

# LOGOSCREEN *cf*

Paperless Recorder  
with CompactFlash card  
as storage medium

B 70.6570.2.3  
Interface Description  
PROFIBUS-DP



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## 1.1 Preface



Please read this manual before starting up the interface. Keep the manual in a place which is accessible to all users at all times.

Please assist us to improve this manual.

Your suggestions will be appreciated.

Phone +49 661 6003-0

Fax +49 661 6003-607

email mail@jumo.net



If any difficulties should arise during commissioning, you are asked not to carry out any manipulations on the unit. You could endanger your rights under the instrument warranty!

Please contact the nearest subsidiary or the head office in such a case.



When returning modules, assemblies or components, the regulations of EN 61340-5-1 and EN 61340-5-2 "Protection of electronic devices from electrostatic phenomena" must be observed. Use only the appropriate **ESD** packaging for transport.

Please note that we cannot accept any liability for damage caused by ESD (electrostatic discharge).

# 1 Introduction

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## 1.2 Typographical conventions

### 1.2.1 Warnings

The signs for **Danger** and **Caution** are used in this manual under the following conditions:



#### **Danger**

This symbol is used where there may be **danger to personnel** if the instructions are disregarded or not followed accurately!



#### **Caution**

This symbol is used where there may be **damage to equipment or data** if the instructions are disregarded or not followed accurately!



#### **Caution**

This symbol is used if precautions must be taken when handling **electrostatically sensitive components**.

### 1.2.2 Note signs



#### **Note**

This symbol is used to draw your **special attention** to a remark.



#### **Reference**

This symbol refers to **additional information** in other manuals, chapters or sections.

abc<sup>1</sup>

#### **Footnote**

Footnotes are notes which **refer to certain points** in the text. Footnotes consist of two parts:

Marking in the text and the footnote text.


The marking in the text is arranged as continuous superscript numbers.

#### **Handling instructions**

\*

This symbol marks the description of a **required action**.

The individual steps are indicated by an asterisk, e. g.

\* Press the  key

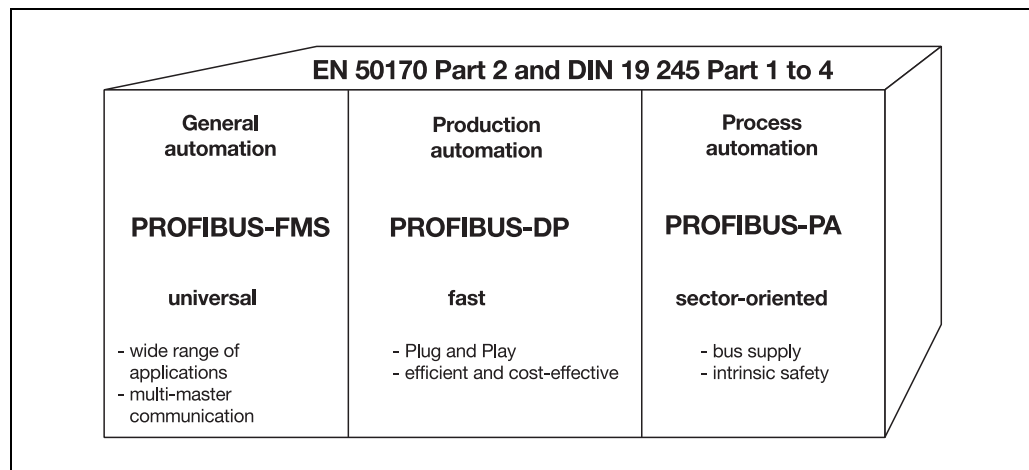
\* Confirm with 

## 2 Profibus description

PROFIBUS is a manufacturer-independent, open fieldbus standard for a wide range of applications in manufacturing, process and building automation. Manufacturer independence and openness are ensured by the international standard EN 50 170.

Using PROFIBUS, devices from different manufacturers can communicate without any special interface adjustments. PROFIBUS can be employed for both high-speed time-critical data transmission and extensive, complex communication tasks. The PROFIBUS family consists of three versions.

### 2.1 Profibus types



**The PROFIBUS family**

#### **PROFIBUS-DP**

This PROFIBUS version, which is optimized for high speed and low connection costs, has been especially designed for communication between automation control systems (PLC) and distributed field devices (typical access time: < 10msec). PROFIBUS-DP can be used to replace conventional, parallel signal transmission with 24V or 0/4–20mA.

DPV0: cyclic data transfer:  
--> is supported by the recorder.

DPV1: cyclic and acyclic data transfer:  
--> is not supported by the recorder.

DPV2: slave-to-slave communication takes place in addition to cyclic and acyclic data transfer:  
--> is not supported by the recorder.

#### **PROFIBUS-PA**

PROFIBUS-PA has been specifically designed for process engineering. It permits the linking of sensors and actuators to a common bus cable, even in hazardous areas. PROFIBUS-PA enables the data communication and energy supply for devices in two-wire technology according to the international IEC 1158-2 standard.

#### **PROFIBUS-FMS**

This is the universal solution for communication tasks at cell level (typical access time: approx. 100msec). The powerful FMS services open up a wide range of applications and provide a high degree of flexibility. FMS is also suitable for extensive communication tasks.

## 2 Profibus description

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### 2.2 RS485 transmission technology

Transmission takes place according to the RS485 standard. It covers all areas in which a high transmission speed and simple, cost-effective installation are required. A shielded twisted copper cable with one conductor pair is used.

The bus structure permits addition and removal of stations or step-by-step commissioning of the system without affecting the other stations. Later expansions have no influence on the stations which are already in operation.

Transmission speeds between 9.6 kbit/sec and 12 Mbit/sec are available. One uniform transmission speed is selected for all devices on the bus when the system is commissioned.

Network topology	linear bus, active bus termination at both ends, stub cables are only permissible for baud rates $\leq 1.5$ Mbit/sec.
Medium	shielded twisted-pair cable
Number of stations	32 stations in each segment without repeater (line amplifier). With repeaters, this can be expanded to 126.
Connector	preferably 9-pin sub-D connector

#### Basic features of the RS485 transmission technology

#### Installation tips

All devices are connected in a bus structure (line). Up to 32 stations (master or slaves) can be linked up in one segment.

The bus is terminated by an active bus terminator at the start and end of each segment. Both bus terminators must always be powered, to ensure fault-free operation.

If there are more than 32 users, repeaters must be used to link up the individual bus segments.

## 2 Profibus description

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### Cable length

The maximum cable length depends on the transmission speed. The cable length specified can be extended by using repeaters. It is recommended not to connect more than 3 repeaters in series.

Baud rate (kbit/s)	9.6	19.2	93.75	187.5	500	1500	12000
Range/segment	1200 m	1200 m	1200 m	1000 m	400 m	200 m	100 m

### Range based on transmission speed

### Cable data

These cable length specifications refer to the cable type described below:

Characteristic impedance:	135 — 165 $\Omega$
Capacitance per unit length:	< 30 pf/m
Loop resistance:	110 $\Omega$ /km
Core dia.:	0.64 mm
Core cross-section:	> 0.34 mm <sup>2</sup>

It is preferable to use a 9-pin sub-D connector for PROFIBUS networks incorporating RS485 transmission technology. The pin assignment at the connector and the wiring are shown at the end of this chapter.

PROFIBUS cables and connectors are supplied by several manufacturers. Please refer to the PROFIBUS product catalog ([www.profibus.com](http://www.profibus.com)) for types and addresses of suppliers.

When connecting up the devices, make sure that the data lines are not reversed. It is absolutely essential to use shielded data lines. The braided shield and the screen foil underneath (if present) should be connected to the protective earth on both sides, and with good conductivity. Furthermore, the data lines should be routed separately from all high-voltage cables, as far as this is possible.

As a suitable cable we recommend the following type from Siemens:

**Simatic Net Profibus 6XV1**

**Order No. 830-0AH10**

**\* (UL) CMX 75 °C (Shielded) AWG 22 \***

## 2 Profibus description

### Data rate

For installation, the use of stub cables must be avoided for data rates above 1.5 Mbit/sec.



For important tips on installation, please refer to the Installation Guidelines PROFIBUS-DP, Order No. 2.111 by the PNO (Profibus User Organization).

Address:

Profibus Nutzerorganisation e.V.

