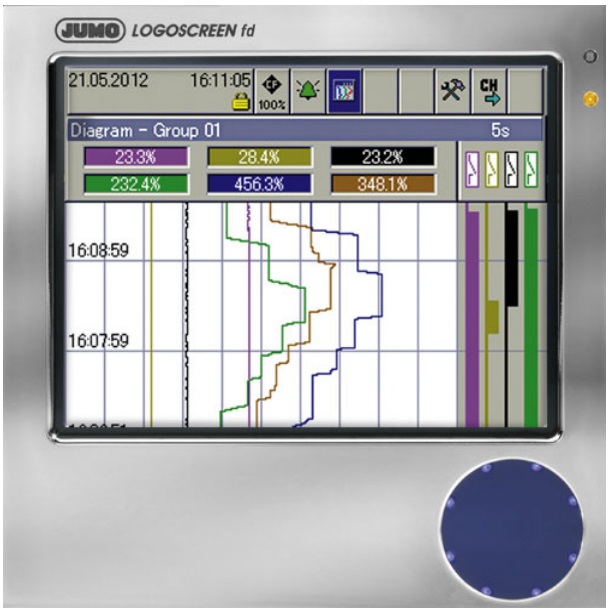
JUMO LOGOSCREEN fd

Secure Data Management and FDA-Compliant Measured Data Recording



B 706585.2.3

Interface Description
PROFIBUS-DP

JUMO

2012-09-12/00586302

Contents

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1.1 Preface

This operating manual is addressed to the system manufacturer with adequate technical background and PC related knowledge.

Please read this interface description prior to starting operation with the PROFIBUS-DP. Keep the interface description in a place accessible to all users at all times. Your comments are appreciated and may assist us in improving this interface description.

Telephone: +49 661 6003-727
Fax: +49 661 6003-508

Warranty

All necessary settings are described in this operating manual. Should problems be encountered during commissioning/start-up, please refrain from carrying out any manipulations that are not described in the operating manual.
Any such intervention will jeopardize your warranty rights. Please contact the nearest subsidiary or the head office.

Service

For technical questions
Phone support in Germany:
Phone: +49 (0)661 6003-300 or -653 or -899
Fax: +49(0)661 6003 -881729
Email: service@jumo.net

Austria:
Phone: +43 1 610610
Fax: +43 1 6106140
Email: info@jumo.at

Switzerland:
Phone: +41 44 928 24 44
Fax: +41 44 928 24 48
Email: info@jumo.ch

Electrostatic charge

When accessing the inner parts of the unit and returning controller modules, assemblies or components, please observe the regulations according to DIN EN 61340-5-1 and DIN EN 61340-5-2 „Protection of electrostatic sensitive devices“. Only use **ESD** packaging for transport.

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

ESD=**E**lectro **S**tatic **D**ischarge

1.2 Typographical conventions

1.2.1 Warning signs

Caution

This symbol is used when there may be **danger to personnel** if the instructions are ignored or not followed correctly!

Caution

This symbol is used when there may be **damage to equipment or data** if the instructions are ignored or not followed correctly!

ESD

This symbol is used where special care is required when handling **components liable to damage through electrostatic discharge**.

1.2.2 Note symbols

Note

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

Reference

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

Footnote

abc[1]

Footnotes are remarks that **refer to specific points** in the text. Footnotes consist of two parts:
A marker in the text and the foot note text itself.
The markers in the text are arranged as continuous superscript numbers.

1.2.3 Performing an action

Instruction to act

✱

This symbol indicates that an **action to be performed** is described. The individual steps are marked by this asterisk, e.g.:

✱ Start PLC software

✱ Click on hardware catalog

Vital text

This text contains important information, and it is vital that you read it before going any further.

String of commands

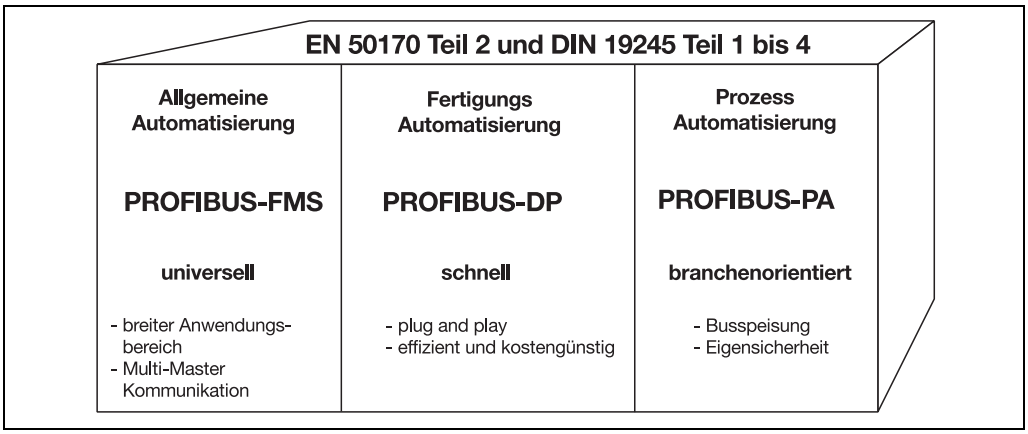
Save file ➔ as

Small arrows between words indicate a **string of commands** to be executed in succession.

1 Introduction

PROFIBUS-DP 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 standards IEC 61158 and IEC 61784.
With PROFIBUS-DP, devices from different manufacturers can communicate without any special interface adaptation. PROFIBUS-DP can be employed for both high-speed time-critical data transmission and extensive, complex communications tasks.

2.1 Profibus types



The PROFIBUS family

PROFIBUS-DP This PROFIBUS variant optimized for high speed and low connection costs, has been specially tailored for communication between automation control systems (PLC's) and distributed field devices (typical access time < 10 ms). PROFIBUS-DP can be used to replace conventional, parallel signal transmission with 24 V or 0/4-20 mA.

DPV0: Cyclic data transfer:
--> is supported by all JUMO devices.

DPV1: Cyclic and acyclic data transfer:
--> is not supported by JUMO devices.

DPV2: Slave-to-slave communication, amongst others, takes place in addition to cyclic and acyclic data transfer:
--> is not supported by JUMO devices.

PROFIBUS-PA PROFIBUS-PA has been specially designed for process engineering. It permits the linking of sensors and actuators to a common bus cable, even in explosion endangered zones. PROFIBUS-PA allows data communication with and energy supply to two-wire technology devices according to MBP (Manchester Bus Powering), specified in the international IEC 61158-2 standard.

PROFIBUS-FMS This is the universal solution for communication tasks at the cell level (typical access time approx. 100 ms). 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.

2.2 RS485 Transmission technology

Transmission takes place according to the RS485 standard. It covers all areas in which high transmission speed and simple, cost-efficient installation technology is 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 other stations. Later expansions have no influence on the stations already in operation.

Transmission speeds can be selected within a range of 9.6kbit/s and up to 12Mbit/s. During system commissioning, one uniform speed is selected for all devices connected to the bus.

Basic characteristics

Network topology	Linear bus, active bus termination at both ends, stub cables are only permissible for baud rates of <1.5 Mbit/s.
Medium	Shielded, twisted-pair cable
Number of stations	32 stations in each segment without repeater (line amplifier). With repeaters, extension to 126 stations is possible.
Connector	Preferably 9-pin sub-D connector

Structure

All devices must be connected in a line structure (one after another). Up to 32 stations (master or slaves) can be linked up with one segment.
Repeater are required for more than 32 stations to, for example, increase the number of devices.

Cable length

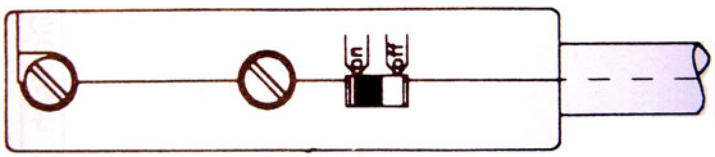
The maximum cable length depends on the transmission speed. The cable length specified can be extended by the use of repeaters. It is recommended to limit the number of repeaters connected in series to a total of 3.

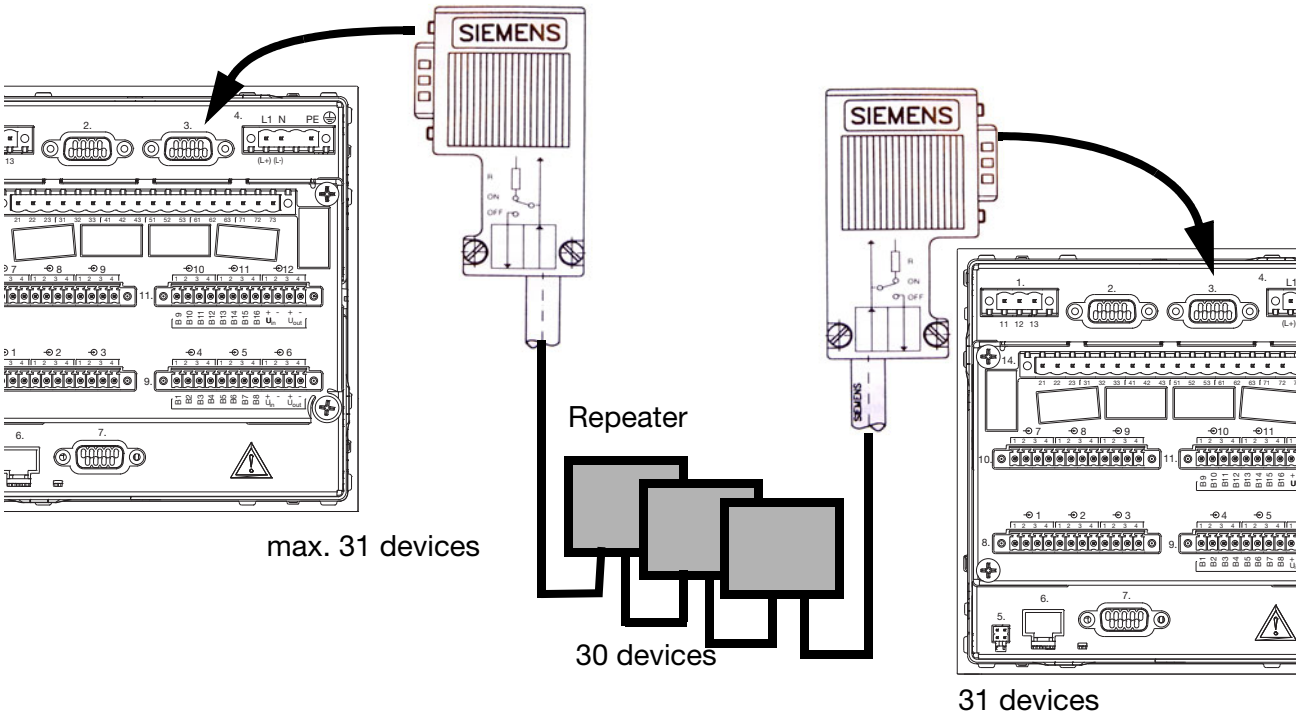
Baud rate (kBit/s)	9,6	19,2	93,75	187,5	500	1500	12000
Range/segment	1,312.34 yd	1,312.34 yd	1,312.34 yd	1,093.61 yd	437.45 yd	218.72 yd	109.36 yd

Range based on the transmission speed

Bus termination

At both ends of each segment the bus is terminated by termination resistors.
To ensure malfunction-free operation, make sure that voltage is applied to both bus terminations at all times.
The termination resistors are located in the Profibus plugs and can be activated by moving the slide switch to „on“.





Cable data

The cable length specifications refer to the cable type A described as follows:

Characteristic impedance:	135 … 165Ω
Capacitance per unit length:	< 30 pf/m
Loop resistance:	110Ω/km
Core cross-section:	0.64 mm
Core cross-section:	> 0.34 mm²

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-DP cables and connectors are offered by several manufacturers. Please refer to the PROFIBUS product catalog (www.profibus.com) for types and addresses of suppliers.

