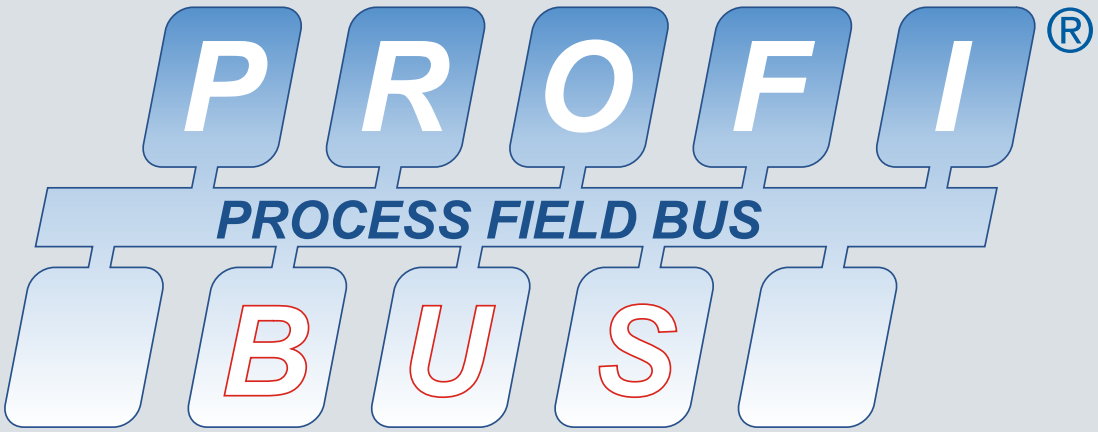
PROFIBUS DP/PA interface

Gas analyzers of Series 6 and ULTRAMAT 23

Description · 07/2012



Continuious Gas Analysis

SIEMENS

SIEMENS

Continuous gas analysis

Analyzers of Series 6 and ULTRAMAT 23 PROFIBUS DP/PA interface

Operating Manual

06/2012

A5E00054148-06

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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GERMANY

Order number: A5E00054148
℗ 01/2013 Technical data subject to change

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Introduction

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1.1 Notes for operators

This description applies to the following gas analyzers:

ULTRAMAT 6	7MB2111, 7MB2112, 7MB2117, 7MB2121, 7MB2123, 7MB2124, 7MB2127, 7MB2128
OXYMAT 6	7MB2011, 7MB2017, 7MB2021, 7MB2027
ULTRAMAT/OXYMAT 6	7MB2023, 7MB2028, 7MB2024, 7MB2026
CALOMAT 6	7MB2511, 7MB2517, 7MB2521, 7MB2527
CALOMAT 62	7MB2541, 7MB2547, 7MB2531, 7MB2537
ULTRAMAT 23	7MB2331, 7MB2333, 7MB2334, 7MB2335, 7MB2337, 7MB2338
OXYMAT 61	7MB2001
OXYMAT 64	7MB2041, 7MB2047
FIDAMAT 6	7MB2421, 7MB2427

This description contains all information required for operation of these gas analyzers via the PROFIBUS PA and PROFIBUS DP communication systems. It provides important notes, additions, and corrections to the manuals and operating instructions for the relevant devices. These documents must also always be observed.

1.2 Benefits

The usual transmission of measured values and fault messages via analog and digital outputs requires complex cabling. In contrast, when using PROFIBUS DP and PROFIBUS PA, one single two-wire conductor is sufficient for digital transmission of all measured values (also from several channels), status information or diagnostics functions for preventive maintenance, for example.

The PROFIBUS DP version is widely used in factory automation because of its high transmission rate for relatively small data quantities per device. It is used as the basis for the add-on board of the S 6 analyzers. The PROFIBUS PA version works in line with the following equation:

PROFIBUS DP communication protocol
+ IEC-1158-2 transmission technology

= PROFIBUS PA

The limited dynamic performance of 4 to 20 mA signals can be replaced, the laborious configuration of measuring ranges can be omitted. By using simulated measured values without media, increased reliability can be provided for the plant configuration and configuration errors can be avoided. Parameter sets can be generated offline (from your desk) and subsequently downloaded and saved in the device. Local operation can thus be reduced to a minimum.

The Siemens gas analyzers

- OXYMAT 6, OXYMAT 61, OXYMAT 64
- ULTRAMAT 6, ULTRAMAT 23
- ULTRAMAT/OXYMAT 6
- CALOMAT 6, CALOMAT 62
- FIDAMAT 6

are PROFIBUS-compatible when using an optional plug-in card (retrofitting also possible) and therefore comply with the "Device profile for analyzers" defined as binding by PI (PROFIBUS International).

Customer benefits include an enormous savings potential in all plant areas, covering configuration and commissioning, operation and maintenance, up to subsequent plant expansions.

Operation of the gas analyzers from a control system or a separate PC is possible using the SIMATIC PDM (Process Device Manager) operator tool; this is software which runs under Windows and which can also be integrated into the SIMATIC PCS7 process control system. This permits a clear presentation of the integration of the analyzers in the system as well as the complex parameter structure of the analyzers.

Direct connection of the analyzers to a control system is also possible without PDM, e.g. using STEP7, but this requires additional programming and does not offer the same user-friendliness. In most cases, this direct connection can therefore only be used if acyclic (device operation) data is not used.

Both graphic displays and values can be output on a PC. Signaling of maintenance, fault and diagnostics information is cyclic. This data is displayed in plain text when using SIMATIC PDM. The digital outputs can also be switched using cyclic services, thus permitting triggering of relays over PROFIBUS (e.g. for measuring point switchover, calibration etc.).

1.3 Additional information

When designing PROFIBUS networks, we recommend the corresponding components from the SIEMENS Catalog ST PI. The order numbers of this catalog are as follows:

- E86060-K4660-A101-A3 (German)
- E86060-K4660-A101-A3-7600 (English)

All information on designing PROFIBUS networks can be found in the "PROFIBUS networks" manual: The order numbers for this are as follows:

- 6GK1970-5CA20-0AA0 (German)
- 6GK1970-5CA20-0AA1 (English).
- 6GK1970-5CA20-0AA2 (French)
- 6GK1970-5CA20-0AA3 (Spanish)
- 6GK1970-5CA20-0AA4 (Italian)

The following documentation can also provide important information on the same topic:

DP/PA bus coupler Issue 2	Order number 6ES7 1757-0AA00-8AA0
Manual for PROFIBUS networks	Order number 6GK1 970-5CA00-0AA0 (German) or Order number 6GK1 970-5CA00-0AA1 (English)
Documentation package	Order number 6ES7 398-8RA00-8AA0

Information on designing PROFIBUS networks is also available under:
Siemens PROFIBUS web link
(http://www.automation.siemens.com/mcms/automation/en/industrial-communications/profibus/Pages/Default.aspx)

You can also obtain further information from Profibus International (PI) or on the Internet under PROFIBUS (PI) (http://www.profibus.com).

Address:
PROFIBUS-Nutzer-Organisation
Haid-und-Neu-Str. 7
D-76131 Karlsruhe, Germany

Tel.: ++49 721 / 96 58 590
Fax: ++49 721 / 96 58 589

1.4 Delivery information

The respective scope of delivery is listed on the shipping documents – enclosed with the delivery – in accordance with the valid sales contract.

When opening the packaging, please observe the corresponding information on the packaging material. Check the delivery for completeness and undamaged condition. In particular, you should compare the Order No. on the rating plates with the ordering data, if available.
If possible, please retain the packaging material, since you can use it again in case of return deliveries.

1.5 PROFIBUS modules

PROFIBUS (PROcess FIeld BUS) is an open and standardized communication system for automation technology. Using these PROFIBUS option modules, it is possible to connect the SIEMENS gas analyzers of Series 6 and the ULTRAMAT 23 gas analyzer to PROFIBUS PA or PROFIBUS DP as follows:

- The option module A5E00034504 allows non-intrinsically safe coupling to PROFIBUS PA.
- The option module A5E00015899 Ex i allows intrinsically safe coupling to PROFIBUS PA.
- The option module A5E00019145 allows coupling to PROFIBUS DP.

NOTICE
Improper use The option module A5E00015899 Ex i is designed for equipment to be used in hazardous areas and may only be fitted in Series 6 devices with the Ex type of protection II 3 G Ex nA II T4.

Safety notes

2

2.1 Precondition for use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.2 Improper device modifications

⚠ WARNING

Improper device modifications

Danger to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.

- Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

Assembly guidelines

3

3.1 Safety instructions

3.1.1 Unprotected cable ends

⚠ WARNING

Unprotected cable ends

Danger of explosion through unprotected cable ends in hazardous areas.

- Protect unused cable ends in accordance with IEC/EN 60079-14.

3.1.2 Insufficient isolation of non-intrinsically safe and intrinsically safe circuits

⚠ WARNING

Insufficient isolation of non-intrinsically safe and intrinsically safe circuits

Danger of explosion in hazardous areas.

- When connecting intrinsically safe and non-intrinsically safe circuits ensure that isolation is carried out properly in accordance with IEC/EN 60079-14.
- Make sure that you observe the device approvals applicable in your country.

3.2 Bus connection for rack-mounted analyzers of Series 6

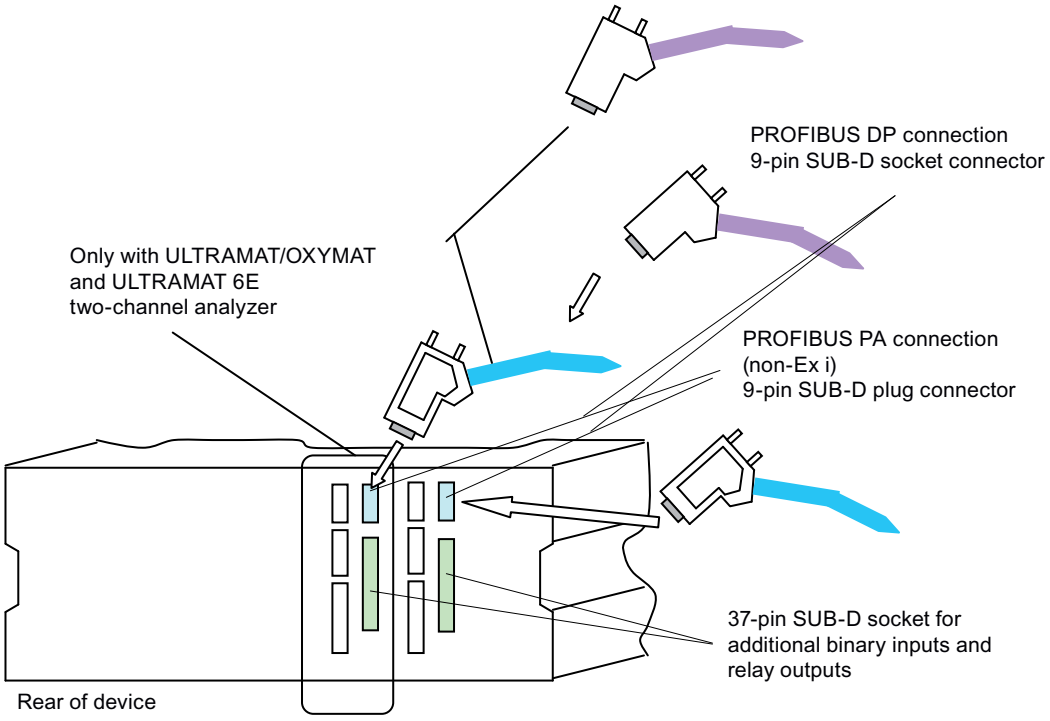


Figure 3-1 Connection diagram for rack-mounted analyzers of Series 6

3.3 Bus connection for ULTRAMAT 23

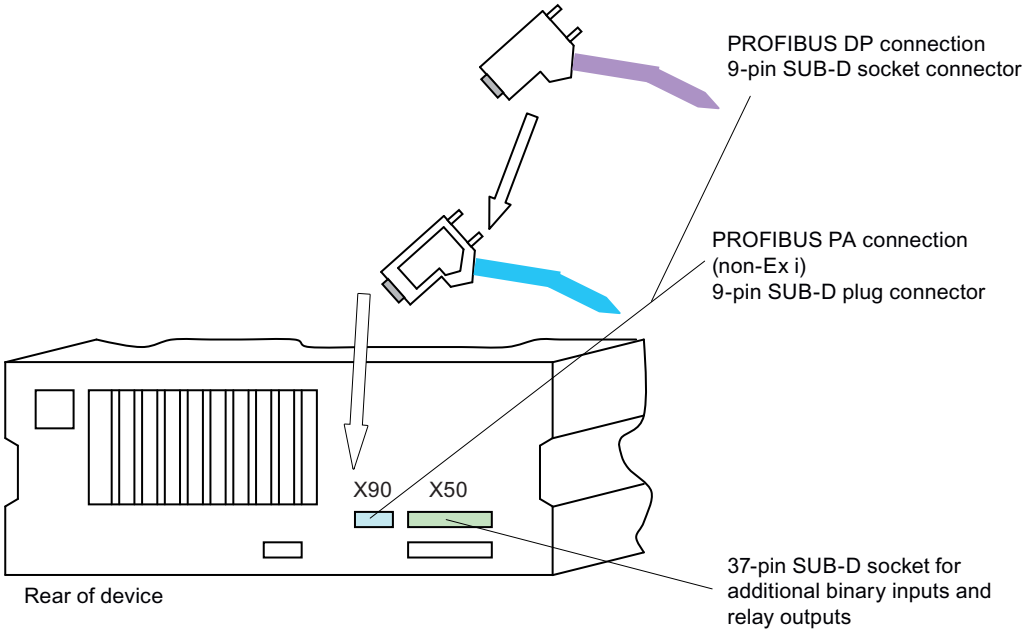


Figure 3-2 Connection diagram for ULTRAMAT 23

3.4 Bus connection for field devices of Series 6

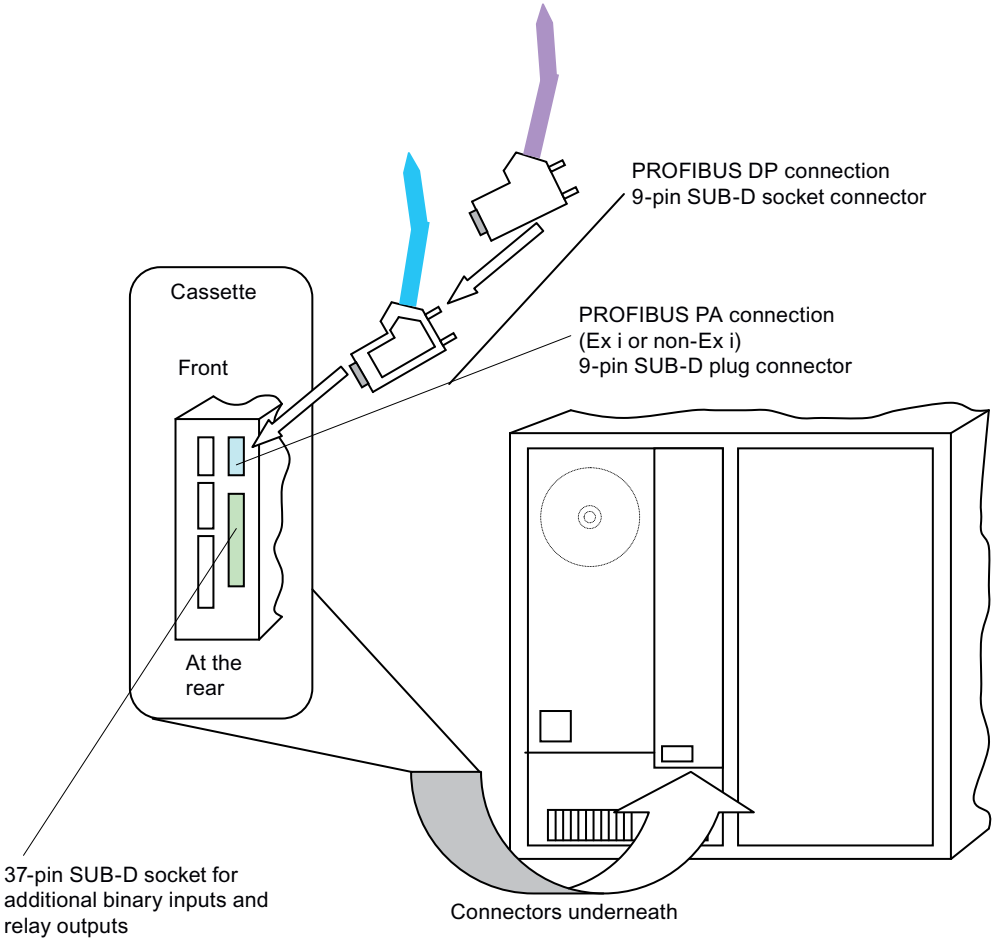


Figure 3-3 Connection of PROFIBUS modules to field devices

NOTICE
Incorrect connection Only the module A5E00015899 Ex i may be used in field devices with Profibus connection which are used in hazardous areas. In such cases, the inputs and outputs of the 37-pin SUB-D socket may only be connected and used with special protection. Details on this can be found in the instruction manual of the associated device and the compact operating instructions for field devices of Series 6 for use in hazardous areas. It is essential that you observe the relevant regulations for installation and operation of systems in these areas.