Haid- u. Neu-Straße 7

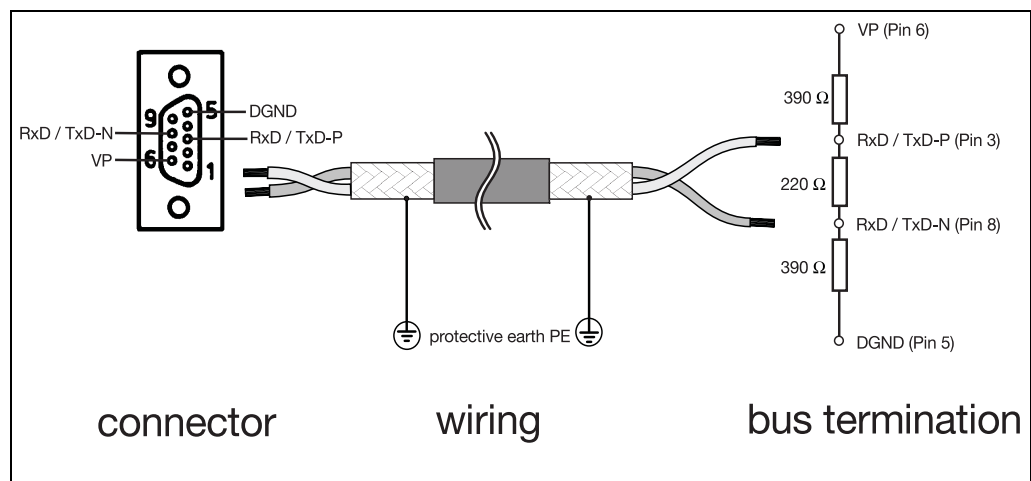
D-76131 Karlsruhe, Germany

Internet: [www.profibus.com](http://www.profibus.com)

### Recommendation:

**Please follow the installation recommendations made by the PNO, especially for the simultaneous use of frequency inverters.**

### Wiring and bus termination



### 2.3 PROFIBUS-DP

PROFIBUS-DP is designed for high-speed data exchange at the field level. The central control devices, PLC/PC for instance, communicate through a fast serial connection with distributed field devices such as I/O, paperless recorders and controllers. Data exchange with these distributed devices is mainly cyclic. The communication functions required for this are defined by the basic PROFIBUS-DP functions in accordance with EN 50 170.

#### Basic functions

The central controller (master) reads the input information cyclically from the slaves and writes the output information cyclically to the slaves. The bus cycle time must be shorter than the program cycle time of the central PLC. In addition to cyclic user data transmission, PROFIBUS-DP provides powerful functions for diagnostics and commissioning.

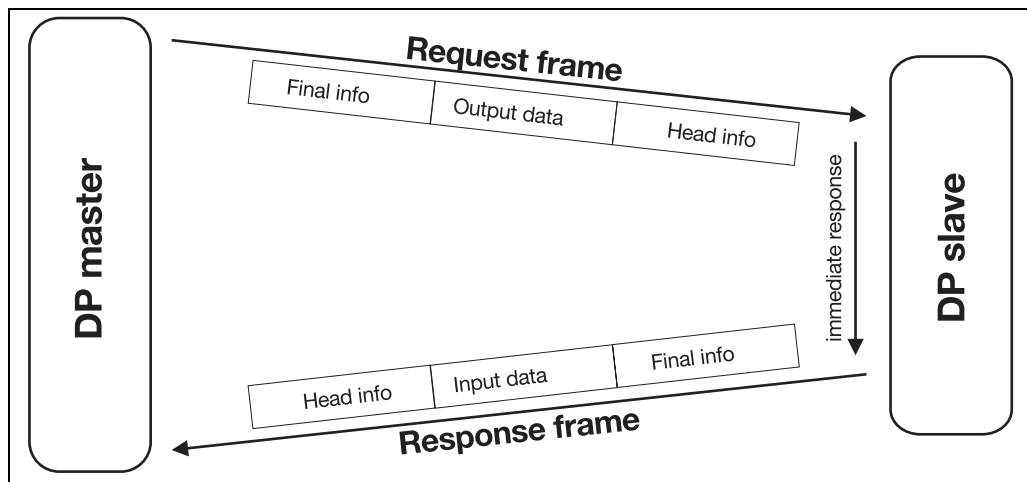
<b>Transmission technology:</b> <ul style="list-style-type: none"><li>• RS485 twisted pair</li><li>• Baud rates from 9.6 kbit/sec up to 12 Mbit/sec</li></ul>
<b>Bus access:</b> <ul style="list-style-type: none"><li>• Master and slave devices, max. 126 users on one bus</li></ul>
<b>Communication:</b> <ul style="list-style-type: none"><li>• Peer-to-peer (user data communication)</li><li>• Cyclic master-slave user data communication</li></ul>
<b>Operating states:</b> <ul style="list-style-type: none"><li>• Operate: Cyclic transmission of input and output data</li><li>• Clear: Inputs are read, outputs remain in secure state</li><li>• Stop: Only master-master data transfer is possible</li></ul>
<b>Synchronization:</b> <ul style="list-style-type: none"><li>• Sync mode: not supported by the recorder</li><li>• Freeze mode: not supported by the recorder</li></ul>
<b>Functionality:</b> <ul style="list-style-type: none"><li>• Cyclic user data transfer between DP master and DP slave(s)</li><li>• Dynamic activation or deactivation of individual DP slaves</li><li>• Checking the configuration of the DP slaves</li><li>• Address assignment for the DP slaves via the bus</li><li>• Configuration of the DP master via the bus</li><li>• maximum of 246 bytes input/output data for each DP slave</li></ul>
<b>Protective functions:</b> <ul style="list-style-type: none"><li>• Address monitoring for the DP slaves</li><li>• Access protection for inputs/outputs of the DP slaves</li><li>• Monitoring of user data communication with adjustable monitoring timer in the master</li></ul>
<b>Device types:</b> <ul style="list-style-type: none"><li>• DP master Class 2, e. g. programming/project design devices</li><li>• DP master Class 1, e. g. central automation devices such as PLC, PC...</li><li>• DP slave e. g. devices with binary or analog inputs/outputs, controllers, recorders...</li></ul>

## 2 Profibus description

### Cyclic data transmission

The data transmission between the master and the DP slaves is carried out by the master in a defined, recurring order. When configuring the bus system, the user defines the assignment of a DP slave to the master. It is also defined which DP slaves are to be included in, or excluded from, the cyclic user data communication.

Data transmission between the master and the DP slaves is divided into three phases: parameterization, configuration and data transfer. Before a DP slave enters the data transfer phase, the master checks in the parameterization and configuration phase whether the planned configuration matches the actual device configuration. In the course of this check, the device type, format and length information, as well as the number of inputs and outputs must agree. These checks provide the user with reliable protection against parameterization errors. In addition to the user data transfer, which is performed automatically by the master, new parameterization data can be sent to the DP slaves at the request of the user.



User data transmission in PROFIBUS-DP

# 3 Configuring a PROFIBUS system

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## 3.1 GSD files

Device base data (GSD) enable open project design.

PROFIBUS devices have different features. They differ with respect to the available functionality (e. g. number of I/O signals, diagnostic messages) or possible bus parameters, such as baud rate and time monitoring. These parameters vary individually for each device type and manufacturer. In order to obtain simple Plug & Play configuration for PROFIBUS, the characteristic device features are defined in an electronic device data sheet (Device Data Base File, GSD file). The standardized GSD files expand open communication up to the operator level. By means of the project design tool, which is based on the GSD files, devices from different manufacturers can be integrated into a bus system, simply and user-friendly. The GSD files provide a clear and comprehensive description of a device type in a precisely defined format. GSD files are prepared according to the application. The defined data format permits the project design system to simply read in the GSD files of any PROFIBUS-DP device and automatically use this information when configuring the bus system. Already during the project design phase, the project design system can automatically perform checks for input errors and the consistency of data entered in relation to the entire system.

The GSD files are divided into three sections.

- **General specifications**  
This section contains information on manufacturer and device names, hardware and software release states, baud rates supported and the possible time intervals for monitoring times.
- **DP master-related specifications**  
This section contains all the parameters related to DP-master devices only, such as the maximum number of DP slaves that can be connected, or upload and download options. This section is not available for slave devices.
- **DP-slave related specifications**  
This section contains all slave-related specifications, such as the number and type of the I/O channels, specification of diagnostic texts and information on the consistency of I/O data.

The GSD format is designed for flexibility. It contains lists, such as the baud rates supported by the device, as well as the possibility of describing the modules available in a modular device.

