For this purpose the engineering software of the respective automation system is required.

Chapter 4 Block Structure of the Device Profile (Analyzer Devices)

The PA device profile for the AO2000 System has been developed and implemented according to the block model, which describes the functionality of the device by means of “blocks”.

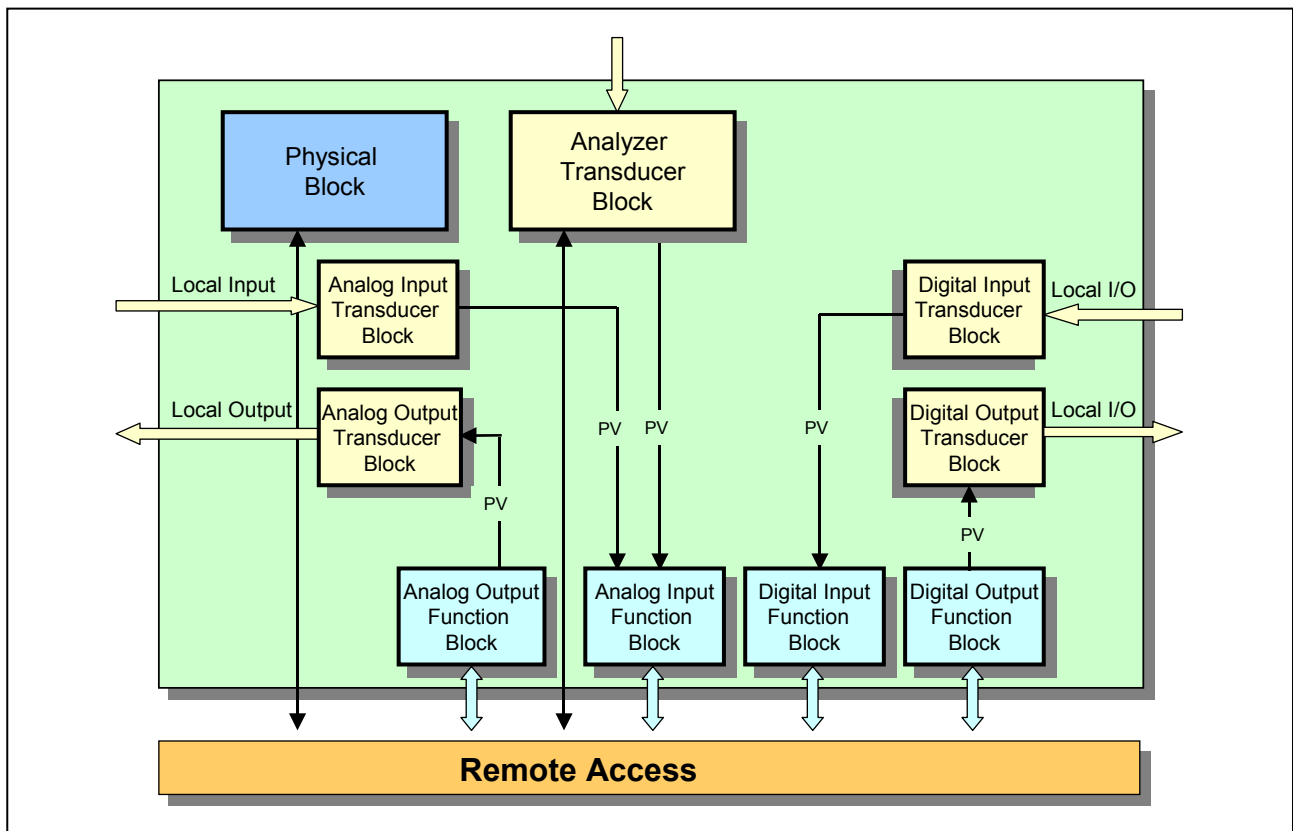


Figure 4 Block structure of the device profile analyzer devices

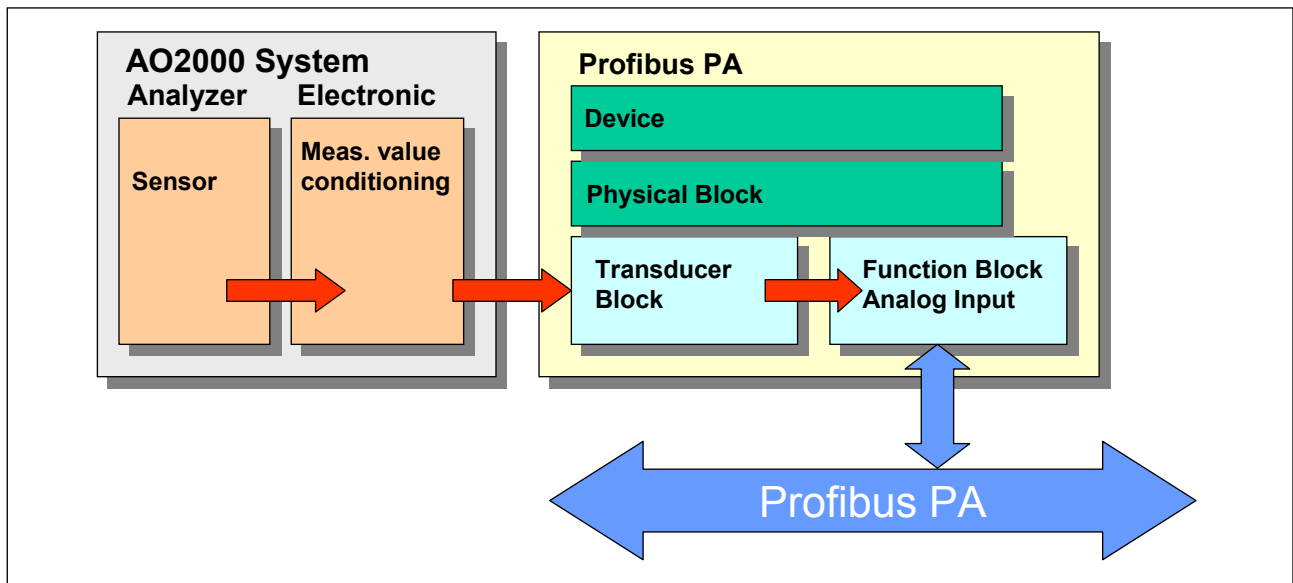


Figure 5 Block model in the AO2000 System

Description of the Blocks

Block type	Block contents	Note
Device block		
Physical Block (PB)	Description of the device (hardware) Measuring method, device configuration, device number, manufacturer's name, operating status (operation, maintenance, ...) global status, diagnosis information.	only one device block for each device
Transducer blocks (Parameters of the physical meas. variable)		
Transducer Block (ATB, DITB, AITB, AOTB, DOTB)	Measuring method and its interpretation Variable (clear text and unit). Number of measurement ranges (MR), lower range and upper range values of MR, active MR. ON/OFF of the function Auto range. Measured value cycle time, measured value with time stamp and status	Analyzer TB, discrete input TB Manufacturer-specific: Analog input TB, Analog output TB, Digital output TB
Function blocks (Functions seen from SPS, PLS, ...)		
Analog Input Function Block (AIFB)	Measured value Current measured value with status and scaling. Calculated meas. values and auxiliary variables via BUS AO	Component measurement values, BUS AO, analog inputs and outputs of the AO2000 System
Analog Output Function Block (AOFB)	Analog output (external measured values)	BUS AI of the AO2000 System
Discrete Input Function Block (DIFB)	Digital input	Digital inputs and outputs of the AO2000 System
Discrete Output Function Block (DOFB)	Digital output (input for control, e.g. calibration)	BUS DI of the AO2000 System

