Instruction Manual

optek PROFIBUS® PA

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PN: 1004-1010-02 (-52)

For converters:
C4151
C4251
C4252
C4452
HC4351
HC4452

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Preface

This instruction manual is written to assist the user in proper procedures for trouble-free operation.

It is explicitly pointed out that optek-Danulat GmbH assumes no responsibility for loss or damage caused due to improper use of this instruction manual or products described herein.

On request, this manual is available in other languages as well as in digital format (Acrobat® Reader required).

Our products are being continuously improved. Technical data is subject to change without notice.

Essen, December 2022

Table of contents

1 Using the instruction manual

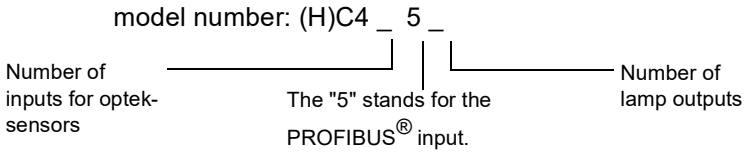
1.1 Validity of the instruction manual

This instruction manual is valid for optek PROFIBUS® converters C4151, C4251, C4252, C4452, HC4351 and HC4452. It contains specific information on the PROFIBUS® PA interface (Process Fieldbus - Process Automation).

Information regarding the installation and operation of the converter is provided in the supplied standard instruction manual of the corresponding converter.

To differentiate PROFIBUS® converters from standard converters by name, the 2 (for 2mA- and 7 remote inputs) in the model number (H)C4X2Z (X=1–4, Z=1–2) was replaced with a 5.

The model number of PROFIBUS® converters is set up as follows:



Converter C4252 is thus a C4000 series converter with inputs for two sensors as well as a PROFIBUS® PA interface and two lamp outputs.

The model number indicates the hardware configuration of your converter.

Therefore, the following combinations of instruction manuals apply:

Tab. 1 Instruction manual combinations overview

PROFIBUS® converter:	**Instruction manuals**		**Remark: Amendment with respect to standard instruction manual**
	Additional manual	**Standard of**	
C4151	PROFIBUS® PA	C4121	Instead of mA- and remote inputs, there is a PROFIBUS® PA interface. Thus, chapters 8.6 "Connecting the mA-inputs" and 8.8 "Connection Remote In" do not apply to the PROFIBUS® PA version.
C4251	PROFIBUS® PA	C4221	
C4252	PROFIBUS® PA	C4222	
C4452	PROFIBUS® PA	C4422	
HC4351	PROFIBUS® PA	HC4321	
HC4452	PROFIBUS® PA	HC4422	

For all works, observe this instruction manual as well as the corresponding standard instruction manual. If the converter is not used as described in these instruction manuals, your safety and the converter function could be affected.

To keep up reliability of the product, enhance its life cycle and avoid down times, you have to follow the instructions in the manuals.

Furthermore, please follow the existing accident prevention and environmental protection instructions, as well as recognized technical instructions for safe and professional working.

1.2 Pictograms and signal words

Important information in this instruction manual is marked with the following pictograms:

Danger!
This pictogram indicates immediate danger to life and health of persons.
The text next to the symbol gives information on how to avoid bodily injuries.

If the possible cause of risk can be specified, the corresponding pictogram precedes instructions:

Danger!
Electrical voltage.
This pictogram indicates danger due to electrical voltage.

Caution!
This pictogram indicates information on how to avoid material damage.

Note!
This pictogram indicates instructional or general advice.

Pictograms on the converter

The following pictogram is on the back of the converter.
It indicates possible and unapparent dangers.
Read this instruction manual prior to initial commissioning.

2 Intended use

optek products are intended for commercial use only. Use outside of commercial, business, trade or professional activities is not permitted.

The converter is to be used exclusively for optek sensor assemblies according to the technical data.
In combination with inline sensors for turbidity, concentration, color and UV absorption, the converter is used for displaying and processing measuring results. The converter may only be interfaced with sensors listed in the "Technical data" chapter of the corresponding instruction manuals.

The converter is to be installed in closed control cabinets with external switch, which allows the user to disconnect power. Please refer to the "Technical data" chapter.

This converter is not intended for use in hazardous areas.

Unauthorized constructional changes, additional fittings or modifications regarding the converter as well as tampering with or changing its software are prohibited.

The manufacturer is not liable for damage resulting from use contrary to the intended use.

Following this instruction manual is part of the intended use.

The content of all serial number plates on optek products is model-specific and refers to the time of delivery.

3 Safety

3.1 General safety instructions

Only operate the converter when free from defects and in accordance with the instructions provided in this manual.

Read this instruction manual prior to initial commissioning. This applies especially to persons only operating the converter occasionally, such as maintenance staff.

Observe all safety and information labels on the product and keep them in readable condition.

Inspect the product for signs of physical damage. Report any damage immediately and do not commission the product until corrective actions have been taken.

After maintenance and repair, proper function as well as the fulfillment of the safety requirements and testing must be guaranteed.

Protect the converter from impacts causing corrosion or preventing components from working properly.

Have faulty parts of the measuring system replaced immediately.

Spare parts must comply with the technical requirements defined by optek. This is always guaranteed when using original spare parts.

For maintenance and repair activities, attach a warning sign to the external release device to prevent re-commissioning of the converter.

When malfunctioning, take the product out of operation. Have the malfunctions repaired immediately by a qualified electrician.

The safety instructions are to be supplemented with the current national regulations on accident prevention.

3.2 Safety instructions for works on electrical equipment

Work on electrical equipment has to be carried out by qualified electricians only.

The power line connection of the converter must be specified correctly to prevent overload.

Disconnect the voltage supply before connecting the power line. Only connect the power line when voltage-free. Do not use the terminal socket for release since no first-to-mate last-to-break protective ground contact is provided.

Do not work on live active parts of the electrical equipment. When working on the electrical equipment, observe the following safety regulations:

1. Remove power.
2. Protect against re-commissioning.
3. Check if voltage-free.
4. Cover live parts.
5. Earth and short-circuit.

In case of faults in the power supply, disconnect the converter immediately.

In case of a short-circuit, there is a danger of sparking and fire.

Use only original fuses with specified current and triggering characteristics! When a fuse has to be exchanged, first try to detect the cause and clear the fault before exchanging the fuse.

When work on live parts is necessary, use insulated tools only.

4 Description PROFIBUS®

Introduction

Constant availability of information is one of the most important characteristics of today's corporate communication. In the fields of production processes (manufacturing, process and building automation), PROFIBUS® provides the basis for networking.
PROFIBUS® is a digital communication system between the control system and the measuring and control elements. It is the leading open fieldbus system in Europe.
PROFIBUS® interconnects decentral field devices via one cable and integrates them into a control system. Here, "real" process values are transferred instead of mA-signals as in the 4–20 mA-technology.

In the following, the variants with their basic characteristics are listed:

PROFIBUS® DP (Decentralized Periphery)

This variant was optimized for manufacturing automation.
The transfer technology is a RS485 standard with a transfer rate of 12 Mbit/s. It features a short response time, good diagnosis possibilities, noise-immune transfer and easy handling.

PROFIBUS® PA (Process Automation)

This version was especially developed for use in process automation. The transfer technology is MBP with a transfer rate of 31.25 kbit/s. Use in hazardous locations is possible.

There are two basic PROFIBUS® device types:

Master

The master controls data traffic on the bus (e. g. programmable logic controller). It sends messages without external prompts and is also referred to as an "active station".

Slave

Slaves are peripherals such as valves, drives, converters and analysis devices. They shall only acknowledge received messages or transfer messages to the master after master request. This is why they are also referred to as "passive stations".

To keep up communication under PROFIBUS®, software protocols are generated. The DP protocol is used for the transport layer between master and slave. It determines type and speed of data interchange and defines the transfer protocol of the PROFIBUS® system.

There are two DP master classes:

DP class 1 master Controller of a DP system (e. g.controls, PLC, …).

DP class 2 master Allows loading programs in controls, diagnosis, parameterization of DP slaves.

A PROFIBUS® network must always include at least one class 1 master.

The figure below shows the principle structure of a PROFIBUS® system. All devices are connected in a bus structure (line). Up to 32 stations can be interconnected in one segment. At the beginning and end, each PROFIBUS® segment must be terminated.

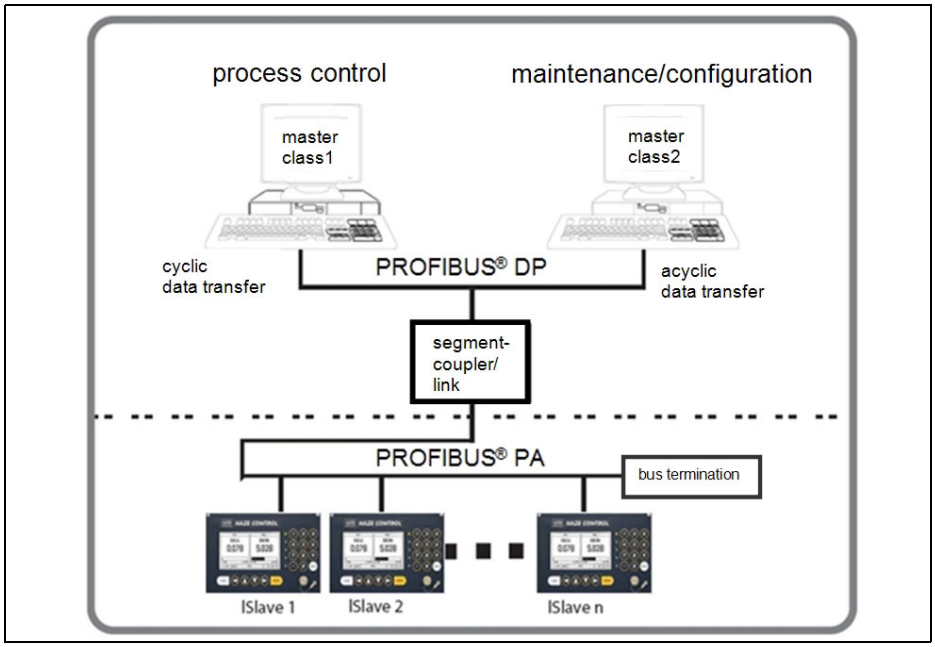


Fig. 1 Principle structure of a PROFIBUS® system

A DP/PA segment coupler or a DP/PA link allows the connection of PROFIBUS® DP and PROFIBUS® PA. A PROFIBUS® PA segment is always a subsegment of a DP segment.

DP/PA segment coupler A DP/PA segment coupler is a signal converter which adjusts RS485 signals to the MBP signal level and vice versa. It does not have an individual bus address and is transparent for the DP master stations. Therefore, only certain bit rates are possible in the DP segment (e. g.45.45 kbit/s).

DP/PA link The DP/PA link has a slave station address over which the DP master accesses the PA segment. In the DP segment, an independent bit rate of 12 Mbit/s maximum is possible.

The PROFIBUS® PA allows cyclic as well as acyclic data transfer. Cyclic services allow transfer of measuring results. They belong to the DP class 1 master and use protocol DP-V0.
Acyclic services serve for device parameterization, remote support maintenance and diagnosis during operation. They belong to the DP class 2 master and use protocol DP-V1.