# 3 Configuring a PROFIBUS system

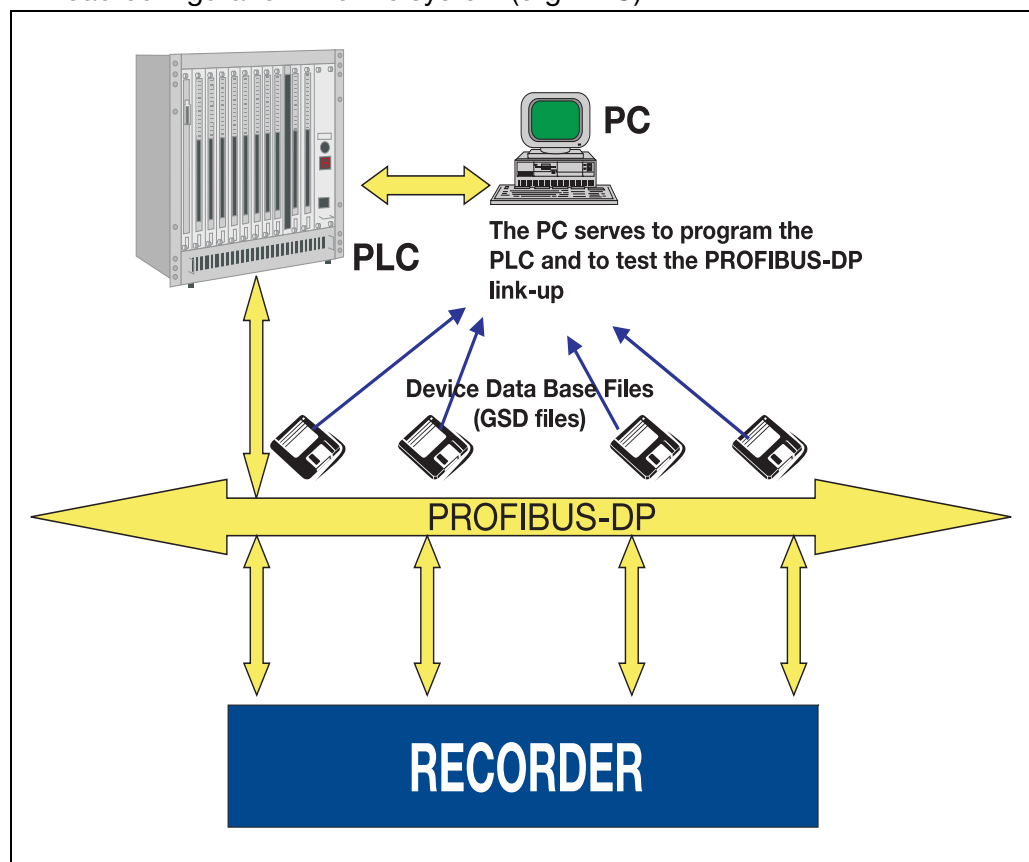
## 3.2 Configuration procedure

### Plug & Play

To simplify the configuration of the PROFIBUS system, the master (PLC) is configured using the PROFIBUS configurator and the GSD files, or in the PLC through the hardware configurator.

#### Configuration steps:

- Create GSD file by using the GSD generator
- Load GSD files of the PROFIBUS slaves into the PROFIBUS network configuration software
- Perform configuration
- Load configuration into the system (e.g. PLC)



### The GSD file

The characteristic device features of a PROFIBUS slave are specified by the manufacturer, clearly and comprehensively in a precisely defined format, in the GSD file (Device Data Base File).

### The PROFIBUS configurator / hardware configurator (PLC)

This software can read in the GSD files for PROFIBUS-DP devices of any manufacturer and integrate them for the configuration of the bus system.

Already in the project design phase, the PROFIBUS configurator automatically checks the files that have been entered for errors in system consistency.

The result of the configuration is read into the master (PLC).

# 3 Configuring a PROFIBUS system

## 3.3 The GSD generator

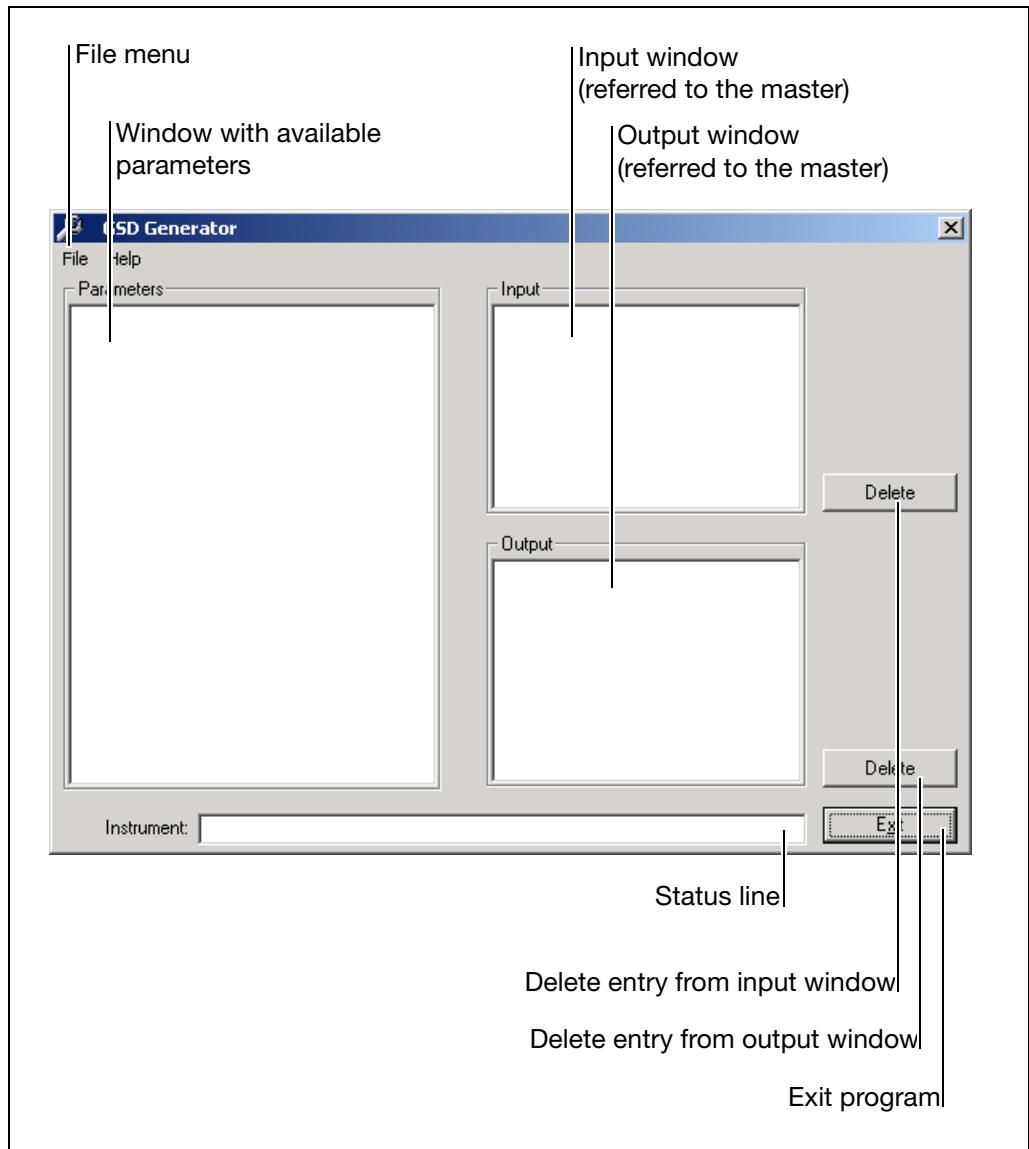
### 3.3.1 General

GSD files for recorders with a PROFIBUS interface are generated by the user with the aid of the GSD generator.

The recorders with a PROFIBUS interface can send or receive a large variety of variables (parameters). Since, however, in most applications, only a portion of these variables will be sent via PROFIBUS, the GSD generator makes a selection of these variables.

After selection of the device, all available variables are shown in the “Parameters” window. Only after these have been copied to the “Input” or “Output” window will they later be contained in the GSD file for processing or pre-processing by the master (PLC).

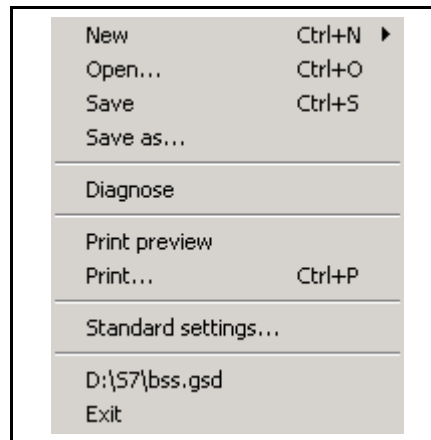
### 3.3.2 Operation



### 3 Configuring a PROFIBUS system

**File menu**

The file menu can be called up using the Alt-D combination or the left mouse button. It provides the following options:



<b>New</b>	After calling up the function which creates a new GSD file, the available devices are selected. After selection of the required device, all available parameters are shown in the parameter window.
<b>Open</b>	This function opens an existing GSD file.
<b>Save/ Save as</b>	This function is available for saving the generated or altered GSD file.
<b>Diagnosis</b>	Using this function, the GSD file can be tested in conjunction with a PROFIBUS-DP adapter from B+W.
<b>Print preview</b>	shows the preview of a report <sup>1</sup> that can be printed.
<b>Print</b>	prints a report <sup>1</sup> .
<b>Standard settings</b>	The language to be used at the next restart of the program can be selected here.
<b>Exit</b>	exits the program.