When connecting the devices, make sure that the data lines are not reversed. We strongly recommend to use a shielded data line. The braided shield and the screen foil underneath (if any) should be connected to the protective earth on both sides, 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, for instance, the following type from Siemens:

Simatic Net Profibus 6XV1
Order No.: 830-0AH10
*** (UL) CMX 75 °C (Shielded) AWG 22 ***

2 PROFIBUS-DP description

Data rate

For installation, the use of sub cables must be avoided for data rates ≥1.5 MBit/s.

☞ For important information on installation, please refer to the Installation Guidelines PROFIBUS-DP, Order No. 2.111 from PNO.

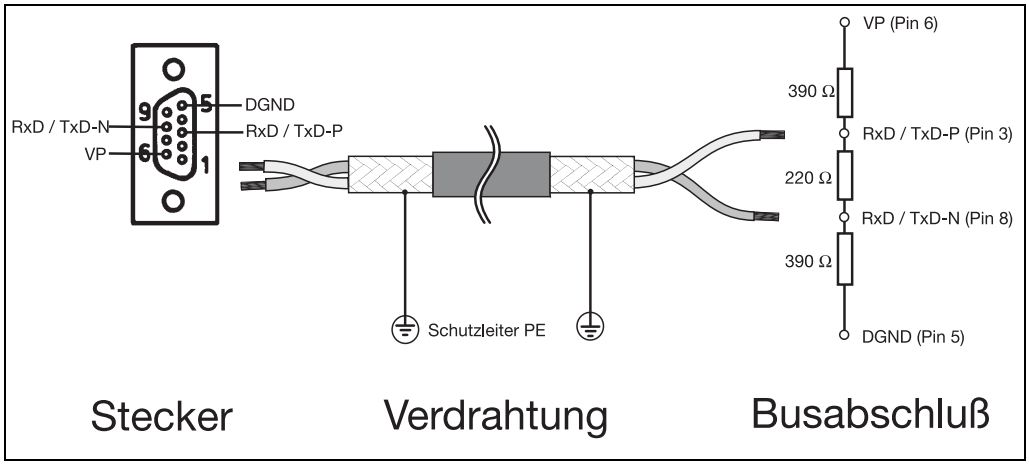
Address:
Profibus Nutzerorganisation e.V.
Haid- u. Neu-Straße 7
D-76131 Karlsruhe

Internet: www.profibus.com

Recommendation:

Please follow the installation recommendations given by PNO, especially for the simultaneous use of frequency changers.

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. Communication functions required for this purpose are defined by the basic PROFIBUS-DP functions in accordance with IEC 61158 and IEC 61784.

Basic functions

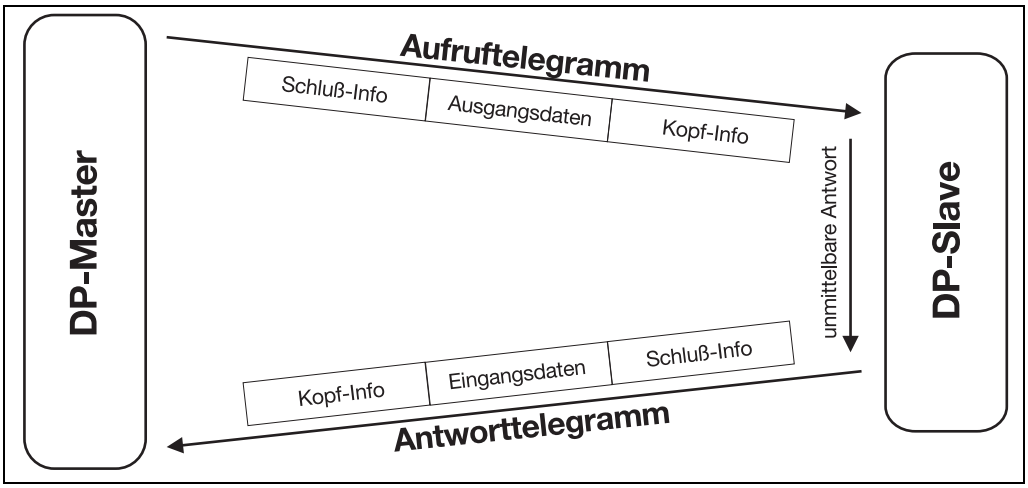
The central control system (master) reads the input information cyclically from the slaves and writes the output information cyclically to the slaves. The bus cycle time must be shorter than the program cycle time of the central PLC. In addition to cyclic user data transmission, PROFIBUS-DP also provides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

Transmission technology: • RS485, twisted pair • Baud rates of 9.6 kbit/s up to 12 Mbit/s
Bus access: • Master and slave devices, max. 126 stations on one bus
Communication: • Peer-to-peer (user data communication) • Cyclic master-slave user data communication
Operating states: • Operate: Cyclic transmission of input and output data • Clear: Inputs are read, outputs remain in a secure state • Stop: Only master-master data transfer is possible
Synchronization: • Sync mode: is not supported by JUMO devices • Freeze mode: is not supported by JUMO devices
Functions: • Cyclic user data transfer between DP master and DP slave(s) • Dynamic activation or deactivation of individual DP slaves • Checking the configuration of the DP slaves • Address assignment for the DP slaves via the bus (is not supported by the LOGOSCREEN fd) • Configuration of the DP master via the bus • maximum of 246 bytes input/output data for each DP slave possible
Protective functions: • Address monitoring for the DP slaves • Access protection for inputs/outputs of the DP slaves • Monitoring of the user data communication with adjustable monitoring timer in the DP master
Device types: • DP master class 2, e.g. programming/project design devices • DP master class 1, e.g. central automation devices, such as PLC, PC... • DP slave, e.g. devices with binary or analog inputs/outputs, controllers, recorders...

Cyclic data transmission

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

Data transmission between the DP master and the DP slaves is divided into three phases: parameterization, configuration and data transfer. Prior to a DP slave entering the data transfer phase, the DP master checks in the parameterization and configuration phase, whether or not the intended 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 coincide. These checks provide the user with reliable protection against parameterization errors. In addition to the user data transfer, which is automatically performed by the DP master, new parameterization data can be sent to the DP slaves at the request of the user.



User data transmission in PROFIBUS-DP

3.1 The GSD file

Device data (GSD) allow open project design.

PROFIBUS-DP devices have different performance features. They differ with respect to the available functionality (e. g. number of I/O signals, diagnostic messages) or the possible bus parameters, such as baud rate and time monitoring. These parameters vary individually for each device type and manufacturer. To accomplish a simple plug & play configuration for PROFIBUS-DP, the characteristic device features are defined in an electronic data sheet **d**evice **d**atabase **f**ile (ddf = GSD file). The standardized GSD files expand open communication up to the operator level. Simple and user friendly integration of devices from different manufacturers is possible by means of the project design tool, which is based on the GSD files. The GSD files provide clear and comprehensive description of the features of a device type in a precisely defined format. GSD files are produced for the specific application. The defined file format permits the project design system to simply read in the device data of any PROFIBUS-DP device and to automatically use this information for the bus system configuration. As early as in 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 subdivided into three sections.

- **General specifications**
  This section contains, amongst others, information on manufacturer and device names, hardware and software release versions, and on the supported baud rates
- **DP master-referenced specifications**
  This section is used to enter all 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-referenced specifications**
  This section contains all slave-related information, such as the number and type of the I/O channels, specifications of diagnostic texts and information on the consistency of I/O data.

The GSD file not only includes lists, such as information on the baud rate supported by the device, but also the possibility of describing the modules available in a modular device.

3 Configuring a PROFIBUS-DP system

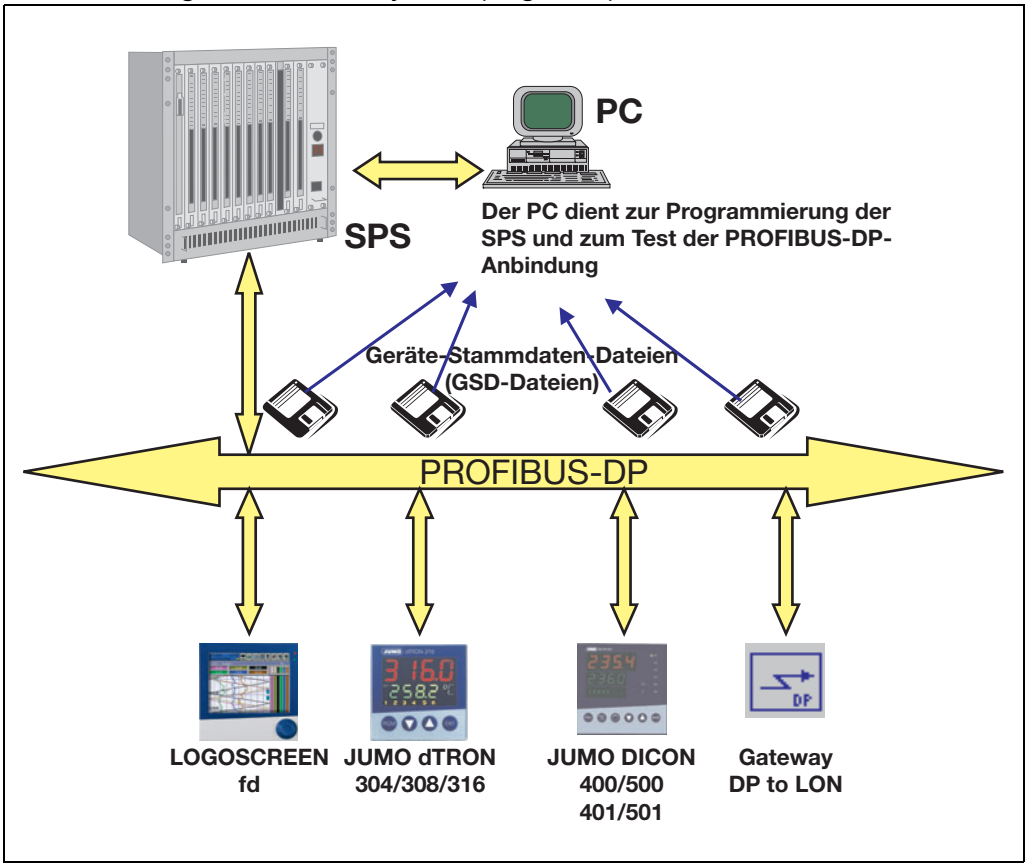
3.2 Configuration

Plug & Play

To simplify configuration of the PROFIBUS-DP system, the DP master (PLC) is configured with the aid of the PROFIBUS-DP configurator and the GSD files, or with the hardware configurator in the PLC.

Sequence of a configuration:

- Accomplishing a GSD file by means of the GSD generator
- Loading the GSD files of the PROFIBUS-DP slaves into the PROFIBUS-DP network
  configuration software
- Carry out configuration
- Load configuration in the system (e. g. PLC)



The GSD file

The individual device features of a DP slave are specified clearly and comprehensively in a precisely defined format in the GSD file by the manufacturer.

The PROFIBUS-DP configurator / hardware configurator (PLC)

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

As early as in the project design phase, the PROFIBUS-DP configurator automatically checks the entered files for system consistency errors.