3.5 PROFIBUS plug connectors

PROFIBUS plug connectors

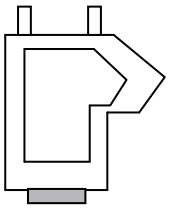


Figure 3-4 Plug connectors

PROFIBUS PA connection

Connect the PROFIBUS module using the 9-pin SUB-D socket plug connector which is included as an option with the device. With this plug connector, the bus cable can be connected via a solder joint. Alternatively, you can use a commercially available plug connector with removable terminal connection, *e.g. of type SUBCON 9/F-SH from Phoenix-Contact (item no.: 2761499)*.

PROFIBUS PA connector assignment

Function	Contact
PA-P (+)	3
PA-P (-)	8
None (NC)	1, 2, 4, 5, 6, 7, 9

PROFIBUS PA cable

We recommend use of the following cable types (FastConnect technique):

SIEMENS order number	Color	Function
6XV1 830-5EH10	Blue	Applications in the hazardous area
6XV1 830-5FH10	Black	Applications only in the non-hazardous area

Connect the cable screen flush in the connector housing.

PROFIBUS DP connection

Connect the PROFIBUS module using the 9-pin SUB-D plug connector (pin connector) included as an option with the device. With this plug connector, the bus cable can be connected via a solder joint. This connector does **not** have any bus terminating resistors.

Other RS485 bus connectors are also suitable for PROFIBUS DP. Some examples are listed in the following table:

Order number	Properties
6GK1 500-0EA02	Axial cable outlet, internal terminal blocks
6ES7 972-0BA11 - 0XA0	90° cable outlet, internal terminal blocks
6ES7 972-0BA40 - 0XA0	Angled cable outlet, internal terminal blocks
6ES7 972-0BA50- 0XA0	90° cable outlet, insulation displacement terminals for FastConnect cables
ERNI Series ERbic Profibus Reverse Order number 114592	180° cable outlet, internal terminal blocks, 2 cables can be connected

Alternatively, you can use a commercially available plug connector with removable terminal connection, *e.g. of type SUBCON 9/F-SH from Phoenix-Contact (item no.: 2761509)*.

Note

Relay outputs/binary inputs

When connecting PROFIBUS DP **and** binary inputs/relay outputs, you must use the plug connector with axial cable outlet.

Function	Contact
NC (not used)	1, 2
RxD/TxD-P, data cable B	3
CNTR-P, direction control	4
DGND, data transmission potential (ground to 5 V)	5
VP, +5 V for bus terminators, Optical Link Plug	6
RxD/TxD-N, data cable A	8
CNTR-N, direction control	9

Note

Connector 7

Connector 7 is connected to the data cable. Consumers must therefore not be connected.

PROFIBUS DP cable

We recommend use of the following cable type:

Order number 6XV1 830-0E10 (violet). This cable is also suitable for the FastConnect technique.

Connect the cable screen flush in the connector housing.

3.6 Binary inputs and relay outputs of the add-on board

3.6.1 Connector assignment of the rack-mounted analyzers of Series 6 and the ULTRAMAT 23

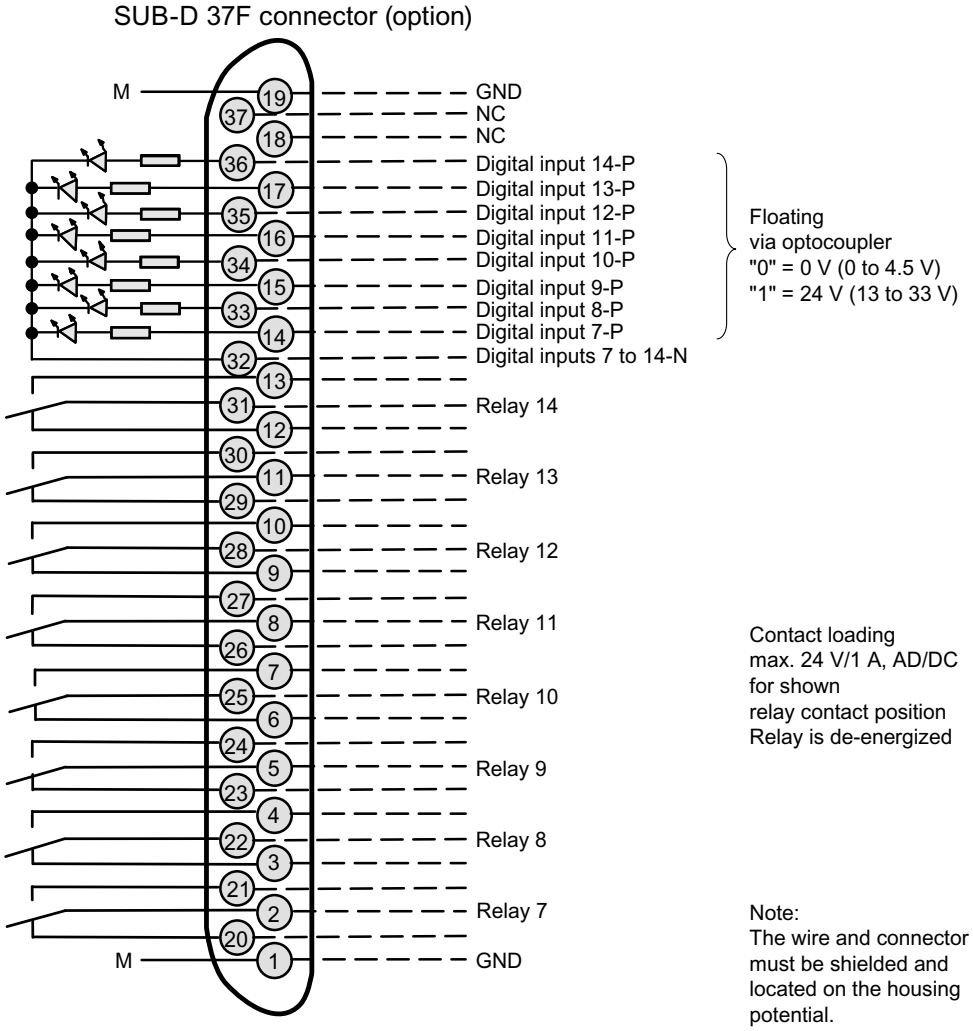


Figure 3-5 D-SUB 37 connector assignment

3.6.2 Connector assignment for field devices of Series 6

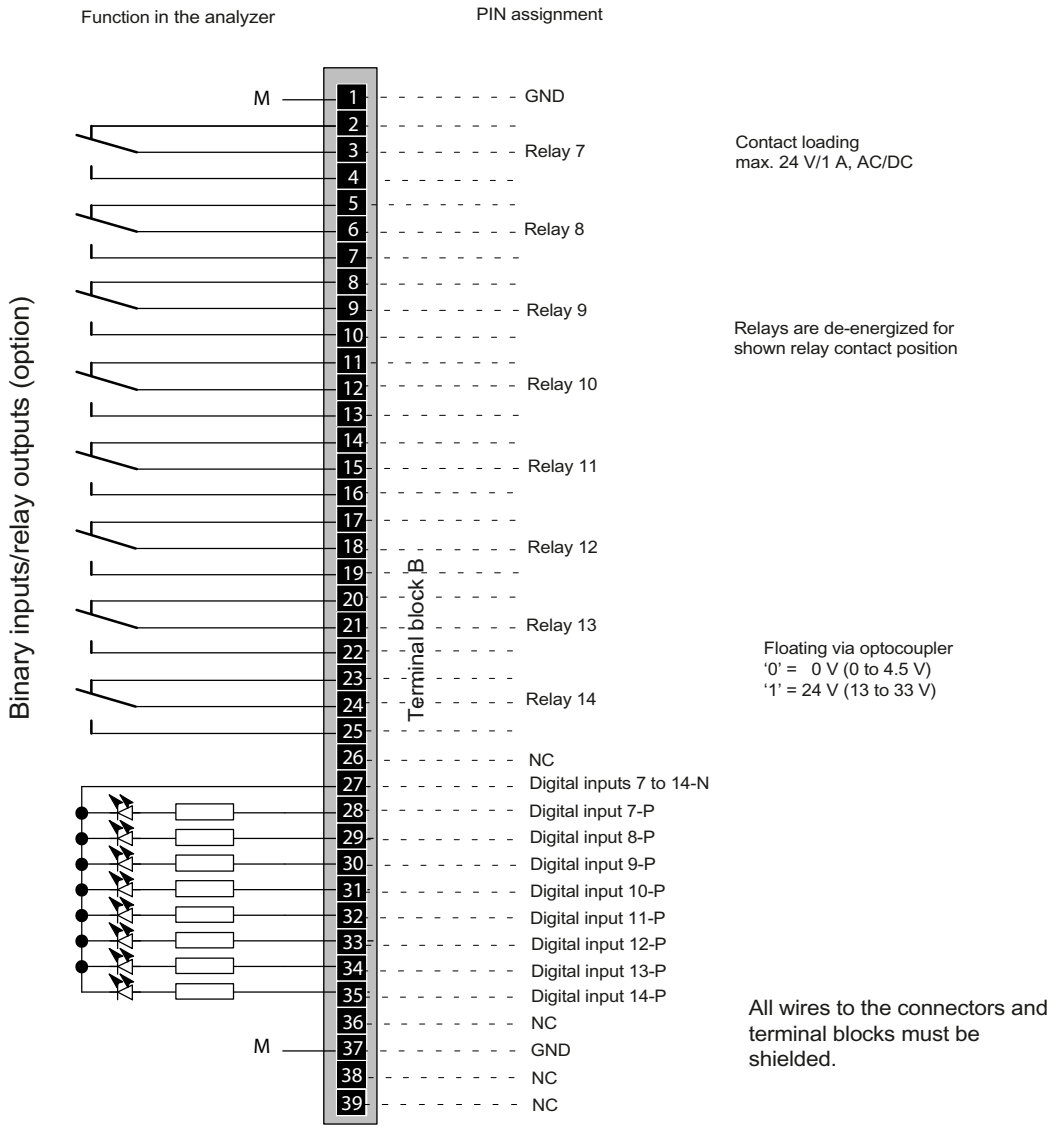


Figure 3-6 Connector assignment for field devices

3.6.3 Design of add-on board

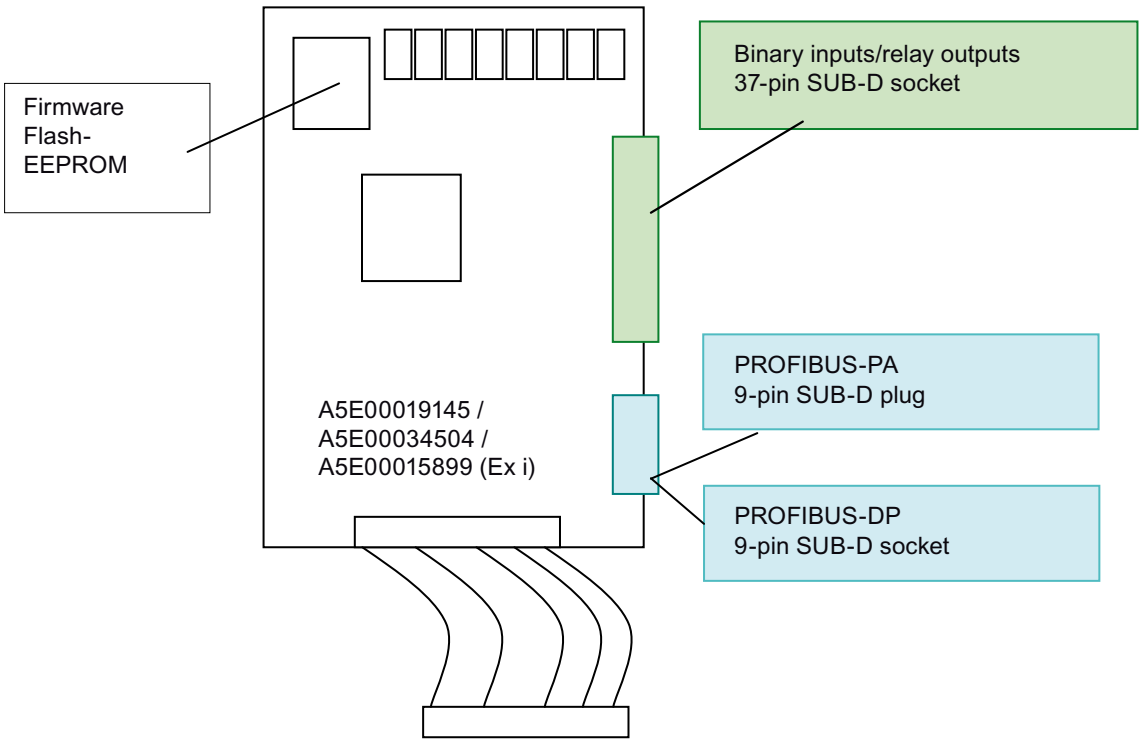


Figure 3-7 Design of add-on board

3.6.4 Fitting or retrofitting the add-on board

Note

Firmware

When retrofitting or subsequently installing the add-on board, it may be necessary to replace the firmware.

Further details can be found in the section 'Firmware of basic devices (Page 79)' or in the device manual or operating instructions of the relevant device.

3.6.4.1 Rack-mounted analyzers of Series 6

Note

Wrong modules

Ehen installing the add-on board in rack-mounted analyzers of Series 6, please note that only the following boards can be used:

- A5E00034504 for non-intrinsically safe coupling to PROFIBUS PA
- A5E00019145 for coupling to PROFIBUS DP.

The ULTRAMAT 6E/OXYMAT 6E (combined analyzer) and ULTRAMAT 6E (2-channel analyzer) each require 2 PROFIBUS interface modules.

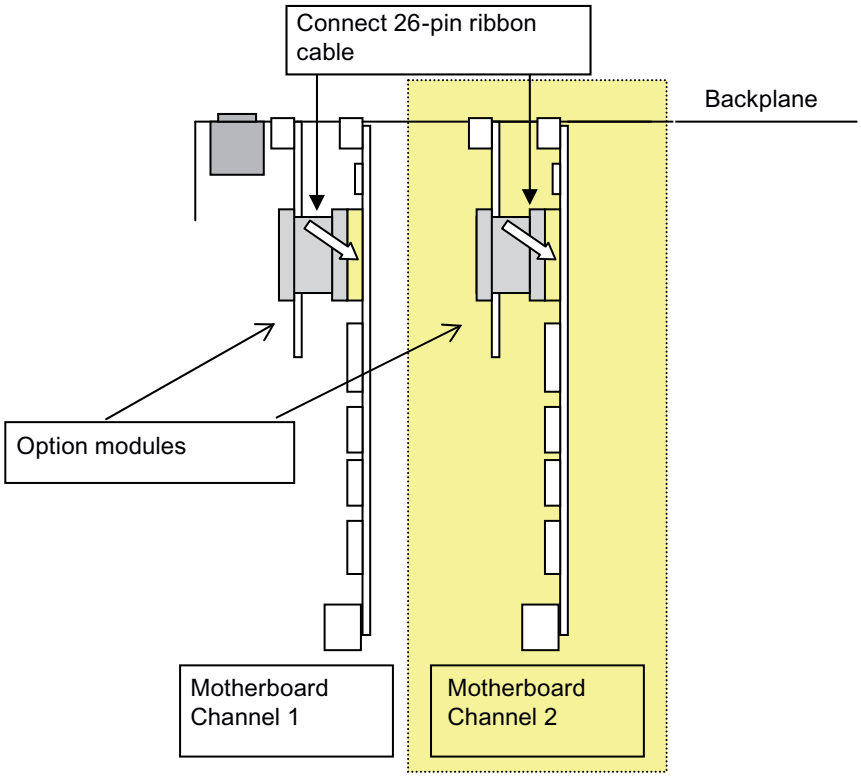


Figure 3-8 Installation diagram for add-on board in rack-mounted analyzers of Series 6

To install the add-on board, proceed as follows:

1. Disconnect the device from the mains.
2. Unscrew and remove the housing cover.
3. Remove the old add-on board, if there is one.
4. Fit the (new) module(s) into the rail on the base.
5. Fasten the module(s) with the M3 screws at the position intended for this purpose between the connectors on the rear panel.
6. Plug the ribbon cable connector onto the motherboard.
7. Fit the holding clamp.
8. Screw the housing cover back into place.
9. Connect the PROFIBUS cable to the device.
10. Reconnect the device to the power supply.

3.6.4.2 ULTRAMAT 23

Note

Wrong modules

When installing the add-on board in the ULTRAMAT 23 gas analyzer, please note that only the following boards can be used:

- A5E00034504 for non-intrinsically safe coupling to PROFIBUS PA
- A5E00019145 for coupling to PROFIBUS DP.