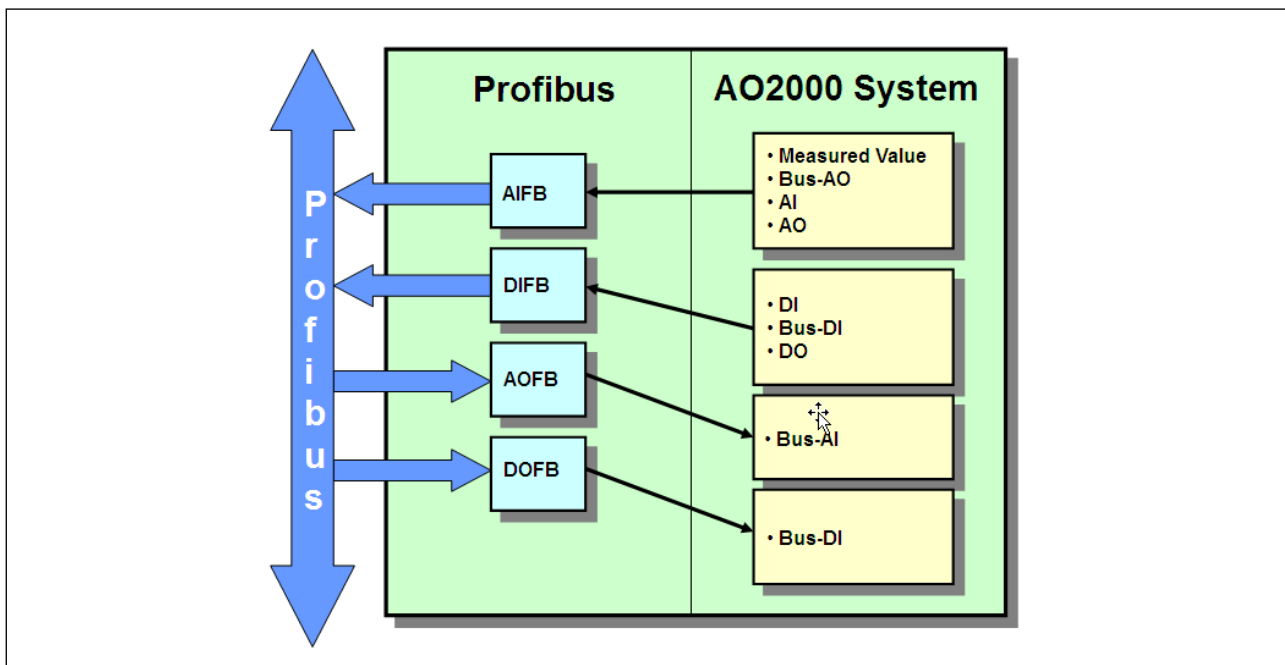
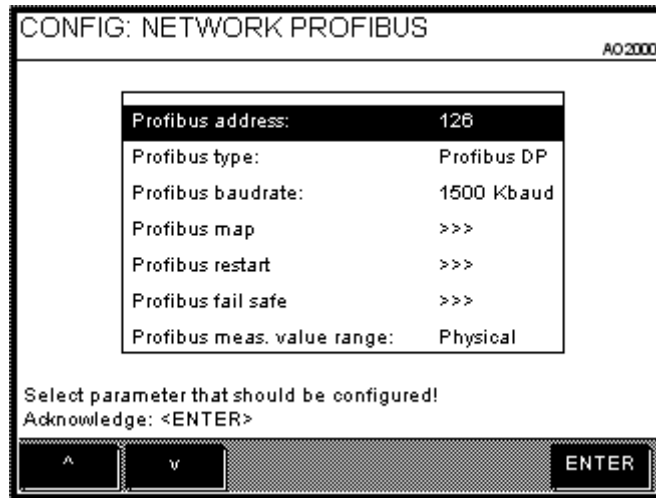


Figure 6 Mapping of the process values in the AO2000 System on the PROFIBUS

Configuration Menu



Parameter	Value range	
Profibus address	1...126	
Profibus type	Profibus DP	Connection to the RS485 interface
	Profibus PA	Connection to the MBP interface (non-intrinsically safe)
Profibus baudrate	RS485 interface	automatically, 9600 Baud, 19200 Baud, 93750 Baud, 187.5 KBaud, 500 KBaud, 1.5 MBaud, 3 MBaud, 6 MBaud
	MBP interface	set to 31.25 KBaud
Profibus map	Profibus Inputs	see paragraph "Boundary Conditions/Limits", page 8,
	Profibus Outputs	and paragraph "Mapping in cyclic data communication", page 18
Profibus restart	Warm Start	With Warm Start the PROFIBUS stack is reset, comparable with a Power off/on.
	Cold Start	With Cold Start, all the parameters which are stored in the PROFIBUS stack as Store parameters are reset to the default value. These are e.g. all the parameters of the function blocks, the block header parameters of the transducer blocks, cancelling the blocking of the change of PROFIBUS address via the bus.
Profibus fail safe	Measured value	The Profibus function block value follows the AO2000 function block output value.
	Hold last value	The Profibus function block holds the last output value. The indication of the AO2000 function block can deviate from this value.
Profibus meas. value range	Physical	The Profibus-AI value is the physical measured value (indicated value) of AO2000.
	VDI 4201	The physical measured values of AO2000 are scaled to the range -10000...0...+10000. 0 equals physically zero and 10000 corresponds to the end value of the indication range (according to VDI 4201; see section „Application of Reference Material via PROFIBUS to VDI 4201“, page 17).

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Explanatory remarks to the parameter "Profibus fail safe":

In table "AO2000 Status Messages", column "PROFIBUS Status" (see page 23) it is indicated which measured value status is set for each status message. When the BMA or BFC status is output, either the measured value is continuously output or the last valid measured value is being held depending on how the parameter is set ("Measured value" or "Hold last value").

Application of Reference Material via PROFIBUS to VDI 4201

An evaluation computer equipped with a PROFIBUS interface to VDI 4201 is able to apply reference material to the connected gas analyzer. For this purpose, connections must be established between the bus digital inputs switched via PROFIBUS and the digital outputs used to switch the solenoid valves. The bus digital inputs must set the "External maintenance mode" status simultaneously.

These connections are established ex works based on a function block configuration when the gas analyzer has been ordered with the "Profibus interface to VDI 4201" option. In this case, the "PROFIBUS Interface" data sheet with the necessary information on the relevant parameters is delivered with the gas analyzer.

Mapping in Cyclic Data Communication

In cyclic data communication the measured values and I/Os are arranged automatically.

Alternatively, the map can be parameterized in the configuration menu “System → Network → PROFIBUS → Map”. This menu contains a list of all I/O groups.

PROFIBUS	AO2000 functions	
Inputs	Measured values	Component measurement values
	Bus analog outputs	
	Analog inputs	Hardware inputs only readable
	Analog outputs	Hardware outputs only readable
	Digital inputs	Hardware inputs only readable
	Bus digital outputs	
	Digital outputs	Hardware outputs only readable
Outputs	Bus analog inputs	
	Bus digital inputs	

From these I/O groups you can select the I/Os which are to participate in cyclic data communication. The used number of I/Os is shown in the sub-menus. Arrangement of the I/Os in cyclic data communication is always made based on the table above.

If the limits described in the paragraph “Boundary Conditions/Limits” are exceeded (i.e. there are more I/Os than can be mapped) and automatic distribution is activated, it is made according to the following priority list until all resources are used up:

- Component measurement values
- Bus analog outputs
- Digital inputs
- Bus digital outputs
- Digital outputs
- Analog outputs
- Analog inputs
- Bus digital inputs
- Bus analog inputs

Notes:

- If the user manually changes the map, automatic distribution of the I/Os is deactivated.
- If a component measurement value or an I/O is added or removed, the map of the cyclic I/O data is altered.

Continued on next page

Example:

If digital inputs are selected in the menu “Map”, they will be inserted according to the list. The following I/Os will be shifted accordingly.

Configuration menu digital inputs	
	Configured
DI 1 I/O module 1	X
DI 2 I/O module 1	
DI 3 I/O module 1	X
DI 4 I/O module 1	
DI 1 I/O board 1	
DI 2 I/O board 1	X

	DI 1 I/O module 1	DI 3 I/O module 1	DI 2 I/O board 1	
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Map in cyclic data communication before the change

Configuration menu digital inputs	
	Configured
DI 1 I/O module 1	X
DI 2 I/O module 1	
DI 3 I/O module 1	X
DI 4 I/O module 1	X
DI 1 I/O board 1	X
DI 2 I/O board 1	X

	DI 1 I/O module 1	DI 3 I/O module 1	DI 4 I/O module 1	DI 1 I/O board 1	DI 2 I/O board 1	
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Map in cyclic data communication after the change

The menu is protected by password Level 3.

As you can see in the above example, the user can introduce changes which lead to a changed map in the cyclic data communication. In order to enter the cyclic data into a SPS or control system, the user needs the map of the cyclic data. Therefore the software tool “SMT” (as well as “SMT light”) has been extended by the following functions:

- SMT reads out the map of the cyclic data from the AO2000 System.
- Subsequently these data can be printed and saved.

See example in the Appendix “PROFIBUS Map”

Adding New Modules

When adding new modules you have to differentiate between

- automatic mapping and
- manual mapping

of the I/Os in cyclic data communication.

Automatic mapping means the sequence of the I/Os in cyclic data communication is always defined as described in the paragraph “Mapping in Cyclic Data Communication”.

Manual mapping means all I/Os of the new module have to be entered by the user via the configuration menu “System → Network → PROFIBUS → Map”.

Removing Modules

If a module is removed, all PROFIBUS function blocks belonging to this module have to be deleted. And in this context it is irrelevant whether the configuration was made automatically or manually. As the cyclic data have to be mapped without a gap, removing a module can change the addresses of the remaining modules.

Cyclic Data Transfer of Digital Inputs and Outputs

2 bytes are transferred for each digital value. (PROFIBUS PA profiles for Process Control Devices / General Requirements Data structure DS-34). The first byte represents the digital value. The second byte represents the status (see the following Section “Cyclic Data Transmission of Analog Inputs and Outputs”).

Cyclic Data Transfer of Analog Inputs and Outputs

For each analog value 5 bytes are transmitted (PROFIBUS PA Profile for Process Control Devices / General Requirements Data Structure DS-33). The first 4 bytes represent the analog value, which is transmitted in the IEEE 754 format (see below) .The 5th byte represents the status.

Condensed Status

For each diagnostic event which occurs in AO2000, a measured value status and a bit must be set in the device diagnosis. A measured value status and diagnostic information are stored for each status message.

Device Diagnosis

Each diagnostic event of the AO2000 is assigned to one of the following diagnosis bits in the device diagnosis.