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

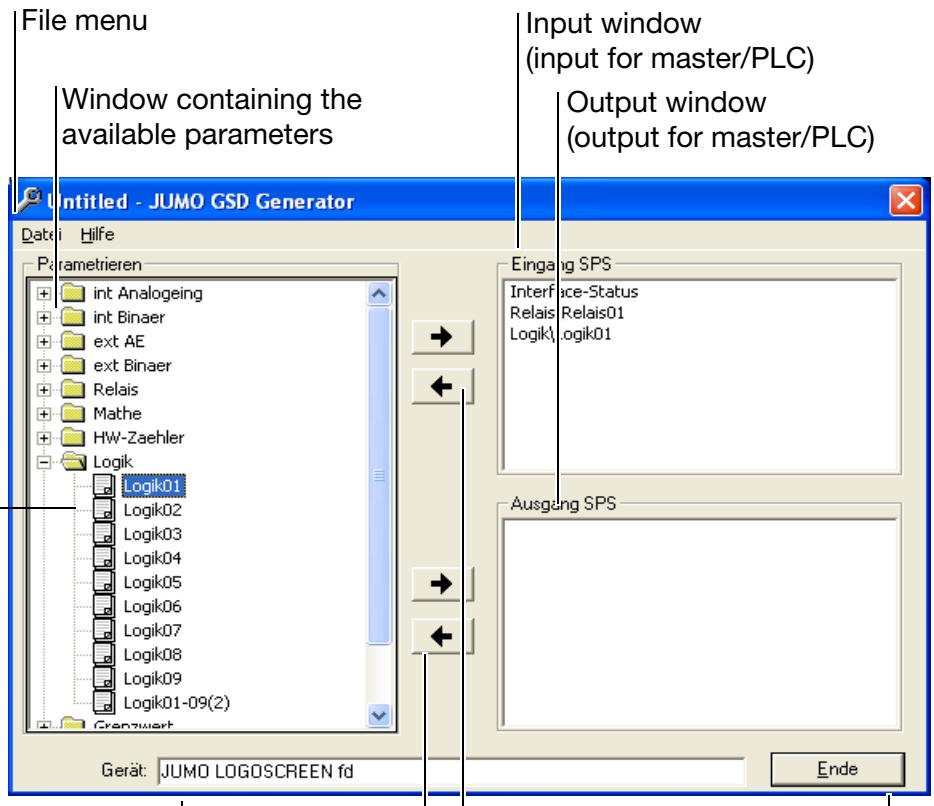
3.3 The GSD generator

3.3.1 General information

The user can use the GSD generator to generate GSD files for JUMO devices with PROFIBUS-DP interface.
The devices with PROFIBUS-DP interface available from JUMO are able to transmit or receive a large amount of variables (parameters). Due to the fact, however, that in the most applications only a part of these variables are to be transmitted via PROFIBUS-DP, the GSD generator is used to select these variables.

Once the device is selected, all variables available appear in the „Parameterization“ window. Only when these have been copied either to the "Input" or "Output" window, will they later be contained in the GSD file for further processing or pre-processing by the DP master (PLC).

3.3.2 Operation

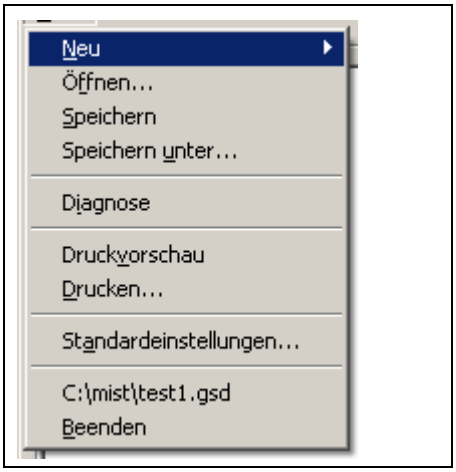


If SIMATIC S7 from SIEMENS is used for project design, the names in the GSD file must not be longer than 8 characters.

GSD files with long file names cannot be entered into the PLC hardware catalog!

File menu

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



New	After calling up the function for the creation of a new GSD file, the available devices are selected. After selecting the required device, all available parameters are shown in the parameter window.
Open	This function opens an existing GSD file.
Save/ Save as	This function is used to save the generated or edited GSD file.
Diagnosis	This function can be used to test the GSD file in conjunction with a PROFIBUS-DP master simulator from B+W and the Profibus slave.
Print preview	shows a preview of a report [1] that can be printed.
Print	Prints a report[1].
Standard (default) settings	The language to be used at the next restart of the program can be selected here.
Exit	Exits the program.

1. The report contains additional information for the PLC programmer (such as data type of the selected parameters).

⇨ Chapter 3.3.3 „Example report“

3.3.3 Example report

I/O Report

Gerät: JUMO LOGOSCREEN fd

Länge der Eingänge (Byte): 19
Länge der Ausgänge (Byte): 6

Eingänge

Byte	Beschreibung	Type
[0]	Interface-Status	BYTE
[1]	Relais\Relais01	INTEGER
[3]	Logik\Logik01	INTEGER
[5]	int Analogeing\Real\Real_Out01	REAL
[9]	int Binaer\int_Binaer01-24(4)	LONG
[13]	Mathe\Real\Real_Mathe01	REAL
[17]	Alarm\int AE\A1_int_AE01	INTEGER

Ausgänge

Byte	Beschreibung	Type
[0]	ext AE\Real\Bus\Real_In01	REAL
[4]	ext Binaer\ext_Binaer01-16(2)	INTEGER

3.3.4 Configuration of a GSD file

```
;;===============================================================================
; GSD-File Gateway PROFIBUS-DP
; JUMO LOGOSCREEN FD
; Release 1.0
;===============================================================================
;
;
#Profibus_DP
GSD_Revision = 2                        ;extended GSD-file is supported
;                                       ;according to PNO directrive of 14.12.95
Vendor_Name = "JUMO GmbH & Co. KG"      ;name of the manufacturer
Model_Name = "JUMO LOGOSCREEN fd"       ;name of the DP-instrument
Revision = "Version 2.0"                ;actual edition of the DP-instrument
Ident_Number = 0x0AA0                   ;exact type designation of the DP-instrument
Protocol_Ident = 0                      ;protocol characteristica PROFIBUS-DP
Station_Type = 0                        ;DP-Slave
FMS_supp = 0                            ;DP-instrument only
Hardware_Release = "1.00"               ;actual edition of the hardware
Software_Release = "2.00"               ;actual edition of the software
;                                       ;the following baudrates are supported
9.6_supp = 1                            ;  9.6  kBaud
19.2_supp = 1                           ;  19.2  kBaud
;                                       ;  31.25 kBaud (PA)
45.45_supp = 1                          ;  45.45  kBaud
93.75_supp = 1                          ;  93.75  kBaud
187.5_supp = 1                          ;  187.5  kBaud
500_supp = 1                            ;  500  kBaud
1.5M_supp = 1                           ;  1.5  MBaud
3M_supp = 1                             ;  3    MBaud
6M_supp = 1                             ;  6    MBaud
12M_supp = 1                            ;  12    MBaud
;
MaxTsdr_9.6 = 60
MaxTsdr_19.2 = 60
;                                       ;  31.25 kBaud (PA)
MaxTsdr_45.45 = 60
MaxTsdr_93.75 = 60
MaxTsdr_187.5 = 60
MaxTsdr_500 = 100
MaxTsdr_1.5M = 150
MaxTsdr_3M = 250
MaxTsdr_6M = 350
MaxTsdr_12M = 800
;
Redundancy = 0                          ;no redundant transmission
Repeater_Ctrl_Sig = 1                   ;Plug signal  CNTR-P  RS485
24V_Pins = 0                            ;Plug signals  M24V and P24 V not connected
Implementation_Type = "SPC3"            ;Application of ASIC SPC3
;
;
```

```
;                               ;*** Slave specific values ***
Freeze_Mode_supp = 0                ;Freeze-mode is not supported
Sync_Mode_supp = 0                  ;Sync-mode is not supported
Auto_Baud_supp = 1                  ;Automatic recognition of baudrate
Set_Slave_Add_supp = 0              ;Set_Slave_Add is not supported
Min_Slave_Intervall = 6             ;Slave-Interval  = 0.6 ms
Modular_Station = 1                 ;Modular station
Max_Module = 5
Max_Diag_Data_Len = 6               ;
Slave_Family = 0                    ;General
;
;
;                               ;*** Parameterization ***
;
;This lines are for locating PBC file, and initial data length.
;Do not disturb!!!
;atPBC_File = C:\PROGRAMME\JUMO\GSDGEN\14401XX\D\ju_LS_NT.PBC
;atINIT_LEN = 2
;
User_Prm_Data_Len = 20
User_Prm_Data = 0x00, 0x03, 0x02, 0x02, 0x13, 0x12, 0x57, 0x04, 0x11, 0x12, \
0x7B, 0x02, 0x23, 0x12, 0xDA, 0x04, 0x21, 0x01, 0x05, 0x02
Max_Input_Len = 7
Max_Output_Len = 6
Max_Data_Len = 13
;==================== Input Master ========================================
Module = "Interface Mode" 0x10
Preset = 1
Endmodule
Module = "int Analog inp/Real/Real_Out01" 0x13
Preset = 1
Endmodule
Module = "Alarm/int AE/A1_int_AE01" 0x11
Preset = 1
Endmodule
;==================== Output Master ======
Module = "ext AE/Real/Bus/Real_In01" 0x23
Preset = 1
Endmodule
Module = "ext Binary/ext_Binary01-16(2)" 0x21
Preset = 1
Endmodule
```

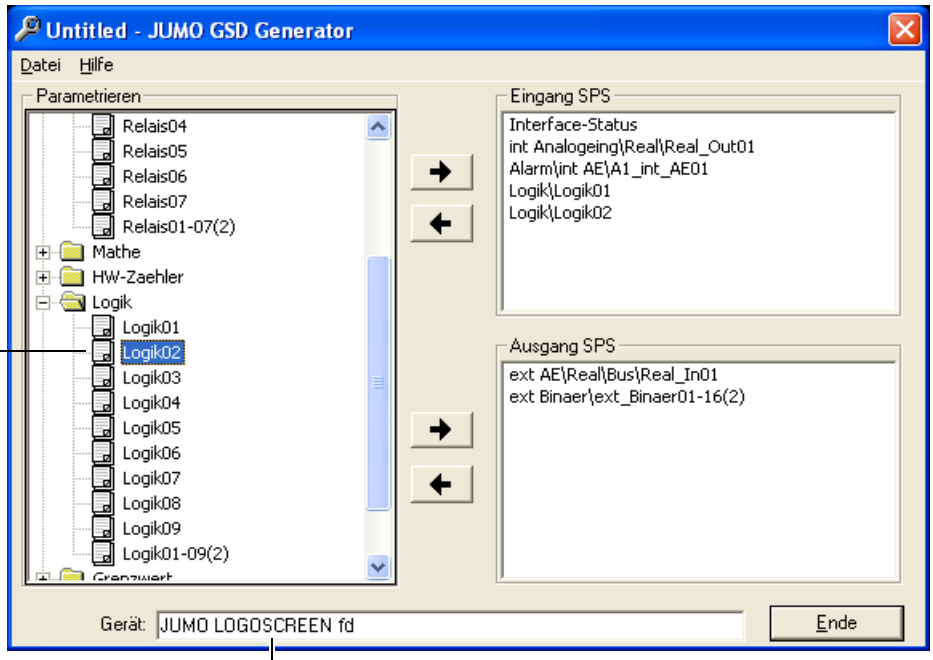
The configuration of the GSD file is designed for installation on SIMATIC S7 (SIEMENS).

Should installation problems with other controls be encountered, delete all Preset=1 entries.

In this case, in the PLC process image, it is also necessary to set up the variables selected in the GSD generator in the correct order.

Parameter selection

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



These addresses are explained in the interface description Modbus

⇨ B706585.2.0

Device name for hardware catalog
If different GSD files are required for devices of the same type, this standard name has to be altered in such a way as to enable unambiguous assignment of the Profibus master in the hardware configuration.

A click with the left mouse button on the "+" (⊞ Regler) or "-" (⊟ Sollwerte) symbol will extend or reduce the parameter list.

"Click" on the parameters with the left mouse button, keep the button pressed (Drag & Drop) while copying the parameter to the input or output window.