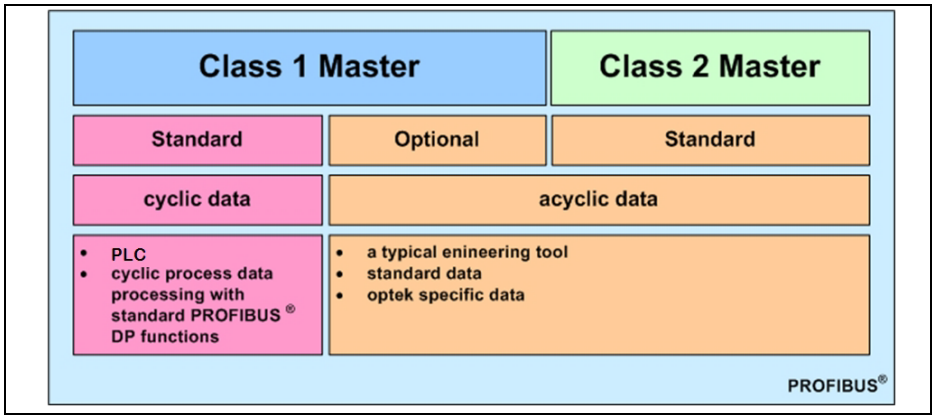


Fig. 2 Cyclic and acyclic data transfer

5 Description optek Control 4000 / Haze Control bus interface

To allow the easiest possible commissioning of the C4000 converter and the Haze Control at the bus, the reliable concept of parameterization via parameter sets was maintained in great parts. Up to eight parameter sets each can be stored on the converter with a product number with product name for that purpose.

For comfortable handling even of complex parameter sets (e. g.complex mathematical operations), the well-known PC-Transfer Advanced software is used for the Control 4000.

Thus, almost all internal parameters can be changed when changing the product number. The product number can be changed locally or via access to an individual register via bus.

Even complex parameter changes, such as the exchange of the mathematical operations of several input signals or the exchange of the linearization function for a simple operation in the control system, are therefore possible. It is not necessary to reboot the converter or bus segment.

The structure with up to four independent definable measuring results to each of which a name and a text for designating the unit can be assigned was adapted as well.

The four measuring results also play a central role for mapping on the bus: To each of these measuring results, a transducer block and an analog function block are assigned according to the PROFIBUS® PA profile specification. Therefore, in cyclic data traffic, these four measuring results can be read, together with the corresponding status information.

For each measuring result, apart from the limit values without bus connection, there are four additional limit values in the cyclically transferred status information. There, the information regarding quality of the measuring result with respect to malfunctions of the converter or bus interface is provided as well.

The four status are mapped on the four evaluation levels

- good
- uncertain
- local override and
- bad

according to the condensed status.

Since the signal loss state is admitted for some applications but indicates technical malfunctions in others, the user can change the assignment to uncertain or bad.

The functionality defined with parameter sets can be queried in acyclic data traffic with the standard parameters of the function blocks. Thus, e.g. set limits of the measuring range and the names of the units can be read by the control system.

Apart from the measuring results, in cyclic traffic, the switching status of the four relay outputs are available as well. They are arranged in a shared digital input block.

To send analog signals from control to converter, there are two analog output blocks. In the converter, these are used like the mA-inputs available for converter models (H)C4X2Z (X=1–4, Z=1–2).

Malfunctions of converter or bus interface can be displayed with the PROFIBUS® diagnosis mechanism. They are signaled in the manufacturer-specific diagnosis.
For some parameters (e. g.signal loss), the user can choose if these shall be displayed in the manufacturer-specific diagnosis.

Further detailed information on the state of the converter can be read out of the optek-specific status transducer block. Here, data of lamp and detector monitor can be called as well as sensor information and a list of available product names. A writable parameter defines which channels are displayed. In case an error is signaled, the number of the error message, such as displayed on the converter display, can be read out as well.

The following figure shows the PROFIBUS® PA interface for the C4000 and the Haze Control converter according to PROFIBUS® PA profile 3.01 with amendment 2: Analyzer.

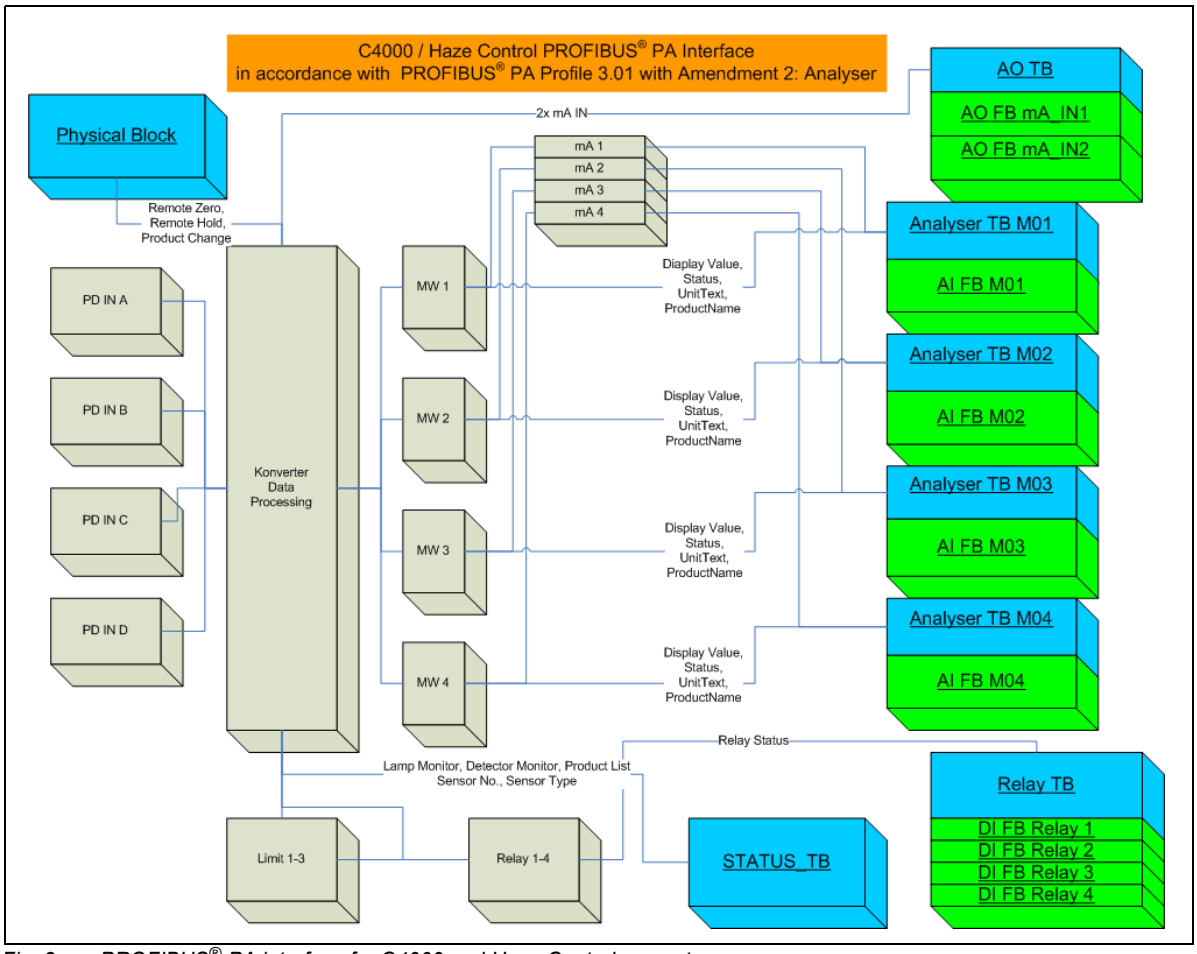


Fig. 3 PROFIBUS® PA interface for C4000 and Haze Control converter

Numbers stand for:

PB = physical block
TB = transducer block
FB = function block

AO = analog output block
AI = analog input block
DI = digital input

PD IN X = detector input A-D
MW 1-4 = measuring result 1-4

5.1 Technical data PROFIBUS® PA interface

Tab. 2 Technical data PROFIBUS® PA interface

Physical:	IEC 61158-2 31.25 kbit/s voltage mode
Connection:	polarity-independent
voltage range:	9…32 V
Background current:	18 mA
Galvanic separation:	function separation
Intrinsic safety:	No
ID:	0x0BF3
Address range:	3 to 126 delivery state 126 Set_Slave_Adr. of master
Device profile:	PROFIBUS® PA profile, version 3.01 with amendment 2
Block structure:	1 PB 4 AI with 1 TB each 4 DI with 1 TB 2 AO with 1 TB 1 status TB (device-specific)

5.2 Converter front view

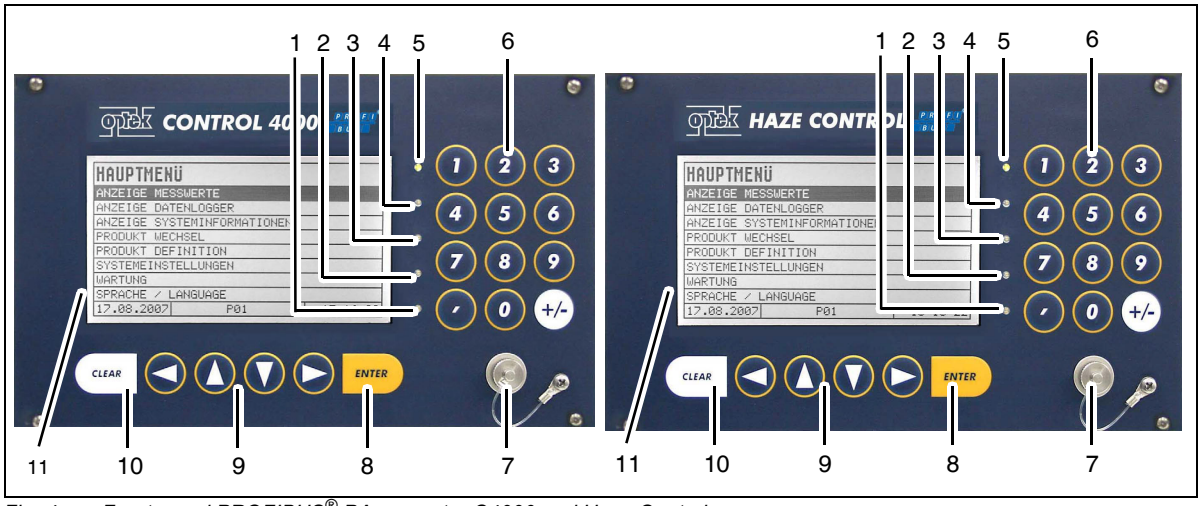


Fig. 4 Front panel PROFIBUS® PA converter C4000 and Haze Control

Numbers stand for:

1. LED (flashes red), indicates lamp failure or system failure
2. LED (yellow), switch indicator for alarm 3 when a value exceeds or falls below a limit value
3. LED (yellow), switch indicator for alarm 2 when a value exceeds or falls below a limit value
4. LED (yellow), switch indicator for alarm 1 when a value exceeds or falls below a limit value
5. LED (green), indicates readiness for operation
6. Numerical keyboard (single assignment)
7. Connection for RS-232 (control-connect cable)
8. ENTER key (confirmation of entries)
9. Cursor key (moving in the menus and entries)
10. CLEAR key (rejecting entries, returning to previous menu)
11. Display

5.3 Rear view converter C4151

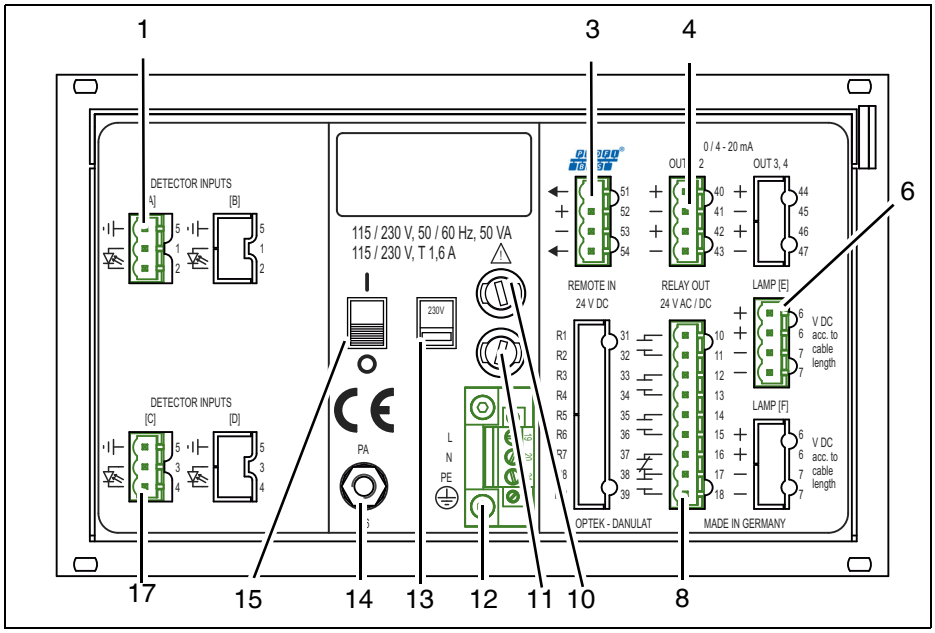


Fig. 5 Rear view converter C4151

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. -
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. -
6. Lamp output E (only for optek-sensors)
7. -
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. -
17. Detector input C (inactive)

5.4 Rear view converter C4251

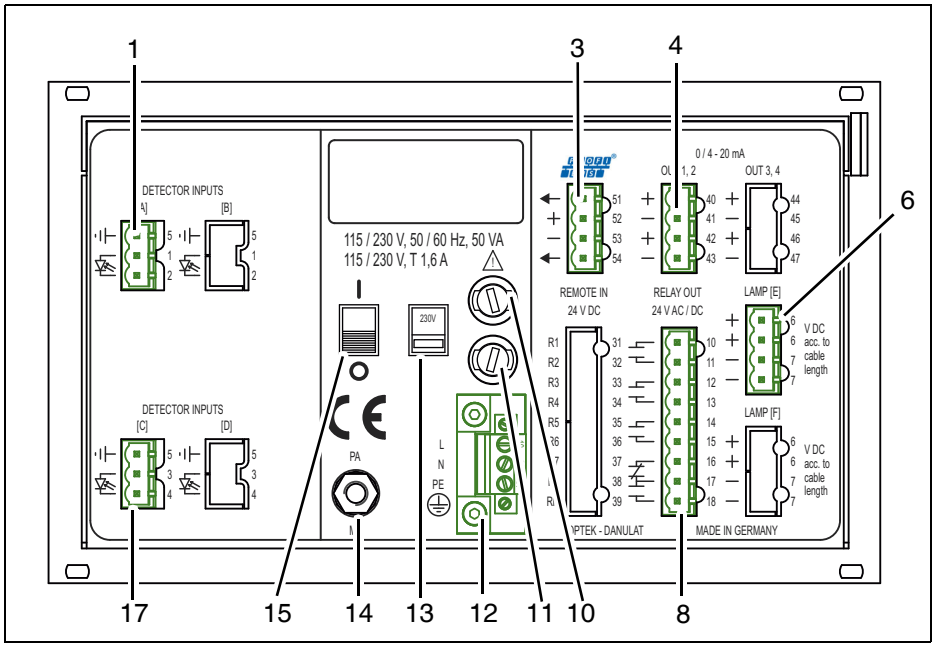


Fig. 6 Rear view converter C4251

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. -
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. -
6. Lamp output E (only for optek-sensors)
7. -
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. -
17. Detector input C (only for optek-sensors)

5.5 Rear view converter C4252

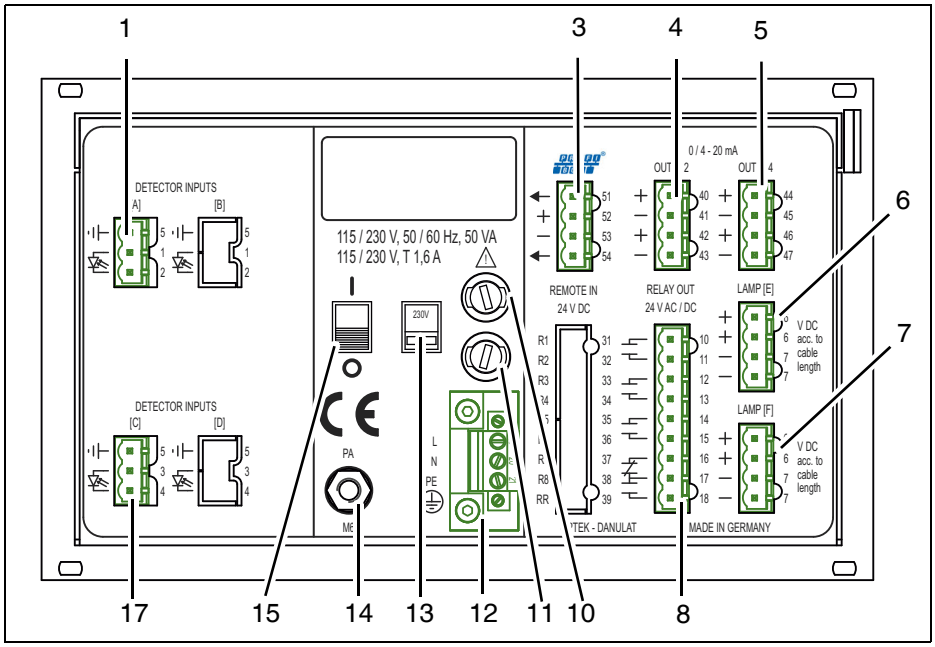


Fig. 7 Rear view converter C4252

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. -
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. mA-output 3, mA-output 4 (0/4–20 mA)
6. Lamp output E (only for optek-sensors)
7. Lamp output F (only for optek-sensors)
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. -
17. Detector input C (only for optek-sensors)

5.6 Rear view converter C4452

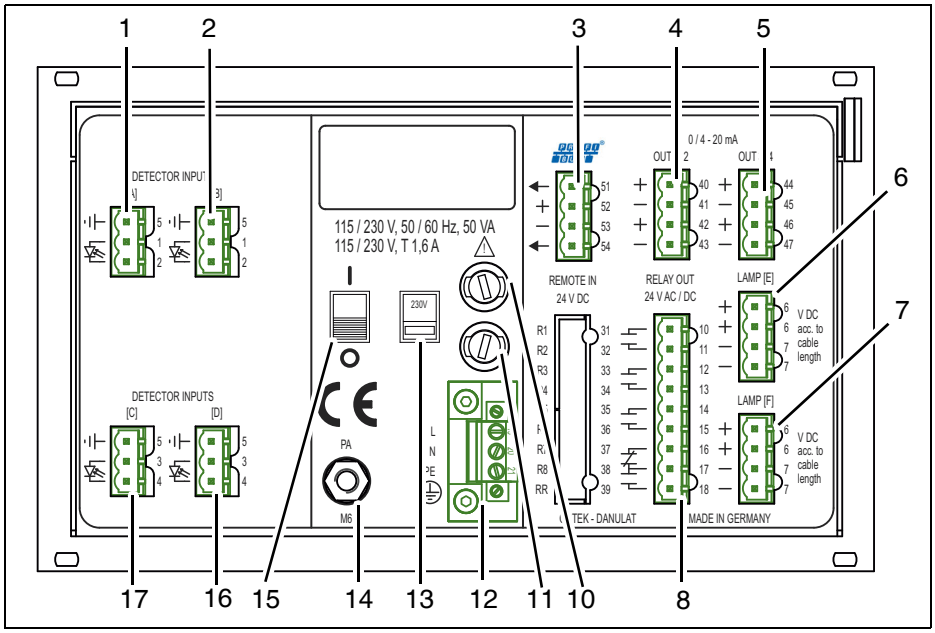


Fig. 8 Rear view converter C4452

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. Detector input B (only for optek-sensors)
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. mA-output 3, mA-output 4 (0/4–20 mA)
6. Lamp output E (only for optek-sensors)
7. Lamp output F (only for optek-sensors)
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. Detector input D (only for optek-sensors)
17. Detector input C (only for optek-sensors)

5.7 Rear view HC4351 converter

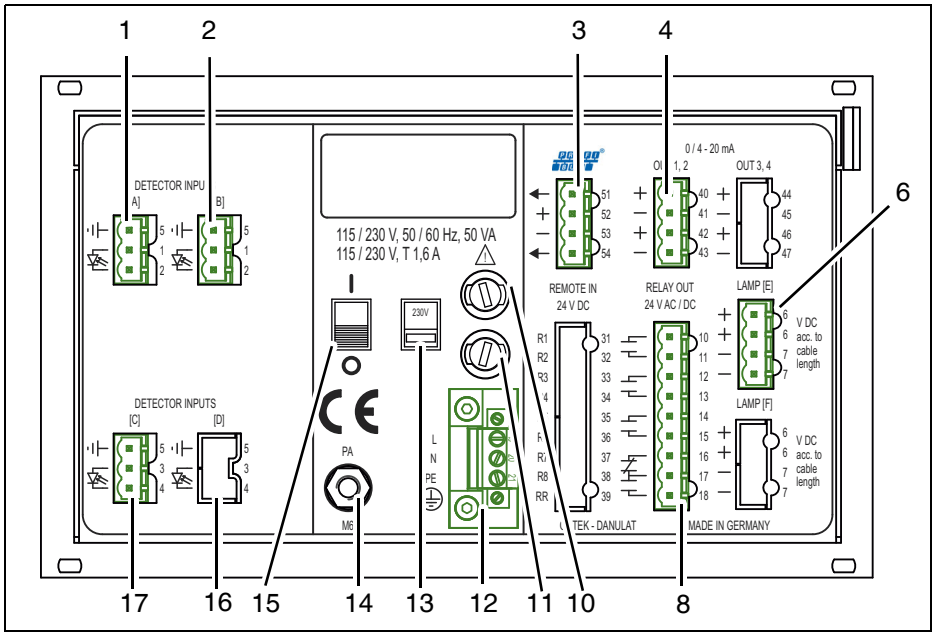


Fig. 9 Rear view HC4351 converter

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. Detector input B (only for optek-sensors)
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. –
6. Lamp output E (only for optek-sensors)
7. –
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. Detector input D (inactive)
17. Detector input C (only for optek-sensors)