Abbr.	Diagnosis bit	Code		
DMR	DIA_MAINTENANCE	0x00200000	Maintenance required	Maintenance request: Maintenance in ≥ 7 days
DMA	DIA_MAINTENANCE_ALARM	0x00000100	Failure of the device	Failure: Maintenance is required immediately
DMD	DIA_MAINTENANCE_DEMANDED	0x00000200	Maintenance demanded	Maintenance request: Maintenance in ≥ 24 h
DFC	DIA_FUNCTION_CHECK	0x00000400	Device is in function check mode or in simulation or under local control, e.g. maintenance	Function check: The device is under local control, in self-diagnosis, being calibrated
DIPC	DIA_INV_PRO_COND	0x00000800	The process conditions do not allow to return valid values. (Set if a value has the quality Uncertain – process related, no maintenance or Bad – process related, no maintenance)	Process-related fault

Other diagnosis bits used

Abbr.	Diagnosis bit	Code
DCS	DIA_COLDSTART	0x00100000
DWS	DIA_WARMSTART	0x00080000
INV	IDENT_NUMBER_VIOLATION	0x00800000

Measured Value Status

The following measured value statuses are defined by the profile:

Abbr.	Code	Description	Meaning	
GOK	0x80– 0x8E	Good – OK		
GMR	0xA4	Good – maintenance required	Device has wearout message (2nd level)	
GMD	0xA8	Good – maintenance demand	Device has wearout message (2nd level)	
GFC	0xBC	Good – internal function check	Self-diagnosis, calibration, without noticeable influence on measured value	
BFC	0x3C	Bad – function check / local override	Device is maintained, cleaned or calibrated. Measured value does not correspond to the process value	If one of these faults occurs at the inlet of the FB, this will be converted to the outlet status to the defined failsafe table (Chapter 3.3.1 of amendment 2).
BMA	0x24	Bad – maintenance alarm	Error in device	
BP	0x23	Bad – passivated	Device is not used in the process. Device may not report any kind of diagnosis or other status.	
BNM	0x2B	Bad – process related, no maintenance	Device fault-free but fault-free measurement not possible	
USS	0x4B	Uncertain – substitute set	Device supplies preset substitute value in the event of a fault	Set by the profile stack to the defined failsafe table (Chapter 3.3.1 of amendment 2)
UIV	0x4F	Uncertain – initial value	Activate initial value to	Set by the profile stack
UMD	0x68	Uncertain – maintenance demanded	Device has wearout message (2nd level) measured value if necessary, outside the specification	
USVS	0x73	Uncertain – simulated value, start	Start of a simulation e.g. loop test when commissioning	Set by the profile stack (Chapter 3.1 of amendment 2)
USVE	0x74	Uncertain – simulated value, end	End of the simulation	Set by the profile stack (Chapter 3.1 of amendment 2)
UPR	0x78	Uncertain – process related	Device fault-free but fault-free measurement not possible, e.g. measured value with reduced precision	

AO2000 Status Messages

Legend for the Table "Status Messages"

Status signals

A	Status "Error"	A status has occurred in the gas analyzer which requires the immediate intervention of the user. The measured value is invalid.
W	Status "Maintenance Request"	A status has occurred in the gas analyzer which will soon require the intervention of the user. The measured value is valid.
F	Status "Maintenance Mode"	A calibration is being carried out in the gas analyzer, or the maintenance switch has been set to "On". The measured value is not a process measured value and is to be discarded.
S	Overall Status	The overall status is always set in conjunction with the status "Error" and for individual messages in conjunction with the status "Maintenance request"; it is not set in conjunction with the status "Maintenance mode".

Status messages categories

a	Active status messages not requiring acknowledgement
aQ	Active status messages requiring acknowledgement
aL	Active status messages requiring acknowledgement and troubleshooting
iQ	Inactive status message requiring acknowledgement

PROFIBUS diagnosis and status

	The abbreviations for the diagnosis are to be taken from the table in the Section "Device diagnosis" (cf. Page 21)
	The abbreviations for the status are to be taken from the table in the Section "Measured value status" (cf. Page 22). The measured value status for the inlet of the FB is entered in this column. If the status is Bad, this will be converted in the FB on the basis of the failsafe table (Chapter 3.3.1 of amendment 2).
L	With this status message only the disturbed variable (Local) assumes the measured value status.
GM	With this status message all the measurement values (Global) assume the measured value status.
G	With this status message all the measurement variables (measurement values and IO) (Global) assume the measured value status.
	Note: Status messages with no entry in the "PROFIBUS" columns are not mapped via the PROFIBUS.

Continued on next page

AO2000 Status Messages, *continued*

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
System Controller							
101							System controller shut down at:
102							System controller starts up at:
103							Installing Module:
104							Removing Module:
105							Reactivating Module:
106							A user installed module:
107							A user removed module:
108							A user replaced module:
109				GOK			A password is active! To delete, press the <MEAS> key on the measurement value display.
110	A	S	a				System booting.
111				GOK			This system is temporarily under remote control!
112				GOK			Display/control unit synchronizing with analyzer. Please wait.
113				GOK			The system time was changed from -> to:
114				GOK			The system is saving the changed parameters. Please wait!
116	A	S	a				The PROFIBUS Module is mounted on the wrong slot! The PROFIBUS interface is not working. Please remount the PROFIBUS Module on slot X20/X21.
117				GOK			The configuration backup was saved.
118				GOK			The configuration backup was loaded. The system has been restarted.
119	A	S	iQ				The system configuration could not be loaded! This system contains no configuration now. Please enter menu Configure/System/Save configuration to load your backup configuration. Or use SMT to re-install your configuration.
System Bus							
200				BMA	G	DMA	The selected system bus baudrate is not valid.
201	A	S		BMA	G	DMA	The selected system bus module could not be found.
202				BMA	G	DMA	The selected system bus module already exists.
203	A	S		BMA	G	DMA	The selected system bus module does not exist.
204				BMA	G	DMA	The system bus Software driver has an error.
206				BMA	G	DMA	It is no system bus module name defined.
207				BMA	G	DMA	The system bus network communication has an error.
208	A	S		BMA	G	DMA	The system bus was not able to transfer data into the database.
209	A	S		BMA	G	DMA	The system bus connection to this module is interrupted.
210	A	S		BMA	G	DMA	The system bus module configuration has changed.
211	A	S		BMA	G	DMA	The system bus module has no more on-board memory.
214				BMA	G	DMA	The system is currently maintained with Optima SMT.
215	A	S		BMA	G	DMA	The analyzer module has an internal communication error!
216	A	S		BMA	G	DMA	The analyzer module has an internal program error!

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
Analyzer Modules							
300	A	S	aL	BMA	L	DMA	No new measured values from the analog/digital converter.
301	A	S	a	BMA	L	DMA	The measurement value exceeds the analog/digital converter value range.
302	W		aQ	GMR	L	DMR	The offset drift exceeds half the permissible range.
303	A	S	aQ	GMD	L	DMD	The offset drift exceeds the permissible range.
304	W		aQ	GMR	L	DMR	The amplification drift exceeds half the permissible range.
305	A	S	aQ	GMD	L	DMD	The amplification drift exceeds the permissible range.
306	W		aQ	GOK	L	DMD	The offset drift between two calibrations exceeds the permissible range.
307	W		aQ	GOK	L	DMD	The amplification drift between two calibrations exceeds the permissible range.
308	A	S	aQ	BMA	L	DMA	A computational error occurred during the calculation of the measured value.
309	W		a	BMA	L	DMA	The temperature controller has an error.
310	W		a	UMD	L	DMR	The temperature compensation for this component was switched off. The temperature value is incorrect.
311	A	S		BMA	L	DMA	The pressure controller has an error.
312	W		a	UMD	L	DMR	The pressure compensation for this component was switched off. The pressure value is incorrect.
313	W		a	UMD	L	DMD	There is no cross-sensitivity correction possible for this component. The correction value is incorrect.
314	W		a	UMD	L	DMD	There is no carrier gas correction possible for this component. The correction value is incorrect.
Auxiliary Detector							
315	W			GOK			No new measurement values from analog/digital converter.
316	W			GOK			Measurement value exceeds the analog/digital converter value range.
317	W			GOK			A computer error occurred during calculation of the measurement value.
Uras							
318	A	S		BMA	L	DMA	No new measurement values from analog/digital converter.
Caldos, Magnos							
319	A	S		BMA	L	DMA	The measurement bridge is improperly balanced.
320	A	S		BMA	L	DMA	The measurement amplifier offset is too high.
Fidas, MultiFID							
321	A	S		BMA	L	DMA	The detector temperature is below the lowest permissible temperature.
322	A	S		BMA	L	DMA	The flame is out.
323	A	S		BMA	L	DMA	The analyzer is in the fail-safe state.
Temperature Regulator							
324	W		a	GOK			The temperature is above or below the upper or lower alarm value 1.
325	W		a	GOK			The temperature is above or below the upper or lower alarm value 2.