Parameter deletion

Parameters are deleted from the input or output window by pressing the left-pointing arrow key ← .

☞ The "Interface status" parameter automatically appears in the input window and cannot be deleted. This parameter is used for diagnosis of the internal data transmission in the device and should be evaluated by the PLC program to ensure data validity.

0 : internal communication in the device is OK

not equal to 0: faulty internal communication in the device

3.4 Connection example

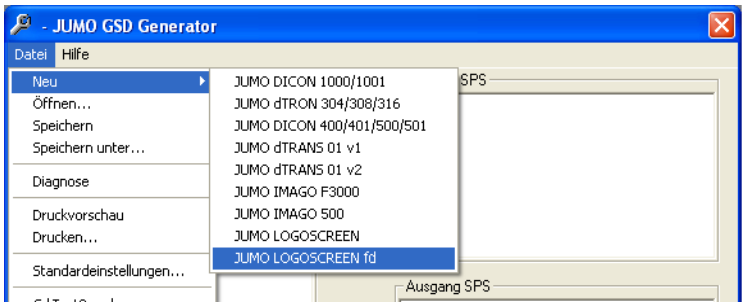
The example below shows the path for the connection of a paperless recorder to a SIMATIC S7.

3.4.1 Paperless recorder

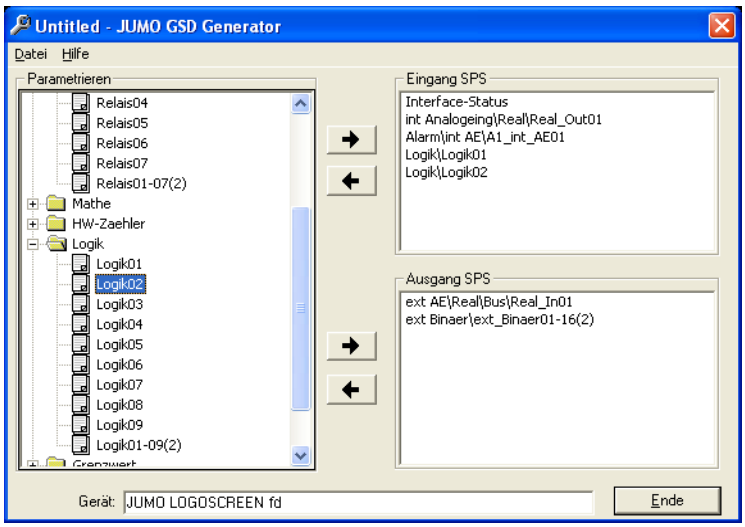
* Connect the device to the PLC.
* Set the device address.
  The device address can be set using the device keys or the setup program.

3.4.2 JUMO GSD generator

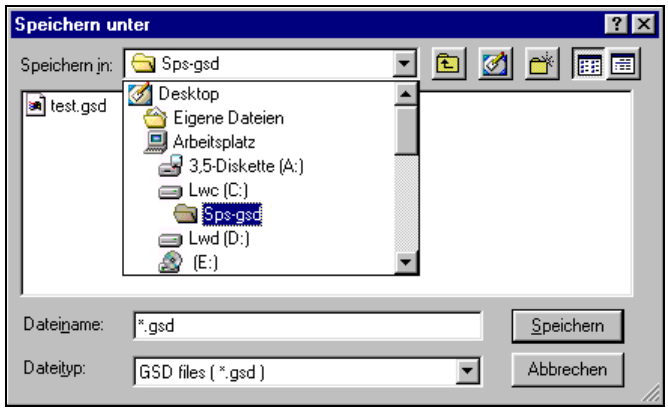
* Start the GSD generator (Example: *Start* ➔ *Programs* ➔ *JUMO device* ➔ *PROFIBUS* ➔ *JUMO GSD generator*).
* Select the device.



* Select the variable to be transmitted to the DP master in the left window.
* Click on the directive arrow and the variable appears in the window on the right or displace the variable using Drag & Drop.



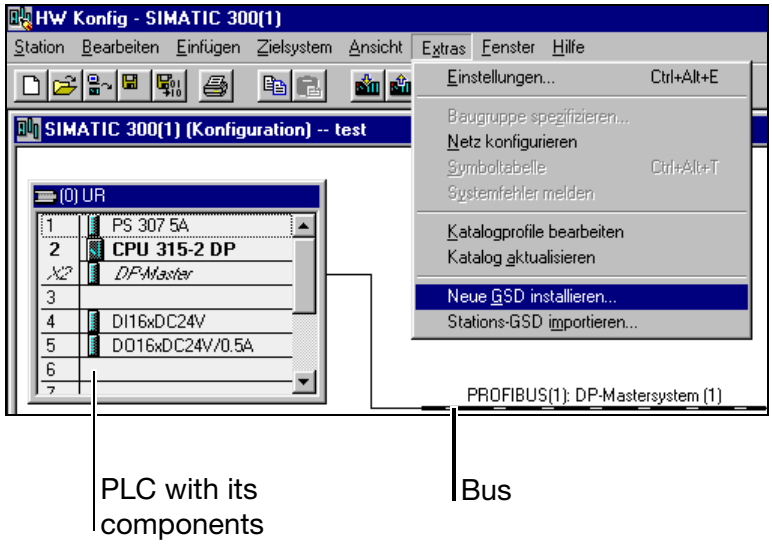
* Save the GSD file in any folder.



If SIMATIC S7 from SIEMENS is used for project design, the names in the GSD file must not be longer than 8 characters.

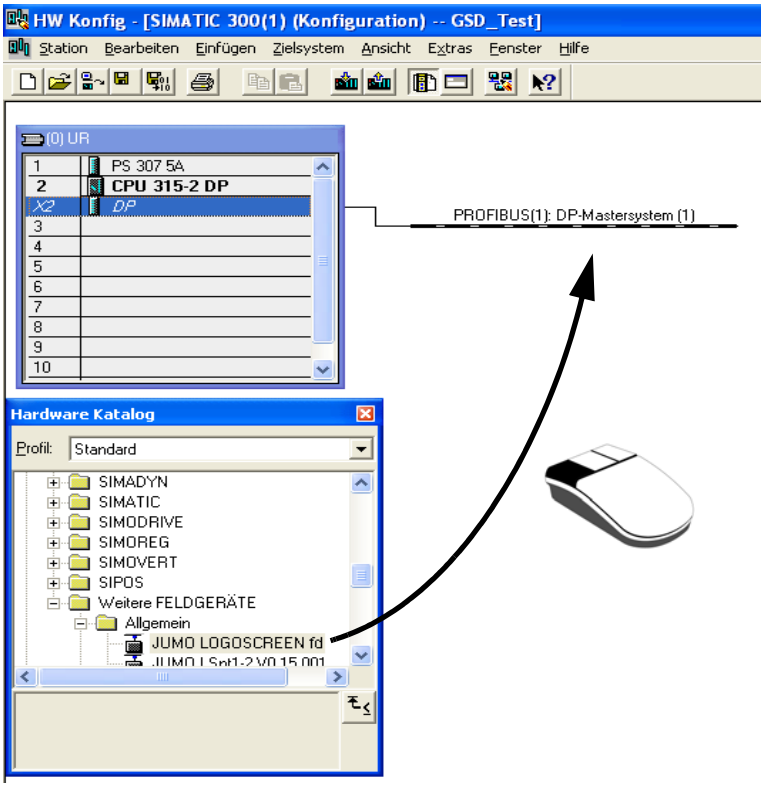
3.4.3 PLC configuration

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



The new GSD file will be read in, processed, and the recorder inserted into the hardware catalog.

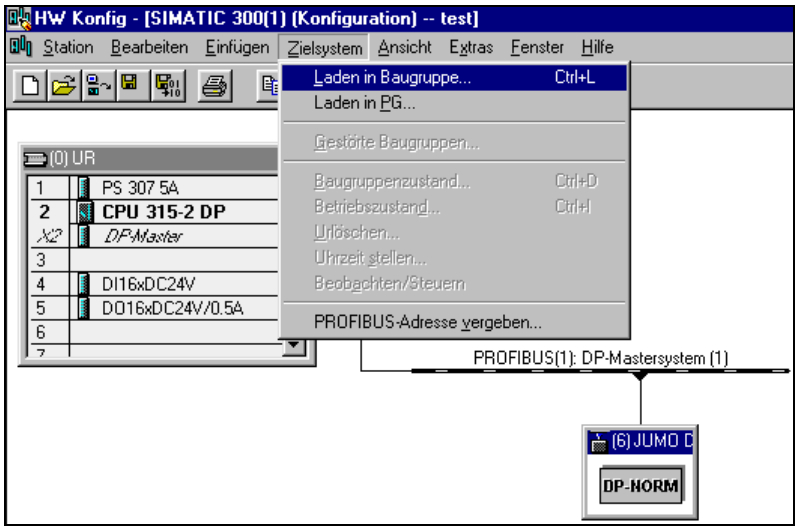
✱ Open the hardware catalog and place the new device in the work surface.



The controller will be filed on the bus by clicking on the left mouse button. After releasing the mouse button, the controller address has to be assigned.

☞ Via the GSD file of the slaves, the master receives information on which baud rates are supported.

✱ Finally load the configuration into the PLC.
(*Target system* ➔ *Load in module*).



☞ If a device with PROFIBUS-DP interface is operated on a master system (PLC), suitable error analysis routines should be provided in the master system.

In conjunction with a SIMATIC S7, we recommend to install the OB86 in the PLC, so that failure of a PROFIBUS-DP device can be detected, analyzed and registered for the specific plant.

☞ The "Interface status" parameter automatically appears in the input window and cannot be deleted. It should be analyzed by the PLC program to diagnose the internal data transmission in the device, so that, for instance, a communication problem within the device can be detected by the PLC master.

0	: internal communication in the device is OK
not equal to 0	: faulty communication in the device

When using JUMO devices on a PROFIBUS-DP system, observe the data format used by the devices.

Two different data formats can be selected on the LOGOSCREEN fd by means of the configuration.
The first is the Intel format (Little Endian) and the second is the Motorola format (Big Endian).

The Motorola format is used for communication with Siemens PLCs (default value).

4.1 Integer values

Integer values are transmitted in the following format:

	Motorola format:	Intel format:
the	- High-Byte,	- Low-Byte first,
followed by the	- Low-Byte.	- High-Byte.

4.2 Float values / real values

The float values/real values of the device are filed in the IEEE-754 standard format (32 bit).

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

SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM
Byte 1	Byte 2	Byte 3	Byte 4

S - sign bit (Bit31)
E - exponent (two's complement) (Bit23...Bit30)
M - 23 bits normalized mantissa (Bit0...Bit22)

Example:
Calculation of the real number from prefix, exponent and mantissa.

Byte1 = 40h, Byte2 = 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

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

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

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

$$\text{Value} = 1 \cdot 4 \cdot 1.875$$

Value = 7.5:

4 Data format of the JUMO devices

The transmission order of the individual bytes depends on the data format set in the configuration.