<sup>1</sup>. The report contains additional information for the PLC programmer (e.g. data type of the selected parameters).

⇒ Chapter 3.3.3 “Example report”

## 3 Configuring a PROFIBUS system

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### 3.3.3 Example report

I/O report

Device: RECORDER

Length of inputs (byte): 7

Length of outputs (byte): 4

Inputs

Byte	Description	Type
-----		
[ 0]	Interface status	BYTE
[ 1]	int. logic inputs\Bool_Out01	BOOLEAN
[ 2]	int. logic inputs\Bool_Out02	BOOLEAN
[ 3]	int. analog inputs 16bit\Int_Out01	INTEGER
[ 5]	int. analog inputs 16bit\Int_Out02	INTEGER

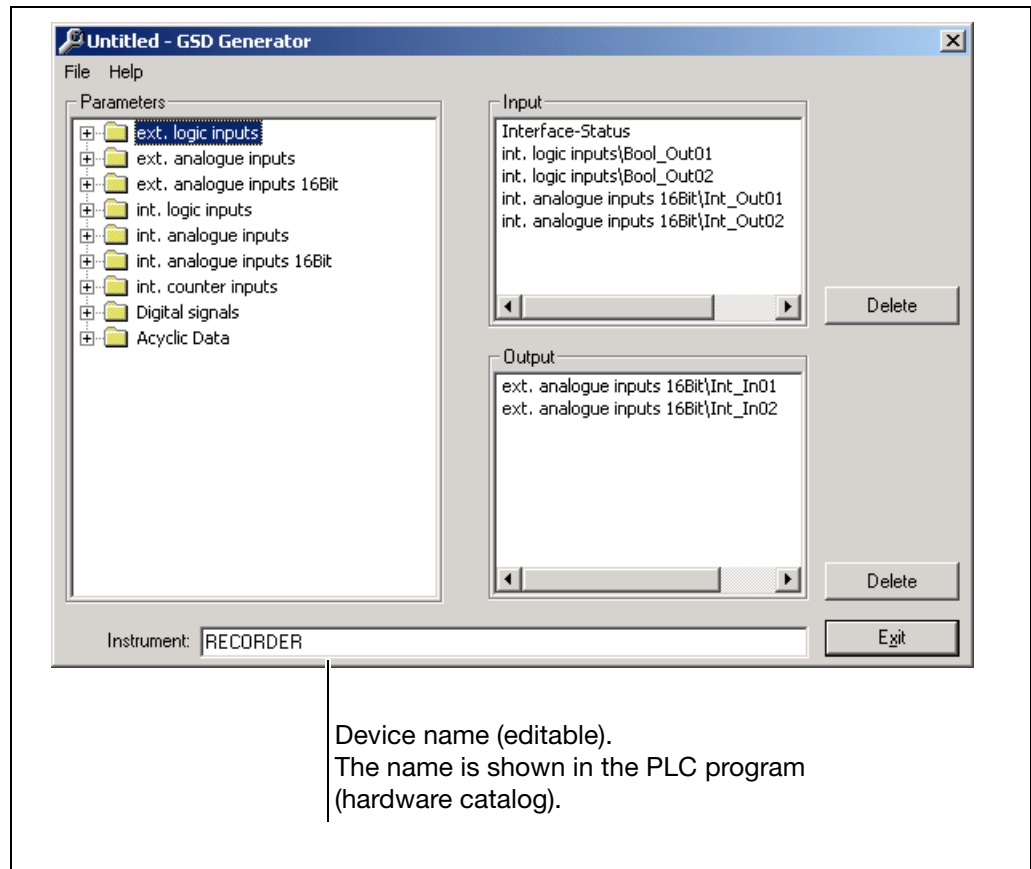
Outputs

Byte	Description	Type
-----		
[ 0]	ext. logic inputs\Bool_In01	BOOLEAN
[ 1]	ext. logic inputs\Bool_In02	BOOLEAN

# 3 Configuring a PROFIBUS system

## Select parameter

If an existing file has been opened, or a new one created, all available parameters are shown in the parameter window.



A click with the left mouse button on the “+” (⊕-📁 int. analogue inputs 16Bit) symbol or “-” (📁- int. analogue inputs 16Bit) will extend the parameter list or reduce it.

Click on the parameter with the left mouse button, and, keeping it pressed, copy it to the input or output window by Drag & Drop.

## Remove parameter

Parameters are deleted from the input or output window using the corresponding **Delete** button.



The parameter “Interface status” will automatically appear in the input window and cannot be deleted. It is used for diagnosis of the internal data transmission in the device and can be requested by the PLC:

- 0 : internal communication in device is OK
- unequal 0 : faulty communication in device

# 3 Configuring a PROFIBUS system

## 3.4 Connection example

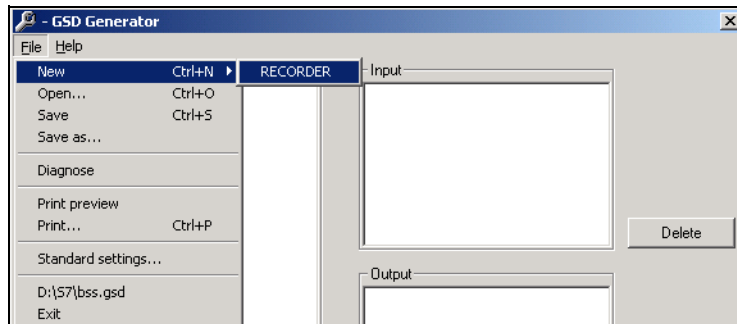
The example below shows the path for the connection of a recorder to a S7 from Siemens.

### 3.4.1 RECORDER

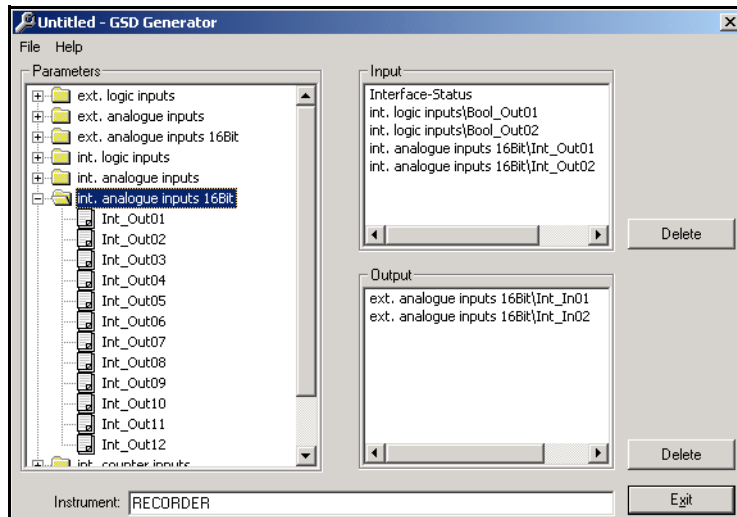
- \* Connect the device to the PLC.
- \* Set the device address.  
The device (instrument) address can be selected via the instrument keys or through the setup program.

### 3.4.2 GSD generator

- \* Start up the GSD generator (Example: *Start* → *Programs* → *OEM devices* → *Profibus* → *GSD generator*).
- \* Select the recorder.

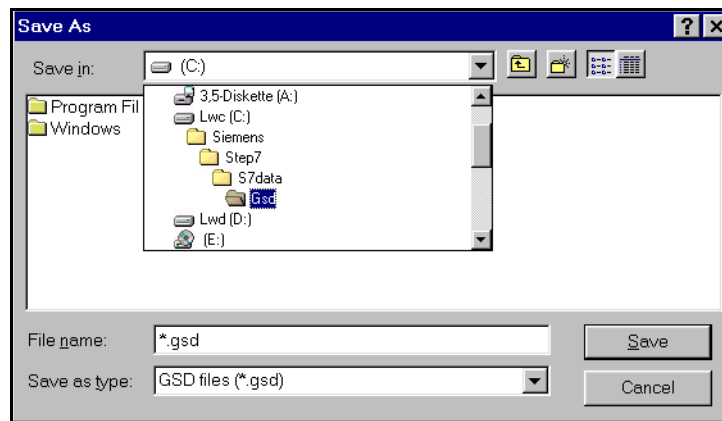


- \* Select the variables that are transmitted to the master.