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
Pressure Regulator							
326	A	S		GOK			No new measurement values from analog/digital converter.
327	A	S		GOK			Measurement value exceeds the analog/digital converter value range.
328	A	S		GOK			A computer error occurred during calculation of the measurement value.
329	W			GOK			The pressure is above or below the upper or lower alarm value 1.
330	W			GOK			The pressure is above or below the upper or lower alarm value 2.
331	A	S		GOK			The pressure regulator control variable is beyond the valid range.
I/O Boards							
332	A	S		BMA	G	DMA	Accessory voltage defect on I/O board.
333	A	S		BMA	G	DMA	Unavailable I/O type configured.
334	A	S		BMA	G	DMA	No new measurement values from analog/digital converter.
335	A	S		BMA	G	DMA	Measurement value exceeds the analog/digital converter value range.
336	A	S		BMA	G	DMA	A computer error occurred during calculation of the measurement value.
337	A	S		GOK			Broken analog output line.
338	A	S		BMA	G	DMA	Broken digital input line (moisture sensor)..
339	W			BMA	G	DMA	Broken or shorted analog input line.
340	W			BMA	G	DMA	Analog input value above or below upper or lower limit value 1.
341	W			BMA	G	DMA	Analog input value above or below upper or lower limit value 2.
Flow Monitor (Gas Module)							
342	W			GMD	GM	DMD	Flow rate under limit value 1.
343	A	S		BMA	GM	DMA	Flow rate under limit value 2.
Measurement Value							
344				GOK			Value above measurement value range.
345				GOK			Value below measurement value range.
Limas							
356	A	S		BMA	L	DMA	Analyzer in warm-up phase.
357	A	S		BMA	L	DMA	Limas motor optimization in progress.
358	W			GMR	L	DMR	Lamp intensity above or below middle of permissible range.
359	A	S		BMA	L	DMA	Lamp intensity above or below permissible range.
360	A	S		BMA	L	DMA	Filter wheel 1 cannot be initialized.
361	A	S		BMA	L	DMA	Filter wheel 2 cannot be initialized.
362	A	S		BMA	L	DMA	The calibration filter wheel cannot be initialized.
363	A	S		BMA	L	DMA	The Limas analyzer board cannot be initialized.
364				GOK			A new lamp is installed and the amplifier settings are optimized.
365				GOK			The LIMAS amplifier settings are optimized.

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
LS25							
366	A	S		BMA	L	DMA	The LS25 analyzer has an error.
367	W	S		GMD	L	DMD	The LS25 analyzer has a maintenance request.
368	A	S		BMA	L	DMA	The LS25 analyzer starts measurement.
369	A	S		BMA	L	DMA	LS25 analyzer detector error #
370	W			GMD	L	DMD	The beam transmission exceeds the permissible range.
371	W			GMD	L	DMD	The temperature input signal exceeds the permissible range.
372	W			GMD	L	DMD	The pressure input signal exceeds the permissible range.
373				GMD	L	DMD	The flow input signal exceeds the permissible range.
374	A	S		BMA	L	DMA	The detector signal is too low for measurement.
375	A	S		BMA	L	DMA	The input current loop (4-20mA) has an error.
376	F	S		BFC	L	DFC	This LS25 module is under maintenance.
Uras							
378	A	S	aL	BMA	L	DMA	The chopper wheel is blocked.
379	A	S	aL	BMA	L	DMA	Chopper wheel speed not OK.
380	A	S	aL	BMA	L	DMA	IR source element or electronics defective.
381	A	S	aL	BMA	L	DMA	High voltage in the preamplifier defective.
382	A	S	aL	BMA	L	DMA	Measuring value is influenced by shock.
Flow Regulator							
398	A	S	aL	GOK			No new measured values from the analog/digital converter.
399	A	S	a	GOK			The measurement value exceeds the value range of the analog/digital converter.
400	A	S	a	GOK			A computational error occurred during the calculation of the measured value.
401	W		a	GOK			The flow is above or below the upper or lower alarm value 1.
402	A	S	a	GOK			The flow is above or below the upper or lower alarm value 2.
403	A	S	a	GOK			The controller output value is out of range.
ZO23							
404	A	S	a	GOK			The temperature is above or below the upper or lower alarm value 2.
405				GOK			A ZO23 function test has been performed:
406	W			GMR	GM	DMR	This ZO23 analyzer has failed the function test!
407	F			BFC	L	DFC	A ZO23 function test is running.
408	F			GOK			The ZO23 function test is canceled!

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
Fidas24							
411	F	S		BFC	L	DFC	The analyzer is in standby condition. Enter menu Service/Test..Standby/Restart FID to restart the analyzer.
412	A	S		BMA	GM	DMA	Ignition failed. The analyzer has to be restarted manually. Enter menu Service/Test..Standby/Restart FID to restart the analyzer.
413	A	S	aL	BMA	GM	DMA	Power fail on analyzer hardware,
414	F	S		BFC	L	DFC	The control value of this controller exceeds the lower limit. (< 20%)
415	F	S		BFC	L	DFC	The control value of this controller exceeds the upper limit. (> 90%)
Virtueller Detektor							
420	F	S		BFC	L	DFC	The first component used to calculate the result is not measured now.
421	F	S		BFC	L	DFC	The second component used to calculate the result is not measured now.
422	F	S		BFC	L	DFC	The first component used to calculate the result has an error.
423	F	S		BFC	L	DFC	The second component used to calculate the result has an error.
Calibration							
500	W	S	iQ	GOK			System bus communication defect.
501			iQ	GOK			The requested functional capability is not available in the instrument.
502			iQ	GOK			A system error occurred in the system module addressed.
503	W		iQ	GMD	L	DMD	Sensitivity to low. Calibration rejected.
504				GOK			Acknowledgement of this calibration will cause a Drift error between two calibrations.
505				GOK			Acknowledgement of this calibration will cause a Half Drift Limit Exceeded error.
506				GOK			Acknowledgement of this calibration will cause a Drift Limit Exceeded error.
507				BMA	L	DMA	A combination of the following errors occurred: Half Drift Limit, Drift Limit, Amplification or Delta Drift,
508			iQ	GOK			Unknown error number. Check software versions.
509				GOK			Automatic calibration started.
510				GOK			Automatic calibration ended.
511			iQ				Automatic calibration externally interrupted.
512	F		a	BFC	G	DFC	Automatic calibration in progress.
513			iQ	GOK			System bus communication defect during automatic calibration.
514				GOK			External calibration started.
515				GOK			External calibration ended.
516	F			BFC	GM	DFC	External calibration in progress.
517	F		a	BFC	G	DFC	Device being serviced.
518			iQ				The calibration could not be carried out because the measured value is unstable.
519			iQ				The calibration could not be carried out because the preamplifier is overranging.
520				GOK			Initial zero calibration started.
521				GOK			Initial zero calibration ended.

No.	Status			PROFIBUS			Message
				Status	L/G	Diagn.	
522				GOK			Initial zero calibration interrupted.
523				GOK			Initial zero calibration incomplete. System bus communication defect during calibration.
524	F		a	BFC	G	DFC	Initial zero calibration in progress.
525				GOK			Linearization impossible: Linearization did not produce a valid result. Measurement value possibly inaccurate. Check center point gas.
526				GOK			Linearization impossible: Linearization could not be performed because the characteristic is linear.
527				GOK			Initial calibration for component:
528				GOK			Autocalibration not started because manual calibration was running.
529	W	S	iQ	GMD	L	DMD	The calibration was aborted because no raw measured values can be recorded.
530	W	S		GMD	L	DMD	Calibration stopped because the pressure switch did not detect any calibration gas.
Calibration (continued)							
531				GOK			Automatic validation started.
532				GOK			Automatic validation ended.
533				GOK			Automatic validation externally interrupted.
534	F		a	BFC	G	DFC	Automatic validation in progress.
535				GOK			Automatic validation successful for:
536				GOK			Automatic validation out of limits for:
537	W			GMD	GM	DMD	Automatic validation out of limits for:
User Configured Messages							
800	A	S		BMA	GM	DMA	An external error occurred during:
801	A	S		BMA	GM	DMA	A user-defined error occurred during:
802	W			GMR	GM	DMR	A user-defined maintenance requirement occurred during:
803	F			BFC	GM	DFC	A user-defined maintenance mode event occurred during:
Miscellaneous Messages							
1000	A	S		BMA	G	DMA	This function block has an error:
1001				BMA	GM	DMA	Condensate penetration.
1002	A	S		BMA	GM	DMA	Flow rate excessive at this point.
1003	A	S		BMA	GM	DMA	Flow rate inadequate at this point.
System Cooler							
1100	A	S		BMA	GM	DMA	Cooler temperature too high.
1101	A	S		BMA	GM	DMA	Cooler temperature too low.
1102	A	S		BMA	GM	DMA	Condensate penetration in cooler.
1103	W			GMD	GM	DMD	Flow rate inadequate in cooler.
1104	W			GMD	GM	DMD	Cooler condensate level too high.
1105	W			GMD	GM	DMD	Cooler condensate level too high.
1106	W			GMD	GM	DMD	Cooler reagent level too low.

IEEE 754 Format

Designation	Number of bits	Meaning
S	1	Sign bit; indicated sign (0 = positive, 1 = negative)
E	8	2nd complement representation. The actual value is the exponent minus 127.
M	23	The “most significant bit” of the normalized mantissa ahead of the decimal point is implicitly 1 but not stored. The value range is thus between 1.0 (included) and 2.0.