Motorola format

SEEEEEEE	EMMMMMMM	MMMMMMMM	MMMMMMMM
Byte 1	Byte 2	Byte 3	Byte 4

Intel format

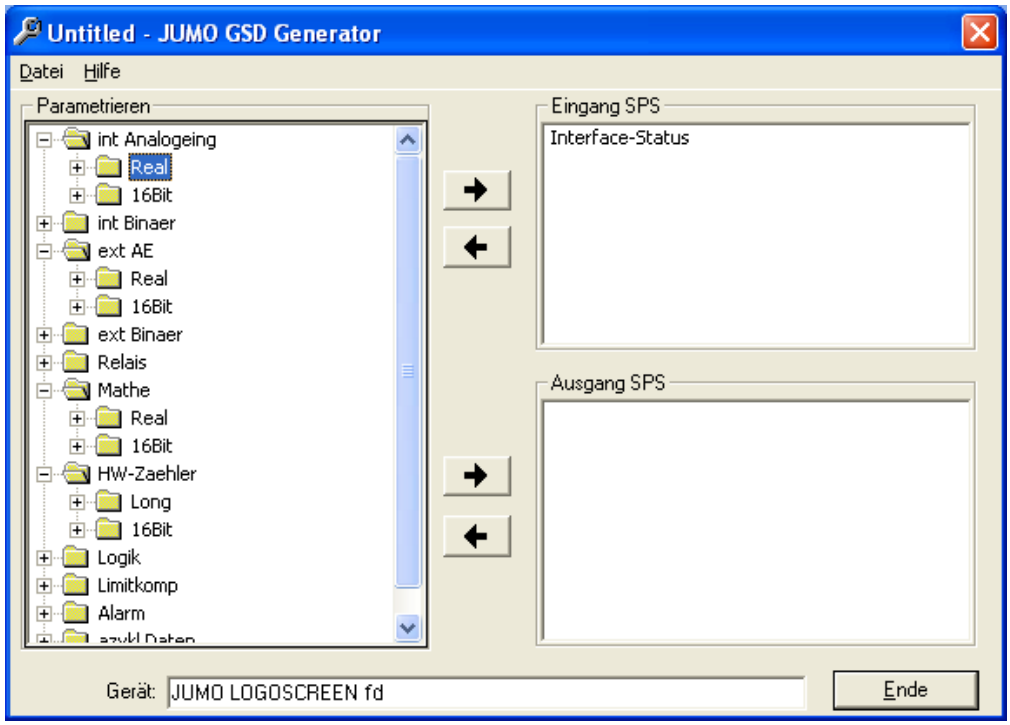
MMMMMMMM	MMMMMMMM	EMMMMMMM	SEEEEEEE
Byte 4	Byte 3	Byte 2	Byte 1

Prior to/after transmission to/from the device, the bytes of the float value need to be changed over accordingly.

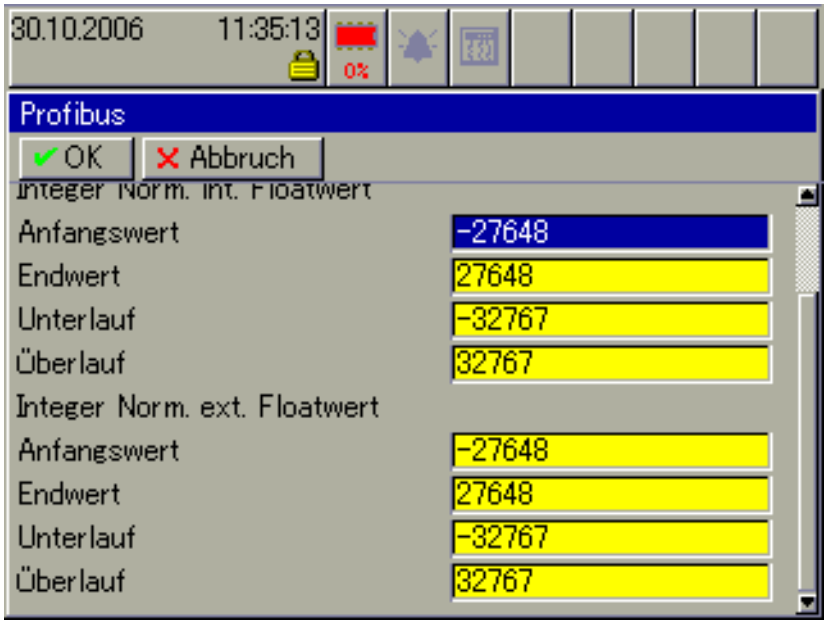
Please find out the way float values are saved in your application. It might be necessary to change the bytes over accordingly.

4.3 Integer standardization of float values

In the GSD generator you can select whether a float value is transmitted as a float (32 Bit) or integer (16 Bit).



Integer standardization can be set separately for incoming/transmitted floats in the configuration level:
Device manager ➔ *Configuration* ➔ *Interface* ➔ *Profibus*



4.3.1 Transmitted floats

(e. g. internal outputs and Mathe) are standardized using the following formula and transmitted to the Profibus:

$$\text{Integer} = \frac{(\text{Float} - \text{Bereichsanfang})}{(\text{Bereichsende} - \text{Bereichsanfang})} \bullet (\text{Endwert} - \text{Anfangswert}) + \text{Anfangswert}$$

The values of the formula corresponds to the following configuration values:
Device manager ➔ *Configuration* ➔ *Interface* ➔ *Profibus* ➔
Integer standardization, int. float value

Start value/limit value:
The internal measured values are standardized according to the integer range set here depending on their value range to enable the PLC to carry out mere integer processing.

Underrange/overrange:
If underrange/overrange is read in on the LOGOSCREEN fd for, e. g. the int. analog input or Mathe, the underrange/overrange values set in the Profibus configuration are transmitted to the Profibus.

For int. analog inputs:
Device manager ➔ *Configuration* ➔ *Analog inputs* ➔ *Analog input 1* ➔

Range start:	Measuring range start of the int. analog inputs
Range end:	Measuring range end of the int. analog inputs

For external analog inputs:
Device manager ➔ *Configuration* ➔ *External analog inputs* ➔ *Ext. Analog input 1* ➔

Range start:	Range start of the ext. Analog input
Range end:	Range end of the ext. Analog input

For Mathe:
For Mathe, range start and end cannot be set on the device but only via setup. Here the values corresponds to the range start and end confiugration values.

4.3.2 Incoming floats

(e. g. external analog inputs) are received by the Profibus and standardized using the following formula:

$$\text{Float} = \frac{(\text{Integer - Anfangswert})}{(\text{Endwert - Anfangswert})} \bullet (\text{Bereichsende - Bereichsanfang}) + \text{Bereichsanfang}$$

The values of the formula corresponds to the following configuration values:
Device manager ➔ *Configuration* ➔ *Interface* ➔ *Profibus* ➔ *Integer standardization, ext. float value*

Start value/limit value:
The external measured values are standardized according to the integer range set here depending on their value range to enable the PLC to carry out mere integer processing.

Underrange/overrange:
If the underrange/overrange value set in the Profibus configuration is received by the Profibus, an underrange/overrange appears on the LOGOSCREEN fd.

For int. analog inputs:
Device manager ➔ *Configuration* ➔ *Analog inputs* ➔ *Analog input 1* ➔

Range start:	Measuring range start of the int. analog inputs
Range end:	Measuring range end of the int. analog inputs

For external analog inputs:
Device manager ➔ *Configuration* ➔ *External analog inputs* ➔ *Ext. Analog input 1* ➔

Range start:	Range start of the ext. Analog input
Range end:	Range end of the ext. Analog input

4.4 Display of negative integer (two's complement)

The two's complement is a possibility to display negative numbers in the binary system. The two's complement is the method used most to display negative integer numbers in the computer.

Conversion: decimal system - binary system
Positive numbers are only assigned a 0 as a prefix (prefix bit) in the two's complement, no more changes are carried out.
Negative numbers are assigned a 1 as a prefix bit and coded as follows:
All numbers of the corresponding positive value are negated.
1 is added to the result.

Example of a negative value: -4
1. Ignore the prefix and convert the value into the binary system.
2. Invert.
3. Add 1.
4. Binary display of the negative value.

1. $4_{(dec)}$ = 00000000 00000100$_{(bin)}$

2. 11111111 11111011

3. 11111111 11111011 + 00000000 00000001 = 11111111 11111100

4. 11111111 11111100$_{(bin)}$ $\triangleq$ -4$_{(dec)}$

Conversion: binary system - decimal system
If the first place is 1, the value is negative. First place 0, positive value. Positive values can be directly converted from the binary system into the decimal system.
The individual numbers of negative values are negated and 1 is added. The positive value generated in the binary system is converted into the decimal system and a "–" must be placed as a prefix.

Example of a negative value: 11111111 11010011$_{(bin)}$ $\triangleq$ -45$_{(dec)}$
1. Invert.
2. Add 1.
3. Convert into the decimal system.
4. Decimal display of the negative value.

1. 11111111 11010011 ➔ 00000000 00101100

2. 00000000 00101100 + 00000000 00000001 = 00000000 00101101

3. 00000000 00101101$_{(bin)}$ = 45$_{(dec)}$

4. -45

Observe the byte order of the set data format.
Motorola: High-Byte followed by Low-Byte
Intel: Low-Byte followed by High-Byte
(Examples are displayed in the Motorola format)

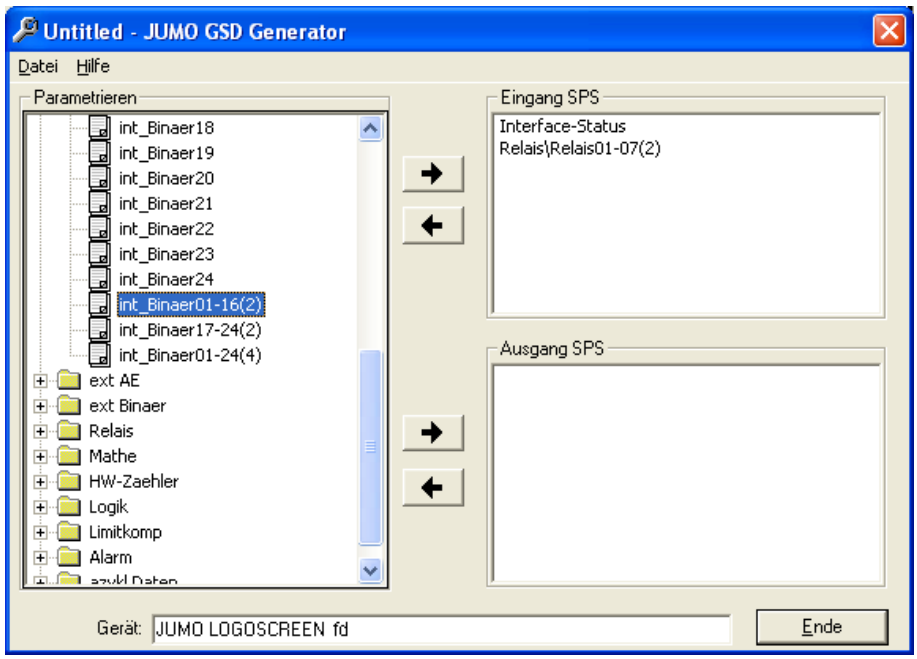
4 Data format of the JUMO devices

4.5 Bit coded transmission of several binary signals

Binary signals such as, e. g. int./ext. binary inputs, relay status are usually transmitted in the LOGOSCREEN fd as integer (16 bits) via Profibus.

To ensure that several binary signals do not exceed the limits of a PLC, e. g. max. 1280 byte input and output data in the process image of the SIMATIC S7-300, binary signals can also be transmitted bit coded.

For this purpose, select the respective entry in the GSD generator.



The 2 in brackets means that the signals are transmitted word by word (16 bits).
4 in brackets means word pair by word pair (32 bits).
Bit places not used are transmitted as 0.

When writing external binary inputs and transmiting byte by byte, a transmission bit by bit is inadmissible.

If Bool values are selected byte by byte via the GSD generator, value transmission via Modbus master is inadmissible.

Then transmission is executed depending on the set format:

Motorola format

15 14 13 12 11 10 9 8	7 6 5 4 3 2 1 0
Byte 2	Byte 1

Intel format

7 6 5 4 3 2 1 0	15 14 13 12 11 10 9 8
Byte 1	Byte 2

4.6 Strings (texts)

Character strings are transmitted in the ASCII format.

To mark the end, the last character to be transmitted must always be a "\0" (ASCII code 0x00). Characters after this mark are without significance.

The maximum lengths for character strings specified in the address tables (see „Address tables“ in the interface description B 706585.2.0) contains the terminating "\0“. This means, in the case of "char 11", the text can consist of max. 10 readable characters.