5.8 Rear view converter HC4452

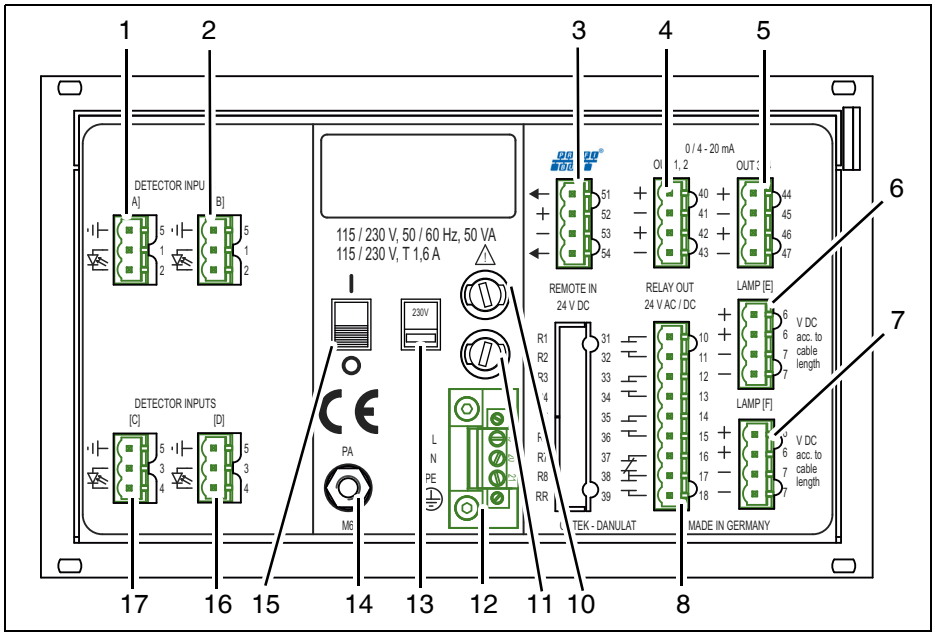


Fig. 10 Rear view converter HC4452

Numbers stand for:

1. Detector input A (only for optek-sensors)
2. Detector input B (only for optek-sensors)
3. PROFIBUS® PA interface
4. mA-output 1, mA-output 2 (0/4–20 mA)
5. mA-output 3, mA-output 4 (0/4–20 mA)
6. Lamp output E (only for optek-sensors)
7. Lamp output F (only for optek-sensors)
8. Relay outputs 1, 2, 3 for limit values or system status feedback, system relay (enabled)
9. -
10. Fuse I 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
11. Fuse II 115 / 230 V AC T 1.6 A (option 24 V AC / DC: T 3.15 A)
12. Power supply (fixed)
13. Selector switch for voltage (preset 230 V AC) - (does not apply for a 24 V AC/DC version)
14. Equipotential bonding (in the non-ex-proof version, only necessary in extreme EMC requirements)
15. ON / OFF switch
16. Detector input D (only for optek-sensors)
17. Detector input C (only for optek-sensors)

5.9 Connecting the sensors

Danger!
Electrical voltage!
Remove power from the converter before connecting the sensor!
Electrical interconnection should only be performed by qualified personnel!

An overview of the connections of our sensors as well as of the wiring plans is provided in the supplied standard instruction manual of the converter.

5.10 PROFIBUS® PA interface

Caution!
Electrical interconnection should only be performed by qualified personnel!
The interface must only be connected to circuits which cannot become dangerously active (SELV / PELV).

The two conductors in the two-core cable have different colors. Usually, red (B conductor) and green (A conductor) are used. However, other colors can be used as well.

Tool

- Screwdriver

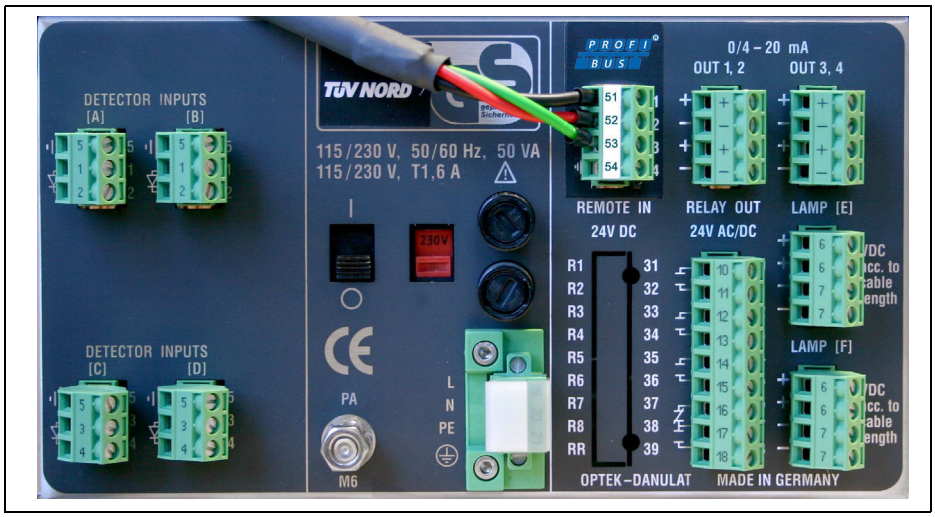


Fig. 11 Fieldbus terminals PROFIBUS® PA with connector

The fieldbus is connected to the supply terminals of the device (terminals 51-54):

- grounding = terminal 51 / 54
- cable red (B conductor) = terminal 52 +
- cable green (A conductor) = terminal 53 -

The connection to the PROFIBUS® depends on the realization on site but should be shielded.

Note!
The supply voltage of the PROFIBUS® PA interface must be bus-powered. It is not supplied by the converter.

6 Addressing

In order to integrate a slave into a PROFIBUS® network, the address must be set. optek PROFIBUS® PA devices are delivered with the default address 126.

6.1 Overview addressing

Tab. 3 Overview addressing

0	service, diagnosis and programming tool
1…2	address for master (class 1)
3…125	address range for slaves
126	default address: address for „Set_Slave_Adr“

6.2 Addressing methods

In a PROFIBUS® PA network, there are different ways to set an address. Depending on the manufacturer, the physical address can be set by means of hardware DIP switches, the manufacturer's device software or the master control system.

6.3 Addressing via the master control system

The optek PROFIBUS® PA interface for C4000 and Haze Control converters only supports the setting of the slave address by means of the Profibus DP service „Set_Slave_Adr“ (SAP55) via a DPM2 master (DP master class 2).

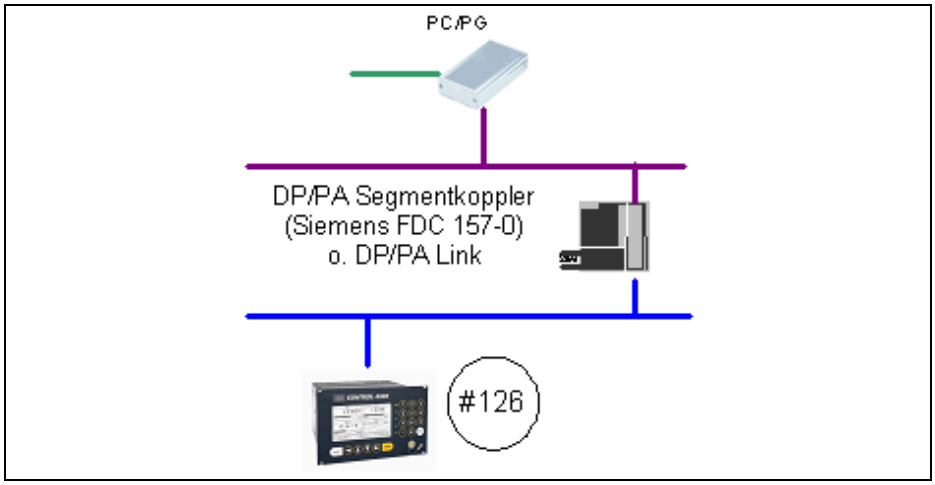


Fig. 12 Schematic structure of an addressing network

Thus, a DP/PA segment coupler or a DP/PA link is required.

Tab. 4 DP/PA segment coupler, DP/PA link

Siemens	Pepperl+Fuchs
DP/PA segment coupler • segment coupler transparent in DP net (max. 124 slaves possible) • transfer rate: 45.45 kbit/s • address range for slaves: 3-125 • DPV1 compatible (cyclic, acyclic)	Segment coupler SK1 • segment coupler transparent in DP net (max. 124 slaves possible) • transfer rate: 93.75 kbit/s • address range for slaves: 3-125 • DPV1 compatible (cyclic, acyclic)
DP/PA link • multislave 124 slaves per device possible • transfer rate: 12 Mbit/s • address range for slaves: 3-125 • DPV1 compatible (cyclic, acyclic)	Segment coupler SK2 • multislave 124 slaves per device possible • transfer rate: 93.75 kbit/s • address range for slaves: 3-125 • DPV1 compatible (cyclic, acyclic)

Note!

- If possible, only short connection lines to the slave should be used.
- There must only be one PROFIBUS® PA slave with the default address 126 on the bus. In case that several slaves to be configured are to be integrated, they must be addressed consecutively.
- There must be no other master on the bus segment.
- The addressing should not be carried out in the project network.

7 Specifications

The PROFIBUS® PA interface for C4000 and Haze Control converters supports PROFIBUS® PA profile version 3.01 with amendment 2 Analyzer. The following blocks are used:

Tab. 5 Device info

User blocks	Description
1 PB	with device-specific expansion features
4 analyzer TBs	for four measuring results
1 status TB	for device status information
1 relay TB	for four relay outputs
1 AO TB	for mA inputs
4 AI FBs	for four measuring results
4 DI FBs	for four relay outputs
2 AO FBs	for two mA-inputs

Note!
A detailed description of the bus interface is given in "Description optek Control 4000 / Haze Control bus interface", chapter 5, page 10.

Tab. 6 Assignment of the different blocks

Slot	Block name	
0	Physical Block	Abbreviations: PB = physical block TB = transducer block FB = function block AO = analog output block AI = analog input block DI = digital input
1	AI FB M01	
2	AI FB M02	
3	AI FB M03	
4	AI FB M04	
5	DI FB Relay 1	
6	DI FB Relay 2	
7	DI FB Relay 3	
8	DI FB Relay 4	
9	AO FB mA_IN1	
10	AO FB mA_IN2	
11	Analyzer TB M01	
12	Analyzer TB M02	
13	Analyzer TB M03	
14	Analyzer TB M04	
15	Relay TB	
16	AO TB	
17	STATUS_TB	

An unambiguous slot number is assigned to each block. Within a block, all parameters are assigned with an index in ascending order which allows unequivocal assignment.