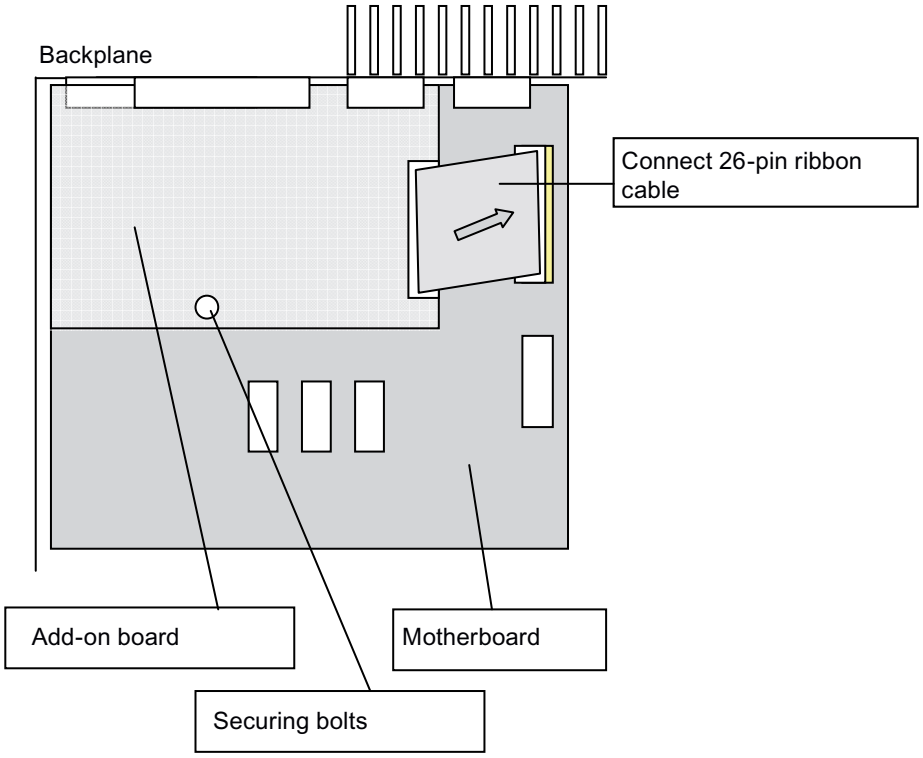


Figure 3-9 Installation diagram for add-on board in ULTRAMAT 23 rack-mounted analyzers

To install the add-on board, proceed as follows:

1. Disconnect the device from the mains.
2. Unscrew and remove the housing cover.
3. Remove the old add-on board, if there is one.
4. Fasten the module(s) with the M3 screws at the position intended for this purpose between the connectors on the rear panel.
5. A plastic bolt is included in the retrofitting kit.
   Use this to fasten the (new) module to the housing base.
6. Plug the ribbon cable connector onto the motherboard.
7. Screw the housing cover back into place.
8. Connect the PROFIBUS cable to the device.
9. Reconnect the device to the power supply.

3.6.4.3 Field devices of Series 6

Note

Wrong modules

When installing the add-on board in analyzers of Series 6, please note that only the following boards can be used:

- A5E00034504 for non-intrinsically safe coupling to PROFIBUS PA
- A5E00019145 for coupling to PROFIBUS DP.
- A5E00015899 Ex i for intrinsically safe coupling to PROFIBUS PA for devices used in hazardous areas of protection class Ex p [ia/ib]

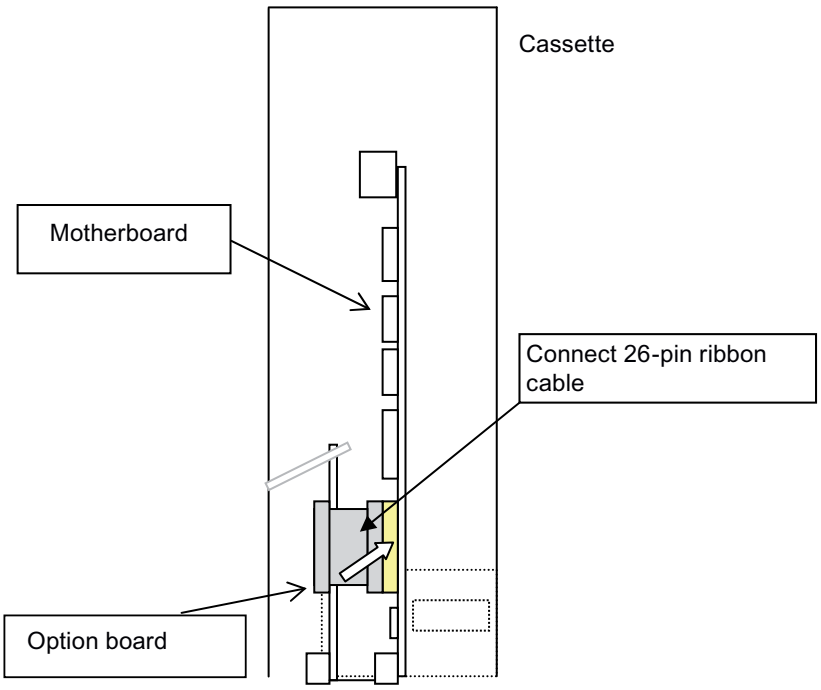


Figure 3-10 Installation of add-on board in field devices of Series 6

To install the add-on board, proceed as follows:

1. Disconnect the device from the mains.
2. Open the left door of the housing.
3. Remove the sheet-metal cover.
4. Disconnect all cables leading to the cassette.
5. Remove the sheet metal cassette from the device.
6. Remove the old add-on board, if there is one.
7. Fit the new module into the rail.
8. Fasten the module with the M3 screws at the position intended for this purpose between the connectors on the underside of the cassette
9. Hook the metal bracket onto the upper edge of the option module.
10. Plug the ribbon cable connector onto the motherboard.
11. Connect the 37-pin SUB-D socket of the option module to the terminal block in the device.
12. Fit the sheet-metal cassette back into the device.
13. Screw the sheet-metal cover back into place.
14. Connect the PROFIBUS cable to the device.
15. Reconnect the device to the power supply.

Commissioning

4

4.1 General information

Following installation of all components required for communication over PROFIBUS, you must still carry out the following steps:

- Check the firmware of your device. The assignment of the firmware to the device can be found in section Device revisions (Page 49). If retrofitting is necessary, you must replace the firmware block. A list of suitable blocks can be found in section Firmware/retrofitting kits/spare parts packages of PROFIBUS modules (Page 78).
- Set the PROFIBUS station address. This is described in section Parameter assignment on the device (Page 39).
  If the device is not detected during cyclic data transfer, check whether the ID number in the device parameter set is '1 (device-specific)'.
- We recommend a PC software program such as SIMATIC PDM for operation via PROFIBUS. Installation and the steps required for commissioning are described in the associated operating instructions and online help; refer to the information provided there.

4.2 Use of a configuration tool

The following example demonstrates the selection of the gas analyzer using the configuration tool STEP 7 HW-Config.

4.2.1 Selection of the target configuration

The device concerned has either a DP or PA interface. Select the appropriate device from the DP or PA catalog.

4.2.1.1 Device-specific selection with device revision 1

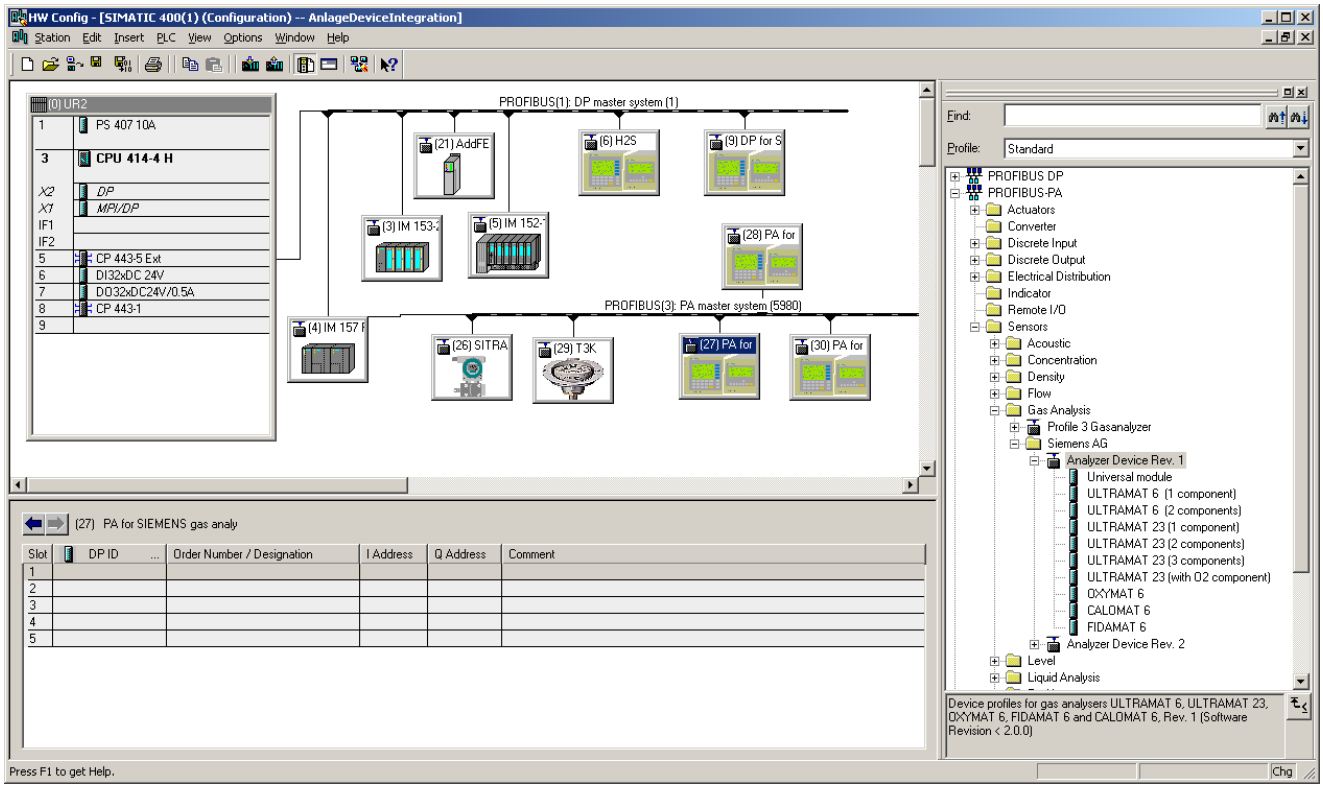


Figure 4-1 Device-specific selection of the target configuration with device revision 1

When selecting a device, the slots with the device-specific function blocks are output.

4.2.1.2 Block-specific selection with device revision 2

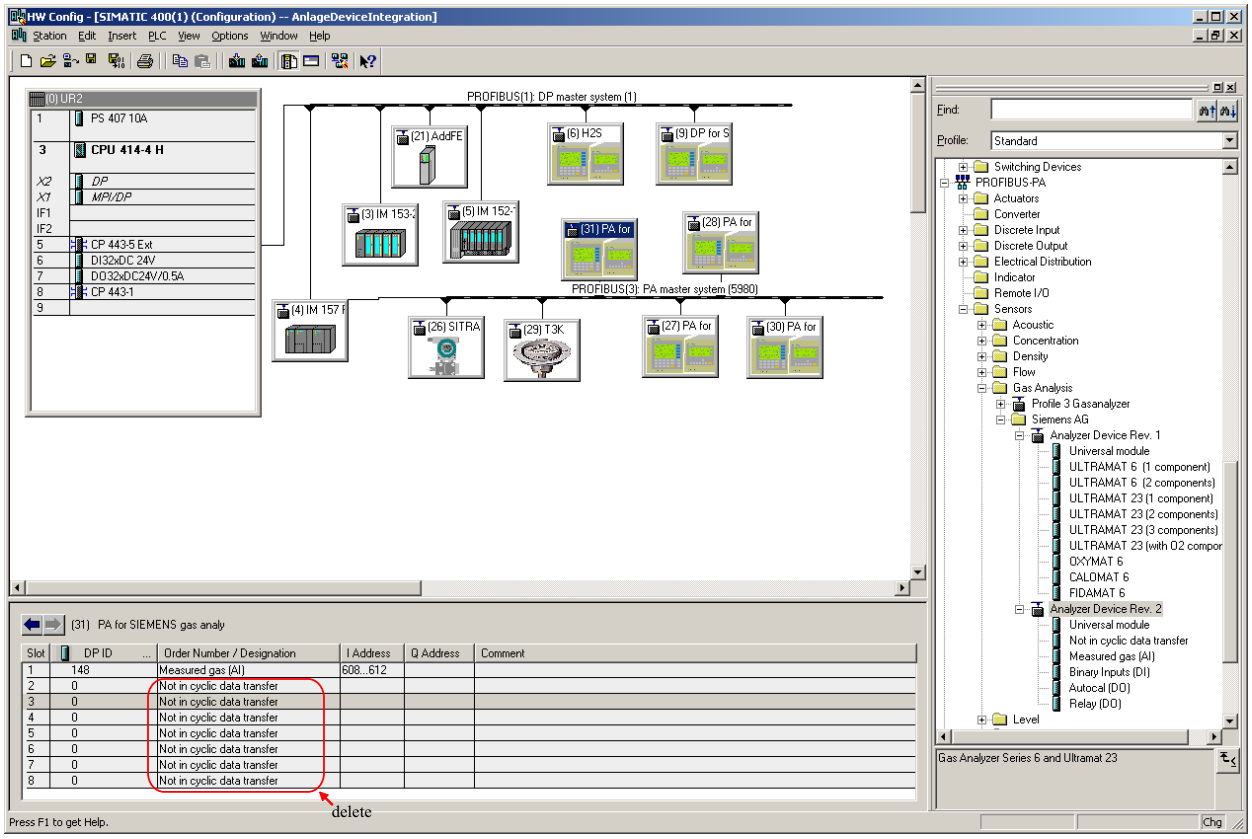
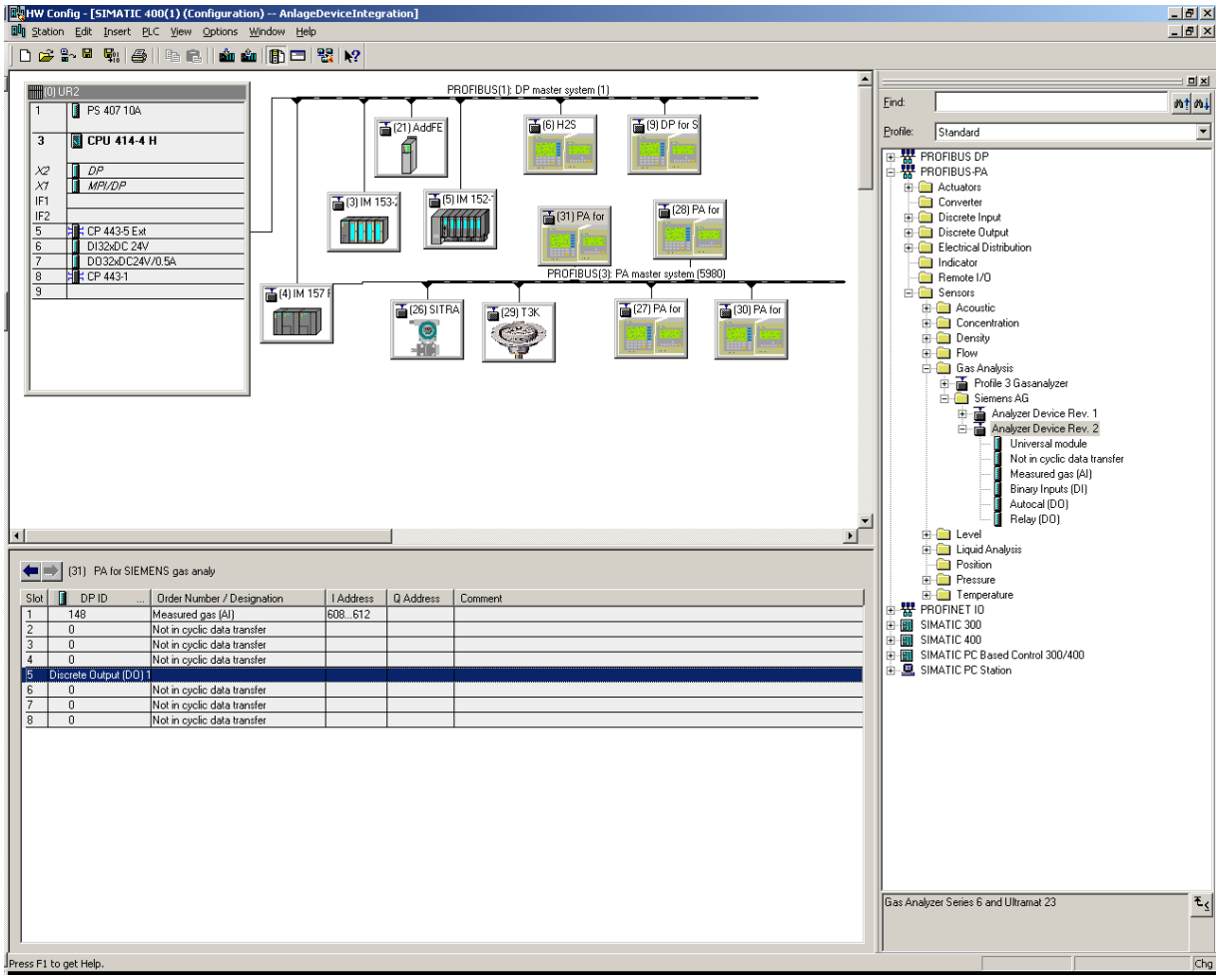


Figure 4-2 Output of available slots

When selecting a device, the slots are output which are not currently assigned to a function and are therefore available.



The function of the slot is output by selecting it and deleting the description 'Not in cyclic data transfer'.