Example

The number -12.5 is stored as hexadecimal value 0xC1480000. The following table shows the memory allocation:

Address	+0	+1	+2	+3
Format	SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM
Binary	11000001	01001000	00000000	00000000
Hexadecimal	C1	48	00	00

Explanation:

- The sign is 1, that is the value is negative.
- The exponent is binary 10000010; this is equivalent to the decimal value 130. The exponent value is thus $130-127=3$.
- The stored mantissa has a binary value of 10010000000000000000000. Adding the (unstored) leading 1 ahead of the decimal point results in the value $1.10010000000000000000000$.
- After fitting the mantissa to the exponents (shifting three places) the result is $1100.10000000000000000000000$. This binary value corresponds to the decimal value 12.5. With the sign the value is -12.5.

The following components can be accessed acyclically via the PROFIBUS.

Physical Block (PB)

The PB contains a global device description with the following information:

- Software version
- Manufacturer identification (ABB PROFIBUS identification = “26”)
- Serial number of the device
- Diagnosis (status of the device)
- Device configuration (description of the device modules with function units)
- Device status (run, standby, power down, maintenance)
- Global status (see below)
- ...

Global status

The “global status” of a PROFIBUS PA device is a 16-bit variable. Each bit represents one status class. The status classes are divided into 3 NAMUR status signals (error, maintenance request and maintenance mode), limit value monitoring and manufacturer-specific status information. The “global status” is shown as follows:

Bit 1	Error
Bit 2	Maintenance request
Bit 3	Maintenance mode
Bit 4	Limit value monitoring (not supported)
Bit 5–16	manufacturer-specific

The “global status” is formed from the OR sum of the status classes. The status classes are described in the Transducer Alarm Block (TAB). As the TAB is not to be implemented, the 3 NAMUR status signals error, maintenance request and maintenance mode are mapped.

PROFIBUS “Analog Input Function Blocks”

Component measurement values

In the profile one Analyzer Transducer Block (ATB) is created for each measurement component. The cyclic data exchange of measurement components is made via “Analog Input Function Blocks” (AIFB). To each AIFB is assigned one ATB. This assignment is made via the AIFB channel. If a detector measures more than one component, these components will share one AIFB (e.g. Caldos15/Caldos17).

Switching of components can be implemented via BUS DIs and a FB application in the AO2000 System. With switching components the AIFB channel is shifted to the active ATB. The channel is not permitted to write via the PROFIBUS.

Continued on next page

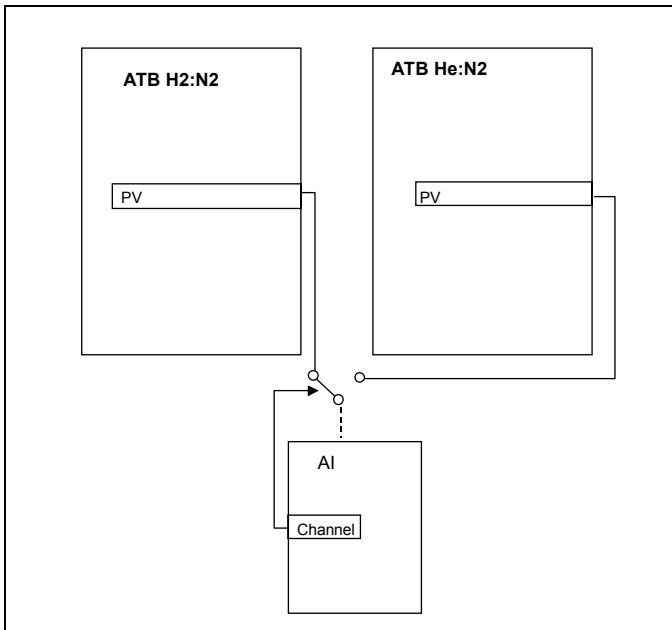
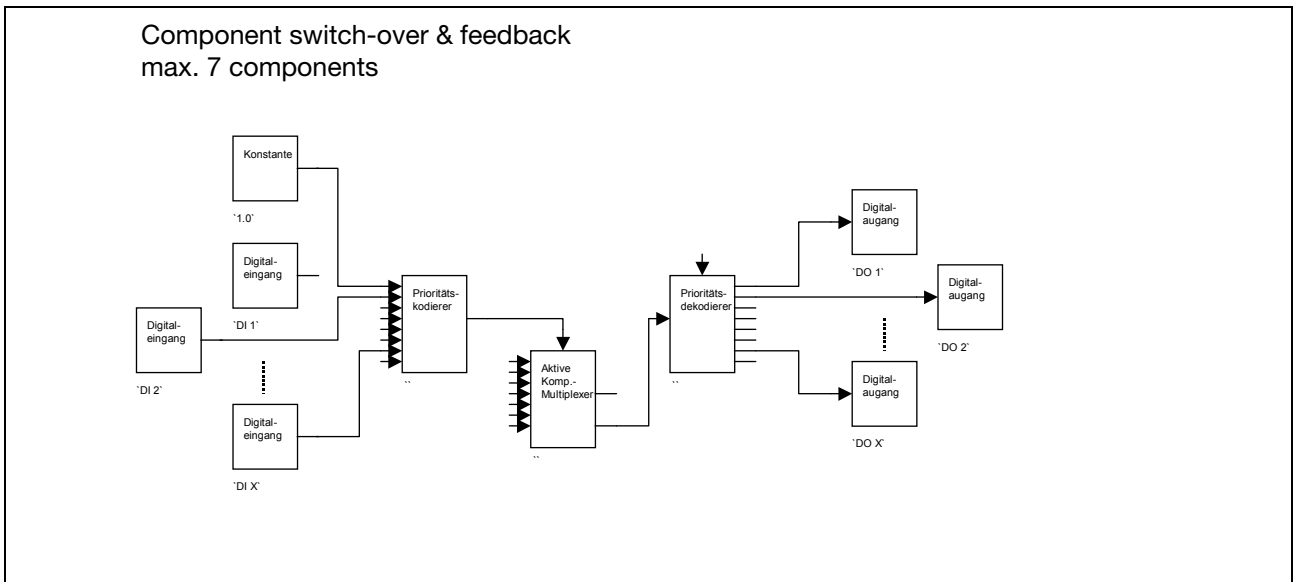


Figure 7 Switching components between two ATBs



Bus analog output

One PROFIBUS AIFB is assigned to each configured bus analog output and a manufacturer-specific “Analog Input Transducer Block” (AITB) is assigned to the AIFB. Via the bus analog output it is possible to map for example calculated component measurement values and auxiliary variables.

Analog input (Hardware analog inputs of the AO2000 System)

One PROFIBUS AIFB is assigned to each configured analog input and a manufacturer-specific AITB is assigned to the AIFB.

Analog output (Hardware analog outputs of the AO2000 System)

One PROFIBUS AIFB is assigned to each configured analog output and a manufacturer-specific AITB is assigned to the AIFB.

PROFIBUS “Digital Input Function Blocks”

Bus digital output

One PROFIBUS DIFB is assigned to each configured bus digital output and a “Discrete Input Transducer Block” (DITB) is allocated to the DIFB.

Digital input (Hardware digital inputs of the AO2000 System)

One PROFIBUS DIFB is assigned to each configured digital input and a manufacturer-specific DITB is allocated to the DIFB.

Digital output (Hardware Digital outputs of the AO2000 System)

One PROFIBUS DIFB is assigned to each configured digital input and a DITB is allocated to the DIFB.

PROFIBUS “Analog Output Function Blocks”

Bus analog input

One PROFIBUS AOFB is assigned to each configured bus analog input and a manufacturer-specific “Analog Output Transducer Block” (AOTB) is allocated to the AOFB. Via the bus analog inputs it is possible for example to enter additional measurement values needed for cross calculations into the system. For the Analyzer System ACF-NT you have to keep in mind that bus analog inputs which are used by the FTIR must not be mapped on the PROFIBUS.

PROFIBUS “Digital Output Function Blocks”

Bus digital input

One PROFIBUS DOFB is assigned to each configured bus digital input and a manufacturer-specific “Digital Output Transducer Block” (AITB) is allocated to the DOFB. Via the bus digital inputs it is for example possible to control calibrations and to switch hardware digital outputs. For the Analyzer System ACF-NT you have to keep in mind that bus digital inputs which are used by the FTIR must not be mapped on the PROFIBUS.

Analyzer Transducer Block (ATB)

The ATB describes the measurement components and provides the following information:

- Component name
- Unit
- Active measurement range
- Autorange off/on
- Number of measurement ranges
- Lower-range value and upper-range value
- Measurement value with status and time stamp
- Measurement value cycle time

In addition, the ATB contains the following manufacturer-specific information:

- lowest and highest values, within which the measurement range can be set and
- the smallest measurement range span

Discrete Input Transducer Block (DITB)

The DITB describes the bus digital outputs as well as the hardware digital inputs and outputs of the AO2000 System. Each DITB is assigned to one DIFB and provides the process value for the DIFB.

Analog Input Transducer Block (AITB)

The AITB is a manufacturer-specific transducer block. The AITB describes the bus analog outputs as well as the hardware analog inputs and outputs of the AO2000 System. Each AITB is assigned to one AIFB and provides the process value for the AIFB.