7.1 Physical Block

Tab. 7 Physical Block

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
		Reserved	Unsigned8	1	
		Block Object	Unsigned8	1	
		Parent Class	Unsigned8	1	
		Class	Unsigned8	1	
		DD Reference	Unsigned32	4	
		DD Revision	Unsigned16	2	
		Profile	Octet String	2	
		Profile Revision	Unsigned16	2	
		Execution Time	Unsigned8	1	
		Number_of_Parameters	Unsigned16	2	
		Address of VIEW_1	Unsigned16	2	
		Number of Views	Unsigned8	1	
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
		Actual	Unsigned8	1	
		Permitted	Unsigned8	1	
		Normal	Unsigned8	1	
7	23	ALARM_SUM	DS-42	8	R
		Current	Octet String (10)	2	
		Unacknowledged	Octet String (10)	2	
		Unreported	Octet String (10)	2	
		Disabled	Octet String (10)	2	
8	24	SOFTWARE_REVISION	Visible String	16	R
9	25	HARDWARE_REVISION	Visible String	16	R
10	26	DEVICE_MAN_ID	Unsigned16	2	R
11	27	DEVICE_ID	Visible String	16	R
12	28	DEVICE_SER_Num	Visible String	16	R
13	29	DIAGNOSIS	Octet String	4	R
14	30	DIAGNOSIS_EXTENSION	Octet String	6	R
15	31	DIAGNOSIS_MASK	Octet String	4	R
16	32	DIAGNOSIS_MASK_EXTENSION	Octet String	6	R
17	33	DEVICE_CERTIFICATION	Visible String	32	R
18	34	WRITE_LOCKING	Unsigned16	2	R, W
20	36	DESCRIPTOR	Octet String	32	R, W
21	37	DEVICE_MESSAGE	Octet String	32	R, W
22	38	DEVICE_INSTAL_DATE	Octet String	16	R, W

Tab. 7 Physical Block (cont.)

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
24	40	IDENT_NUMBER_SELECTOR	Unsigned8	1	R, W
26	42	FEATURE	DS-68	8	R, W
27	43	COND_STATUS_DIAG	Unsigned8	1	R, W
28	44	DIAG_EVENT_SWITCH	Diag_Event_Switch	50	R, W
36	52	DEVICE_CONFIGURATION	Visible String	32	R
37	53	INIT_STATE	Unsigned8	1	R, W
38	54	DEVICE_STATE	Unsigned8	1	R, W
39	55	GLOBAL_STATUS	Unsigned16	2	R
48	64	REMOTE_CONTROL_STATUS*	Unsigned8	1	R
49	65	SET_HOLD**	Boolean	1	R, W
50	66	SET_ZERO_POINT***	Unsigned16	1	R, W
51	67	SET_PRODUCT****	Unsigned16	1	R, W
52	68	CONVERTER_SN	Visible String	16	R
53	69	MODEL_NR	Visible String	16	R
54	70	SET_UNCERTAIN_AS_BAD*****	Unsigned8	1	R, W

Note!

*** REMOTE_CONTROL_STATUS (slot index 64)**
With this parameter you can read which remote functionalities can be released in the C4000 or Haze Control software.

Data type: Unsigned8 as single bits
1 = Corresponding function in converter is released via bus.
0 = Corresponding function in converter is blocked via bus.

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
not used					hold	Product change	System zero point

0x00000101 = The product change function (via parameter slot index 67) is not possible via PROFIBUS®. The other two remote functions are released.

**** SET_HOLD (slot index 65)**
With this parameter, hold can be triggered or cancelled in the converter via PROFIBUS®.

Data type: Boolean
0x00 → false Converter disables an existing system hold state.
0xFF → true Converter enables a system hold state.

***** SET_ZERO_POINT (slot index 66)**

With this parameter, the zero point for the corresponding measuring result can be read in and set according to the software description.

Data type: Unsigned16 as single bits

High byte

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
not used				zero point M04	zero point M03	zero point M02	zero point M01

Low byte

Upon writing the parameter, the low byte value can be any value from 0 to 255.
For reading the parameter, the following applies:

0x__00 → High byte (see above);
Low byte operation is executed.

0x00FF → Operation was completed or standby position.

Example:

0x0300 = Read in zero point for measuring results M01 and M02.

0x0B00 = Read in zero point for measuring results M01, M02 and M04.

****** SET_PRODUCT (slot index 67)**

With this parameter you can load a configured product in the converter.

Data type: Unsigned16

High byte

0x01 → change to product 1
0x02 → change to product 2
0x03 → change to product 3
0x04 → change to product 4
0x05 → change to product 5
0x06 → change to product 6
0x07 → change to product 7
0x08 → change to product 8

Low byte

Upon writing the parameter, the low byte value can be any value from 0 to 255.
For reading the parameter, the following applies:

0x__00 → Operation product change is executed.
Standby position when writing the value 0x00 for the high byte.

0x__FF → Operation was completed or standby position.

******* SET_UNCERTAIN_AS_BAD (slot index 70)**
This parameter includes two functions.

Data type: Unsigned8 as single bits

With BIT 0 you can select whether a Status process value is mapped from UNCERTAIN to BAD.
0 = UNCERTAIN is displayed.
1 = UNCERTAIN is automatically mapped on BAD state.

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
-	mask bit Diag. ID 37	mask bit Diag. ID 36	mask bit Diag. ID 35	mask bit Diag. ID 34	mask bit Diag. ID 33	mask bit Diag. ID 32	UNCERTAIN AS BAD

BIT 1 to BIT 6 serves for masking enhanced optek-specific diagnosis information.

0 = The corresponding diagnosis information is not displayed in DIAGNOSIS_EXTENSION.
1 = The corresponding diagnosis information is displayed in DIAGNOSIS_EXTENSION.

The setting is maintained after a restart of the device.
Delivery state: 0x00

7.2 Analyzer TB for measuring results M01–M04

Tab. 8 Analyzer TB for the four measuring results M01–M04

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
8	24	COMPONENT_NAME	Octet String	32	R, W
9	25	PV	DS-60	12	R
		PV	Floating point	4	
		MEASUREMENT_STATUS	Unsigned8	1	
		PV_TIME	Date	7	
10	26	PV_UNIT	Unsigned16	2	R, W
11	27	PV_UNIT_TEXT	Octet String	8	R, W
12	28	ACTIVE_RANGE	Unsigned8	1	R, W
13	29	AUTORANGE_ON	Boolean	1	R, W
14	30	SAMPLING_RATE	Time_difference	4	R, W
25	41	NUMBER_OF_RANGES	Unsigned8	1	R
26	42	RANGE_1	DS-61	8	R, W
		Begin_of_Range	Float	1	
		End_of_Range	Float	1	
27	43	PRODUCT	Visible String	12	R
28	44	OUT_1_(mA)*	Float	4	R

Note!

* slot 11: measuring result M01 = OUT_1_(mA)
  slot 12: measuring result M02 = OUT_2_(mA)
  slot 13: measuring result M03 = OUT_3_(mA)
  slot 14: measuring result M04 = OUT_4_(mA)

7.3 AI FB for measuring results M01–M04

Tab. 9 AI FB for the four measuring results M01–M04

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
8	24	BATCH	DS-67	10	R, W
		BATCH_ID	Unsigned32	4	
		RUP	Unsigned16	2	
		OPERATION	Unsigned16	2	
		PHASE	Unsigned16	2	
10	26	OUT	DS-33	5	R
		VALUE	Float32	4	
		STATUS	Unsigned8	1	
11	27	PV_SCALE	Float	8	R, W
12	28	OUT_SCALE	DS-36	11	R, W
		EU at 100 %	Float	4	
		EU at 0 %	Float	4	
		UNITS INDEX	Unsigned16	2	
		DECIMAL POINT	Integer8	1	
13	29	LIN_TYPE	Unsigned8	1	R, W
14	30	CHANNEL	Unsigned16	2	R, W
16	32	PV_FTIME	Float	4	R, W
17	33	FSAFE_TYPE	Unsigned8	1	R, W
18	34	FSAFE_VALUE	Float	4	R, W
19	35	ALARM_HYS	Float	4	R, W
21	37	HI_HI_LIM	Float	4	R, W
23	39	HI_LIM	Float	4	R, W
25	41	LO_LIM	Float	4	R, W
27	43	LO_LO_LIM	Float	4	R, W
34	50	SIMULATE	DS-50	6	R, W
		Simulate_Status	Unsigned8	1	
		Simulate_Value	Floating point	4	
		Simulate_Enable	Unsigned8	1	

7.4 Relay TB

Tab. 10 Relay TB

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
12	28	PV_D_1	DS-34	2	R
		Value	Unsigned8	1	
		Status	Unsigned8	1	
23	39	PV_D_2	DS-34	2	R
		Value	Unsigned8	1	
		Status	Unsigned8	1	
24	40	PV_D_3	DS-34	2	R
		Value	Unsigned8	1	
		Status	Unsigned8	1	
25	41	PV_D_4	DS-34	2	R
		Value	Unsigned8	1	
		Status	Unsigned8	1	

7.5 DI FB relay 1 to 4

Tab. 11 DI FB relay 1 to 4

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
8	24	BATCH	DS-67	10	R, W
		BATCH_ID	Unsigned32	4	
		RUP	Unsigned16	2	
		OPERATION	Unsigned16	2	
		PHASE	Unsigned16	2	
10	26	OUT_D	DS-34	2	R, W
		VALUE	Unsigned8	1	
		STATUS	Unsigned8	1	
14	30	CHANNEL	Unsigned16	2	R, W
15	31	INVERT	Unsigned8	1	R, W
20	36	FSAFE_TYPE	Unsigned8	1	R, W
21	37	FSAFE_VAL_D	Unsigned8	1	R, W
24	40	SIMULATE	DS-50	6	R, W
		Simulate_Status	Unsigned8	1	
		Simulate_Value	Floating point	4	
		Simulate_Enable	Unsigned8	1	

7.6 AO TB

Tab. 12 AO TB

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
80	96	PV_1	DS-60	12	R
		PV	Floating point	4	
		MEASUREMENT_STATUS	Unsigned8	1	
		PV_TIME	Date	7	
81	97	PV_2	DS-60	12	R
		PV	Floating point	4	
		MEASUREMENT_STATUS	Unsigned8	1	
		PV_TIME	Date	7	

7.7 AO FB for mA-In1 and mA-In2

Tab. 13 AO FB for mA-In1 and mA-In2

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
8	24	BATCH	DS-67	10	R, W
		BATCH_ID	Unsigned32	4	
		RUP	Unsigned16	2	
		OPERATION	Unsigned16	2	
		PHASE	Unsigned16	2	
10	26	SP*	DS-33	5	R, W
		VALUE	Float32	4	
		STATUS	Unsigned8	1	
11	27	PV_SCALE	Float	8	R, W
		EU at 100 %	Float	4	
		EU at 0 %	Float	4	
		UNITS INDEX	Unsigned16	2	
		DECIMAL POINT	Integer8	1	
12	28	READBACK	DS-33	5	R
		VALUE	Float32	4	
		STATUS	Unsigned8	1	
21	37	IN_CHANNEL	Unsigned16	2	R, W
22	38	OUT_CHANNEL	Unsigned16	2	R, W
23	39	FSAFE_TIME	Float	4	R, W
24	40	FSAFE_TYPE	Unsigned8	1	R, W
25	41	FSAFE_VAL_D	Float	4	R, W
31	47	POS_D	DS-34	2	R
		VALUE	Unsigned8	1	
		STATUS	Unsigned8	1	
33	49	CHECK_BACK	Octet String	3	R
34	50	CHECK_BACK_MASK	Octet String	3	R
35	51	SIMULATE	DS-50	6	R, W
		Simulate_Status	Unsigned8	1	
		Simulate_Value	Floating point	4	
		Simulate_Enable	Unsigned8	1	
36	52	INCREASER_CLOSE	Unsigned8	1	R, W

Tab. 13 AO FB for mA-In1 and mA-In2 (cont.)