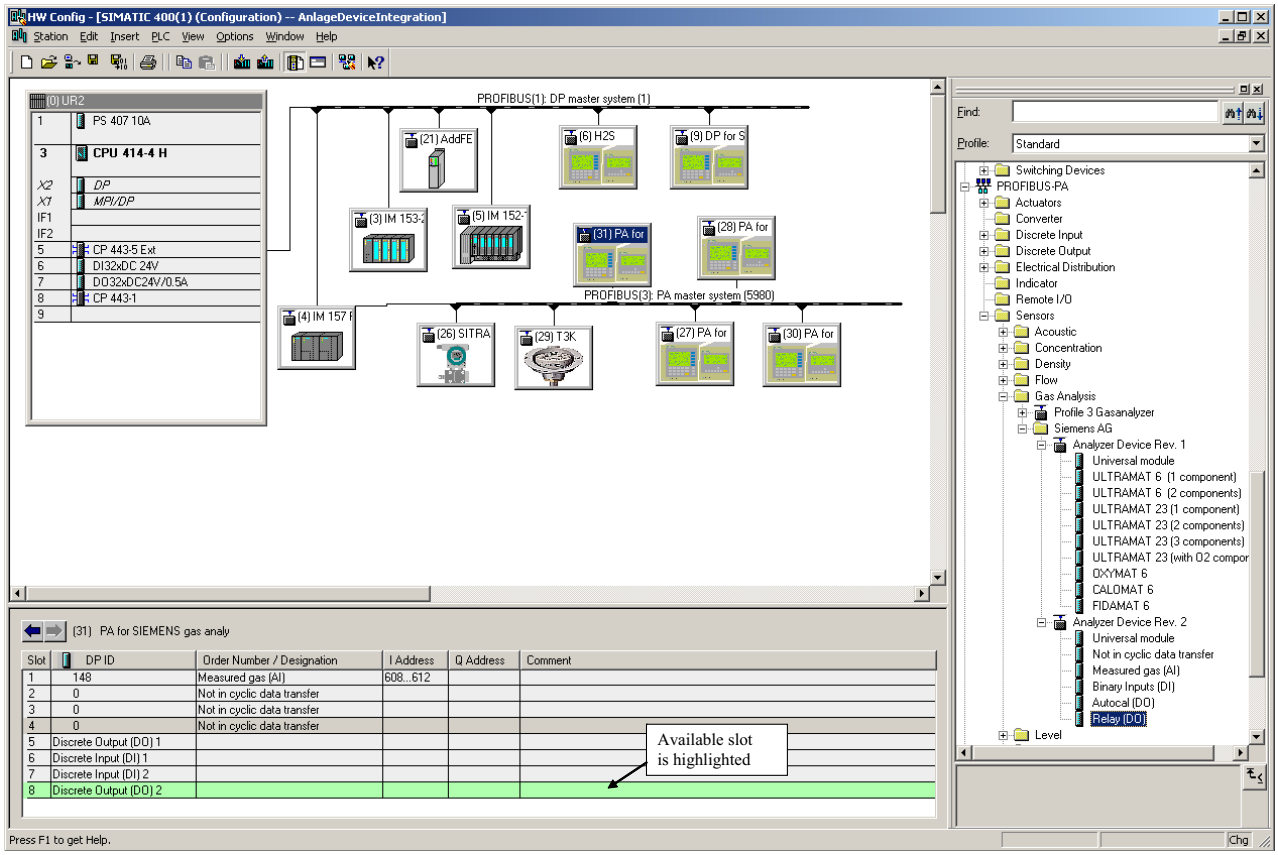


Figure 4-3 Output of the occupied slots (gray) and available slots (green)

The slot is occupied by dragging to the intended position of the specific function block (Drag and Drop). Only slots highlighted in green are available.

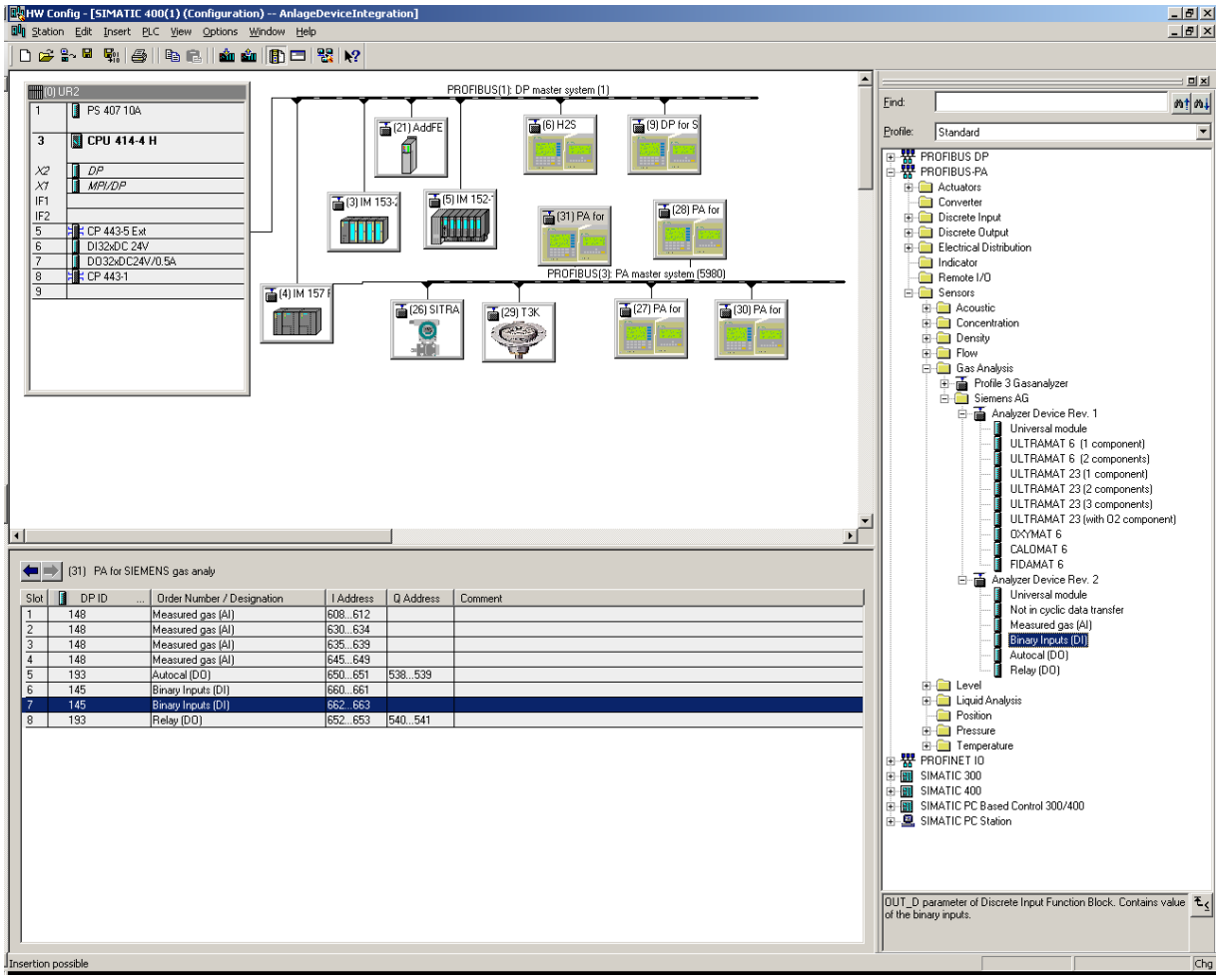


Figure 4-4 Configuration with completely occupied slots

4.2.1.3 Setting the PROFIBUS address

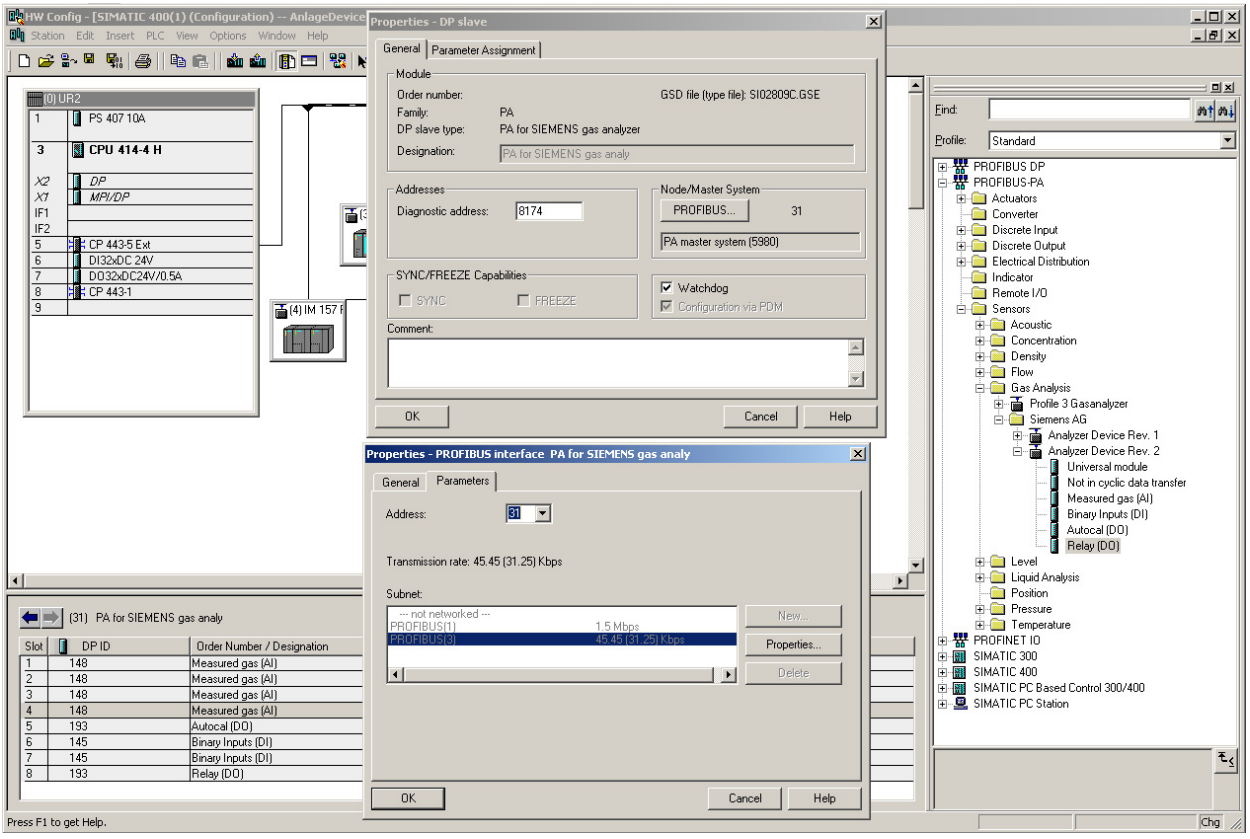
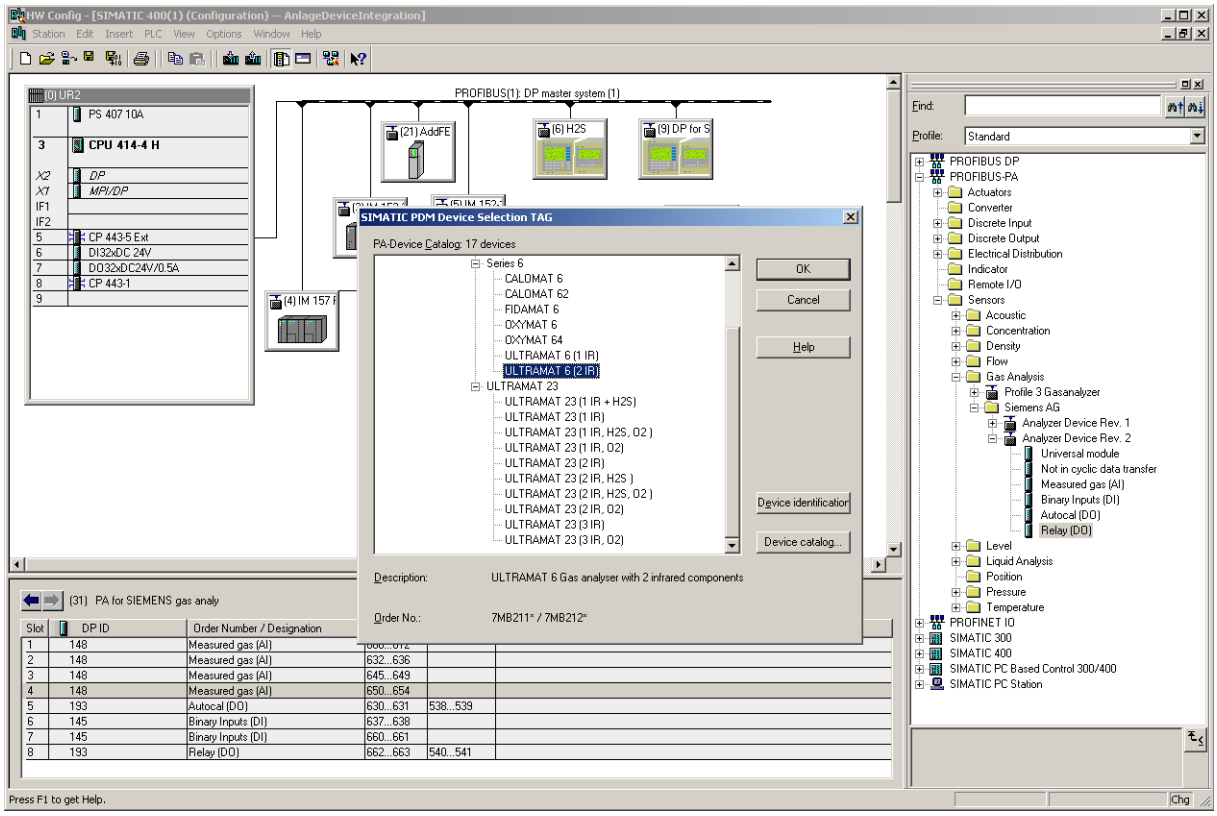


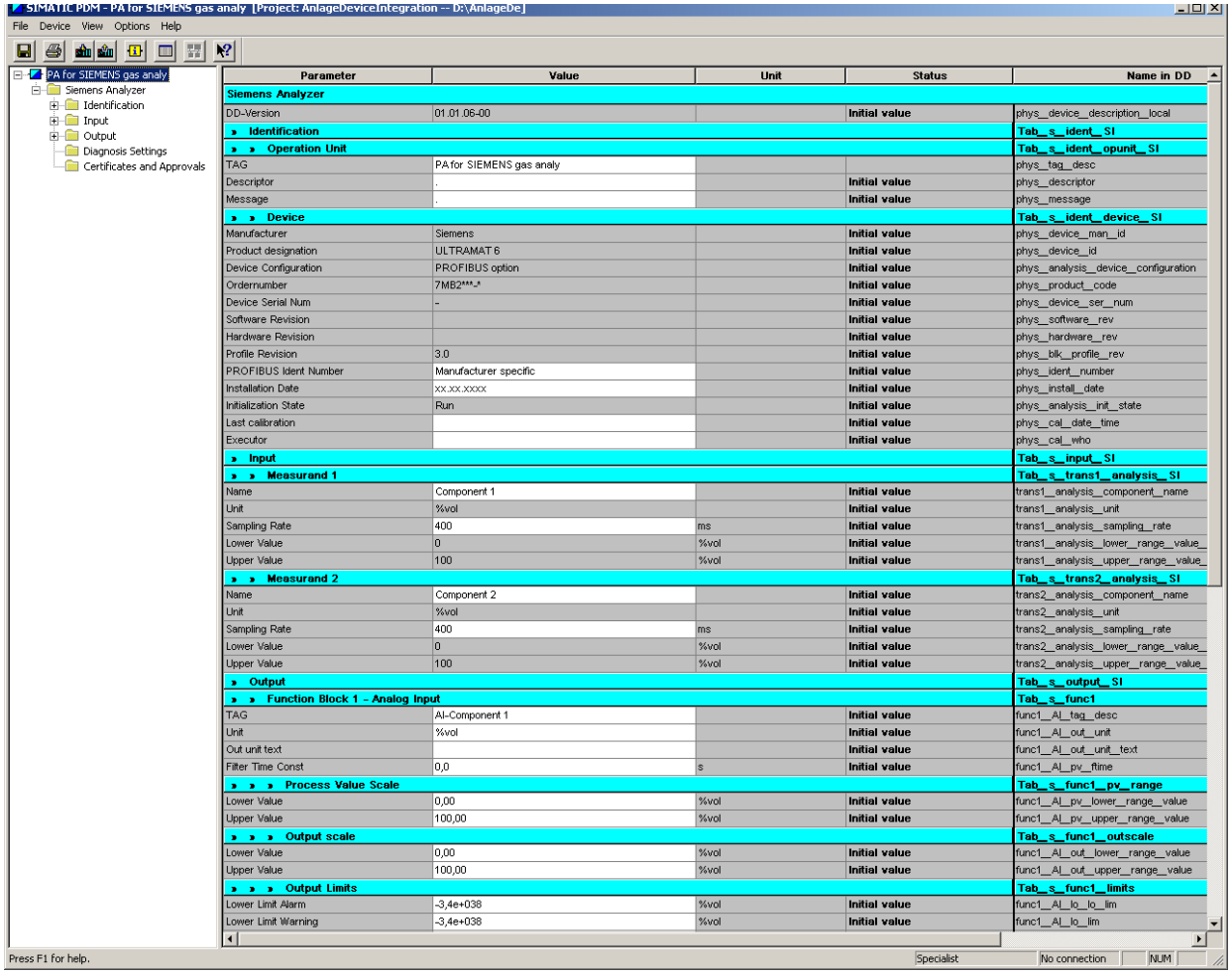
Figure 4-5 Setting the PROFIBUS address

4.2.1.4 SIMATIC PDM device catalog



You can select the appropriate device by double-clicking on the new device icon.