Example:
Text inquiry from address 0x1000, if the "recorder" character string is entered under this address.
(ASCII code: 0x53, 0x63, 0x68, 0x72, 0x65, 0x69, 0x62, 0x72, 0x00)

Text inquiry via acyclic data transmission:
Request: Address 0x1000, length 22 bytes
Response: Data 536368726569626572000031323334353637383900 00

Values following „\0“ are not taken into consideration.

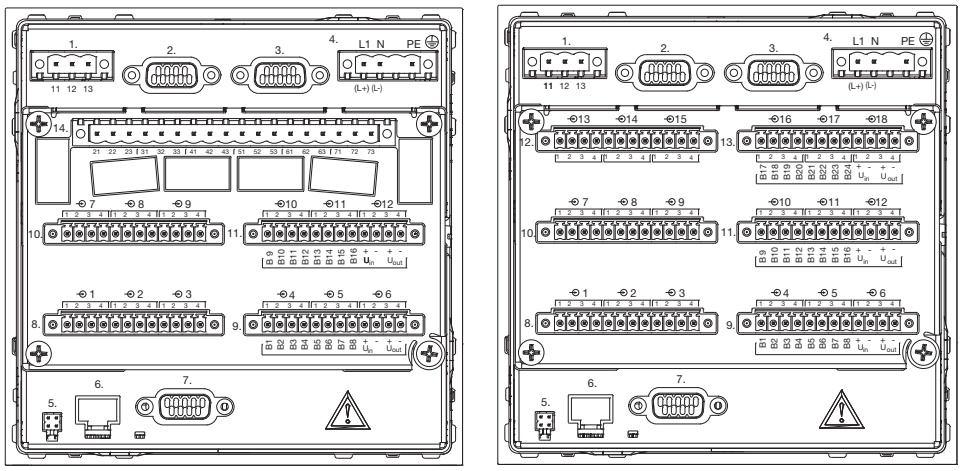
If texts or recipes are transmitted block by block, ensure that the first byte is transmitted last. The string is internally applied by switching the first data byte over from 0 to the respective ASCII character.

4 Data format of the JUMO devices

5.1 Connection type 706585

Rear view

Depending on the device version, the rear panel layout can be as follows:

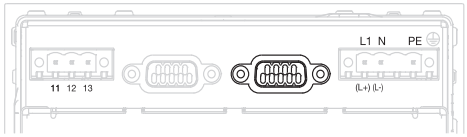


✱ Use the type description to check that the device is equipped with the PROFIBUS-DP interface (option).

⇨ Refer to operating manual B706585.0

Assignment of the 9 pole D-SUB socket

Plug 3.

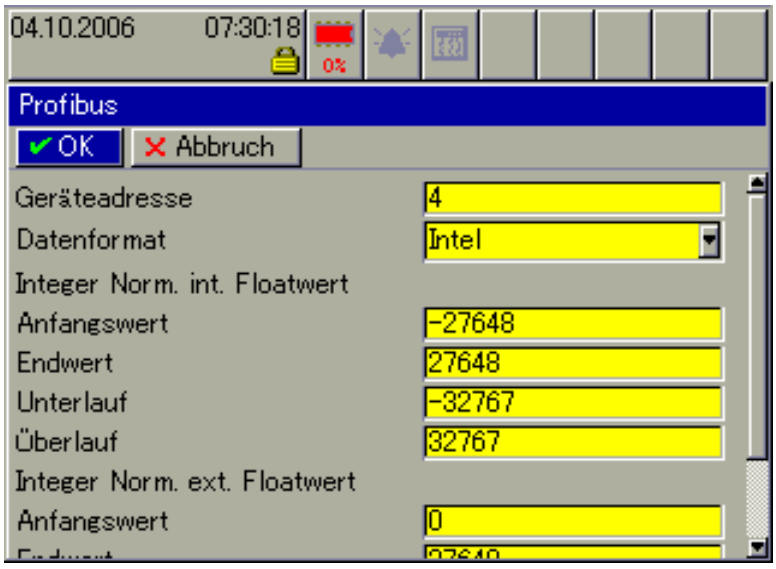


3 RxD/TxD-P	Receive/transmit data-Plus B-cable
5 DGND	Data transmission potential
6 VP	Supply voltage-Plus
8 RxD/TxD-N	Receive/transmit data-N A-cable

If you want to use the RS-232 interface (plug 2), e. g. for barcode scanners, in addition to the Profibus interface (plug 3), ensure that PROFIBUS plugs of the axial version are used,
e. g. the following type of Phoenix Contact:
SUBCON-PLUS-PROFIB/AX/SC
Article no.: 2744380
PROFIBUS plugs up to 12Mbit/s, axial version,
integrated termination resistor to be activated from external,
screw-connection

5.2 Setting the slave address

The slave address is set in the configuration level:
Device manager ➔ *Configuration* ➔ *Interface* ➔ Profibus



Configuration	Value range	Default value	Description
Device address	0 ... 125	125	
Data format	Intel Motorola	Motorola	
Integer standardization int. float values			Standardization of int. float
Start value	-32767 ... 32767	-27648	
Limit value	-32767 ... 32767	27648	
Underrange	-32767 ... 32767	-32767	
Overrange	-32767 ... 32767	32767	
Integer standardization ext. float values			Standardization of ext. float
Start value	-32767 ... 32767	-27648	
Limit value	-32767 ... 32767	27648	
Underrange	-32767 ... 32767	-32767	
Overrange	-32767 ... 32767	32767	

The baud rate is automatically calculated (max. 12 MBit/s).

Changing the device address using the bus is not supported by the device.

If "Simulate inputs is active under *Device manager* ➔ *Configuration* ➔ *Monitor*
the system does not allow communication via PROFIBUS-DP.

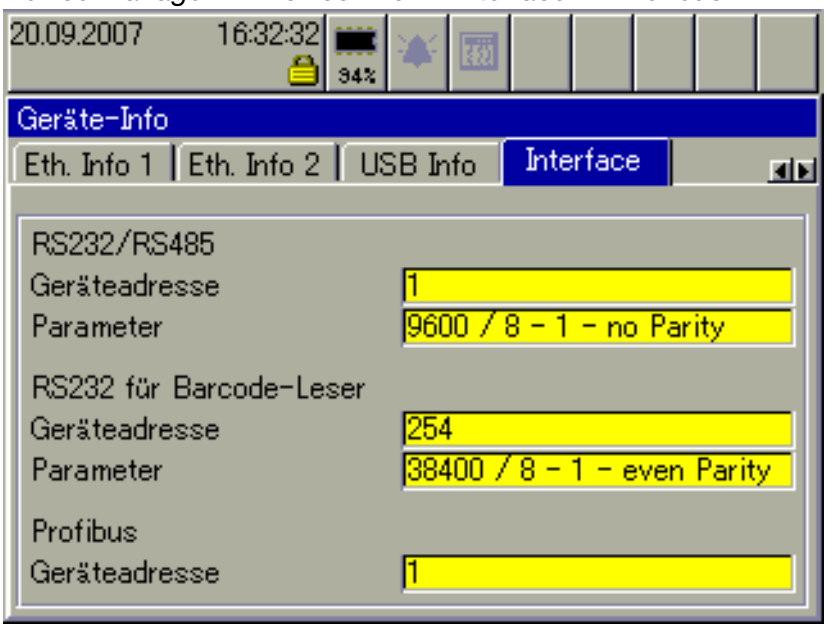
5.3 Diagnostic and status messages

In the event of communication problems with the device, the "Comm.error Profibus" error message appears in the display.

Please check the wiring, the device address and the master (PLC). A new start of the plant may be necessary.

Please refer to the configuration or the device info for the set device address.

Device manager ➔ Device info ➔ *Interface* ➔ *Profibus* ➔

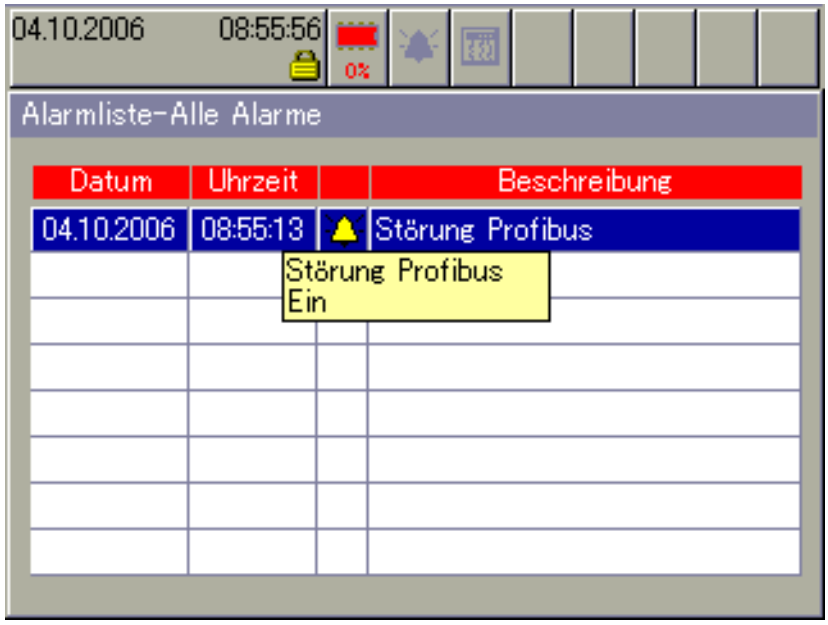


This error message can be suppressed by setting slave address 0.

☞ When slave address 0 is set, communication via Profibus is not possible.

If an internal communication malfunction occurs in the device, a yellow bell appears on the display.

The "Profibus malfunction" message is displayed in the alarm list.



Default values in the event of a malfunction

If a communication malfunction occurs (external or internal), the external values transmitted via Profibus are set to default in the device.

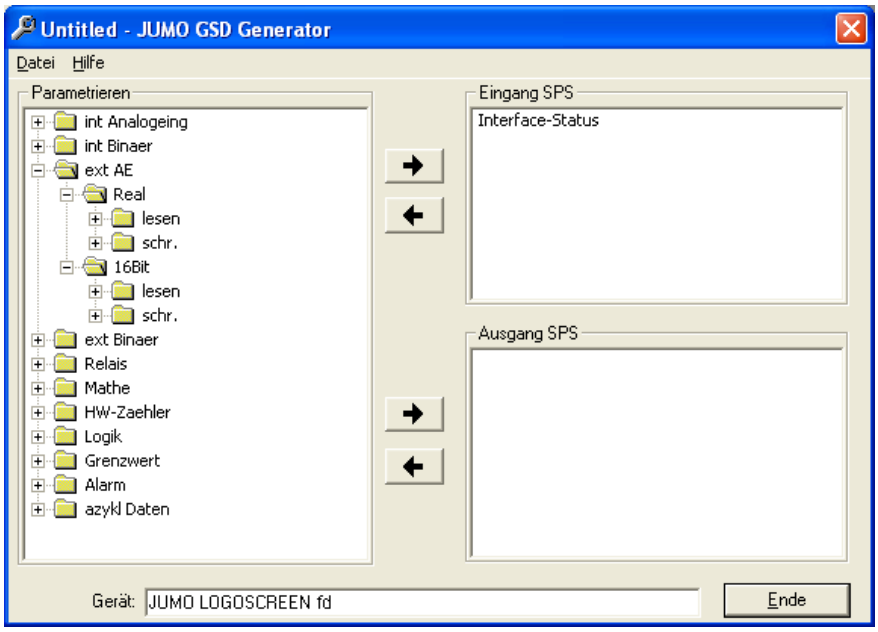
This means:
external analog inputs are set to "NO INPUT".
(Display on the device "-----")
external binary inputs are set to 0.

Acyclically transmitted values are **not** set to default.
These values retain the value transmitted last via Profibus.