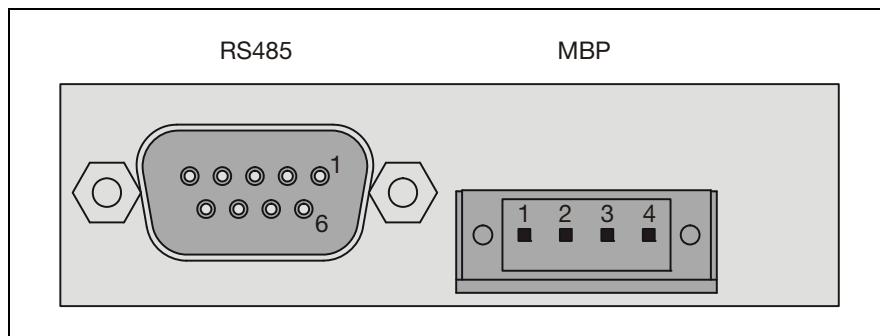
Digital Output Transducer Block (DOTB)

The DOTB is a manufacturer-specific transducer block. The DOTB describes the bus digital inputs of the AO2000 System. Each DOTB is assigned to one DOFB and provides the process value for the bus digital input.

Analog Output Transducer Block (AOTB)

The AOTB is a manufacturer-specific transducer block. The AOTB describes the bus analog inputs of the AO2000 System. Each AOTB is assigned to one AOFB and provides the process value for the bus analog input.

Connecting PROFIBUS



RS485 interface:

1	-	not used
2	M24	24 V Output Ground
3	RxD/TxD-P	Receive/Transmit Data Plus, B-Line
4	-	not used
5	DGND	Data Transmission Potential (Ref. Pot. for VP)
6	VP	Supply Voltage Plus (5 V)
7	P24	24 V Output Voltage Plus, max. 0.2 A
8	RxD/TxD-N	Receive/Transmit Data N, A-Line
9	-	not used

Design: 9-pin Sub-D female connector

MBP interface (non-intrinsically safe):

1	+
2	Shield
3	-
4	Not used

Design: 4-pin terminal strip for braided or solid conductors with a maximum section of 1 mm² (17 AWG)

The PROFIBUS module must always be inserted into slot -X20/-X21 of the electronic module.

The scope of supply does not include cables or connectors. PROFIBUS accessories can be acquired from ABB Automation Products GmbH (see also Data Sheet 70/63).

GSD File

```
-----  
; Profibus GSD for ABB Continuous Gas Analyzer AO2000 Series S3  
; 17. Nov. 2008 WK V 0.0.0.1  
; 12. Jan. 2009 WK V 0.0.0.2 SW Version 5.0.0  
; 23. Aug. 2012 WK V 1.0.0.0 SW Version 5.1.2  
-----  
  
#Profibus_DP  
GSD_Revision = 5  
Vendor_Name = "ABB"  
Model_Name = "AO2000 Series S3"  
Info_Text = "AO2000 Series, Continuous Gas Analyzer AO2000 Series"  
Revision = "1.0.0.0"  
Ident_Number = 0x3401  
Protocol_Ident = 0  
Station_Type = 0  
FMS_supp = 0  
  
Hardware_Release = "-"  
Software_Release = "5.1.2"  
Implementation_Type = "SPC4"  
  
Bitmap_Device = "AO2000_R"  
Bitmap_Diag = "AO2000_D"  
Bitmap_SF = "AO2000_S"  
  
9.6_supp = 1  
19.2_supp = 1  
31.25_supp = 1  
45.45_supp = 1  
93.75_supp = 1  
187.5_supp = 1  
500_supp = 1  
1.5M_supp = 1  
3M_supp = 1  
6M_supp = 1  
  
MaxTsdr_9.6 = 60  
MaxTsdr_19.2 = 60  
MaxTsdr_31.25 = 60  
MaxTsdr_45.45 = 250  
MaxTsdr_93.75 = 60  
MaxTsdr_187.5 = 60  
MaxTsdr_500 = 100  
MaxTsdr_1.5M = 150  
MaxTsdr_3M = 250  
MaxTsdr_6M = 450
```

Continued on next page

```
Auto_Baud_supp          = 1

Redundancy              = 0
Repeater_Ctrl_Sig      = 0
24V_Pins                = 2
Freeze_Mode_supp       = 0
Sync_Mode_supp         = 0
Set_Slave_Add_supp     = 1

Min_Slave_Intervall    = 6
Modular_Station        = 1

Max_Module              = 60
Max_Input_Len          = 240           ; maximum Input Length
Max_Output_Len         = 240           ; maximum Output Length
Max_Data_Len           = 300           ; maximum In-Output Length

Slave_Family=12

Max_Diag_Data_Len      = 14
Max_User_Prm_Data_Len  = 8

PrmText                = 1
Text(0)                = "Disabled"
Text(1)                = "Enabled"
EndPrmText

Ident_Maintenance_supp = 1

ExtUserPrmData         = 1 "Condensed Status"
Bit(0) 1 0-1
Prm_Text_Ref           = 1
EndExtUserPrmData

Ext_User_Prm_Data_Const(0) = 0x00, 0x00, 0x00
Ext_User_Prm_Data_Const(3) = 0x05,0x41,0x00,0x00,0x01 ;default Values
                                                    ;Structure_Length = 5
                                                    ;Structur_Type = 65

(profile specific

                                                    ;Slot_Number = 0
                                                    ;reserved = 0
                                                    ;PRM_COND = 1 (enable)

Ext_User_Prm_Data_Ref(7) = 1           ;reference to condensed status bit
PRM_COND
Prm_Block_Structure_supp = 1           ;enables the block structure of extended
parametrization
```

Continued on next page

```
;----- Description of extended DP features: -----  
;  
DPV1_Slave                = 1  
C2_Read_Write_supp       = 1  
C2_Max_Data_Len          = 130  
C2_Read_Write_required   = 1  
C2_Max_Count_Channels    = 1  
Max_Initiate_PDU_Length  = 52  
C2_Response_Timeout      = 4000  
DPV1_Data_Types          = 0  
  
;---- Description of physical interface for asynchronous transmission: ----  
; RS485 Standard Copper can be selected without additional restrictions.  
  
;----- Description of device related diagnosis: -----  
;  
Unit_Diag_Bit(16)        = "Error appears"  
Unit_Diag_Bit(17)        = "Error disappears"  
Unit_Diag_Bit(35)        = "Restart"  
Unit_Diag_Bit(36)        = "Coldstart"  
Unit_Diag_Bit(37)        = "Maintenance Required"  
Unit_Diag_Bit(39)        = "Ident_Number violation"  
Unit_Diag_Bit(40)        = "Maintenance Alarm"  
Unit_Diag_Bit(41)        = "Maintenance Demanded"  
Unit_Diag_Bit(42)        = "Function Check"  
Unit_Diag_Bit(43)        = "Inv Pro Cond"  
Unit_Diag_Bit(55)        = "Extension Available"  
;  
-----  
;Modules for Analog Input  
Module = "Analog Input (AI) "          0x42,0x84,0x81,0x81  
1  
EndModule  
  
;Modules for Discrete Input  
Module = "Discrete Input (DI) "        0x42,0x81,0x83,0x81  
2  
EndModule  
  
;Modules for Analog Output  
Module ="Analog Output (AO) "          0x82,0x84,0x82,0x82  
3  
EndModule  
  
;Modules for Discrete Output  
Module = "Discrete Output (DO) "       0x82,0x81,0x84,0x82  
4  
EndModule
```

Acyclic Parameters – Physical Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString *	S	32	r,w	C/a	' '	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	SOFTWARE_REVISION	Simple	VisibleString	Cst	16	r	C/a	Version 3.0.2	m
9	HARDWARE_REVISION	Simple	VisibleString	Cst	16	r	C/a	-	m
10	DEVICE_MAN_ID	Simple	Unsigned16	Cst	2	r	C/a	26 (ABB)	m
11	DEVICE_ID	Simple	VisibleString	Cst	16	r	C/a	-	m
12	DEVICE_SER_Num	Simple	VisibleString	Cst	16	r	C/a	MAC Address	m
13	DIAGNOSIS	Simple	OctetString byte4,MSB=1 more diag available	D	4	r	C/a	-	m
14	DIAGNOSIS_EXTENSION	Simple	OctetString	D	6	r	C/a	-	o
15	DIAGNOSIS_MASK	Simple	OctetString	Cst	4	r	C/a	-	m
16	DIAGNOSIS_MASK_EXTENSION	Simple	OctetString	Cst	6	r	C/a	-	o
17	DEVICE_CERTIFICATION	Simple	VisibleString	Cst	32	r	C/a	-	o
18	WRITE_LOCKING	Simple	Unsigned16	N	2	r,w	C/a	-	o
19	FACTORY_RESET	Simple	Unsigned16	S	2	r,w	C/a	-	o
20	DESCRIPTOR	Simple	OctetString	S	32	r,w	C/a	-	o
21	DEVICE_MESSAGE	Simple	OctetString	S	32	r,w	C/a	-	o
22	DEVICE_INSTAL_DATE	Simple	OctetString	S	16	r,w	C/a	-	o
23	LOCAL_OP_ENA	Simple	Unsigned8	N	1	r,w	C/a	1	o
24	IDENT_NUMBER_SELECTOR	Simple	Unsigned8	S	1	r,w	C/a	-	m (B)
25	HW_WRITE_PROTECTION	Simple	Unsigned8	D	1	r	C/a	-	o
26	FEATURE	Record	DS-68	N	8	R	C/A	-	M(fo r Revi sion 3.01)
27	COND_STATUS_DIAG	Simple	Unsigned8	S	!	r,w	C/a	1	M