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
37	53	OUT	DS-33	5	R, W
		VALUE	Float32	4	
		STATUS	Unsigned8	1	
38	54	OUT_SCALE	Float	8	R, W
		EU at 100 %	Float	4	
		EU at 0 %	Float	4	
		UNITS INDEX	Unsigned16	2	
		DECIMAL POINT	Integer8	1	

Note!

* 4-20 mA correspond to 0–100 %=0–1 here.

7.8 Status TB

Tab. 14 Status TB

Rel. Index	Slot index	Parameter	Data type	Size (bytes)	Access
0	16	BLOCK_OBJECT	DS-32	20	R
1	17	ST_REV	Unsigned16	2	R
2	18	TAG_DESC	Octet String	32	R, W
3	19	STRATEGY	Unsigned16	2	R, W
4	20	ALERT_KEY	Unsigned8	1	R, W
5	21	TARGET_MODE	Unsigned8	1	R, W
6	22	BLOCK_MODE	DS-37	3	R
7	23	ALARM_SUM	DS-42	8	R
8	24	FIRMWARE_VERSION	Visible String	16	R
9	25	INFO_ADDRESS_1	Octet String	24	R
10	26	INFO_ADDRESS_2	Octet String	24	R
11	27	INFO_ADDRESS_3	Octet String	24	R
12	28	INFO_ADDRESS_4	Octet String	24	R
13	29	INFO_ADDRESS_5	Octet String	24	R
14	30	CONFIGURATION_STATUS*	Unsigned8	1	R
15	31	SET_LAMP_CHANNEL**	Unsigned16	1	R, W
16	32	STATUS_LAMP***	DS-LAMP	10	R
		LAMP_ON	Boolean	1	
		SENSOR_ON_LAMP	Unsigned8	1	
		LAMP_VOLTAGE_(V)	Float	4	
		LAMP_CURRENT_(mA)	Float	4	
17	33	DETECTOR_MONITOR***	DS-DETECTOR	16	R
		PHOTO_CURRENT_(nA)	Float	4	
		ZERO_CURRENT_(nA)	Float	4	
		PHOTO_CURRENT_(CU)	Float	4	
		PHOTO_CURRENT_ISA_(CU)	Float	4	
18	34	ERROR_NUMBER****	Unsigned16	2	R
19	35	PRODUCT_NAME	DS_P_Name	96	R
		PRODUCT_1	Visible String	12	
		PRODUCT_2	Visible String	12	
		PRODUCT_3	Visible String	12	
		PRODUCT_4	Visible String	12	
		PRODUCT_5	Visible String	12	
		PRODUCT_6	Visible String	12	
		PRODUCT_7	Visible String	12	
		PRODUCT_8	Visible String	12	
20	36	SENSOR_INFO*****	DS_Sensor	32	R
		SENSOR_SN	Visible String	16	
		SENSOR_TYPE	Visible String	16	

Note!

*** CONFIGURATION_STATUS (slot index 30)**
This parameter contains the configuration status of the individual slave circuit cards in summarized form.

Data type: Unsigned8 as single bits

0 = There is a problem with the configuration of the corresponding circuit card.
1 = Configuration is OK.

Configuration bit

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
not used		IO-14/ IO-16	IO-13	IO-24	MA-11 (2)	MA-11 (1)	MC-02

**** SET_LAMP_CHANNEL (slot index 31)**
With this parameter, the register contents for ***Status_Lamp (slot index 32) and ***Detector_Monitor (slot index 33) can be selected according to the selected lamp outputs or optek detector inputs.
The register contents correspond to the values of the corresponding monitor.

Data type: Unsigned16

High byte

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
not used		-	LAMP F	CHAN-NEL D	CHAN-NEL B	CHAN-NEL C	CHAN-NEL A

In the high or low nibble, no more than 1 bit shall be set. If 0x00 is transferred as information, the information of LAMP E and CHANNEL A is written into the corresponding registers.

Low byte

Upon writing the parameter, the low byte value can be any value from 0 to 255.
For reading the parameter, the following applies:
0x__00 → Operation product change is executed.
Standby position when writing the value 0x00 for the high byte.
0x__FF → Operation was completed or standby position.

Example
0x00 → lamp E, channel A
0x18 → lamp F, channel D
0x15 → not permitted

****** ERROR_NUMBER (slot index 34)**

Corresponds to the error number currently displayed on the converter display. If you acknowledge the error window locally at the converter, the parameter is set to zero and the error number cannot be read via PROFIBUS® anymore.

******* SENSOR_INFO (slot index 36)**

According to the selected channel (slot index 31), with this parameter, the sensor serial number and type can be read. For that, the information must be defined in the system settings for the corresponding sensor. For a Haze Control with PROFIBUS® interface, both strings are empty.

7.9 Device Spec. Data structures

Tab. 15 Device Spec. Data structures

Data structure ID	Data structure name	Sub. idx.	Component name	Data type of component	Size of component
70	DS-LAMP	1	LAMP_ON	Boolean	1
		2	SENSOR_ON_LAMP	Unsigned8	1
		3	LAMP_VOLTAGE_(V)	Float	4
		4	LAMP_CURRENT_(mA)	Float	4
71	DS-DETECTOR	1	PHOTO_CURRENT_(nA)	Float	4
		2	ZERO_CURRENT_(nA)	Float	4
		3	PHOTO_CURRENT_(CU)	Float	4
		4	PHOTO_CURRENT_ISA_(CU)	Float	4
72	DS_P_Name	1	PRODUCT_1	Visible String	12
		2	PRODUCT_2	Visible String	12
		3	PRODUCT_3	Visible String	12
		4	PRODUCT_4	Visible String	12
		5	PRODUCT_5	Visible String	12
		6	PRODUCT_6	Visible String	12
		7	PRODUCT_7	Visible String	12
		8	PRODUCT_8	Visible String	12
73	DS_Sensor	1	SENSOR_SN	Visible String	16
		2	SENSOR_TYPE	Visible String	16

7.10 Diagnosis

Tab. 16 Diagnosis

Diag. ID	Diagnosis description	Physical block DIAGNOSIS bit no		Physical block DIAGNOSIS_ EXTENTION bit no		Remarks, e.g. reference to detailed specification
		Octet	Bit	Octet	Bit	
0	HW failure	1	0			DIA_HW_ELECTR
1	-		1			DIA_HW_MECH
2	-		2			DIA_TEMP_MOTOR
3	Flag when Error 1402 (TEMP_HI) occurs		3			DIA_TEMP_ELECTR
4	-		4			DIA_MEM_CHKSUM
5	-		5			DIA_MEASUREMENT
6	-		6			DIA_NOT_INIT
7	-		7			DIA_INIT_ERR
8	-	2	0			DIA_ZERO_ERR
9	-		1			DIA_SUPPLY
10	-		2			DIA_CONF_INVAL
11	-		3			DIA_WARMSTART
12	-		4			DIA_COLDSTART
13	-		5			DIA_MAINTENANCE
14	-		6			DIA_CHARACT
15	-		7			IDENT_NUMBER_VIOLA-TION
16	reserved by PNO	3	0	reserved by PNO		
17			1			
18			2			
19			3			
20			4			
21			5			
22			6			
23			7			
24		4	0			
25			1			
26			2			
27			3			
28			4			
29			5			
30			6			
31	EXTENSION_AVAILABLE		7			

Tab. 16 Diagnosis (cont.)

Diag. ID	Diagnosis description	Physical block DIAGNOSIS bit no		Physical block DIAGNOSIS_ EXTENTION bit no		Remarks, e.g. reference to detailed specification
		Octet	Bit	Octet	Bit	
32	ERROR NUMBER AVAILABLE*			1	0	optek-internal error code in Status TB available
33	SIGNAL LOSS MEASUREMENT VALUE 1**				1	
34	SIGNAL LOSS MEASUREMENT VALUE 2**				2	
35	SIGNAL LOSS MEASUREMENT VALUE 3**				3	
36	SIGNAL LOSS MEASUREMENT VALUE 4**				4	
37	NO ISB COMMUNICATION***				5	
38	NO MODBUS COMMUNICATION****				6	
39					7	

Note!
Enhanced diagnosis information Diag. ID 32 to Diag. ID 34 can be enabled or disabled per bit mask in the parameter SET_UNCERTAIN_AS_BAD (slot index 70, physical block). Upon delivery, these bits are disabled.

* If this diagnosis bit is set, an enhanced error analysis can currently be read out as an optek-specific error number from the parameter ERROR_NUMBER (slot index 34, status transducer block).

** The bit number signals a signal loss at the corresponding measuring result.

*** There is a problem with internal data communication. Please contact us. Please find our contact details in chapter 11, page 56.

**** If this diagnosis is signaled, the converter may currently be switched off or booting. If this is not the case, there can be a problem with internal data communication. Please contact us. Please find our contact details in chapter 11, page 56.

7.11 Condensed status

Tab. 17 Condensed status

Index	Meaning according to NE107	Usage in PCS/DCS	Coding								Description	
			Quality		Quality substatus				Limits		Hex. value	Meaning
0	Good (G)	Good	1	0	0	0	0	0	0	0	0x80	Good - OK
0	Good (G)	Good	1	0	0	0	0	0	x	x	0x84 .. 0x87	Good - update event
0	Good (G)	Good	1	0	0	0	1	0	0	1	0x89	Good - advisory alarm, low limit
0	Good (G)	Good	1	0	0	0	1	0	1	0	0x8A	Good - advisory alarm, high limit
0	Good (G)	Good	1	0	0	0	1	1	0	1	0x8D	Good - critical alarm, low limit
0	Good (G)	Good	1	0	0	0	1	1	1	0	0x8E	Good - critical alarm, high limit
1	Failure (F)	Failure	0	0	1	0	0	1	x	x	0x24 .. 0x27	Bad
2	Maintenance (M)	Good	1	0	1	0	0 1	1 0	x	x	0xA4 .. 0xAB	Good - maintenance request
3	Check (C)	Failure	0	0	1	1	1	1	x	x	0x3C .. 0x3F	Bad - local override
4	Out of specification (S)	Uncertain	0	1	1	1	1	0	x	x	0x78 .. 0x7B	Uncertain

Note!
The PROFIBUS® interface for C4000 and Haze Control supports PA profile V3.01 with amendment 2, i.e. signalization of the process value Status according to the above table. For amendment 2 however, it is possible to switch over to signalization of the Status process value according to PA profile V3.01 (classic mode). The following changes for status signalization shall be observed.