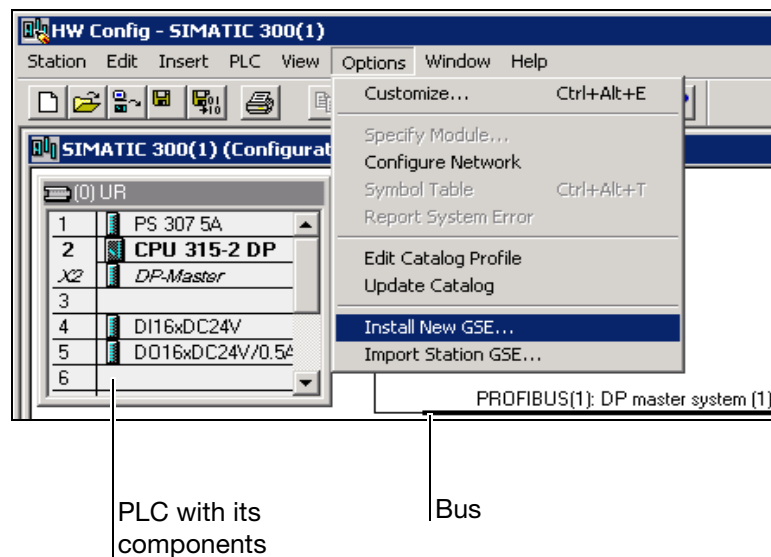
## 3 Configuring a PROFIBUS system

- \* Save the GSD file in any folder.



### 3.4.3 PLC configuration

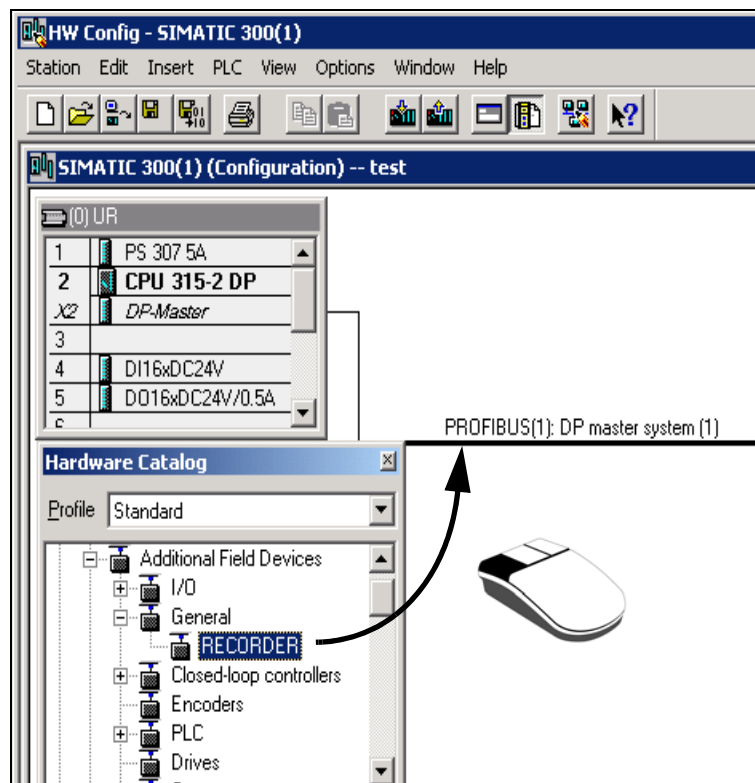
- \* Start the PLC software.
- \* Call up the hardware configuration and execute menu command "Install new GSD".



The new GSD file is read in and processed, and the recorder is inserted in the hardware catalog.

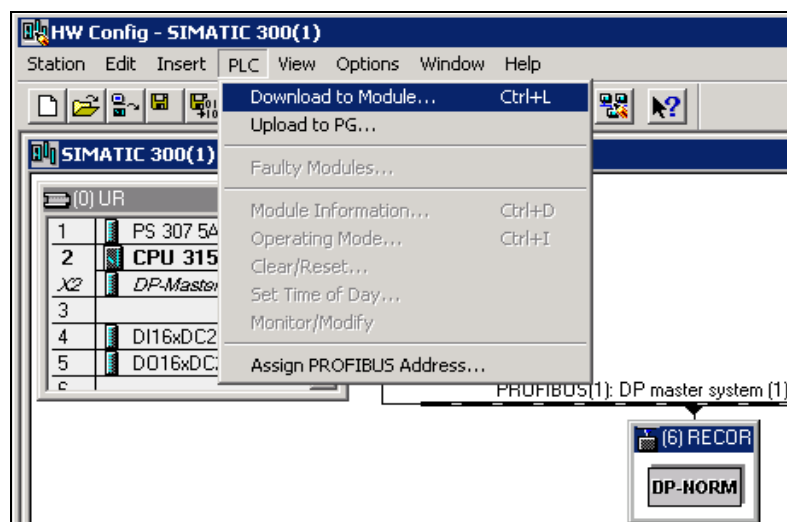
## 3 Configuring a PROFIBUS system

- \* Open the hardware catalog and place the new device in the working area.



The recorder is placed on the bus using the left mouse button. After releasing the mouse button, the recorder address has to be assigned. The baud rate is determined automatically.

- \* Finally, you have to load the configuration into the PLC (*PLC* → *Download to module*).



# 3 Configuring a PROFIBUS system

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## 4 Data format of the recorder

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When using recorders in a PROFIBUS-DP system, please take note of their data format.

### Integer values

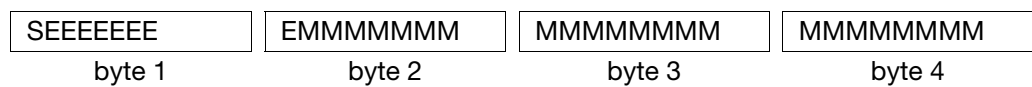
Integer values are transmitted in the following format:

- first the high byte,
- then the low byte.

### Float values/ real values

With all JUMO instruments, the float/real values are transmitted using the IEEE-754 standard format (32bits), with the difference, however, that bytes 1 and 2 are swapped with bytes 3 and 4.

#### Single-float format (32bits) as per IEEE 754 standard



S - sign bit (bit31)

E - exponent in complement to base 2 (bit23 — bit30)

M - 23bit normalized mantissa (bit0 — bit22)

Example:

calculation of the real number from sign, exponent and mantissa.

byte 1 = 40h, byte 2 = F0, byte 3 = 0, byte 4 = 0

40F00000h = 0100 0000 1111 0000 0000 0000 0000 0000b

S = 0

E = 100 0000 1

M = 111 0000 0000 0000 0000 0000

Value =  $-1^S \cdot 2^{\text{exponent}-127} \cdot (1 + M_{b22} \cdot 2^{-1} + M_{b21} \cdot 2^{-2} + M_{b20} \cdot 2^{-3} + M_{b19} \cdot 2^{-4} + \dots)$

Value =  $-1^0 \cdot 2^{129-127} \cdot (1 + 1 \cdot 2^{-1} + 1 \cdot 2^{-2} + 1 \cdot 2^{-3} + 0 \cdot 2^{-4})$

Value =  $1 \cdot 2^2 \cdot (1 + 0.5 + 0.25 + 0.125 + 0)$

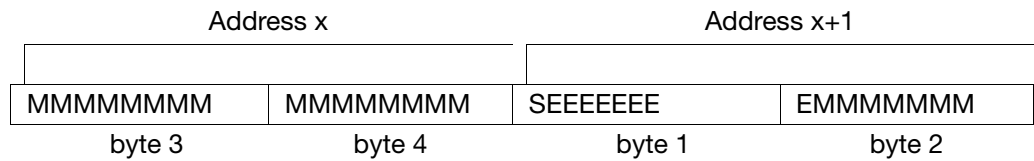
Value =  $1 \cdot 4 \cdot 1.875$

Value = 7.5

## 4 Data format of the recorder

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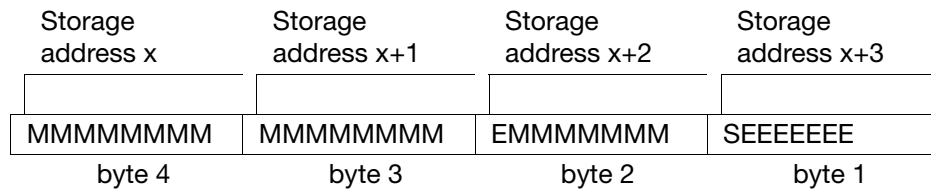
### MODbus float format



After/before the transmission from/to the device, the bytes of the float value have to be swapped accordingly.