4.2.1.5 Starting SIMATIC PDM



Parameter	Value	Unit	Status	Name in DD
Siemens Analyzer				
DD-Version	01.01.06-00		**Initial value**	phys_device_description_local
» Identification				**Tab_s_ident_SI**
» » Operation Unit				**Tab_s_ident_opunit_SI**
TAG	PA for SIEMENS gas analy			phys_tag_desc
Descriptor	.		**Initial value**	phys_descriptor
Message	.		**Initial value**	phys_message
» » Device				**Tab_s_ident_device_SI**
Manufacturer	Siemens		**Initial value**	phys_device_man_id
Product designation	ULTRAMAT 6		**Initial value**	phys_device_id
Device Configuration	PROFIBUS option		**Initial value**	phys_analysis_device_configuration
Ordernumber	7MB2***-*		**Initial value**	phys_product_code
Device Serial Num	-		**Initial value**	phys_device_ser_num
Software Revision			**Initial value**	phys_software_rev
Hardware Revision			**Initial value**	phys_hardware_rev
Profile Revision	3.0		**Initial value**	phys_blk_profile_rev
PROFIBUS Ident Number	Manufacturer specific		**Initial value**	phys_ident_number
Installation Date	xx.xx.xxxx		**Initial value**	phys_install_date
Initialization State	Run		**Initial value**	phys_analysis_init_state
Last calibration			**Initial value**	phys_cal_date_time
Executor			**Initial value**	phys_cal_who
» Input				**Tab_s_input_SI**
» » Measurand 1				**Tab_s_trans1_analysis_SI**
Name	Component 1		**Initial value**	trans1_analysis_component_name
Unit	%vol		**Initial value**	trans1_analysis_unit
Sampling Rate	400	ms	**Initial value**	trans1_analysis_sampling_rate
Lower Value	0	%vol	**Initial value**	trans1_analysis_lower_range_value_
Upper Value	100	%vol	**Initial value**	trans1_analysis_upper_range_value_
» » Measurand 2				**Tab_s_trans2_analysis_SI**
Name	Component 2		**Initial value**	trans2_analysis_component_name
Unit	%vol		**Initial value**	trans2_analysis_unit
Sampling Rate	400	ms	**Initial value**	trans2_analysis_sampling_rate
Lower Value	0	%vol	**Initial value**	trans2_analysis_lower_range_value_
Upper Value	100	%vol	**Initial value**	trans2_analysis_upper_range_value_
» Output				**Tab_s_output_SI**
» » Function Block 1 - Analog Input				**Tab_s_func1**
TAG	AI-Component 1		**Initial value**	func1_AI_tag_desc
Unit	%vol		**Initial value**	func1_AI_out_unit
Out unit text			**Initial value**	func1_AI_out_unit_text
Filter Time Const	0,0	s	**Initial value**	func1_AI_pv_ftime
» » » Process Value Scale				**Tab_s_func1_pv_range**
Lower Value	0,00	%vol	**Initial value**	func1_AI_pv_lower_range_value
Upper Value	100,00	%vol	**Initial value**	func1_AI_pv_upper_range_value
» » » Output scale				**Tab_s_func1_outscale**
Lower Value	0,00	%vol	**Initial value**	func1_AI_out_lower_range_value
Upper Value	100,00	%vol	**Initial value**	func1_AI_out_upper_range_value
» » » Output Limits				**Tab_s_func1_limits**
Lower Limit Alarm	-3,4e+038	%vol	**Initial value**	func1_AI_lo_lo_lim
Lower Limit Warning	-3,4e+038	%vol	**Initial value**	func1_AI_lo_lim

SIMATIC PDM can be started following selection of the device.

Operation

5

5.1 Parameter assignment on the device

5.1.1 Analyzers of Series 6

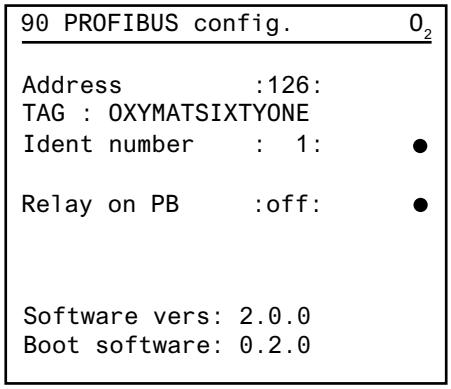
Note

General information

The basic principles for operation on the device are described in the manual or operating instructions of the associated device in the section 'Operation'.

The station address can be set in the main menu under Configuration. Cyclic communication must be terminated prior to modifying one of these parameters, and restarted when the menu is left.

This function is coded and requires the level 2 code. The following display then appears, for example:



You can then set the following parameters:

- Address: The PROFIBUS station address can be set here. The address can be set from 0 to 126.
- TAG
  Display of name assigned to the device in the network (or the first 16 characters).
- Ident number
  This parameter is used to set the configuration response of the device. The values 0, 1 and 3 can be set for the parameter. They have the following meanings:
  - 0: Only the Profil Ident number is acknowledged positively
  - 1: Only the device-specific Ident number is acknowledged positively
    Note: In order to work with the provided GSD and DD, the ‚Ident number' parameter must have the value 1.
  - 3: Only the Profil Ident number for multivariable devices (complex analyzers) is acknowledged positively.
- Relay by PB
  This function can be used to control the 8 relays of the add-on card via PROFIBUS. To allow activation, none of these relays must already be occupied by a device-internal function.
  Note: The function 'Relay by PB' is only possible as of PROFIBUS card firmware version 2.0.0 (shown as Software Version in the figure).

5.1.2 ULTRAMAT 23

Note

General information

The basic principles for operation of the analyzers are described in the manual or operating instructions of the ULTRAMAT 23 in the section 'Operation'.

The station address can be set in the main menu under Configuration in the submenu item 'Special Functions'. Cyclic communication must be terminated prior to modifying one of these parameters, and restarted when the menu is left.

This function is coded, and requires the level 2 code. The following display then appears, for example:

```
Codes/Language
AUTOCAL drift
ELAN/PROFIBUS
Fact.Data/Res/Units
```

Select the 'ELAN/PROFIBUS' item. The following is displayed, for example:

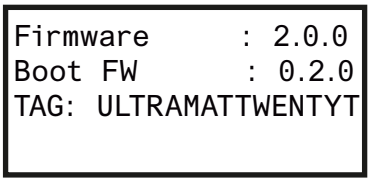
```
ELAN Parameters
ELAN ext. Interfer.
PROFIBUS Parameters
```

Select the 'PROFIBUS Parameters' item. The following is displayed, for example:

```
Adress         : 126
Ident number   :   1
PB Relay       : off
Diagnosis
```

You can then set the following parameters:

- Address: The PROFIBUS station address can be set here. The address can be set from 0 to 126.
- Ident number
  This parameter is used to set the configuration response of the device. The values 0, 1 and 3 can be set for the parameter. They have the following meanings:
  - 0: Only the Profil Ident number is acknowledged positively
  - 1: Only the device-specific Ident number is acknowledged positively
    Note: In order to work with the provided GSD and DD, the ‚Ident number' parameter must have the value 1.
  - 3: Only the Profil Ident number for multivariable devices (complex analyzers) is acknowledged positively.
- PB Relay
  This function can be used to control the 8 relays of the add-on card via PROFIBUS . To allow activation, none of these relays must already be occupied by a device-internal function.
  Note: The function 'Relay by PB' is only possible as of PROFIBUS card firmware version 2.0.0 (shown as Software Version in the figure).
- Diagnosis
  If the ‘Diagnostics’ parameter is selected, the 'Firmware' display appears with, for example, the following parameters:



  This display also includes the 'TAG' parameter which indicates the name which has been assigned to the device in the network (or the first 16 characters).

5.2 Settings with SIMATIC PDM

The analyzers can handle a wide variety of measuring tasks and must therefore be set accordingly. This can be carried out using the SIMATIC PDM control program, for example. When you select the appropriate analyzer according to the type and number of components (see also section Setting the PROFIBUS address (Page 35)), the SIMATIC PDM user interface includes correspondingly preset parameters which also have an influence on the cyclic user data.

The following sections describe some of the most important parameters in detail.

5.2.1 TAG/Analog Input Block

The name of the process measured variable can be changed as a "TAG". This name is shown in the measured value display in the Measured values/output tab to allow identification of the measured value.

5.2.2 Adjusting to a desired process value

The 'Analog Input Block' function block has the purpose of mapping the measured value to the process value. As a rule, the device measured value should directly correspond to the process value. In this case, the values received by the device for unit, start-of-scale value and full-scale value in the "Measured value" block must be identical to the adjustable values with the same name in the Analog Input Block with measured-value scaling and output scaling.

The following example shows how a process value is adapted to other conditions:

Example

You wish to assign the device measured value 0 ... 1 000 mg/m³ CO to the process value 0 ... 100 %. To do this, proceed as follows:

1. Set the following parameters:
   - In the block 'Measured value 1':
     CO as measured component.
   - In the function block 'Analog Input 1':
     0 as the start-of-scale value for the input
     1 000 as the full-scale value for the input
     % as the unit (output)
     0.0 as the start-of-scale value for the output
     100.0 as the full-scale value for the output.

5.2.3 Electrical attenuation

The electrical attenuation acts as a 1st order filter. After the preset filter time constant T_{63}, the output has reached 63% of the input value.

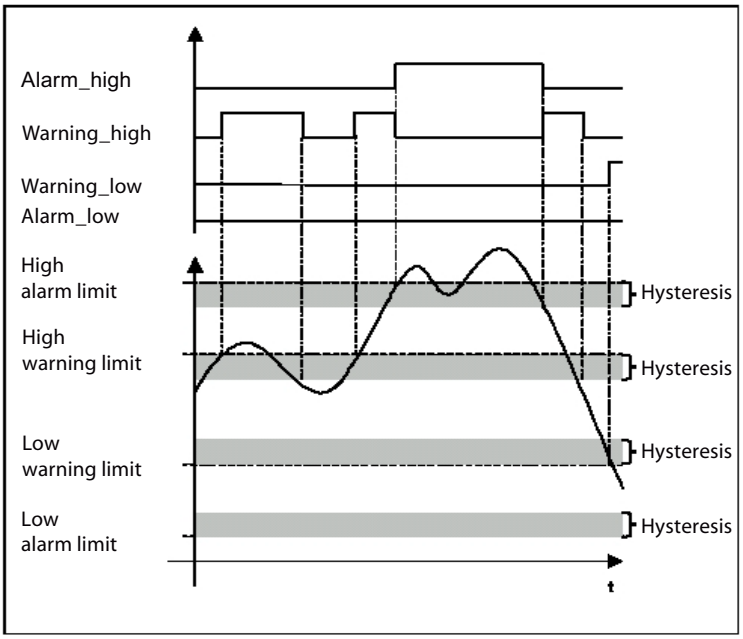
Set the desired time (between 0 and 100 s) for the 'Filter time constant' parameter in the 'Analog Input Block'.

5.2.4 Warning and alarm limits

The function blocks of the 'Analog Input Block' have high and low warning and alarm limits for the output. In order to avoid unstable display of warnings and alarms, you can specify a hysteresis. For this purpose, set the following parameters in the function blocks of the analog input according to the process conditions:

- Hysteresis limit
- High warning limit
- High alarm limit
- Low warning limit
- Low alarm limit

If one of the limits is violated, the output is accompanied by a status value which you can evaluate in your user program. The following figure provides an overview of the relationship between the individual limits.



5.2.5 Response in event of failure

The function blocks of the 'Analog Input Block' can adopt a preset response upon failure of the measured value block. If the output variables of the measured value block are accompanied by the "bad" status due to an error, e.g. "Bad - Sensor fault", the function blocks activate the failure response. The output is then accompanied by an "uncertain" status. An overview of the statuses can be found in section Data type DS-33 (Page 64).

Set the failure response in the function block 'Analog Input Block' as follows:

Response in event of failure	Description
The substitute value is applied as the output value	The predefined safety default value is output
Saving the last valid output value	The last valid output value is output
The incorrectly calculated measured value is at the output (failure logic switched off)	The 'bad' output value is accompanied by the status assigned to it by the measured value block

5.2.6 AUTOCAL

If the appropriate option is present, the analyzers can perform a complete calibration cycle.

This calibration can be started in the Device/Calibration/Calibrate zero/AUTOCAL menu.

5.2.7 Simulations

Various simulations can be called using the 'Device -> Simulation' menu.

5.2.7.1 Simulation of an output

You can use this function to provide process values for the cyclic user data traffic at the output of an analyzer using acyclic write operations. In this manner, you can check the processing of process values.

To do this, proceed as follows:

1. Select the simulation of the output
2. Set the target mode to MAN (manual)
3. Enter the desired output value, the quality, and the status
4. Transfer the settings from the program to the analyzer.

The behavior of the output can be observed, for example, in SIMATIC PDM or using a variable table (VAT in the block folder of the SIMATIC messenger).

To return to normal operation afterwards, set the target mode to 'AUTO'.

5.2.7.2 Simulation of an input

Following adaptation of the measured value, you can use this function to check the value for correct implementation of the modified parameters, such as

- Monitoring of the preset process limits
- Electrical attenuation
- Response in event of failure.

To do this, proceed as follows:

1. Select the simulation of the input
2. Set the target mode to 'AUTO'
3. Select the simulation mode 'Released'
4. Enter the desired output value, the quality, and the status
5. Transfer the settings from the program to the analyzer.

You can observe the behavior of the output in SIMATIC PDM, for example.

To return to normal operation afterwards, you must switch off the simulation.

5.2.8 Reset functions

Various reset functions can be called using the 'Device -> Reset' menu.

5.2.8.1 Resetting to the as-supplied state

If a device has been adjusted in such a way that it can no longer perform its measuring task correctly, you can use this function to restore the parameters to the as-supplied state. Using this function, all parameters are reset to the factory settings. The PROFIBUS address is not changed in the process. The reset action is indicated by the "Cold start executed" diagnostics message. If no measured value result is available after this, the "Unsure, initial value, value constant" status is output.

This function only resets the PROFIBUS module. The factory settings of the device can only be reset using the input menu on the device itself (refer to the operating instructions for the relevant device).

Resetting the PROFIBUS module has no effect on the following objects:

- ACTIVE_RANGE
- AUTORANGE-ON
- BATCH
- CALIBRATION-DATA
- DESCRIPTOR
- DEVICE_INSTAL_DATE
- DEVICE_MESSAGE
- DEVICE_STATE
- IDENT_NUMBER_SELECTOR
- INIT_STATE
- PV_UNIT
- PV_UNIT_TEXT
- OUT
- OUT_UNIT_TEXT
- RANGE_1
- TAG_DESC

5.2.8.2 Resetting the PROFIBUS address

In the factory setting, the PROFIBUS address is preset to '126'.

If another device in your system already has the preset address 126, you can add your device to the PROFIBUS line during ongoing operation of the automation or control system. You must subsequently change the address of the newly connected device to a different value.

If you then remove a device from the PROFIBUS line, you should reset its address to 126 using this function so that you can re-integrate it into this system or another system if required.

5.3 Operation with SIMATIC PDM

Parameters can be assigned and measured values monitored using the SIMATIC PDM operating program and a personal computer (PC) or programming device (PG).

You can find detailed information on this on the Internet under: SIMATIC PDM info ()

User data via PROFIBUS

6

The PROFIBUS PA communication protocol 3.0.1 is used as the PROFIBUS data structure for all modules. The data structures, their significance, and the functional scope are defined for PROFIBUS PA in the "PROFIBUS PA profiles". These profiles are specified in the following documents:

- PROFIBUS PA Profile for Process Control Devices / General Requirements
- PROFIBUS PA Profile for Process Control Devices / Mapping to Fieldbus
- PROFIBUS PA Profile for Process Control Devices / Data Sheet Transmitter
- PROFIBUS PA Profile for Process Control Devices / Data Sheet Analyzer
- PROFIBUS PA Profile for Process Control Devices / Data Sheet Discrete Output

These documents can be obtained from the PI (PROFIBUS International) either by post:

PROFIBUS Nutzerorganisation
Haid-und-Neu-Str. 7
D-76131 Karlsruhe, Germany
Tel.: +49 (0)721 / 96 58 590
Fax: +49 (0)721 / 96 58 589

or on the Internet under PROFIBUS (PI) (http://www.profibus.com)

With the user data, a distinction is made between cyclic and acyclic services. Cyclic services are used to transmit time-critical data such as measured values and statuses. Acyclic services permit querying or modification of device parameters during operation.

6.1 Device revisions

PROFIBUS communication with the devices was developed in two stages. Specific device revisions and operating software must be available in order to use the complete functionality of stage 2.

The following table provides an overview of the dependency between PROFIBUS functionality and device software.