5.4 Transmission of external analog inputs

The LOGOSCREEN fd is equipped with 24 external analog inputs which can be read/written via Modbus master or Profibus.

The GSD generator can be used to select the external analog inputs. For this purpose, the GSD generator provides four different inputs for each external analog input.

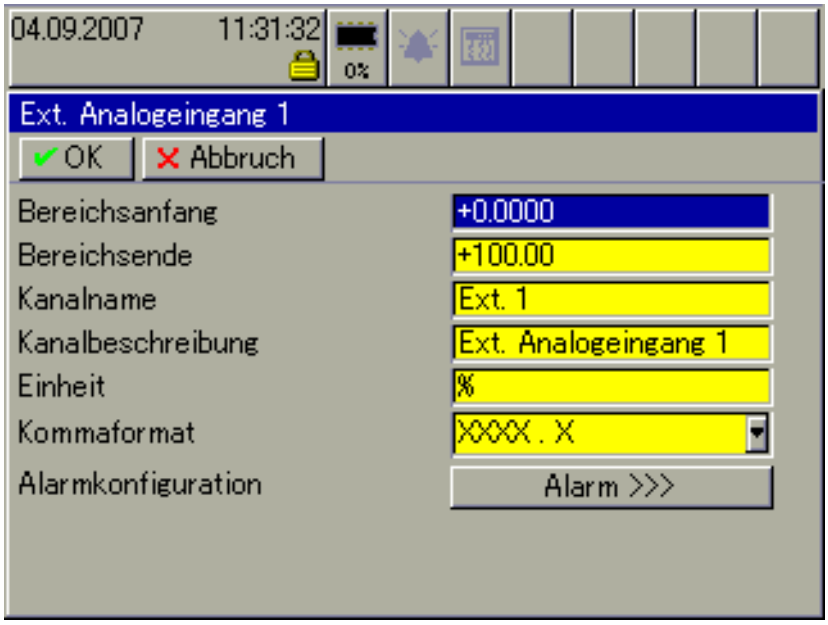


First select the respective folder to define whether the analog values are transmitted as float (Real, 32 bit) or standardized integer (16 bit) (see Chapter 4.3 „Integer standardization of float values“).

Furthermore, each folder contains a subfolder "read" and "write" .

The LOGOSCREEN fd checks the values of the external analog inputs received via interface for the range start and end set in the configuration.

Device manager ➔ *Configuration* ➔ *External analog inputs* ➔ *External analog inputs x* ➔

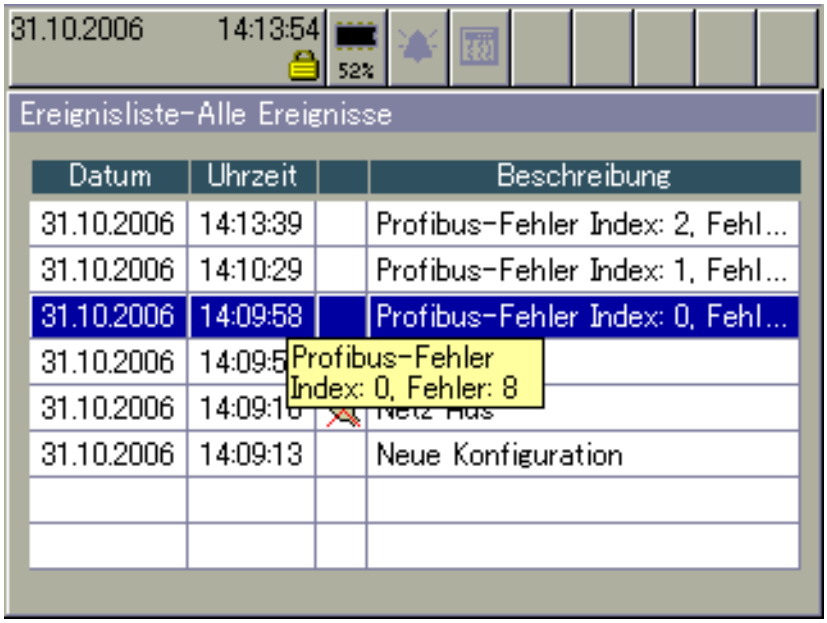


When the measured value exceeds the limits configured here plus the Namur tolerances (-1.25 % or +3.125 %), the error constant for overrange or underrange is written in the measured value variable. When the data are visualized, ">>>>>" appears for overrange and "<<<<<" for underrange.

The values saved by the device can be read out using the interface with the respective entry in the "read" folder.
For transmissions to the device, only entries in the "write" folder can be selected.

Commissioning /start-up

If errors occur, event list entries with index and error ID are generated. The index is a consecutive number.



The following errors are detected:

Error	Error ID	Description
PCode is invalid	1	Only occurs during cyclical data transmission, if an invalid PCode exists in the User_Prm_Data of the GSD file.
Invalid word address	2	Occurs during cyclical/acyclical data transmission, if the word address is not defined in the Modbus table.
Parameters not writable	8	Occurs during cyclical/acyclical data transmission, if a read-only paramater should be overwritten (in the Modbus table = R).
Number of variables invalid	16	An invalid number of parameters has been entered in the GSD file, e. g. only interface status selected in the GSD generator.
Division by zero	101	Occurs during cyclical/acyclical data transmission, if integer standardization is used and an identical value for display or measuring range start and end is set in the device configuration.
Software version of the Profibus PCB incompatible	256	The following errors appear, if the software version of the internal Profibus PCB is incompatible with that of the device: 1.) Software version 2.) Profibus malfunction ⇨ Chapter 5.3 „Diagnostic and status messages“ (yellow bell).

5 Technical data of the devices

5.5 Acyclical data transmission

The "acyclical data" can be used to read and write a large number of parameters, measuring and process data of the LOGOSCREEN fd documented in the interface description B 706585.2.0.

The acyclical data is also transmitted by cyclical data transfer (DPV0).

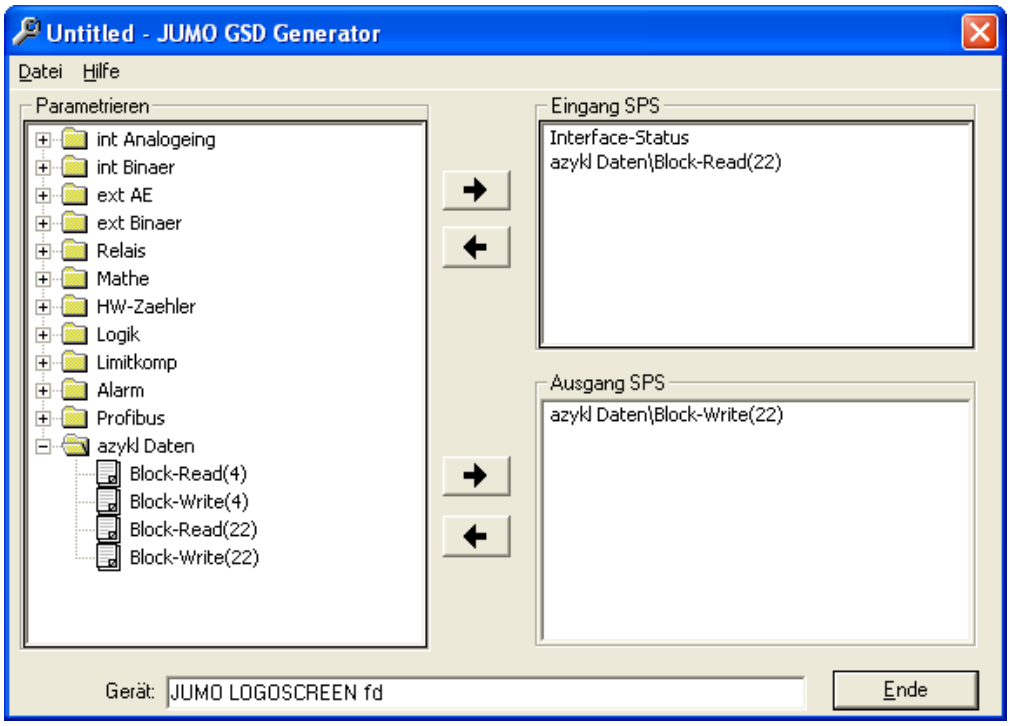
To be able to communicate with the device, ensure that 4 info bytes and max. 22 byte useful data is transmitted. Communication via the acyclical data is based on the Modbus addresses and an identification byte containing the function (read/write) and the length information. 4 of the 22 bytes useful data can be selected in the GSD generator.
The advantage of the acyclical transmission mechanism is the possibility to exceed the limits set by the PLC such as max. 128 byte input and output data in the process image of SIMATIC S7-300 or max. 42 module entries (number of the cyclical parameters) in the GSD file. It is possible to successively transmit and process any number of parameters.
The disadvantage of acyclical transmission is the necessity to integrate an additional interface driver into the PLC to ensure the transmission method described below.
A PLC demonstration program (LSnt*.zip) for SIMATIC S7 using the common CPU 315-2 DP is contained on the CD supplied with the PROFIBUS-DP interface. JUMO can only provide the demonstration program for SIMATIC S7. JUMO does not assume any liability that the program intended to facilitate the initial start-up of the acyclical transmission mechanism functions fault-free in all applications.

The blocks of 4 bytes useful data are intended for the transmission of measured values.

The blocks containing 22 bytes of useful data are used to transmit texts (e. g. event texts, batch texts, batch recipes). This data can only be transmitted to the device using the acyclical transmission. Measured values can also be transmitted.

It is important, to specify the correct data length, otherwise values behind this data could be overwritten in the Modbus table or error entries will appear in the event list.

Selection of the acyclical transmission mechanism in the GSD generator:



The two entries for acyclical data transmission (Read block and Write block) are within the consistent range of the PLC process image.

Only select one block of acyclical data in the GSD generator at a time. Either the blocks containing 4 or 22 byte useful data.
Never use the blocks containing 4 and 22 byte useful data at the same time. [e. g. Block-Read(22) and Block-Write(4)]

5.5.1 Protocol structure

<table>
<tr><td>Byte No.</td><td colspan="5">1..2</td><td>3..4</td><td>5..8/26</td></tr>
<tr><td>Field</td><td colspan="5">Control word</td><td>Modbus addresses</td><td>Data</td></tr>
<tr><td rowspan="3">Contents</td><td colspan="4">Control</td><td>Reserve</td><td>Function</td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td colspan="4">4 bits (Bit 7...4)</td><td>4 bits (Bit 3...0)</td><td>1 byte</td></tr>
<tr><td>Job OK</td><td>JOB defective</td><td>JOB Toggle 2</td><td>JOB Toggle 1</td><td></td><td>see below</td></tr>
</table>

Control bit 0 ...3: Reserve (is not used)

Control bit 4 ...5: Job Toggle 1, job Toggle 2

The two bits are used to control the sequence between PLC and device. Only set control bits 4 and 5 after the transmission buffer is completely filled. To ensure that the correct data is evaluated and processed, adhere to the following sequence:

Bit 5	**Bit 4**	
0	0	1. Job is mirror-imaged by the device.
0	1	Bit 4 set, first job is processed for the first time.
0	1	2. Job is mirror-imaged by the device.
1	0	Bit 4 set, second job is processed for the first time.
...	...	.....

Based on the internal device structure, it is imperative to adhere to the above described sequence. Control bit 6 ...7

Control bit 6 ...7: Job OK, job defective

Bit 6 and 7 send a signal to the PLC after the telegram was evaluated by the device and the next command for the unit can be generated and transmitted by the PLC.

Sequence: 1st case, everthing functions fault-free

Bit 7	Bit 6	Bit 5	Bit 4	
0	0	0	0	No job bit has been set, i.e. the device must mirror-image the job.
0	0	0	1	Job with bit 4 = 1 is set by the PLC, i.e. the device evaluates the telegram.
1	0	0	1	Job with bit 4 = 1 was successfully processed, no error occurred.
0	0	1	0	Job with bit 5 = 1 is set by the PLC, i.e. the device evaluates the new telegram.
1	0	1	0	Job with bit 5 = 1 was successfully processed, no error occurred. Job processing is completed.