Many compilers (e.g. Microsoft C++, Turbo C++, Turbo Pascal, Keil C51) store the float values in the following order (Intel compatibility):

### float value



Please check how float values are stored in your application. If necessary, the bytes have to be swapped accordingly.

## 5 Device-specific data

---

This chapter describes the connection of the paperless recorder to the PROFIBUS-DP.



The device can be used exclusively as a DP slave.

A recorder can be used to record and display, among others, up to 36 analog channels from a PLC.

### 5.1 System requirements

The following conditions must be fulfilled in order to connect a recorder to the PROFIBUS-DP interface:

- Paperless recorder with a PROFIBUS-DP interface

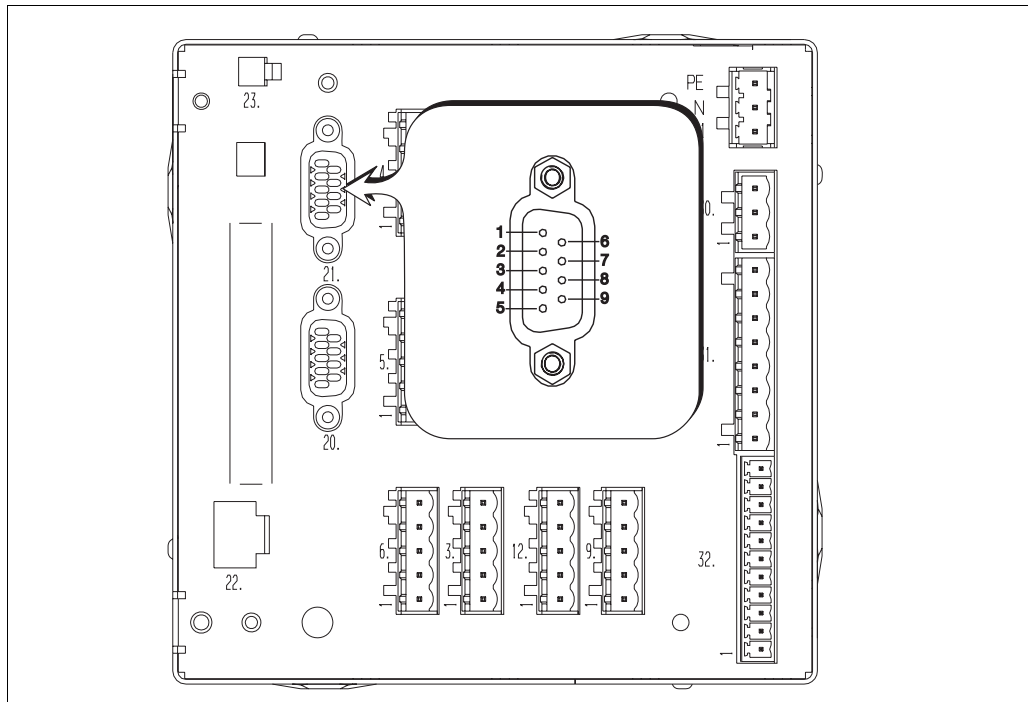


If a plug-in card for PROFIBUS-DP is fitted, then “Profibus-DP” appears in the *Device info* window, under MENU, as an entry for *Interface 21*.

# 5 Device-specific data

## 5.2 Connection diagram

Rear view of the paperless recorder



**Connector 21**

Interface

**PROFIBUS-DP**

Connections

Sub-D	Signal	Designation
3	RxD/TxD-P	Receive/Transmit data-plus, B-cable
5	DGND	Data transmission ground potential
6	VP	Supply voltage-plus, (P5V)
8	RxD/TxD-N	Receive/Transmit data-N, A-cable



When making the connection to the PROFIBUS-DP it is important to ensure that the connectors 20 and 21 are not swapped. Connector 20 is reserved for the serial interface. The serial interface is used to read out device and process data from the paperless recorder. The connection and function of the serial interface are described in the Interface Description 70.6570.2.0.

### 5.3 Setting the slave address

The slave address is set through the paperless recorder or the setup program.

Setting	Meaning
1 – 124	Slave address, as selected
125	The setting of the slave address can be predefined by the bus master

The baud rate is determined automatically (max. 12Mbps).

### 5.4 Diagnostic and status messages

If errors occur during communication with the device, the (i) symbol in the header will blink, and an error message appears in the *Device info* menu.

The measurements are labeled as *invalid* (200003).

The screen of the paperless recorder displays “-----”.

Please check the wiring and the master (PLC).

It may be necessary to restart the system.

#### Suppression

The error message in the *Device info* menu and the (i) in the header can be suppressed by setting the slave address 125.

### 5.5 Acyclic data transmission

You can use the *acyclic data* function to read and write various measurement and process data of the recorder.



Acyclic data can also be transmitted by means of cyclic data transfer.

Acyclic data communication follows Modbus communication.

In order to establish communication with a recorder (device), it must receive 3 info bytes and a maximum of 10 bytes of user data.

#### Protocol structure

Byte No.	1	2	3	4 – 13
contents	control byte	function	address	user data

# 5 Device-specific data

**Control byte**

The control byte (byte No. 1) is organized as follows:

bit 0 – 3: length of the user data in words  
(word number = byte number / 2)

bit 4 – 5: “toggle flag”  
Both bits must change state (toggle) with every new job that is sent to the device, so that it can recognize the new command. The bits must only be set after the transmit buffer has been fully prepared for the new command.

Example:

Bit 5	Bit 4	
0	0	no job present
0	1	bit 4 is set, job 1 is being processed
1	0	bit 5 is set, job 2 is being processed
0	1	bit 4 is set, job 3 is being processed
...	...	.....

bit 6 – 7: Response OK: bit 6 = 0 and bit 7 = 1  
Response faulty: bit 6 = 1 and bit 7 = 0  
Bit 6 and bit 7 are a signal for the PLC that the command has been processed by the device, and the next command for the device can be generated and transmitted by the PLC.

Bit 7	Bit 6	Bit 5	Bit 4	
0	0	0	1	bits 4 and 5 are returned unchanged by the device as a “job is being processed” info
0	0	1	0	bits 4 and 5 are returned unchanged by the device as a “job is being processed” info
1	0	0	1	fault-free processing of job with bit 4 = 1
0	1	0	1	processing of job with bit 4 = 1 was not fault-free
0	0	1	0	bits 4 and 5 are returned unchanged by the device as a “job is being processed” info
1	0	1	0	fault-free processing of job with bit 5 = 1
0	1	1	0	processing of job with bit 5 = 1 was not fault-free
...	...	...	...	.....

**Function**

0x03: read  
0x10: write



The address is given byte-wise in the protocol, the data are addressed word-wise.

**User data**

A maximum of 10 bytes of user data can be presented. The number of user data is given (in words) by bits 4 – 13.

## 5 Device-specific data

### Command sequence

- PLC sends job 1
  - PLC sets bit 4 in the control byte
  - PLC receives response “job OK” or “job faulty”
- PLC sends job 2
  - PLC resets bit 4 in the control byte and sets bit 5
  - PLC receives response “job OK” or “job faulty”
- PLC sends job 3
  - PLC resets bit 5 in the control byte and sets bit 4
  - PLC receives response “job OK” or “job faulty”
- and so on ...

### Example (write)

Text 1 for the batch report has to be written. Since a batch text can have a maximum of 20 characters, it will be transmitted in 2 sections, each consisting of 10 characters. Character 21 (0x) can be left out.