Table 6- 1 Overview of PROFIBUS device revisions for devices of Series 6/U23

Device firmware					**FW/HW add-on card**	**GSD version**	**DD version**	**PDM version**
U6/O6	**C6**	**F6**	**C62/O64**	**U23**				
Device revision 1 with maintenance with the following functionality: • Output of faults • Maintenance requests as texts with help								
V 4.7.0	V 1.3.0	V 1.2.0	--	V 2.13.0	V 1.6.4, all HW	V 3.0; with C6: V 3.1; with F6: V 3.2	01.01.05-014	From PDM 6.0
Device revision 2 with relay control: (supplemented by following functions) • Extended command set • New physical block 2 for the add-on board • Cyclic services with new DO2 for setting relay outputs on the add-on card • Cyclic services with reading of the binary inputs (DI 1/2) of the device								
V 4.7.1	V 1.3.1	V. 1.3.1	--	V. 2.14.0	V2.0.0; HW from ES5 (PA) or ES6 (DP+PA-Ex)	SI02809C.gsd, SI02809E.gsd V. 1.0.3	02.00.00-19	6.0 with SP1; 6.0 with SP2
Device revision 2, supplemented by: • CALOMAT 62 and OXYMAT 64 devices								
V. 4.7.3	V 1.3.2	V 1.3.2	V 0.1.6	V. 2.14.3	V. 2.0.1	As above	02.01.01-06	6.0 with SP2; 6.0 with SP3
Device revision 2, supplemented by: • Switching of relays on the add-on board in every device state except REMOTE								
V 4.8.3	V 1.3.5	V 1.3.4	V 1.0.2	V 2.14.6	V 2.0.2	As above	As above	As above
Device revision 2, supplemented by: • ULTRAMAT 23 - zero adjustment of O_2 probe corrected								
As above	As above	As above	As above	As above	V 2.0.3	As above	As above	As above
Device revision 2, supplemented by: • Expansion of ULTRAMAT 23 by H_2S probe and paramagnetic O_2 probe • Switching of pump and internal valve of ULTRAMAT 23 in every device state except REMOTE								
As above	As above	As above	As above	V 2.14.7	V 2.0.4	As above	As above	As above

Starting with device revision V2.0.0, every FW add-on card is upwards-compatible with GSD and DD.

New option modules are provided with firmware of device revision 2 in the factory. However, if you wish to continue to work with device revision 1 for compatibility reasons, the relevant firmware can be ordered together with the add-on card and the firmware of level 2. An overview of the firmware modules can be found in section Firmware/retrofitting kits/spare parts packages of PROFIBUS modules (Page 78).

6.2 Data profile

PROFIBUS block model

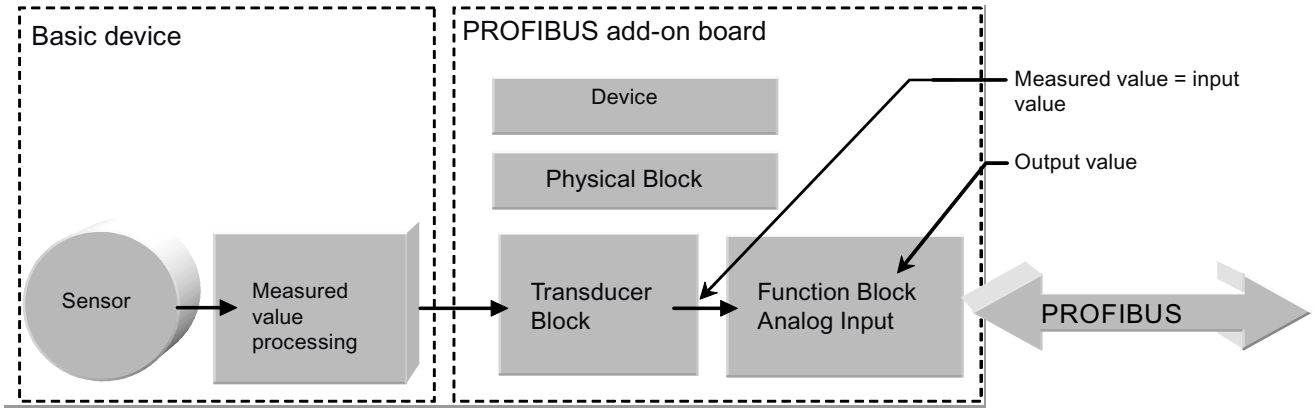


Figure 6-1 Block structure of a gas analyzer with 4 block types, example with one measured value

Block structure of device versions

Device version	Function Block		
	AI (Analog Input)	DO (Digital Output)	DI (Digital Input)
ULTRAMAT 6 with 1 component	1	2	2
ULTRAMAT 6 with 2 components	2	2	2
ULTRAMAT 23 with 1 component	1	2	2
ULTRAMAT 23 with more than one component	See ULTRAMAT 23 table	2	2
OXYMAT 6 OXYMAT 61 OXYMAT 64	1	2	2
CALOMAT 6 CALOMAT 62	1	2	2
FIDAMAT 6	1	2	2

The Digital Input Block and the second Digital Output Block are only available with functional expansion stage (device revision) 2 starting with software version 2.0.0. Older software versions (device revision 1) are still fully operational.

With ULTRAMAT 6 and ULTRAMAT 23, the assignments to the infrared (IR) measured components are always made in ascending order starting with "1".

If the ULTRAMAT 23 is used to measure oxygen (O_2) and hydrogen sulfide (H_2S), these always occupy the positions 3 (H_2S) and 4 (O_2).

ULTRAMAT 23
The following possibilities exist for ULTRAMAT 23 as a result of the measured components:

Device version	IR component 1	IR component 2	IR component 3	H_2S (if present)	O_2 (if present)
7MB2335	AI 1	----------	----------	AI 3	AI 4
7MB2337	AI 1	AI 2	----------	AI 3	AI 4
7MB2338	AI 1	AI 2	AI 3	----------	AI 4

The following slots are assigned to the Function Blocks during the configuration (see also Selection of the target configuration (Page 30)):

- AI 1 to AI 4: 1 - 4;
- DO 1: 5;
- DI 1: 6;
- DI 2: 7;
- DO 2: 8;

6.3 Cyclic data transfer

The address of the PROFIBUS board cannot be changed in the case of cyclic data transfer.

6.3.1 Slots for cyclic data transfer

Table 6- 2 Overview of slots for cyclic data transfer

Slot	Description	Parameter
Slot 1 (AI 1)	Read measured value of component 1 (Measured value/status (Page 54))	5 bytes = 1 float, 1 byte / Bytes 1 to 4: measured value (float) Byte 5: status according to table of PROFIBUS statuses
Slot 2 (AI 2)	Read measured value of component 2 (IR of U6 or U23)	Like AI 1
Slot 3 (AI 3)	Read measured value of component 3 (IR or H_2S probe of U23)	Like AI 1
Slot 4 (AI 4)	Read measured value of component 4 (O_2 probe of U23)	Like AI 1
Write Slot 5 (DO 1)	Start/stop AUTOCAL (Triggering AUTOCAL (Page 54))	2 bytes/ Byte 1: Bit 0 = 1: Start AUTOCAL; (bit 0 must first be = 0) Byte 1: Bit 1 = 1: Abort AUTOCAL; Byte 1: Bits 2 – 7 = 0 Byte 2: 80 Hex
Read Slot 5 (DO 1)	Read Autocal status (Triggering AUTOCAL (Page 54))	2 bytes/ Byte 1: Bit 0 = 1: AUTOCAL in function; Byte 1: Bits 1 – 7 = 0 Byte 2: Status (can be ignored)
Slot 6 (DI 1)	Read binary inputs of motherboard (Reading digital inputs (Page 56))	2 bytes/ Byte 1: Bits 0 - 7 = binary inputs 1 - 8 Byte 2: Status (can be ignored)
Slot 7 (DI 2)	Read binary inputs of PROFIBUS add-on card (Reading digital inputs (Page 56))	2 bytes/ Byte 1: Bits 0 - 7 = binary inputs 1 - 8 Byte 2: Status (can be ignored)
Write Slot 8 (DO 2)	Set relay outputs of PROFIBUS add-on card (Assigning relay outputs (Page 55))	2 bytes/ Byte 1: Bits 0 - 7 = relay outputs 1 - 8 Byte 2: 80 Hex Switching of the relays must be enabled in the device.
Read Slot 8 (DO 2)	Read relay outputs of PROFIBUS add-on card (Assigning relay outputs (Page 55))	2 bytes/ Byte 1: Bits 0 - 7 = relay outputs 1 - 8 Byte 2: Status (can be ignored)

6.3.2 Measured value/status

Cyclic reading of the measured value and status is possible using the Analog Input Block (AI 1 ... 4). Cyclic exchange of the following user data is possible over PROFIBUS:

Parameter name	Description	Direction of data transfer (from viewpoint of gas analyzer)	Data type	Length (bytes)
OUT	Measured value and status	Output	Data type DS-33 (Page 64)	5

6.3.3 Triggering AUTOCAL

Cyclic triggering of AUTOCAL is possible using the Discrete Output Block 1. Cyclic transfer of the following user data to the device is possible over PROFIBUS:

Parameter name	Description	Direction of data transfer (from viewpoint of gas analyzer)	Data type	Length (bytes)
SP_D	Setpoint of function block for AUTO mode	Input	Data type DS-34 (Page 66)	2
READBACK_D	Acknowledgment of function block	Output	Data type DS-34 (Page 66)	2

Note

Wrong setting

When writing SP_D, the status must have the value '0x80'; otherwise, the setting is not accepted.
Bit B01 must be set to '0' again before renewed triggering of AUTOCAL is carried out.
AUTOCAL can only be started if the device is in the 'Measure' state.

Significance of the bits in the status byte with SP_D (trigger AUTOCAL):

MSB							LSB	
7	6	5	4	3	2	1	0	Description
--	--	--	--	--	--	1	--	Abort AUTOCAL
--	--	--	--	--	--	0	1	Trigger AUTOCAL

Significance of the bits in the status byte with READBACK_D (acknowledge AUTOCAL):

MSB							LSB	
7	6	5	4	3	2	1	0	Description
--	--	--	--	--	--	--	1	AUTOCAL functioning
--	--	--	--	--	--	--	0	AUTOCAL not functioning

6.3.4 Assigning relay outputs

The Discrete Output Block 2 is available starting with Device Revision 2 (PROFIBUS card firmware V2.0.0 and higher). In order to control the relay outputs, this function must first be activated in the device (see sections Analyzers of Series 6 (Page 39) and ULTRAMAT 23 (Page 41)).

Cyclic reading and assignment of the relay outputs of the add-on board is possible using the Discrete Output Block 2. Cyclic transfer of the following user data to the device is possible over PROFIBUS:

Parameter name	Description	Direction of data transfer (from viewpoint of gas analyzer)	Data type	Length (bytes)
SP_D	Setpoint of function block for AUTO mode	Input	Data type DS-34 (Page 66)	2
READBACK_D	Acknowledgment of function block	Output	Data type DS-34 (Page 66)	2

Significance of the bits in the status byte with SP_D (assign relay output) and READBACK_D (read set status of relay output):

MSB							LSB
7	6	5	4	3	2	1	0
Relay output 8	Relay output 7	Relay output 6	Relay output 5	Relay output 4	Relay output 3	Relay output 2	Relay output 1

When writing SP_D, the status must have the value '0x80'; otherwise, the setting is not accepted.

6.3.5 Reading digital inputs

Cyclic reading of the digital inputs of the motherboard and add-on board is possible using the Discrete Input Block 1 and Discrete Input Block 2.

The Discrete Output Block 1 and 2 are only available starting with Device Revision 2 (PROFIBUS card firmware V2.0.0 and higher). 8 digital inputs are available on the add-on board. The following digital inputs are available on the motherboard:

Analyzers of Series 6	Digital inputs 1 to 6
ULTRAMAT 23	Digital inputs 1 to 3

Cyclic transfer of the following user data to the device is possible over PROFIBUS:

Parameter name	Description	Direction of data transfer (from viewpoint of gas analyzer)	Data type	Length (bytes)
OUT_D	Reading of function block	Output	Data type DS-34 (Page 66)	2

Significance of the bits in the status byte with OUT_D (read digital input):

Discrete Output Block 1	Digital inputs of the motherboard
Discrete Output Block 2	Digital inputs of the add-on board

MSB							LSB
7	6	5	4	3	2	1	0
Digital input 8	Digital input 7	Digital input 6	Digital input 5	Digital input 4	Digital input 3	Digital input 2	Digital input 1

6.4 Non-cyclic data transfer

Commands for non-cyclic data transfer

The commands shown here are only a selection of the most frequently used commands. The commands of the individual blocks required according to the PROFIBUS Profile 3.0.1 are implemented completely.

Commands for changing device-specific values and statuses can only be entered with non-coded devices. If the commands refer to a specific component (1 to 4), this must usually be specified using the slot number (slot 1 to 4).

6.4.1 Measured value commands

Table 6- 3 Overview of commands for measured value processing

Description	Slot / index	Object name / block	Parameter
Read measured value of component	Slot 1 ... 4/ 26	OUT / AI 1 ... 4	5 bytes / Bytes 1 to 4: measured value (float); Byte 5: Status according to table in Measured value/status (Page 54)
Measured value in event of error (see Response in event of failure (Page 45))	Slot 1 ... 4/ 33	FSAVE_TYPE / AI 1 ... 4	1 byte / Byte = 0: measured value = substitute value FSAVE_VALUE; Byte = 1: measured value = last valid measured value; Byte = 2: measured value without influence
Substitute value in event of error	Slot 1 ... 4/ 34	FSAVE_VALUE / AI 1 ... 4	1 Float / Default = 0.00
PROFIBUS limit (see Warning and alarm limits (Page 44)); sets bit 0 or 1 in the status (see Measured value/status (Page 54)); high alarm limit	Slot 1 ... 4/ 37	HI_HI_LIM / AI 1 ... 4	1 Float / The PROFIBUS limit is independent of the device-specific limits of the device menus
Low alarm limit	Slot 1 ... 4/ 43	LO_LO_LIM / AI 1 ... 4	1 Float /
High warning limit	Slot 1 ... 4/ 39	HI_LIM / AI 1 ... 4	1 Float /
Low warning limit	Slot 1 ... 4/ 41	LO_LIM / AI 1 ... 4	1 Float /
Hysteresis limit	Slot 1 ... 4/ 35	ALARM_HYS / AI 1 ... 4	1 Float / Default = 0.5 (% of largest measuring range)

6.4.2 Calibration commands

A calibration can only be started from the device status MEASURE. The commands may therefore only be sent once. After the calibration is completed or canceled, the device returns to the MEASURE status.

Table 6- 4 Overview of calibration commands

Description	Slot / Index	Object name / block	Parameter
Set calibration mode (zero or sensitivity). With a zero calibration for the ULTRAMAT 23, a calibration is carried out as with AUTOCAL with the selected IR component.	Slot 1 ... 4/ 134	RECIPE / CTB 1 ... 4	1 unsigned16 / Value= 8000 Hex: zero calibration Value = 8001 Hex: sensitivity calibration MR 1 Value = 8002 Hex: sensitivity calibration MR 2 Value = 8003 Hex: sensitivity calibration MR 3 Value = 8004 Hex: sensitivity calibration MR 4
Start/abort calibration	Slot 1 ... 4/ 130	COMMAND / CTB 1 ... 4	1 unsigned16 / Value= 5: start calibration Value = 6: abort calibration
Carry out calibration; apply value	Slot 1 ... 4/ 152	CALIBRATE / CTB 1 ... 4	1 byte / Byte = 1: carry out calibration (calibration must be started beforehand)
Calibration gas setpoints of the measuring ranges	Slot 1 ... 4/ 153	STEEPNESS_ CONCENTRATION / CTB 1 ... 4	4 Float / Values 1-4: setpoints of measuring ranges 1-4
	Slot 5/ 25	SP_D / DO 1	2 bytes / Byte 1: Bit 0 = 1: Start AUTOCAL; (bit 0 must first be set to 0) Byte 1: Bit 1 = 1: abort AUTOCAL Byte 2: 80 Hex
Read AUTOCAL status	Slot 5/ 28	READBACK_D / DO 1	2 bytes / Byte 1: Bit 0 = 1: AUTOCAL in function; Byte 2: Status (can be ignored here)
AUTOCAL purging times	Slot 5/ 85	CLEAN_TIME_ AUTOCAL_1 / DO 1	6 Float / Values 1–6: purging times of AUTOCAL sequence points 1-6 (in seconds)
Read remaining time of current AUTOCAL state	Slot 1/ 228	REMAINING_ TIME / PB2	3 bytes / Byte 1: device state according to table 'Device statuses' (see Parameter tables (Page 62)) Bytes 2 to 3: (unsigned16) remaining time of current state in s The value of the remaining time is updated approximately every 8 seconds.