Continued on next page

Acyclic Parameters – Physical Block, *continued*

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
28	DIAG_EVENT_SWITCH	Record	Diag_Event_Switch	S	50	r,w	C/A	-	O
29–32	Reserved by PNO								
33–35	Reserved by PNO								
36	DEVICE_CONFIGURATION	Simple	VisibleString	N	32	r	C/a	-	m
37	INIT_STATE	Simple	Unsigned8	S	1	r,w	C/a	-	m
38	DEVICE_STATE	Simple	Unsigned8	D	1	r,w	C/a	-	m
39	GLOBAL_STATUS	Simple	Unsigned16	D	2	r	C/a	0	m
40–47	Reserved by PNO								m
48	First manufacturer-specific parameter								o

Continued on next page

Acyclic Parameters – Physical Block, *continued*

Physical Block Bit Strings DIAGNOSIS Parameter Structure

		DIAGNOSIS		
Octet	Bit	Mnemonic	Description	Indication Class
1	0		reserved by PNO, fixed to 0	R
	1		reserved by PNO, fixed to 0	R
	2		reserved by PNO, fixed to 0	R
	3		reserved by PNO, fixed to 0	R
	4		reserved by PNO, fixed to 0	R
	5		reserved by PNO, fixed to 0	R
	6		reserved by PNO, fixed to 0	R
2	7		reserved by PNO, fixed to 0	R
	0		reserved by PNO, fixed to 0	R
	1		reserved by PNO, fixed to 0	R
	2		reserved by PNO, fixed to 0	R
	3	DIA_WARMSTART	New-start-up (warmstart up) carried out.	A
	4	DIA_COLDSTART	Re-start-up (coldstart up) carried out.	A
	5	DIA_MAINTAINANCE	Maintenance required	R
3	6		reserved by PNO, fixed to 0	R
	7	IDENT_NUMBER_Violation	Set to 1 (one), if the Ident_Number of the running cyclic data transfer and the value of Physical Block IDENT_NUMBER_SELECTOR parameter are different.	R
	0	DIA_MAINTENANCE_ALARM	Failure of the device	
	1	DIA_MAINTENANCE_DEMANDED	Maintenance demanded	
	2	DIA_FUNCTION_CHECK	Device is in function check mode or in simulation or under local control e.g. maintenance	
	3	DIA_INV_PRO_COND	The process conditions don't allow to return valid values. (set if a value has the quality Uncertain-Process related, no maintenance or Bad-Process related, no maintenance)	
	4 ... 7	reserved	Reserved for use within the PNO	
4	0 ... 6	reserved	Reserved for use within the PNO	
	7	EXTENSION_AVAILABLE	More diagnosis information is available	

Values of the DIAGNOSIS bit: 0 = not set, 1 = set

R Indication, remains active as long as the reason for the message exists.

A Indication, will be automatically reset after 10 s.

Octet 1				Octet 2				Octet 3				Octet 4			
Bit 7	...	...	Bit 0	Bit 7	...	...	Bit 0	Bit 7	...	...	Bit 0	Bit 7	..	..	Bit 0

Function Blocks

Analog Input Function Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	BATCH	Structure	DS-67	S	10	r,w	C/a	0,0,0,0	m
10	OUT	Record	DS-33	D	5	r	O/cyc		m (A,B)
11	PV_SCALE	Array	Float (*)	S	8	r,w	C/a	100, 0	m (A,B)
12	OUT_SCALE	Record	DS-36	S	11	r,w	C/a	100,0,-,-	m (B)
13	LIN_TYPE	Simple	Unsigned8	S	1	r,w	C/a	0	m (B)
14	CHANNEL	Simple	Unsigned16	S	2	r,w	C/a	-	m (B)
16	PV_FTIME	Simple	Float	S	4	r,w	C/a	0	m (A,B)
17	FSAFE_TYPE (***)	Simple	Unsigned8	S	1	r,w	C/a	1 Last usable value (0 Failsafe value) (2 Wrong calculated value)	o (B)
18	FSAFE_VALUE	Simple	Float	S	4	r,w	C/a	-	o (B)
19	ALARM_HYS	Simple	Float	S	4	r,w	C/a	0.5 % of range	m (A,B)
21	HI_HI_LIM	Simple	Float	S	4	r,w	C/a	max value	m (A,B)
23	HI_LIM	Simple	Float	S	4	r,w	C/a	max value	m (A,B)
25	LO_LIM	Simple	Float	S	4	r,w	C/a	min value	m (A,B)
27	LO_LO_LIM	Simple	Float	S	4	r,w	C/a	min value	m (A,B)
30	HI_HI_ALM	Record	DS-39	D	16	r	C/a	0	o (A,B)
31	HI_ALM	Record	DS-39	D	16	r	C/a	0	o (A,B)
32	LO_ALM	Record	DS-39	D	16	r	C/a	0	o (A,B)
33	LO_LO_ALM	Record	DS-39	D	16	r	C/a	0	o (A,B)
34	SIMULATE	Record	DS-50	S	6	r,w	C/a	disable	m (B)
35	OUT_UNIT_TEXT	Simple	OctetString	S	16	r,w	C/a	-	o (A,B)
36-44	reserved by PNO								m (A,B)
45	first manufacturer-specific parameter								o (A,B)

Continued on next page

Analog Output Function Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	BATCH	Structure	DS-67	S	10	r,w	C/a	0,0,0,0	m
9	SP	Record	DS-33	D	5	r,w	l/cyc	-	M (A,B)
11	PV_SCALE	Record	DS-36	S	11	r,w	C/a	100,0, %	M (A,B)
12	READBACK	Record	DS-33	D	5	r	O/cyc	-	M (B)
14	RCAS_IN	Record	DS-33	D	5	r,w	l/cyc	-	O (B)
21	IN_CHANNEL	Simple	Unsigned16	S	2	r,w	C/a	-	M (B)
22	OUT_CHANNEL	Simple	Unsigned16	S	2	r,w	C/a	-	M (B)
23	FSAFE_TIME	Simple	Float	S	4	r,w	C/a	0	M (B)
24	FSAFE_TYPE	Simple	Unsigned8	S	1	r,w	C/a	2	M (B)
25	FSAFE_VALUE	Simple	Float	S	4	r,w	C/a	0	M (B)
27	RCAS_OUT	Record	DS-33	D	5	r	O/cyc	-	O (B)
31	POS_D	Record	DS-34	D	2	r	O/cyc	-	M (B)
32	SETP_DEVIATION	Simple	Float	D	4	r	C/a	-	O (B)
33	CHECK_BACK	Simple	OctetString	D	3	r	O/cyc	-	M (B)
34	CHECK_BACK_MASK	Simple	OctetString	Cst	3	r	C/a	-	M (B)
35	SIMULATE	Record	DS-50	S	6	r,w	C/a	disabled	M (B)
36	INCREASE_CLOSE	Simple	Unsigned8	S	1	r,w	C/a	0	M (B)
37	OUT	Record	DS-33	D	5	r,w	C/a	-	M (B)
38	OUT_SCALE	Record	DS-36	S	11	r,w	C/a	-	M (A,B)
39-48	reserved by PNO								M (A,B)
49	first manufacturer-specific parameter								O (A,B)

Continued on next page

Digital Input Function Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	BATCH	Structure	DS-67	S	10	r,w	C/a	0,0,0,0	m
10	OUT_D	Record	DS-34	D	2	r,w	O/cyc		M(A,B)
14	CHANNEL	Simple	Unsigned16	S	2	r,w	C/a	-	O(A) M(B)
15	INVERT	Simple	Unsigned 8	S	1	r,w	C/a	0	M (A,B)
20	FSAVE_TYPE	Simple	Unsigned 8	S	1	r,w	C/a	1 Last usable value (0 Failsafe value) (2 Wrong calculated value)	O(A) M(B)
21	FSAVE_VAL_D	Simple	Unsigned 8	S	1	r,w	C/a	0	M(A,B)
24	SIMULATE	Record	DS-51	S	3	r,w	C/a	disable	O(A) M(B)
25-34	reserved by PNO								M(A, B)
35	first manufacturer-specific parameter								O

Continued on next page

Digital Output Function Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	BATCH	Structure	DS-67	S	10	r,w	C/a	0,0,0,0	m
9	SP_D	Record	DS-34	D	2	r,w	l/a, cyc	-	M(A,B)
10	OUT_D	Record	DS-34	D	2	r,w	C/a	-	O(A) M(B)
12	READBACK_D	Record	DS-34	D	2	r	O/a, cyc	-	O cyc optional
14	RCAS_IN_D	Record	DS-34	D	2	r,w	l/a, cyc	-	O(A) M(B) cyc optional
17	CHANNEL	Simple	Unsigned16	S	2	r,w	C/a	-	O(A) M(B)
18	INVERT	Simple	Unsigned 8	S	1	r,w	C/a	0	M(A,B)
19	FSAVE_TIME	Simple	Float	S	4	r,w	C/a	0	O(A) M(B)
20	FSAVE_TYPE	Simple	Unsigned 8	S	1	r,w	C/a	2	O(A) M(B)
21	FSAVE_VAL_D	Simple	Unsigned 8	S	1	r,w	C/a	0	O(A) M(B)
22	RCAS_OUT_D	Record	DS-34	D	2	r	O/a, cyc	-	O(A) M(B) cyc optional
24	SIMULATE	Record	DS-51	S	3	r,w	C/a	disable	O(A) M(B)
33	CHECK_BACK	Simple	OctetString	D	3	r	C/a, cyc	-	M cyc optional
34	CHECK_BACK_MASK	Simple	OctetString	Cst	3	r	C/a	-	M
35–44	reserved by PNO								M (A,B)
45	first manufacturer-specific parameter								O (A,B)