The following bytes must be transmitted to the recorder:

#### a.) Bytes 1 – 10

0x25	0x10	0xA6	0x50	0x72	0x6F	0x64	0x75	0x63	0x74	0x20	0x6E	0x6F
			P	r	o	d	u	c	t		n	o

#### b.) Bytes 11 – 20

0x15	0x10	0xAB	0x41	0x42	0x43	0x31	0x32	0x33	0x34	0x35	0x36	0x37
			A	B	C	1	2	3	4	5	6	7

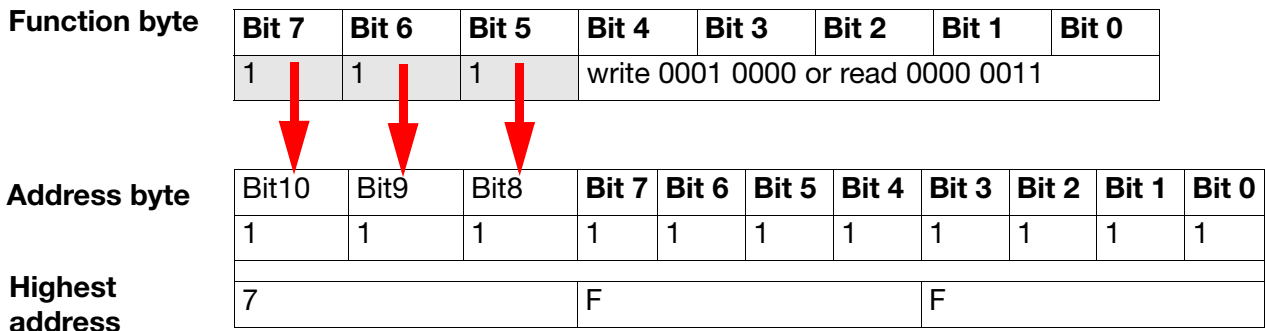


The starting address for transmitting the first 10 characters is 0xA6. Since addressing is carried out word-wise, the second 10 characters must be addressed from 0xAB (0xA6 + 5) onwards for transmission.

# 5 Device-specific data

## 5.6 Extension of the address range

The (previously) unused bits 7, 6 and 5 from the function byte are used to form an 11-bit wide Modbus address.



### Address

The following addresses can be read or written. The list corresponds to a portion of the addresses which are contained in the interface description for the paperless recorder.

The address that is defined in the protocol is derived from:

$$\text{address} = \text{base address} + \text{address of variable}$$

Example: the address for the measurement of analog input 6 is:

$$\text{address} = 0x35 + 0x0A = 0x3F$$

### Example (write)

In the following example, a message text is transmitted to the address 0x0114 (extended address range).



When transmitting a message text to the event list, bytes 11 – 20 must be sent before bytes 1 – 10, since the text is accepted in the event list on receipt of byte 1.

The following bytes must be transmitted to the recorder:

#### a.) Bytes 11 – 20

0x25	0x30	0x19	0x72	0x75	0x6E	0x6E	0x69	0x6E	0x67	0x20	0x20	0x20
			r	u	n	n	i	n	g			

Bits 5, 6 and 7 of 0x30 and 0x19 from the address 0x0119.

0x30 -> **0011** 0000 = 0x01 and 0x19 -> **0001 1001** = 0x19

address = 0x0119

#### b.) Bytes 1 – 10

0x15	0x30	0x14	0x50	0x72	0x6F	0x63	0x65	0x73	0x73	0x20	0x69	0x73
			P	r	o	c	e	s	s		i	s

Bits 5, 6 and 7 of 0x30 and 0x14 form the address 0x0114.

0x30 -> **0011** 0000 = 0x01 and 0x14 -> **0001 0100** = 0x14

address = 0x0114

## 5 Device-specific data

### 5.7 Process data

Base address: 0x002F

Address	Access	Data type	Signal designation
0x0000	R/O	int	Group alarm and logic input settings
	R/O	bit0	Alarm group 1 0 = no alarm 1 = at least 1 limit infringement in group
	R/O	bit1	Alarm group 2
	R/O	bit2	Alarm group 3
	R/O	bit3	Alarm group 4
	R/O	bit4	Alarm group 5
	R/O	bit5	Alarm group 6
	R/O	bit6-7	not used
	R/O	bit8	Logic input 1 0 = open / 1 = closed
	R/O	bit9	Logic input 2
	R/O	bit10	Logic input 3
	R/O	bit11	Logic input 4
	R/O	bit12	Logic input 5
	R/O	bit13	Logic input 6
	R/O	bit14	Logic input 7
	R/O	bit15	not used
0x0001	R/O	int	Logic signals
	R/O	bit0	CompactFlash card is in the slot (0 = no, 1 = yes)
	R/O	bit1	CF card has been stolen (0 = no, 1 = card was removed while no user was logged in)
	R/O	bit2	Memory alarm: insufficient free internal memory available. Data must be fetched with CF card!
	R/O	bit3	Memory alarm: insufficient free internal memory available. Data must be fetched via the serial interface!

## 5 Device-specific data

Address	Access	Data type	Signal designation
	R/O	bit4	Memory alarm: insufficient free memory available on the CompactFlash card!
	R/O	bit5	Login status: 0 = no user logged in, 1 = user logged in
	R/O	bit6	not used
	R/O	bit7	not used
	R/O	bit8	Combination alarm 0 = no alarm 1 = at least 1 limit infringed in device
	R/O	bit9	not used
	R/O	bit10	Fault condition 0 = no fault / 1 = fault
	R/O	bit11-15	not used
0x0002	R/O	int	Logic outputs
	R/O	bit0	Relay output 1 0 = not active / 1 = active
	R/O	bit1	Relay output 2
	R/O	bit2	Relay output 3
	R/O	bit3	Relay output 4
	R/O	bit4	Relay output 5
	R/O	bit5	Open collector output 0 = not active / 1 = active
	R/O	bit6-15	not used
0x0003	R/W	int	External logic inputs (either from external I/O modules or via Modbus)
	R/W	bit0	External logic input 1 0 = open / 1 = closed
	R/W	bit1	External logic input 2
	R/W	bit2	External logic input 3
	R/W	bit3	External logic input 4
	R/W	bit4	External logic input 5
	R/W	bit5	External logic input 6
	R/W	bit6-15	not used

## 5 Device-specific data

Address	Access	Data type	Signal designation
0x0004	R/W	int	Flag for operating various device functions
	R/W	bit0	Modbus flag (control flag) 0 = false / 1 = true
	R/W	bit1-15	not used

Base address: 0x0035

Address	Access	Data type	Signal designation
0x0000	R/O	float	Measurement input 1 (analog input 1)
0x0002	R/O	float	Measurement input 2 (analog input 2)
0x0004	R/O	float	Measurement input 3 (analog input 3)
0x0006	R/O	float	Measurement input 4 (analog input 4)
0x0008	R/O	float	Measurement input 5 (analog input 5)
0x000A	R/O	float	Measurement input 6 (analog input 6)
0x000C	R/O	float	Measurement input 7 (analog input 7)
0x000E	R/O	float	Measurement input 8 (analog input 8)
0x0010	R/O	float	Measurement input 9 (analog input 9)
0x0012	R/O	float	Measurement input 10 (analog input 10)
0x0014	R/O	float	Measurement input 11 (analog input 11)
0x0016	R/O	float	Measurement input 12 (analog input 12)
0x0018	R/O	float	not used
0x001A	R/O	float	not used
0x001C	R/O	float	not used
0x001E	R/O	float	not used
0x0020	R/W	float	Counter value 1
0x0022	R/W	float	Counter value 2
0x0024	R/W	float	External counter value 1 (from external I/O modules)
0x0026	R/W	float	External counter value 2 (from external I/O modules)
0x0028	R/W	float	External analog input 1 (from external I/O modules or via Modbus)
0x002A	R/W	float	External analog input 2

## 5 Device-specific data

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0x002C	R/W	float	External analog input 3
0x002E	R/W	float	External analog input 4
0x0030	R/W	float	External analog input 5
0x0032	R/W	float	External analog input 6
0x0034	R/W	float	External analog input 7
0x0036	R/W	float	External analog input 8
0x0038	R/W	float	External analog input 9
0x003A	R/W	float	External analog input 10
0x003C	R/W	float	External analog input 11
0x003E	R/W	float	External analog input 12
0x0040	R/W	float	External analog input 13
0x0042	R/W	float	External analog input 14
0x0044	R/W	float	External analog input 15
0x0046	R/W	float	External analog input 16
0x0048	R/W	float	External analog input 17
0x004A	R/W	float	External analog input 18
0x004C	R/W	float	External analog input 19
0x004E	R/W	float	External analog input 20
0x0050	R/W	float	External analog input 21
0x0052	R/W	float	External analog input 22
0x0054	R/W	float	External analog input 23
0x0056	R/W	float	External analog input 24
0x0058	R/W	float	External analog input 25
0x005A	R/W	float	External analog input 26
0x005C	R/W	float	External analog input 27
0x005E	R/W	float	External analog input 28
0x0060	R/W	float	External analog input 29
0x0062	R/W	float	External analog input 30
0x0064	R/W	float	External analog input 31
0x0066	R/W	float	External analog input 32
0x0068	R/W	float	External analog input 33
0x006A	R/W	float	External analog input 34

## 5 Device-specific data

0x006C	R/W	float	External analog input 35
0x006E	R/W	float	External analog input 36

Base address: 0x00A6

Address	Access	Data type	Signal designation
0x0000	R/W	char 21	Text 1 for batch reports
0x000B	R/W	char 21	Text 2 for batch reports
0x0016	R/W	char 21	Text 3 for batch reports
0x0021	R/W	char 21	Text 4 for batch reports
0x002C	R/W	char 21	Text 5 for batch reports
0x0037	R/W	char 21	Text 6 for batch reports
0x0042	R/W	char 21	Text 7 for batch reports
0x004D	R/W	char 21	Text 8 for batch reports
0x0058	R/W	char 21	Text 9 for batch reports
0x0063	R/W	char 21	Text 10 for batch reports

Base address: 0x0114

Address	Access	Data type	Signal designation
0x0000	R/W	char 21	Message text (for entry in the event list) ⇒ Page 30

Base address: 0x011F

Address	Access	Data type	Signal designation
0x0000	W/O	char 11	Password

Base address: 0x012B

Address	Access	Data type	Signal designation
0x0000	R/W	char 400	Recipe for batch reports

# 5 Device-specific data

## 5.8 PLC data in 16-bit format

The functions described below are only available for recorders with a program version 100.03.05 or higher.