Description	Slot / Index	Object name / block	Parameter
Read number of current device sequence point	Slot 5/ 82	ACTUAL_SEQ / DO 1	1 Byte / Byte = see table 'Device sequence points' in section Parameter tables (Page 62) Updating of the value may be delayed by up to 60 seconds. From PROFIBUS software version 2.00.04 onwards, this delay is approximately 8 seconds.
Start AUTOCAL check once/abort AUTOCAL check	Slot 5 / 90	AUTOCAL-CHECK / DO 1	1 byte / Byte = 1: start Autocal check; Byte = 0: abort Autocal check

6.4.3 Commands for device hardware

Table 6- 5 Overview of commands for device hardware

Description	Slot/ Index	Object name / block	Parameter
Read digital inputs of the motherboard	Slot 6/ 26	OUT_D / DI 1	2 bytes / Byte 1: Bits 0 - 7 = binary inputs 1 - 8 Byte 2: Status (can be ignored here)
Read digital inputs of PROFIBUS add-on card	Slot 7/ 26	OUT_D / DI 2	2 bytes / Byte 1: Bits 0 - 7 = binary inputs 1 - 8 Byte 2: Status (can be ignored here)
Switch relay outputs of PROFIBUS add-on card	Slot 8/ 25	SP_D / DO 2	2 bytes / Byte 1: Bits 0 - 7 = relay outputs 1 - 8 Byte 2: 80 Hex Switching of the relays must be enabled in the device.
Read relay outputs of the motherboard	Slot 6/ 95	RELAY_ READBACK_D / DI 1	2 bytes / Byte 1: Bits 0 - 7 = relay outputs 1 - 8 Byte 2: Status (can be ignored here)
Read relay outputs of PROFIBUS add-on card	Slot 8/ 28	READBACK / DO 2	2 bytes / Byte 1: Bits 0 - 7 = relay outputs 1 - 8 Byte 2: Status (can be ignored here)
Switch pump (ULTRAMAT 23 only)	Slot 1/ 225	SWITCH_ FUNCTION / PB 2	3 bytes / Byte 1 = 0; Byte 2 = 11; Byte 3 = 1 (pump on) or 0 (pump off). A change in the device status can also change the status of the pump.
Switch internal solenoid valve (ULTRAMAT 23 only)	Slot 1/ 225	SWITCH_ FUNCTION / PB 2	3 bytes / Byte 1 = 0; Byte 2 = 6; Byte 3 = 1 (solenoid valve on) or 0 (solenoid valve off). A change in the device status can also change the status of the solenoid valve.

Description	Slot/ Index	Object name / block	Parameter
Read switching status of pump (ULTRAMAT 23 only)	Slot 1/ 222	CHANNEL_ FUNCTION / PB2	4 bytes / Byte 2: bit 1 = 1 (pump on) or 0 (pump off)
Read switching status of sample gas pressure switch	Slot 1/ 222	CHANNEL_ FUNCTION / PB2	4 bytes / Byte 1: bit 3 = 1 (pressure switch fitted and pressure/flow present) Function starting with U6/O6 software version 4.8.4 and U23 software version 2.14.07
Read switching status of reference gas pressure switch (U6, O6 only)	Slot 1/ 222	CHANNEL_ FUNCTION / PB2	4 bytes / Byte 1: bit 3 = 1 (pressure switch fitted and pressure present) Function starting with U6/O6 software version 4.8.4.
Read switching status of valves	Slot 1/ 229	VALVES / PB2	1 byte / Bit 7 = 1; Bit 0 = 1: sample gas valve open Bit 1 = 1: zero gas valve open Bit 2 = 1: calibration gas valve 1 open Bit 1 = 3: calibration gas valve 2 open Bit 1 = 4: calibration gas valve 3 open Bit 1 = 5: calibration gas valve 4 open

6.4.4 General commands

Table 6- 6 Overview of general commands

Description	Slot/ Index	Object name / block	Parameter
Read current device faults	Slot 1/ 217	ERRORS / PB 2	4 bytes / Byte 1: Bits 0 - 7 = errors 1 - 8 Byte 2: Bits 0 - 7 = errors 9 - 16 Byte 3: Bits 0 - 7 = errors 17 - 24 Byte 4: Bits 0 - 7 = errors 25 – 31 The significance of the error numbers is explained in section Structure of the error messages (Page 63).
Read current device maintenance requests	Slot 1/ 218	WARNINGS / PB 2	2 bytes / Byte 1: Bits 0 - 7 = maintenance requests 1 - 8 Byte 2: Bits 0 - 7 = maintenance requests 9 – 16 The significance of the maintenance requests is explained in section Structure of the error messages (Page 63).
Read device status	Slot 1/ 226	CHANNEL_ STATE / PB2	1 Byte / Byte = device status according to table 'Device statuses' in section Parameter tables (Page 62)
Read device sequence point	Slot 5/ 82	ACTUAL_SEQ / DO1	1 unsigned 8 / Value = device sequence point according to table 'Device sequence points' in section (Page 62).
Measuring range 1	Slot 1 ...4/ 92	RANGE_1 / TB 1 ... 4	2 Float / Value 1: start-of-scale value of measuring range Value 2: full-scale value of measuring range
Measuring ranges 2 to 4	Slot 1 ...4/ 93 ... 95	RANGE_2 ... RANGE_4 / TB 1 ... 4	Parameters as with RANGE_1
Read diagnostics value of analog current input (only devices of Series 6)	Slot 1/ 240	DIAG_VALUES_4 / PB2	8 Float / Values 1 to 4: ELAN h, 7 for components 1 to 4 (analog current input with Series 6) Values 5 to 8: ELAN h, 8 for components 1 to 4 (signal vector with Series 6)

6.5 Parameter description

6.5.1 Parameter tables

The 'Device statuses' and 'Device sequence points' parameters described in this section can assume the values listed in the following tables .

Table 6- 7 Device statuses

Value	Description	Comments
1	Warming-up	
2	Pause	
3	Standby	
4	Measure	
5	Calibrate zero point / AUTOCAL with CAL button with ULTRAMAT 23	
6	Calibrate slope of a component	
14	AUTOCAL	
16	Calibrate zero point of O_2 probe	Only ULTRAMAT 23
21	AUTOCAL check	Only analyzers of Series 6

Table 6- 8 Device sequence points

Value	Description	Comments
1	No sequence	
2	AUTOCAL - zero gas 1	Only analyzers of Series 6
3	AUTOCAL - zero gas 2	Only analyzers of Series 6
4	AUTOCAL - calibration gas 1	Only analyzers of Series 6
5	AUTOCAL - calibration gas 2	Only analyzers of Series 6
6	AUTOCAL - calibration gas 3	Only analyzers of Series 6
7	AUTOCAL - calibration gas 4	Only analyzers of Series 6
8	AUTOCAL - sample gas purging	Only analyzers of Series 6
9	AUTOCAL - sample gas intermediate operation	Only analyzers of Series 6
10	AUTOCAL - signaling contact	Only analyzers of Series 6
11	AUTOCAL - zero gas component 2	Only analyzers of Series 6
12	AUTOCAL - calibration gas 1 component 2	Only analyzers of Series 6
13	AUTOCAL - calibration gas 2 component 2	Only analyzers of Series 6
14	AUTOCAL - calibration gas 3 component 2	Only analyzers of Series 6
15	AUTOCAL - calibration gas 4 component 2	Only analyzers of Series 6
100	H_2S protection sequence 'Measure'	Only ULTRAMAT 23
101	H_2S protection sequence 'Purge'	Only ULTRAMAT 23
102	H_2S protection sequence 'Continuous purging'	Only ULTRAMAT 23
110	H_2S probe 'Purge'	Only ULTRAMAT 23
111	H_2S probe 'Pre-purge'	Only ULTRAMAT 23

6.5.2 Structure of the error messages

Faults

Error messages are structured as follows in the ERRORS parameter:

Byte 0								
Bit	8	7	6	5	4	3	2	1
Fault	S8	S7	S6	S5	S4	S3	S2	S1
Byte 1								
Bit	8	7	6	5	4	3	2	1
Fault	S16	S15	S14	S13	S12	S11	S10	S9
Byte 2								
Bit	8	7	6	5	4	3	2	1
Fault	S24	S23	S22	S21	S20	S19	S18	S17
Byte 3								
Bit	8	7	6	5	4	3	2	1
Fault	S32	S31	S30	S29	S28	S27	S26	S25

The meanings of S1 to S32 are explained in the section 'Diagnostics'.

Maintenance requests

Maintenance requests are structured as follows in the WARNINGS parameter:

Byte 0								
Bit	8	7	6	5	4	3	2	1
Maintenance request	W8	W7	W6	W5	W4	W3	W2	W1
Byte 1								
Bit	8	7	6	5	4	3	2	1
Maintenance request	W16	W15	W14	W13	W12	W11	W10	W9

The meanings of W1 to W16 are described in the section 'Diagnostics'.

6.5.3 Data type DS-33

Structure

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Analog value in IEEE floating point				Status
Exponent		Fraction		
MSB				

A status byte is transmitted synchronously in addition to each of the measured values in the DS-33 data structure. This byte provides an indication of the quality of the associated measured value.

Status byte

The status byte is structured as follows:

MSB									
7	6	5	4	3	2	1	0	Description	
Quality		Substatus				Limits			
0	0	The substatus has different meanings depending on the quality.						bad	Bad
0	1							uncertain	Uncertain
1	0							good	Good
1	1							good (cascaded)	Good (cascaded)
						0	0	O.K.	OK
						0	1	low limited	Low PROFIBUS limit violated
						1	0	high limited	High PROFIBUS limit violated
						1	1	constant	Constant value

Status codes

Table 6- 9 Status codes with 'Bad quality' status

Dec	Hex	Cause(s)	Measure(s)
11	0B	Component missing	Change configuration, install device which contains this component
12	0C	Device signals a fault	Define fault more precisely using SIMATIC PDM Replace device
31	1F	Device out of service (last valid value is applied as substitute value)	Depending on the parameter assignment, the device has a certain status which requires a procedure appropriate to the status. Set operating mode 'AUTO'

Table 6- 10 Status codes with 'Uncertain quality' status

Dec	Hex	Cause(s)	Measure(s)
64	40	Device signals a functional check	Warming-up phase AUTOCAL Local service (device coded; in input menu)
71	47	Measured value bad (last valid value)	Define fault more precisely using SIMATIC PDM Replace device
75	4B	Measured value bad (substitute value)	Define fault more precisely using SIMATIC PDM Replace device
79	4F	The initial value appears following switch-on	Reject measured value
80	50	Measured value outside measuring range	Define fault more precisely using SIMATIC PDM Ambient temperature too high

Table 6- 11 Status codes with 'Good quality'

Dec	Hex	Cause(s)	Measure(s)
128	80	Normal operation, everything OK	Measured values can be evaluated without restriction
132	84	Active block alarm, parameter has been changed	Message disappears after approximately 10 s
137	89	PROFIBUS low warning limit violated	Check/change in the user program
138	8A	PROFIBUS high warning limit violated	Check/change in the user program
141	8D	PROFIBUS low alarm limit violated	Check/change in the user program
142	8E	PROFIBUS high alarm limit violated	Check/change in the user program
164	A4	Device signals a maintenance request	Define maintenance request more precisely using SIMATIC PDM

You can find a detailed description of data type DS-33 and the associated status byte under 'PROFIBUS-PA Profile for Process Control Devices / General Requirements'.

6.5.4 Data type DS-34

Structure

Byte 1	Byte 2
Digital value/setpoint	Status

Status codes

Table 6- 12 Status byte

MSB							LSB	Description
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	The significance of the individual bits depends on the parameter, and is therefore described there.

6.5.5 Generic station description

The generic station descriptions (GSD) for PROFIBUS DP/PA are required for cyclic data transfer. These can be found on the Internet at SIEMENS Product Support Automation using the search term "PROFIBUS GSD files: PA" or the link: GSD (generic station description) BR 6 (http://support.automation.siemens.com/WW/llisapi.dll?aktprim=100&lang=en&referer=%2fWW%2f&func=cslib.cssearch&nodeid0=10807001&viewreg=WW&siteid=csius&extranet=standard&groupid=4000002&objaction=cssearch&content=adsearch%2Fadsearch%2Easpx) and downloaded from there

Navigate on this site to the tab 'PROFIBUS GSD files: PA' and open this by double-clicking. You can find all available generic station descriptions there.

The following GSD files are applicable for analyzers of Series 6 and the ULTRAMAT 23:

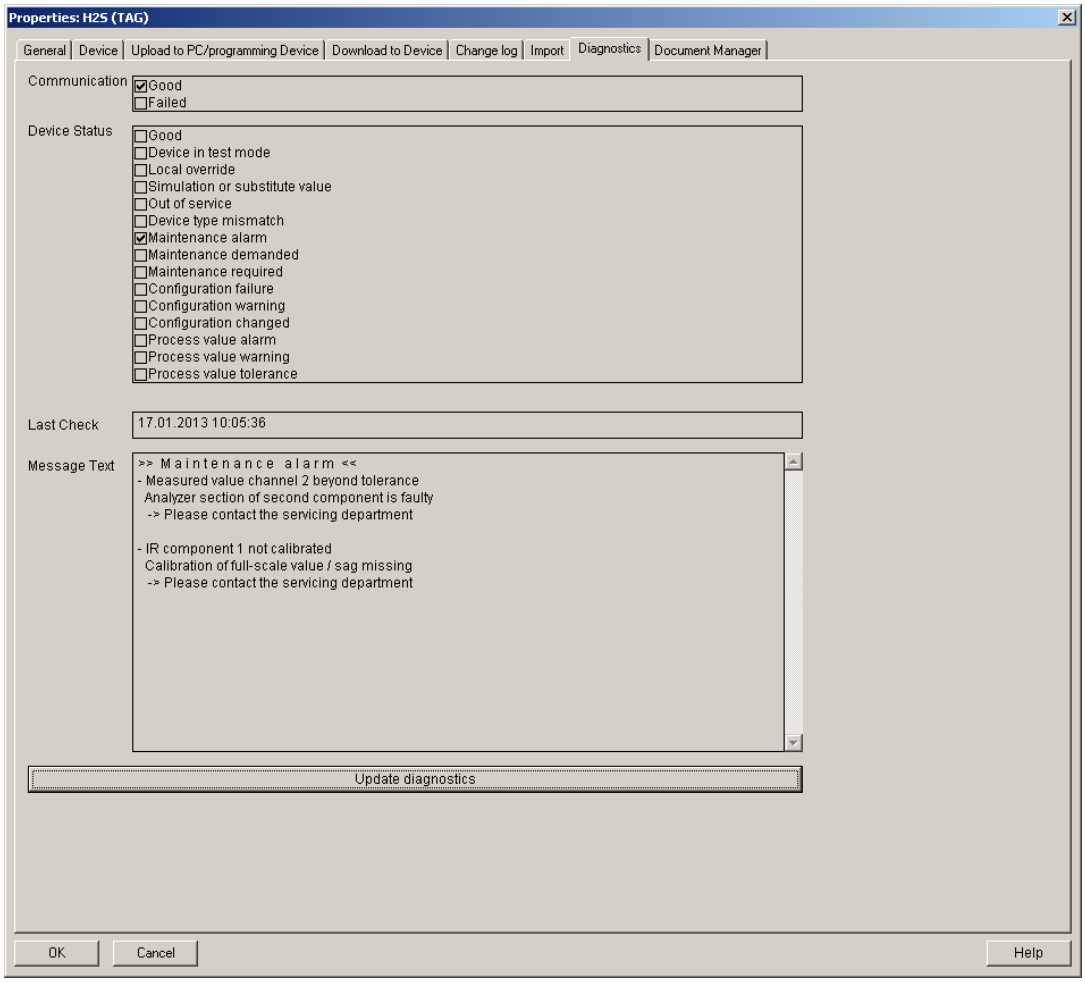
- Dev.Rev. 1:
  - Siem809e.gsg/e/f/i/s (6 KB each) for DP
    in English/German/French/Italian/Spanish
  - Siem809c.gsg/e/f/i/s (6 KB each) for PA
    in English/German/French/Italian/Spanish
  - sie809cn.bmp (5 kB); Bitmap
- Dev.Rev. 2:
  - SIO2809e.gsd/g/e/f/i/s for DP
    and
    SIO2809c.gsd/g/e/f/i/s for PA
  - SIE809Cn.bmp (4 kB); Bitmap

Alarm, error, and system messages

7

7.1 Status and error messages with SIMATIC PDM

Linking the devices using PC software such as SIMATIC PDM allows error diagnostics to be carried out. Current faults and maintenance requests can then be evaluated using SIMATIC PDM, menu "Object properties / Diagnostics". These messages are displayed in plain text, thus facilitating appropriate troubleshooting measures.