Transducer Blocks

Analyzer Transducer Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	' '	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
8	COMPONENT_NAME	Simple	OctetString	S	32	r,w	C/a	-	m
9	PV	Record	DS-60	D	12	r	C/a	-	m
10	PV_UNIT	Simple	Unsigned16	S	2	r,w	C/a	-	m
11	PV_UNIT_TEXT*	Simple	OctetString	S	8	r,w	C/a	-	m
12	ACTIVE_RANGE	Simple	Unsigned8	S	1	r,w	C/a	-	m
13	AUTORANGE_ON	Simple	Boolean	S	1	r,w	C/a	-	m
14	SAMPLING_RATE	Simple	Time_difference	S	4	r,w	C/a	-	m
15-24	Reserved by PNO								m
25	NUMBER_OF_RANGES	Simple	Unsigned8	N	1	r	C/a	-	m
26	RANGE_1	Record	DS-61	N	8	r,w	C/a	-	m
...									
25+n	RANGE_n	Record	DS-61	N	8	r,w	C/a	-	o
25+n+1	First manufacturer-specific parameter								o
55+n	RANGE_LIMIT_1	Array	Floating-Point		12	R	C/a		o

The Range Limit is an array of three floating-point variables. These three variables show the lower and upper range limit as well as the minimum adjustable span of the measurement range (in % of the measurement range)

Continued on next page

Digital Input Transducer Block

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
12	PV_D	Record	DS-34	D	2	R	C/a	-	M(B)
23	first manufacturer-specific parameter								O (A,B)
23	NAME	Simple	OctetString	S	32	R	C/a		O (A,B)

Digital Output Transducer Block (manufacturer-specific)

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	''	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALLERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
9	PV_D	Record	DS-34	D	2	R	C/a	-	o
10	NAME	Simple	OctetString	S	32	R	C/a		o

Continued on next page

Analog Input Transducer Block (manufacturer-specific)

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	' '	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
9	PV	Record	DS-60	D	12	R	C/a	-	o
10	NAME	Simple	OctetString	S	32	R	C/a		o
11	PV_UNIT	Simple	Unsigned16	S	2	r,w	C/a	-	o
12	PV_UNIT_TEXT*	Simple	OctetString	S	8	r,w	C/a	-	o
13	RANGE	Record	DS-61	N	8	r,w	C/a	-	o

Analog Output Transducer Block (manufacturer-specific)

Relative index	Variable	Object type	Data type	Store	Size	Access	Parameter usage/Type of transport	Default values	Mandatory/Optional
0	BLOCK OBJECT	Record	DS-32	C	20	r	C/a	-	m
1	ST_REV	Simple	Unsigned16	N	2	r	C/a	0	m
2	TAG_DESC	Simple	OctetString	S	32	r,w	C/a	' '	m
3	STRATEGY	Simple	Unsigned16	S	2	r,w	C/a	0	m
4	ALERT_KEY	Simple	Unsigned8	S	1	r,w	C/a	0	m
5	TARGET_MODE	Simple	Unsigned8	S	1	r,w	C/a	-	m
6	MODE_BLK actual permitted normal	Record	DS-37	D	3	r	C/a	block-specific	m
7	ALARM_SUM	Record	DS-42	D	8	r	C/a	0,0,0,0	m
9	PV	Record	DS-60	D	12	R	C/a	-	o
10	NAME	Simple	OctetString	S	32	R	C/a		o

PROFIBUS Map

Example of a PROFIBUS map of the AO2000 System

IP-Address: 192.168.1.1

AO2000-Version: V4.0.1.0 Conf. blocks: 0% free Inputs: 27% free Outputs: 93% free

No	PROFIBUS	Component/IO	Offset	Description	Unit	Module text
1	Analog inputs	Measurements	0	CO	ppm	Uras 14 Anlz. 1
2			5	CO2	ppm	Uras 14 Anlz. 1
3			10	SO2	ppm	Uras 14 Anlz. 1
4			15	NO	ppm	Uras 14 Anlz. 1
5			20	O2	Vol%	Uras 14 Anlz. 1
6		Bus analog outputs	25	Bus AO1		SYSCON: BUS IO
7			30	Bus AO2		SYSCON: BUS IO
8			35	Bus AO3		SYSCON: BUS IO
9			40	Bus AO4		SYSCON: BUS IO
10			45	Bus AO5		SYSCON: BUS IO
11			50	Bus AO6		SYSCON: BUS IO
12			55	Bus AO7		SYSCON: BUS IO
13			60	Bus AO8		SYSCON: BUS IO
14		Analog inputs	65	V In 1	V	AIO:X11 IO_Board 1
15			70	I In 1	mA	AIO:X11 IO_Board 1
16			75	V In 2	V	AIO:X11 IO_Board 1
17			80	I In 2	mA	AIO:X11 IO_Board 1
18		Analog outputs	85	CO	mA	AIO:X24 IO-Module 3
19			90	CO2	mA	AIO:X24 IO-Module 3
20			95	SO2	mA	AIO:X26 IO-Module 4
21			100	NO	mA	AIO:X26 IO-Module 4
22			105	O2	mA	AIO:X11 IO_Board 1
23			110	I Out2	mA	AIO:X11 IO_Board 1
24	Digital inputs	Digital inputs	115	Purge		SYSCON: SYST. CPU
25			117	Start		DIO:X28 IO-Module 5
26			119	Disable		DIO:X28 IO-Module 5
27			121	ExtCalZo		DIO:X28 IO-Module 5
28			123	ExtCalSp		DIO:X28 IO-Module 5
29			125	D In 1		AIO:X11 IO_Board 1
30			127	D In 2		AIO:X11 IO_Board 1

Continued on next page

PROFIBUS Map, *continued*

No	PROFIBUS	Component/IO	Offset	Description	Unit	Module text
31			129	CO 1		DIO:X12 IO_Board 2
32			131	O2 1		DIO:X12 IO_Board 2
33			133	D In 3		DIO:X12 IO_Board 2
34			135	D In 4		DIO:X12 IO_Board 2
35		Bus digital outputs	137	Bus DO1		SYSCON: BUS IO
36			139	Bus DO2		SYSCON: BUS IO
37			141	Bus DO3		SYSCON: BUS IO
38			143	Bus DO4		SYSCON: BUS IO
39			145	Bus DO5		SYSCON: BUS IO
40			147	Bus DO6		SYSCON: BUS IO
41			149	Bus DO7		SYSCON: BUS IO
42			151	Bus DO8		SYSCON: BUS IO
43		Digital outputs	153	D out 1		DIO:X28 IO-Module 5
44			155	D out 2		DIO:X28 IO-Module 5
45			157	D out 3		DIO:X28 IO-Module 5
46			159	Solenoid1		DIO:X28 IO-Module 5
47			161	D Out1		AIO:X11 IO_Board 1
48			163	D Out2		AIO:X11 IO_Board 1
49			165	CO 1		DIO:X12 IO_Board 2
50			167	O2 1		DIO:X12 IO_Board 2
51			169	D Out3		DIO:X12 IO_Board 2
52			171	D Out4		DIO:X12 IO_Board 2
-	Analog outputs	Bus analog inputs	-	--	-	-
53	Digital outputs	Bus digital inputs	0	Bus DI1		SYSCON: BUS IO
54			2	Bus DI2		SYSCON: BUS IO
55			4	Bus DI3		SYSCON: BUS IO
56			6	Bus DI4		SYSCON: BUS IO
57			8	Bus DI5		SYSCON: BUS IO
58			10	Bus DI6		SYSCON: BUS IO
59			12	Bus DI7		SYSCON: BUS IO
60			14	Bus DI8		SYSCON: BUS IO

Legend

AIFB	PROFIBUS Analog Input Function Block
AITB	Analog Input Transducer Block
AOFB	PROFIBUS Analog Output Function Block
AOTB	Analog Output Transducer Block
ATB	Analyzer Transducer Block
BM	Binary Message
CTB	Control Transducer Block
DIFB	PROFIBUS Digital Input Function Block
DITB	Discrete Input Transducer Block
DOFB	PROFIBUS Digital Output Function Block
DOTB	Discrete Output Transducer Block
DP	PROFIBUS protocol type for decentralized peripherals
DTM	Device Type Manager
FDT	Field Device Tool
GSD	Device-specific data file
H1	FF protocol type for process automation
LFB	Logging Function Block
MBP	Manchester Coded, Bus Powered
PA	PROFIBUS protocol type for process automation
PB	Physical Block
PKV-30	External protocol converter Modbus/PROFIBUS DP
TAB	Transducer Alarm Block
TLB	Transducer Limit Block
TTB	Transfer Transducer Block

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