### Internal measurement inputs to the recorder

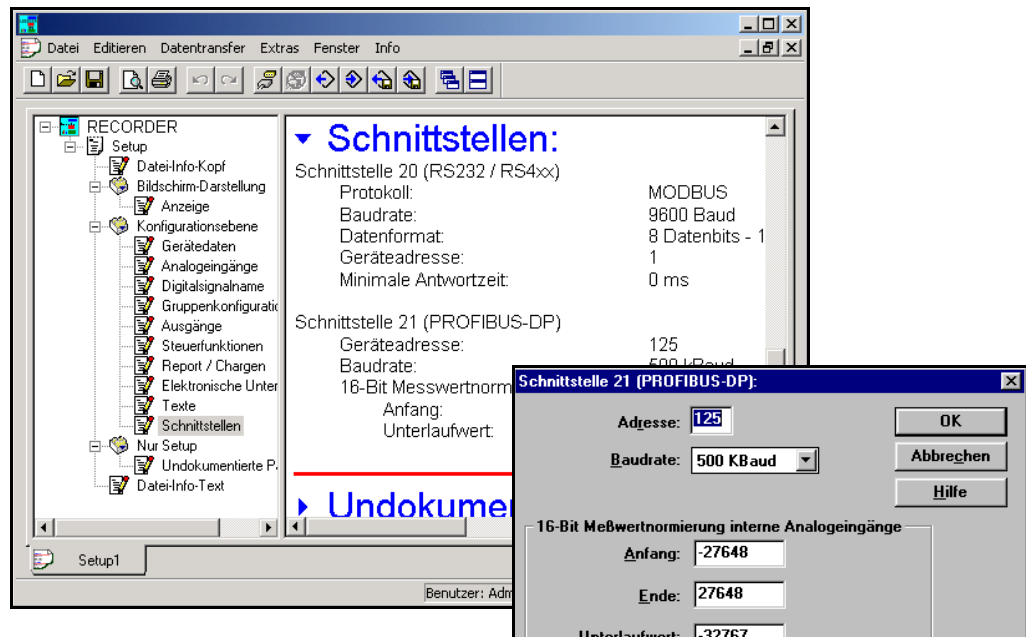
From program version 100.03.05 on, the internal measurement inputs (1 – 6 or 1 – 12) can be transmitted to the PROFIBUS-Master (PLC) not only in the *real* format (4 bytes), but also in the *integer* format (2 bytes).

It is necessary to use the setup program of the recorder to enter four values for the normalization of the measurements **for all internal channels** (i.e. not separately for each channel):

- Measurement range start
- Measurement range end
- Value on underrange
- Value on overrange

The internal measurements are converted from the *real* format to the *integer* format. These four parameters have been introduced in order to enable a uniform conversion calculation for all channels.

The parameters are entered in the section *Interface 21*. Call up the dialog by a double-click inside the working area or through the menu *Edit* → *Interface 21 (PROFIBUS-DP)*.



### External measurement inputs to the recorder

The external measurement inputs (1 – 36) can also be transmitted to the recorder in *real* format (4 bytes) as well as in *integer* format (2 bytes). The decision as to which data format should be used is also made with the aid of the GSD generator.

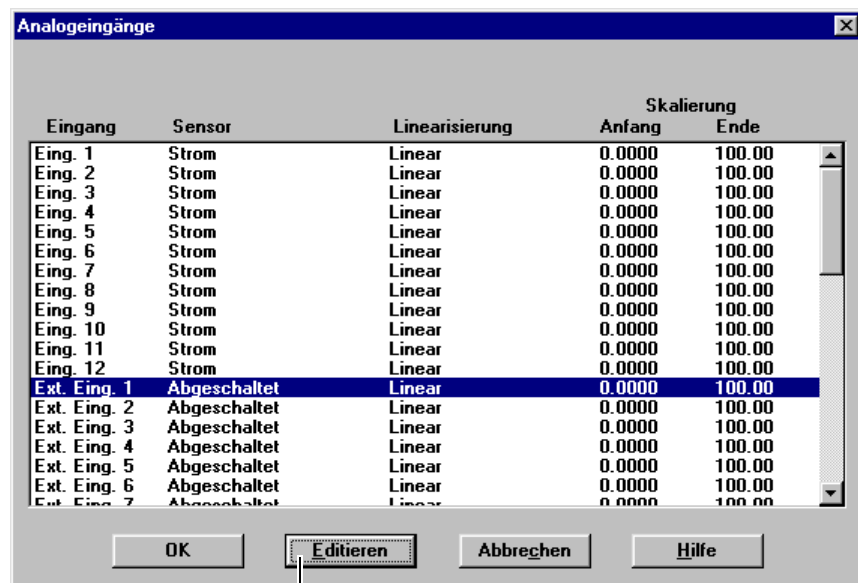
When using the *integer* format, the parameters *Measurement range start* and *Measurement range end* must be set for 16-bit normalization. This can be done either through the setup program or using the keypad on the recorder).

## 5 Device-specific data

The analog input of the PLC provides a 16-bit measurement within the range from -27648 to +27648, whereby the measurement ranges depend on the input sensor selected and the input card used.

### Example

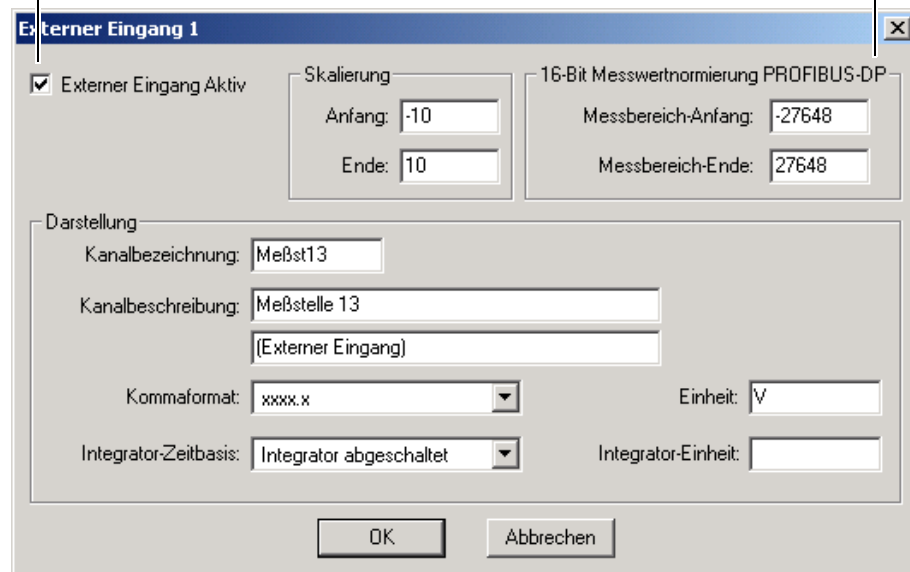
	Input range of the PLC	Normalization range of the PLC	Range of the recorder	Scaling of the recorder
Range start	-10V	-27648	-27648	-10
Range end	+10V	+27648	+27648	+10



For the external measurement inputs, first press the *Edit* button, ...

... then you can activate the external input, and ...

... finally, set up the normalization.



## 5 Device-specific data

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### 5.9 External inputs and faults in the data exchange

As long as there is no data exchange between the PLC and the recorder, the external analog inputs of the recorder are treated as “invalid” (display -----). Thus it is possible to detect, during the evaluation of the measurement data, that there were no valid values present for this period. This only applies to the external measurement inputs.

All other external data (logic signals, batch texts, ...) will be frozen and remain at their current values.





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