Meaning	Hex. value in Mode condensed state	Hex. value in Mode classic mode
BAD	0x24 .. 0x27	0x0C .. 0x0F
Local override	0x3C .. 0x3F	0x00 .. 0x03
Uncertain	0x78 .. 0x7B	0x40 .. 0x43

The delivery status is classic mode.

7.12 Number display format

All float values are indicated according to float format ieee754.

Tab. 18 Number display format

31	BYTE0						24	23	BYTE1						16	15	BYTE2						8	7	BYTE3						1
V	E	E	E	E	E	E	E	E	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
	exponent								mantissa																					

8 Software

The scope of supply includes the following files:

8.1 GSD file

The following file is required for communication between converter and control:

- GSD (General Station Description): **40000BF3_gsd.zip**

In this file, the communication functions are described. Apart from general definitions (such as manufacturer name, device name, hardware, software, transfer rate), it contains the master configuration (i.e. all parameters which only apply to the master, such as the maximum number of slaves to be connected or upload and download options) and the slave configuration (all slave-specific indications such as the definition of diagnosis texts). It shall be loaded into the bus configuration system before starting up the bus system. Please observe the instructions in the host supplier manual for installing the required GSD file in the PLC.

8.2 EDD file

EDD stands for Electronic Device Description and is some kind of parameterization file in which the standard description of the used blocks is stored.

- EDD (Electronic Device Description): **40000BF3_edd.zip**

9 Appendix

9.1 Addressing of the optek PROFIBUS® PA interface

The following chapters describe the addressing of the optek PROFIBUS® PA interface with the communication processor CP5512 and the interface card "Softing PROFIusb".

There are several interfaces and communication processors produced by other manufacturers providing a corresponding Profibus DP service „Set_Slave_Adr“ (SAP55). Below you will find only a small selection. If there is no solution listed for your system, we kindly ask you to contact the manufacturer of your Profibus master environment.

- PC/PG with communication processor, manufacturer Siemens (using Siemens software similar to CP5512)
  - CP 5603
  - CP 5611 A2
  - CP 5613 A2
  - CP 5614 A2
  - CP 5621
  - CP 5711
  - CP 5623
  - CP 5624
- ABB 800xA control system with communication interface component CI854/CI854A (web interface)

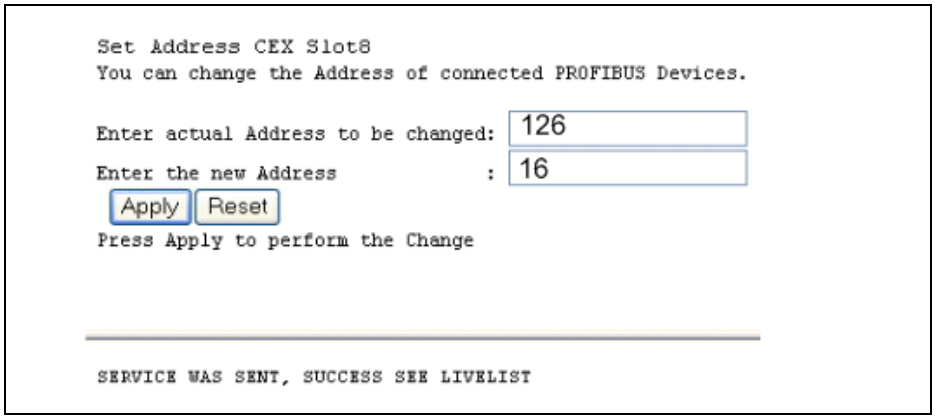


Fig. 13 Addressing via ABB 800xA control system with communication interface component CI854/CI854A

9.1.1 Addressing of the optek PROFIBUS® PA interface with communication processor CP5512

The following procedure shows how to address the optek PROFIBUS® PA interface for C4000 and Haze Control using the example of Siemens SIMATIC® Manager with communication processor CP5512:

DPM2 master implementation tested with the help of

- PC/PG with communication processor "Siemens CP5512"
- software used: SIMATIC® Manager

1. Start the SIMATIC® Manager software.
2. Go to Options and open the window "Set PG/PC Interface".

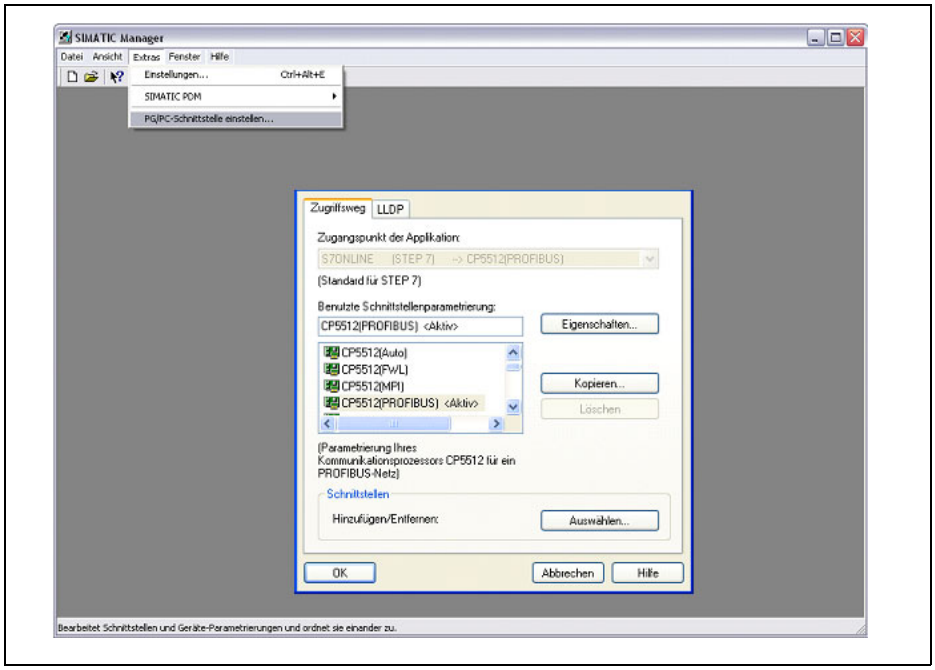


Fig. 14 "Set PG/PC Interface" menu

- Select the access point "CP5512(PROFIBUS)".
- In the properties window, select the option "PG/PC is the only master on the bus".

3. Under Target system / PROFIBUS, open the window "Assign PROFIBUS address...".

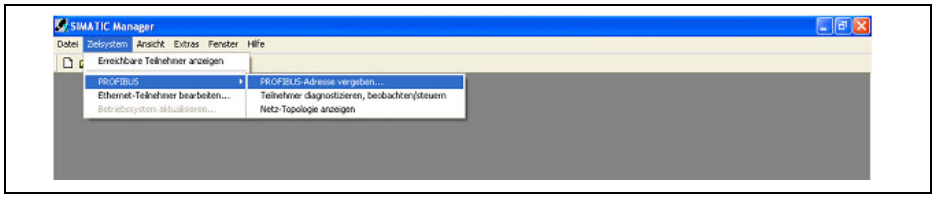


Fig. 15 "Assign PROFIBUS address" menu

4. Enter a new address for the slave device (e. g. 16) and confirm with OK.

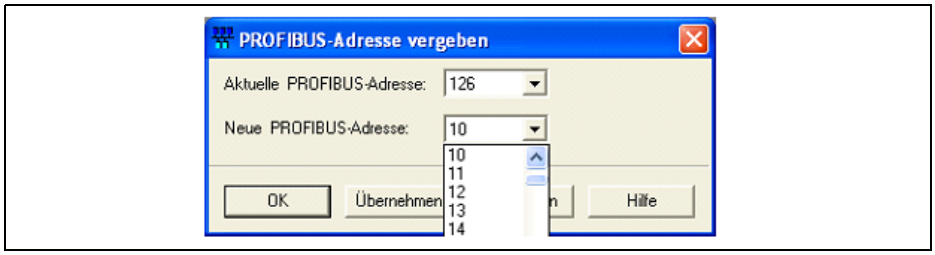


Fig. 16 Entering a new PROFIBUS address

5. For testing purposes, the setting of a new address can be checked by means of a LifeList.

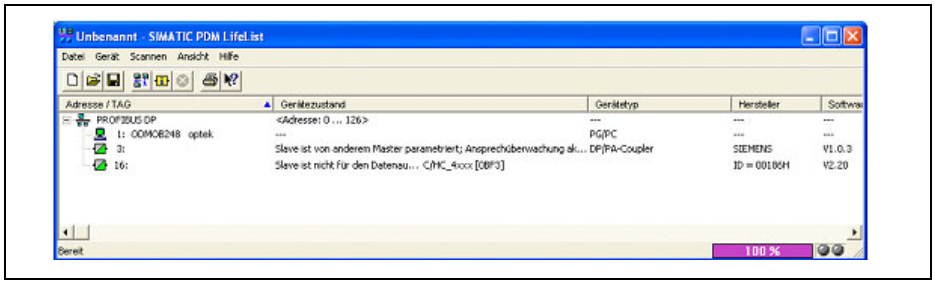


Fig. 17 Checking the new address

9.1.2 Addressing of the optek PROFIBUS® PA interface with interface card "Softing PROFIusb"

The following procedure shows how to address the optek PROFIBUS® PA interface for C4000 and Haze Control using the example of Siemens SIMATIC® Manager with the single-channel USB interface card "Softing PROFIusb":

DPM2 master implementation tested with the help of

- PROFIBUS master single-channel USB interface card "Softing PROFIusb"
- software used: SIMATIC® Manager and SIMATIC® PDM

1. Start the SIMATIC® Manager software.
2. Go to Options and open the window "Set PG/PC Interface".

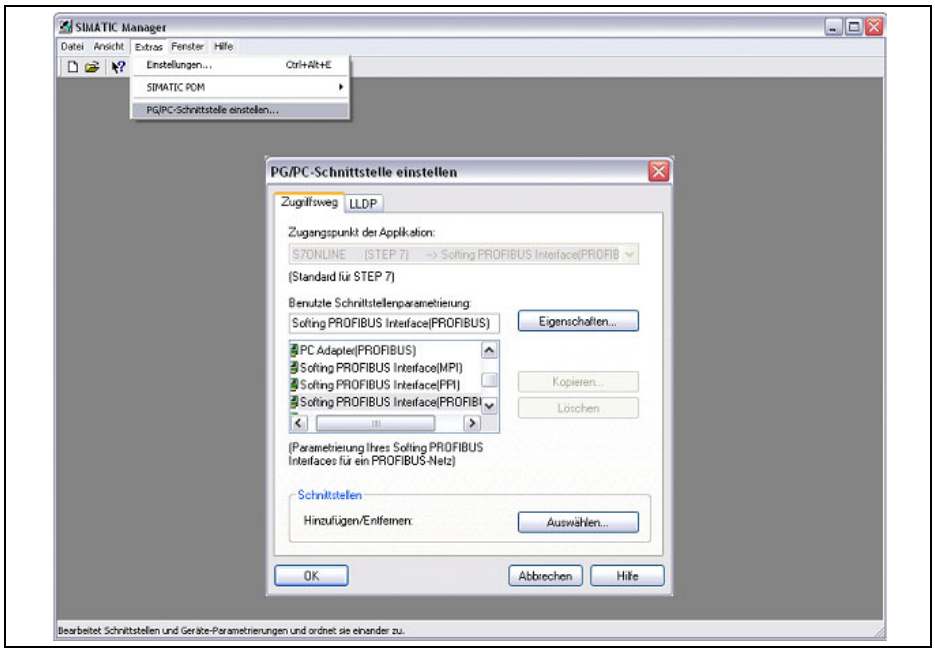


Fig. 18 "Set PG/PC Interface" menu

- Select the access point "Softing PROFIBUS Interface (PROFIBUS)".
- In the properties window, select the option "PG/PC is the only master on the bus".