7.2 Diagnostics information

The following tables show the assignment of device error messages/maintenance requests to the diagnostics bits in the respective physical block:

7.2.1 ULTRAMAT 6

Table 7- 1 ULTRAMAT 6 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S2	Chopper motor faulty	1 / 1	DIA_HW_MECH
S3	Microflow sensor	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S4	External fault	1 / 1	DIA_HW_MECH
S5	Receiver chamber temperature	1 / 1	DIA_HW_MECH
S6	Field device heating is defective	1 / 0	DIA_HW_ELECTR
S8	Pressure sensor signal	2 / 1	DIA_SUPPLY
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S11	Reference gas pressure too low	2 / 1	DIA_SUPPLY
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
S16	Sample gas pressure too low	2 / 1	DIA_SUPPLY
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W2	Reserve for zero adjustment < 20%	2 / 5	DIA_MAINTENANCE
W3	Signal voltage adjustment too low	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W5	Microflow sensor	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W7	Receiver chamber temperature > 70 °C	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.2 CALOMAT 6

Table 7- 2 CALOMAT 6 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S4	External fault	1 / 1	DIA_HW_MECH
S5	Temperature TCD	1 / 1	DIA_HW_MECH
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.3 OXYMAT 6 and OXYMAT 61

Table 7- 3 OXYMAT 6 and OXYMAT 61 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S2	Magnetic field supply faulty	1 / 1	DIA_HW_MECH
S3	Microflow sensor	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S4	External fault	1 / 1	DIA_HW_MECH
S5	Temperature of analyzer section	1 / 1	DIA_HW_MECH
S6	Field device heating is defective	1 / 0	DIA_HW_ELECTR
S7	Temperature of measuring head outside tolerance	1 / 1	DIA_HW_MECH
S8	Pressure sensor signal	2 / 1	DIA_SUPPLY
S9	Signal too high	1 / 5	DIA_ MEASUREMENT
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S11	Reference gas supply failed	2 / 1	DIA_SUPPLY
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
S16	Sample gas pressure too low	2 / 1	DIA_SUPPLY
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W2	Zero signal voltage too high	2 / 5	DIA_MAINTENANCE
W3	Sensitivity signal voltage too low	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W5	Microflow sensor	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W7	Analyzer section temperature > 70 °C	2 / 5	DIA_MAINTENANCE
W8	Temperature of measuring head outside ±3 °C	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.4 ULTRAMAT 23

Table 7- 4 ULTRAMAT 23 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Measured value of channel 1 outside tolerance	1 / 5	DIA_MEASUREMENT
S2	Measured value of channel 2 outside tolerance	1 / 5	DIA_MEASUREMENT
S3	Measured value of channel 3 outside tolerance	1 / 5	DIA_MEASUREMENT
S4	O_2 measured value outside tolerance	1 / 5	DIA_MEASUREMENT
S5	Line voltage outside tolerance	2 / 1	DIA_SUPPLY
S6	Device temperature outside tolerance	1 / 1	DIA_HW_MECH
S7	Atmospheric pressure outside tolerance	2 / 1	DIA_SUPPLY
S8	No flow during measurement process	2 / 1	DIA_SUPPLY
S9	No temperature comparison performed	1 / 7	DIA_INIT_ERR
S10	No flow during AUTOCAL	2 / 1	DIA_SUPPLY
S11	O_2 measured value too low	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S12	Analog current output faulty	1 / 0	DIA_HW_ELECTR
S13	Total error of all IR channels	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S14	Channel component error	1 / 1	DIA_HW_MECH
S15	AUTOCAL drift too large	2 / 0	DIA_ZERO_ERR
S16	EEPROM error	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S20	Channel 1 not calibrated	1 / 7	DIA_INIT_ERR
S21	Channel 2 not calibrated	1 / 7	DIA_INIT_ERR
S22	Channel 3 not calibrated	1 / 7	DIA_INIT_ERR
S23	Source voltage outside tolerance	1 / 0	DIA_HW_ELECTR
S24	Bridge supply voltage outside tolerance	1 / 0	DIA_HW_ELECTR
S25	Bridge half-voltage outside tolerance	1 / 0	DIA_HW_ELECTR
S26	Lockin error	1 / 0	DIA_HW_ELECTR
S27	External fault	1 / 1	DIA_HW_MECH
S28	Protection function of H_2S sensor	1 / 1	DIA_HW_MECH
S29	Zero point of H_2S sensor outside tolerance	1 / 1	DIA_HW_MECH
S30	Sensitivity of H_2S sensor too low	1 / 1	DIA_HW_MECH
S31	Sensitivity of O_2 sensor too low	1 / 1	DIA_HW_MECH
S32	External ADC error	1 / 0	DIA_HW_ELECTR
W1	AUTOCAL drift too large	2 / 5	DIA_MAINTENANCE
W2	O_2 sensor	2 / 5	DIA_MAINTENANCE
W3	LCD temperature outside tolerance	2 / 5	DIA_MAINTENANCE
W4	External maintenance request	2 / 5	DIA_MAINTENANCE
W5	H_2S sensor	2 / 5	DIA_MAINTENANCE

7.2.5 FIDAMAT 6

Table 7- 5 FIDAMAT 6 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S2	Pump does not start up	1 / 1 2 / 1	DIA_HW_MECH DIA_SUPPLY
S3	Flame does not ignite	1 / 0	DIA_HW_ELECTR
S4	External fault	1 / 1	DIA_HW_MECH
S5	Oven temperature	1 / 0	DIA_HW_ELECTR
S6	Catalyst temperature	1 / 0	DIA_HW_ELECTR
S7	Flame temperature	1 / 0	DIA_HW_ELECTR
S8	Combustion air/gas pressure	2 / 1	DIA_SUPPLY
S9	Heater has switched off	1 / 0	DIA_HW_ELECTR
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W5	Combustion air/gas pressure	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W7	Physical unit/electronics temperature	2 / 5	DIA_MAINTENANCE
W8	Flame off	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.6 CALOMAT 62

Table 7- 6 CALOMAT 62 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S4	External fault	1 / 1	DIA_HW_MECH
S5	Temperature of analyzer section	1 / 1	DIA_HW_MECH
S6	Heating is defective	1 / 0	DIA_HW_ELECTR
S9	Signal outside of limits	1 / 5	DIA_MEASUREMENT
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W7	Heating outside ±5 °C	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.7 OXYMAT 64

Table 7- 7 OXYMAT 64 diagnostics information

Fault (F) Maint. request (M)	Description	Diagnostics bit/byte	Diagnostics bit name
S1	Parameter memory	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S4	External fault	1 / 1	DIA_HW_MECH
S5	Temperature of analyzer section	1 / 1	DIA_HW_MECH
S8	Pressure sensor signal	2 / 1	DIA_SUPPLY
S10	24h RAM check	1 / 4 2 / 2	DIA_MEM_CHKSUM DIA_CONF_INVAL
S11	Purging gas supply failed	2 / 1	DIA_SUPPLY
S12	Power supply	2 / 1	DIA_SUPPLY
S13	Hardware/line frequency	2 / 1 1 / 0	DIA_SUPPLY DIA_HW_ELECTR
S14	Measured value > full-scale value of characteristic	1 / 1 1 / 5	DIA_HW_MECH DIA_MEASUREMENT
S15	Calibration aborted	1 / 5	DIA_MEASUREMENT
S16	Sample gas pressure too low	2 / 1	DIA_SUPPLY
W1	Calibration tolerance exceeded	2 / 5	DIA_MAINTENANCE
W4	Set clock	2 / 5	DIA_MAINTENANCE
W6	Temperature sensor of LCD display	2 / 5	DIA_MAINTENANCE
W9	External maintenance request	2 / 5	DIA_MAINTENANCE
W10	AUTOCAL check deviation	2 / 5	DIA_MAINTENANCE

7.2.8 Display of quality status in SIMATIC PDM

In the event of a device fault (S1-S32), the quality status is set as follows:

Response in event of failure (see section Response in event of failure (Page 45))	Last valid measured value		Substitute value		Calculated value	
Status	Coding	Symbol	Coding	Symbol	Coding	Symbol
Bad, device fault	0x44-0x47		0x48-0x4B		0x0C	

In the event of a device maintenance request (W1-W13), the quality status is set as follows:

Response in event of failure (see section Response in event of failure (Page 45))	Last valid measured value		Substitute value		Calculated value	
Status	Coding	Symbol	Coding	Symbol	Coding	Symbol
Good, maintenance request	0xA4		0x4A		0x4A	

With the device status ‘Functional check’, the quality status is set as follows:

Status	Coding	PDM symbol	Symbol
Uncertain, non-specific	0x40		

Maintenance and troubleshooting

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8.1 Possible operating problems

The following table lists various problems and information on correcting them.

Description of problem	Possible cause	Measure for checking	Described in section
PROFIBUS menu in the device cannot be accessed	PROFIBUS board is not detected	Check whether the ribbon cable of the PROFIBUS board is connected to the motherboard. If this is the case, replace the PROFIBUS board.	Parameter assignment on the device (Page 39)
No PROFIBUS connection	PROFIBUS address incorrect	Check PROFIBUS address in device	Parameter assignment on the device (Page 39)
PROFIBUS write and set commands are not possible	Device is coded	Check code display in the device main menu	
Calibration cannot be started	Device is not in MEASURE status	Check status display in the device main menu	
PROFIBUS commands deviate from the description	ID number is not 1	Check whether the ID number in the device is set to 1	Parameter assignment on the device (Page 39)
PROFIBUS measured value is 'frozen' even though the device measured value is current.	Set device fault activates the PROFIBUS failure response	Check the failure response (Object FSAVE_TYPE) setting	Response in event of failure (Page 45)
PROFIBUS status does not the value "good" (80H) even though a device fault or maintenance request is not present	Device is coded -> functional check	Check code display in the device main menu	
	PROFIBUS limits active	Check whether appropriate PROFIBUS limits (Objects HI_HI_LIM and LO_LO_LIM) have been selected	Warning and alarm limits (Page 44)
Measured value via PROFIBUS does not correspond to the value displayed on the device	Incorrect setting of output scaling	Check PROFIBUS parameters for scaling	Adjusting to a desired process value (Page 43)
Relays of the PROFIBUS board cannot be remote-controlled	Relays of the PROFIBUS board have not been enabled for remote control operation	Check whether the "Relay by PB" parameter in the device is set to "On"	Parameter assignment on the device (Page 39)

The PROFIBUS module is maintenance-free

8.2 Spare parts

8.2.1 Firmware/retrofitting kits/spare parts packages of PROFIBUS modules

If it is necessary to replace the firmware of the PROFIBUS option module because of further developments, the flash EEPROM of the module (component on base) must be replaced.

The firmware of device revision 1 is only available as part of the spare parts packages/retrofitting kits. (see section Device revisions (Page 49))

The latest firmware of device revision 2 can be ordered as a spare part from CSC Haguenau (see section Return delivery (Page 83)). You can find the valid order number for your device in the following table.

Module type	Item no. of module	Order no. of retrofitting kit/spare parts package
PROFIBUS-DP	A5E00019145	A5E00057312 (rack-mounted analyzer Series 6; 1-channel analyzer) A5E00057314 (rack-mounted analyzer Series 6; 2-channel analyzer) A5E00057318 (field device Series 6) A5E00057159 (ULTRAMAT 23)
PROFIBUS-PA	A5E00034504	A5E00057307 (rack-mounted analyzer Series 6; 1-channel analyzer) A5E00057310 (rack-mounted analyzer Series 6; 2-channel analyzer) A5E00057315 (field device Series 6) A5E00056834 (ULTRAMAT 23)
PROFIBUS-PA Ex i	A5E00015899	A5E00057317 (field device Series 6)

See also

Fitting or retrofitting the add-on board (Page 21)

8.2.2 Firmware of basic devices

When retrofitting an analyzer with the PROFIBUS option or when changing one of the firmware option modules, it may be necessary to carry out updating (see section 3.1 Device versions):

The following table provides an overview of the order numbers for the firmware of your analyzer:

ULTRAMAT 6

Language	Order number
German	C79451-A3478-S501
English	C79451-A3478-S502
French	C79451-A3478-S503
Spanish	C79451-A3478-S504
Italian	C79451-A3478-S505

FIDAMAT 6E/G

Language	Order number
German	A5E00223093/A5E00409885
English	A5E00223146/A5E00409929
French	A5E00223149/A5E00409947
Spanish	A5E00223152/A5E00409962
Italian	A5E00223155/A5E00409966

OXYMAT 6 and **OXYMAT 61**

German	C79451-A3480-S501
English	C79451-A3480-S502
French	C79451-A3480-S503
Spanish	C79451-A3480-S504
Italian	C79451-A3480-S505

OXYMAT 64

German	A5E00789705
English	A5E00789706
French	A5E00789707
Spanish	A5E00789708
Italian	A5E00789709

CALOMAT 6

German	A5E00092676
English	A5E00092677
French	A5E00092678
Spanish	A5E00092679
Italian	A5E00092680

CALOMAT 62

German	A5E00789689
English	A5E00789691
French	A5E00789692
Spanish	A5E00789693
Italian	A5E00789694

ULTRAMAT 23

All languages	C79451-A3494-S501

Technical specifications

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PROFIBUS PA (in accordance with DIN IEC 1158-2)

Bus voltage Ex i Non-Ex i	 9 ... 24 V 9 ... 32 V
Current consumption	10 mA (typically)
Baud rate	31.25 kBit/s
Electrical isolation between PROFIBUS and rest of electronics/housing ground	1 810 V AC

PROFIBUS DP (in accordance with EN 50170)

Baud rates	9.6; 19.2; 93.75; 187.5; 500 kBit/s, 1,5; 3; 6; 12 MBit/s
Electrical isolation between PROFIBUS and rest of electronics/housing ground	50 V≈

PROFIBUS DP/ PROFIBUS PA

C2 connections	4 connections to master class 2 are supported. Automatic disconnection takes place 60 s after interruption in communication

Appendix A

A.1 Return delivery

The analyzer or replacement parts should be returned in their original packaging material. If the original packing material is no longer available, wrap the analyzer in plastic foil and pack in a sufficiently large box lined with additional padding material (wood shavings, foam rubber, etc.). If you use wood shavings, the padding should be at least 15 cm thick on all sides.

When shipping overseas, the analyzer must be additionally sealed air-tight in polyethylene foil at least 0.2 mm thick and a drying agent (e.g. silica gel) should be added. In addition, the transport container should be lined with a layer of kraft paper.

Photocopy the return delivery form, fill it in and enclose it with the returned device.

In case of guarantee claim, please enclose your guarantee card.

Return delivery addresses

Spare parts service

Send your orders for spare parts to the following address:

SIEMENS SPA
CSC
Tel.: (00333)69066677
Fax: (00333)69066688
1, chemin de la Sandlach
F-67506 Haguenau, France

- DP order form recipient: 0011E

Repairs

To enable us to quickly identify and correct faults, return the analyzer to the following address:

SIEMENS SPA
CSC
Tel.: (00333)69066677
Fax: (00333)69066688
1, chemin de la Sandlach
F-67506 Haguenau, France

- DP order form recipient: 0011E

Returned deliveries form

( ) Repair ( ) Guarantee

Customer name	
Person responsible	
Delivery address	
Phone	
Fax	
E-mail	
Return address (if different from address above)	
Customer (original) Order number	
Device name	
MLFB no.	
Production no.	
Description of returned part	
Fault description	
Process data at location of use	
Operating temperature	
Operating pressure	
Sample gas composition	
Duration of operation/ date of operation	

Service report	
RH no.:	Date received: Date returned: Technician:

List of abbreviations

B

B.1 List of abbreviations

Abbreviation/ symbol	Description
°C	Degrees Celsius
A	Ampere
AC	Alternate Current Alternating current
ADC	Analog to Digital Converter
AI	Analog Input
AO	Analog Output
C6	CALOMAT 6
C62	CALOMAT 62
cm	Centimeter
CTB	Control Transducer Block
DC	Direct Current Direct current
DD	Device Description Device description
DI	Digital Input
DIN	Deutsche Industrie-Norm (German industrial standard)
DO	Digital Output
DP	Distributed Periphery, a PROFIBUS version
DV	Device Revision
EEPROM	Electrically erasable programmable read-only memory
ELAN	Emulated Local Area Network Emulated local data network
EN	Europäische Norm (European standard)
F n	Fault (with number)
F6	FIDAMAT 6
G	Ground
GND	Ground
GSD	Generic Station Description
H_2S	Hydrogen sulfide
HW	Hardware
IEC	International Electrotechnical Commission
IR	Infrared (measured component)
KB	Kilobyte
LCD	Liquid Crystal Display, (liquid crystal display)
LFB	Logbook Function Block Logbook function block

Abbreviation/ symbol	Description
LSB	**L**east **s**ignificant **b**it Least significant digit
mA	**M**illi**a**mpere
Mbps	(**M**ega**bits** per **s**econd)
mg/m³	**M**illi**g**ram per cubic **m**eter
MLFB	Order number (German **M**aschinen**l**esbare **F**abrikate**B**ezeichnung)
mm	**M**illi**m**eter
MSB	**M**ost **s**ignificant **b**it Most significant bit
NC	**N**ot **c**onnected (Not connected or not assigned for contacts)
O_2	Oxygen
O6	**O**XYMAT **6**
O61	**O**XYMAT **61**
O64	**O**XYMAT **64**
PA	**P**rocess **A**utomation, a PROFIBUS version
PB	**P**hysical **B**lock
PC	**P**ersonal **C**omputer
PCS	**P**rocess **C**ontrol **S**ystem (Process control system)
PDM	**P**rocess **D**evice **M**anager
PI	**P**ROFIBUS **I**nternational
PROFIBUS	**Pro**cess **F**ield **Bus**, a standard for fieldbus communication in automation technology
RAM	**R**andom **A**ccess **M**emory (random access memory)
SUB-D	**D**-shaped **SUB**-miniature connector
SW	**S**oft**w**are
TB	**T**ransducer **B**lock (transducer block)
U23	**U**LTRAMAT **23**
U6	**U**LTRAMAT **6**
V	**V**olt
V n.n.n	**V**ersion (with number)
vpm	(**V**olume parts **p**er **m**illion
W n	**W**arning (with number)
TCD	**T**hermal **C**onductivity **D**etector

Siemens Aktiengesellschaft
Sector Industry
Industry Automation
Sensors and Communication

76181 Karlsruhe

www.siemens.com/processautomation

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A5E000540148