3. Start the SIMATIC® PDM LifeList.

Note!
Slaves with the address 126 are not displayed.

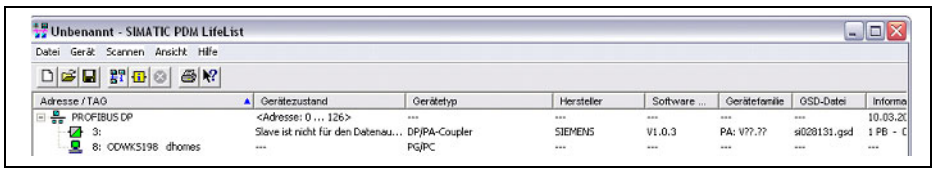


Fig. 19 SIMATIC® PDM LifeList

- For address 3 "Open object".

4. Under SIMATIC® PDM – PROFIBUS PA, add a new device.

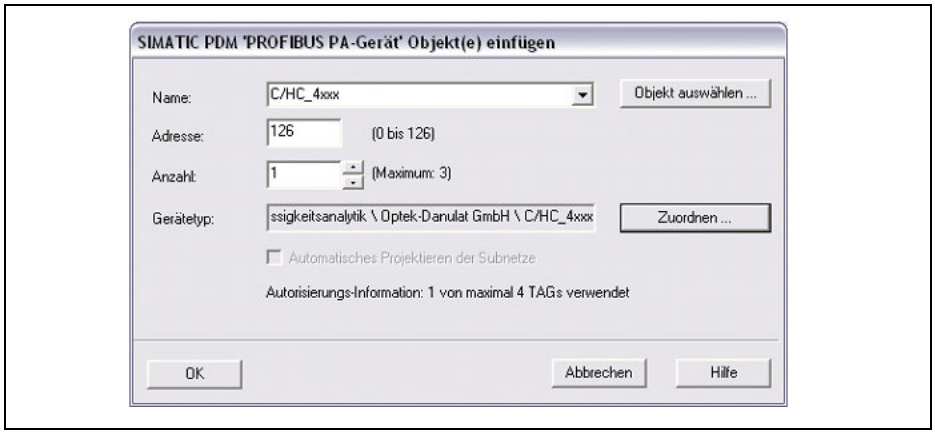


Fig. 20 SIMATIC® PDM – PROFIBUS PA adding a device

5. Select C/HC_4xxx.

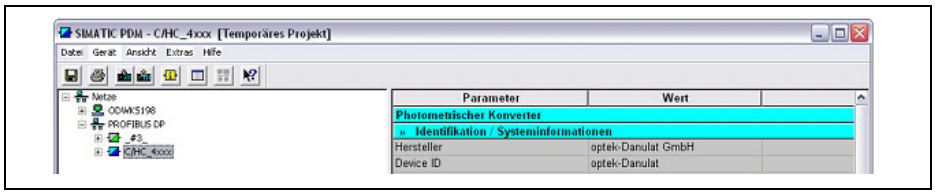


Fig. 21 Selecting C/HC_4xxx

6. Under Device, open the menu "Assign address...".

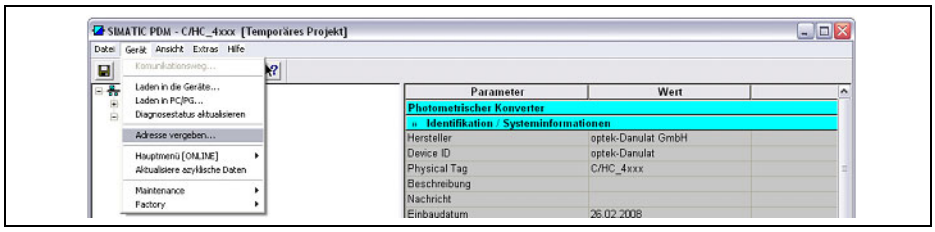


Fig. 22 Assigning an address

7. Enter a new address for the slave device (e. g. 16) and confirm with OK.

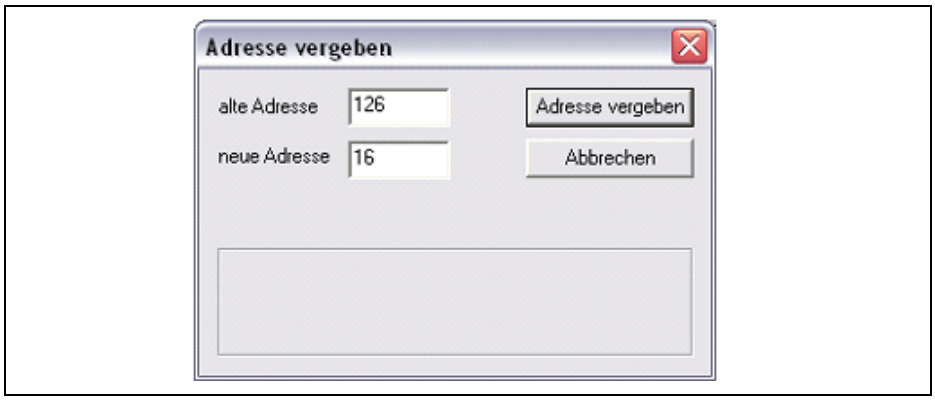


Fig. 23 Assigning an address

- The potential error message "Error during node initialization" can be ignored.

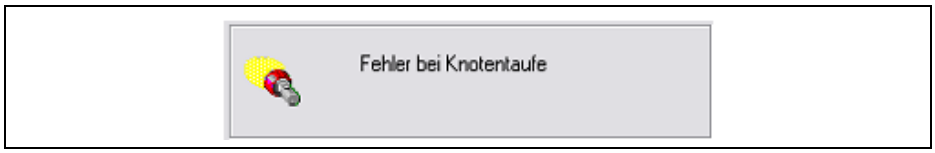


Fig. 24 Error message "Error during node initialization"

8. For testing purposes, the setting of a new address can be checked by means of a LifeList.

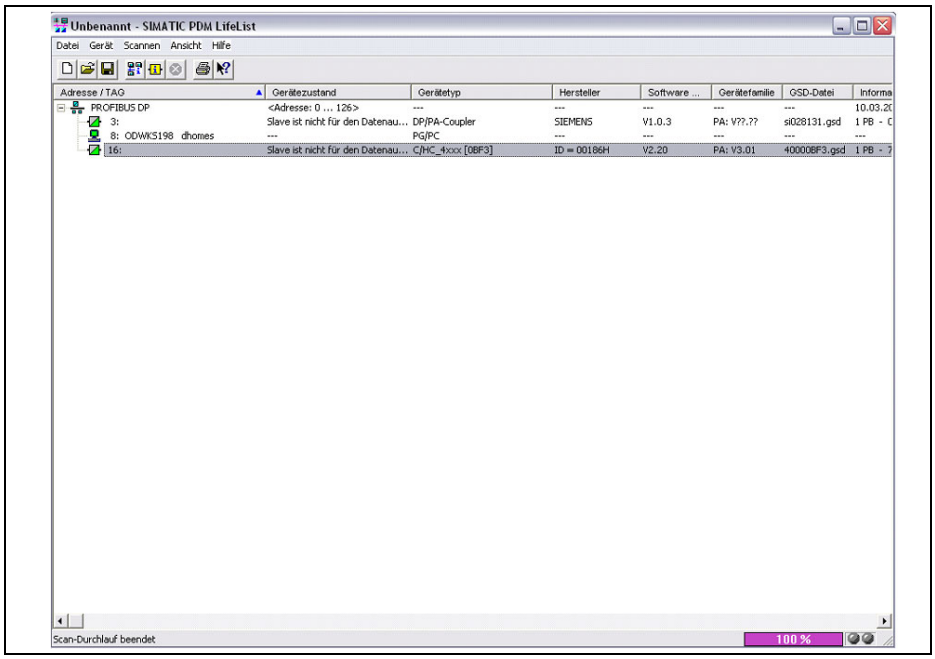


Fig. 25 Checking the new address

9.2 PROFIBUS® PA certificate

PROFIBUS • PROFINET

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

optek-Danulat GmbH
Emscherbruchallee 2, 45356 Essen, Germany

the Certificate No: **Z01398** for the PROFIBUS Device:

Model Name:	C4000 / Haze Control (C/HC_4xxx)
Revision:	1.00; SW/FW: 2.20.C.20; HW: 1.02
GSD:	4000BF3.gsd, File Version: 1.04 PA139703.gsd

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☑	DP-V0	MS0, Fail_Safe, Set_Slave_Add
☑	DP-V1	MS2, I&M
☑	Profile	PA Devices V 3.01
☑	Physical Layer	MBP

Test Report Number: itm 671 PA 01/01
Authorized Test Laboratory: itm, München, Germany

The tests were executed in accordance with the following documents:
"Test Specifications for PROFIBUS DP Slaves, Version 3.0 from November 2005" and
"Test Specifications for PROFIBUS PA Devices, Profile 3.01, Version 4.9.0 from February 2007".

This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".

For all products that are placed in circulation by March 04, 2024 the certificate is valid for life.

Karlsruhe, July 05, 2021

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Karsten Schneider)

(Dr. Jörg Hähniche)

PROFIBUS®

Fig. 26 PROFIBUS® PA certificate

10 EU declaration of conformity

Herewith we,

optek-Danulat GmbH, Emscherbruchallee 2, 45356 Essen, Germany,

declare in sole responsibility that the following measuring systems each comprising one converter of the series

Control 4000 (C4XXX with X=0..6);
Control 8000 (C8XXX with X=0..8);
Haze Control (HC 4XXX, X=0..6)

and one or several sensors of the series

AF16, AF26, AF45, AF46, TF16-N, DTF16, ASD12, ASD25,
AS16, AS56, ACF60, ACS60

have been developed, constructed and manufactured in conformity with the requirements of the European directives 2014/30/EU, 2014/35/EU and 2011/65/EU, 2015/863/EU (including the amendments valid at the time of this declaration).

The assessment is based on the application of the standards:

Tab. 19 EU declaration of conformity

EU Directives	Description	Standards
2014/30/EU	EMV	EN 61326-1:2013 EN 61326-2-3:2013 EN 61326-2-5:2013
2014/35/EU	Low Voltage Directive	EN 61010-1:2010 EN 61010-1-2010/A1:2019/ AC:2019-04 EN 61010-1:2010/A1:2019
2011/65/EU, 2015/863/EU	RoHS	EN IEC 63000:2018

Essen, 2022/05/29

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