Sequence: 2nd case, not everthing functions fault-free

Bit 7	Bit 6	Bit 5	Bit 4	
0	0	0	0	No job bit has been set, i.e. the device must mirror-image the job.
0	0	0	1	Job with bit 4 = 1 is set by the PLC, i.e. the device evaluates the telegram.
1	0	0	1	Job with bit 4 = 1 was successfully processed, no error occurred.
0	0	1	0	Job with bit 5 = 1 is set by the PLC, i.e. the device evaluates the new telegram.
0	1	1	0	Job with bit 5 = 1 was **not** successfully processed, **an error** occurred. This will cancel job processing.

Sequence: 3rd case, not everthing functions fault-free

Bit 7	Bit 6	Bit 5	Bit 4	
0	0	0	0	No job bit has been set, i.e. the device must mirror-image the job.
0	0	0	1	Job with bit 4 = 1 is set by the PLC, i.e. the device evaluates the telegram.
0	1	0	1	Job with bit 4 = 1 was **not** successfully processed, **an error** occurred. Processing can be cancelled, because an error has probably occurred in the telegram structure.

Function: A coded entry is made here as to whether it is written or read. Furthermore, the length of the useful data is entered here.

Function format:

Bit No.	**7**	**6 ... 0**
Field	Input/output	Length
Contents	0: Read 1: Write	000000: 0 byte 000001: 1 byte . . 111110: 62 byte 111111: 63 byte

Address: An extensive number of the addresses listed in the interface description B 706585.2.0 can be transmitted using the acyclical transmission mechanism.

Useful data: 4 or 22 byte useful data can be transmitted. The number of the useful data used is saved in the function byte.

If the block of 22 byte useful data is used, it is possible to write or read, for example 5 consecutive float values from the Modbus table using one command.
For this purpose, only the length must be respectively adapted in the function byte.

It is important, to specify the correct data length, otherwise values behind this data could be overwritten in the Modbus table or error entries will appear in the event list.

Example: The example shows the principle of a data transmission sequence between PLC and device. The external analog input 1 = 50,0 is to be specified by the PLC in Motorola format.

Byte No.	**1 ... 2**			**3 ... 4**	**5 ... 8**
Field	Control word			Modbus address	Data
Contents	Control	Length	Function		

3.) PLC transmits a telegram with Toggle 1 information.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x10	0x84	0x12	0xDA	0x42	0x48	0x00	0x00

4.) The device evaluates the telegram and the feedback job OK or job defective is returned.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x90	0x84	0x12	0xDA	0x42	0x48	0x00	0x00

5.) If the PLC receives job OK, the telegram with Toggle 2 is transmitted to the device. If job defective is received, processing can be immediately cancelled, because an error occured in the telegram structure.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0x20	0x84	0x12	0xDA	0x42	0x48	0x00	0x00

6.) The device evaluates the telegram and the feedback "OK" or "defective" is returned.

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0xA0	0x84	0x12	0xDA	0x42	0x48	0x00	0x00

5.5.2 Demonstration programs LSnt*.zip

The demonstration programs for the LOGOSCREEN fd are saved on the installation CD. JUMO can only provide the demonstration programs for SIMATIC S7. CPU 315-2 DP was used.
A program list in the pdf format is saved on the installation CD after invoking the installation program and clicking on "Documentation ➔ LSfd_azyk_xx.pdf".
JUMO does not assume any liability that the program intended to facilitate the initial start-up of the acyclical transmission mechanism functions fault-free in all applications.

The LSnt_04.zip demonstration program is designed for data communication with 4 byte useful data. The other program respectively for 22 byte useful data. The two programs vary with regard to the UDT10 data type structure and the transmission of texts in the FC1 and FC10 code module.

The sequence of data communication is controlled by flags. The demonstration program processes a total of 12 or 7 commands, whereby the internal analog input 1, the status relay 1 is read and the external analog input 1 is written and transmitted to 2 LOGOSCREEN fd. The external event text group 1 is additionally written to the first LOGOSCREEN fd.

OB1 The PLC operating system cyclically processes the OB1. If processing of OB 1 is completed, the operating system restarts processing of OB 1. Cyclical processing of OB 1 is started after start-up is completed.

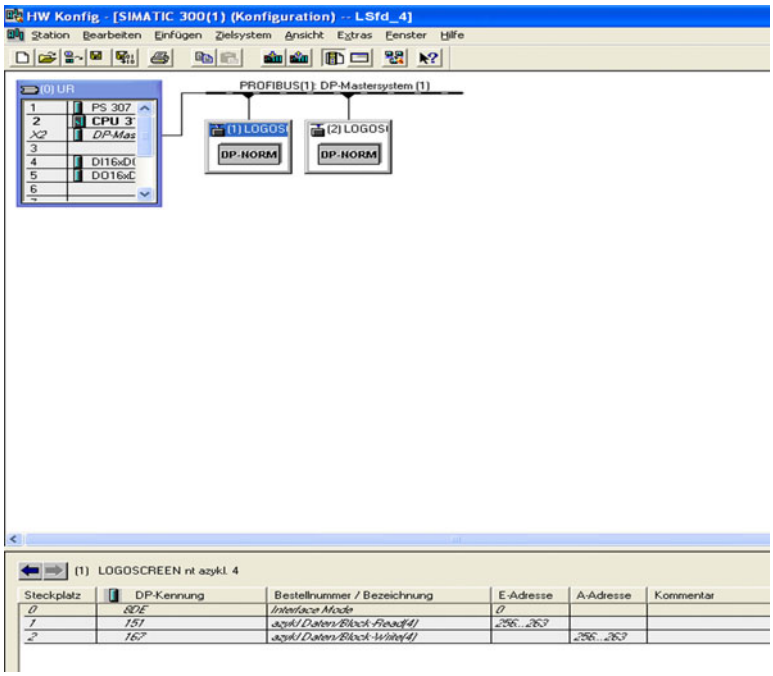
OB86 The PLC operating system invokes OB 86, if the failure of an extension device, of a DP master system or a decentral peripheral station is detected (for a pending event as well as for a remedied/past event). If OB 86 does not exist and with this type of error, the CPU changes to the STOP operating state. The demonstration program only evaluates pending events of the 0xC4 and 0xC5 error codes by incrementing the flag word 28.

FC1 Function to read in 4 and write 2 analog values into the SIMATIC S7 - 300 (315 - 2 DP). Reading and writing process variables is designed separately and can be started individually. Reading is started once using flag 30.3 "StartTransferCyclical", i. e. all 4 analog values are read in consecutively and the process is subsequently terminated. Flag 30.1 "StartTransferAcyclical" can be used to separately start writing the 2 analog values. Flags 30.0 "SteuerFlagCyclical" and 30.2 "SteuerFlagAcyclical" indicate the duration of the transmission, separately for writing and reading.

Processing the commands is structured in a "concatenated list", i. e. if a command is processed, the next is automatically started immediately.

FC10 Operates the PROFIBUS-DP interface (driver). The function has some defined transfer parameters explained in the following text.

Adr Address of the acyclical data in the PLC process image. Ensure that the addresses for acyclical data in the input process image and the output process image are identical. It is not possible to use different addresses. The address must be transmitted to FC 10 in the HEX format.



Command Command syntax to be transmitted to the device, e. g. set external analog input 1 = 50,0, ... The structure of the program is so that a pool of possible commands is predefined in a data module DB.

Response A response transmitted from the device to the PLC, is also saved in a data module and can be interpreted and evaluated by different parts of the PLC program.

STRT Start pulse, i. e. command processing start. The telegram transferred by a command is transmitted to the device.

RDY Command processing completed. The device transmitted a feedback to the PLC, the RDY flag is subsequently set by the FC 10 to signal the higher-ranking processing that telegram processing is completed. The RDY flag is also set after a timeout error.

Toggle The toggle flag is reset by the FC 10. The toggle flag to be transmitted is interpreted and the toggle information is treated for the device.

DB10 This data module records the device feedback messages. Currently it is possible to save 6 different feedback messages. The dimension of DB 10 can be adapted at any time. In DB 10, the complete response telegram of the controller is saved, i. e. the useful data as well as the control information and the address.

DB20 Data module 20 contains several predefined commands. These commands can be individually used in this demonstration program. A short description concerning the data to be transferred is provided for each command. DB 20 can be extended by further commands or changed at any time. Please refer to the operating manual B 706585.2.0 for the required information.

Command 000:
Reading internal analog input1

Command 001
Reading internal analog input2

Command 002
Reading internal analog input3

Command 003
Reading relay status1

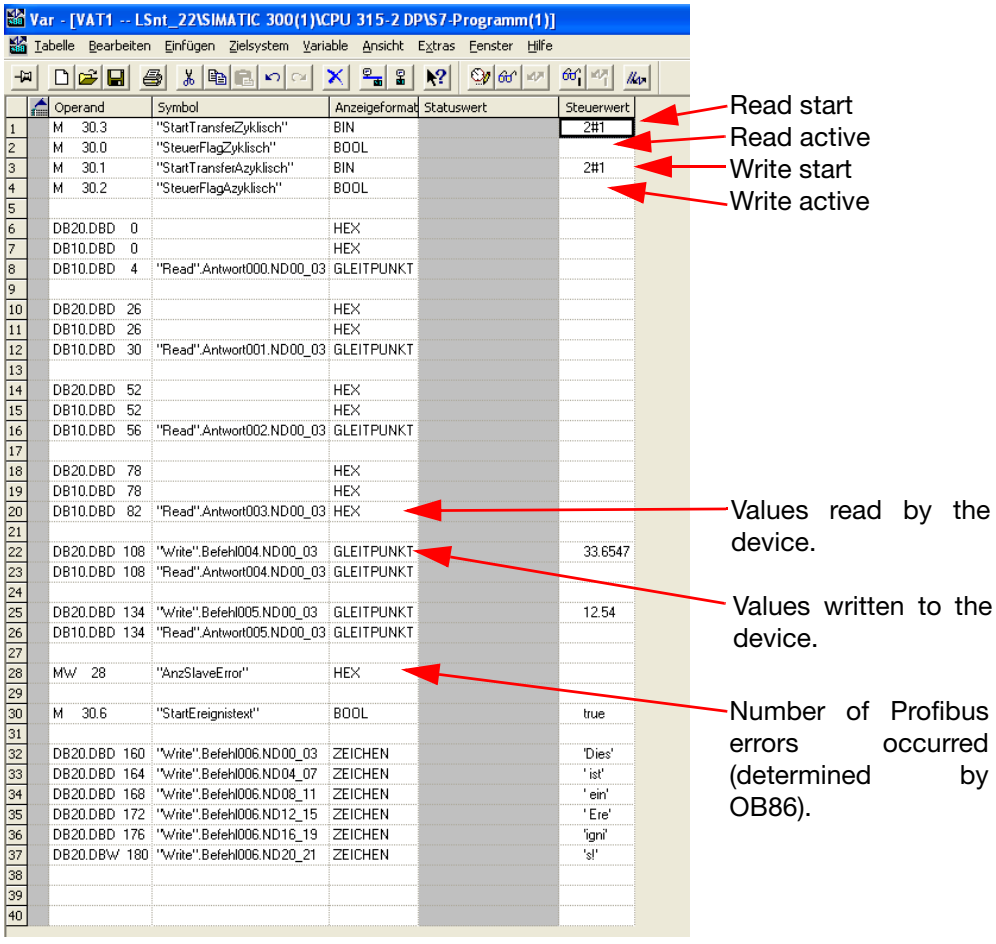
Command 004
Writing external analog input1

Command 005
Writing external analog input2

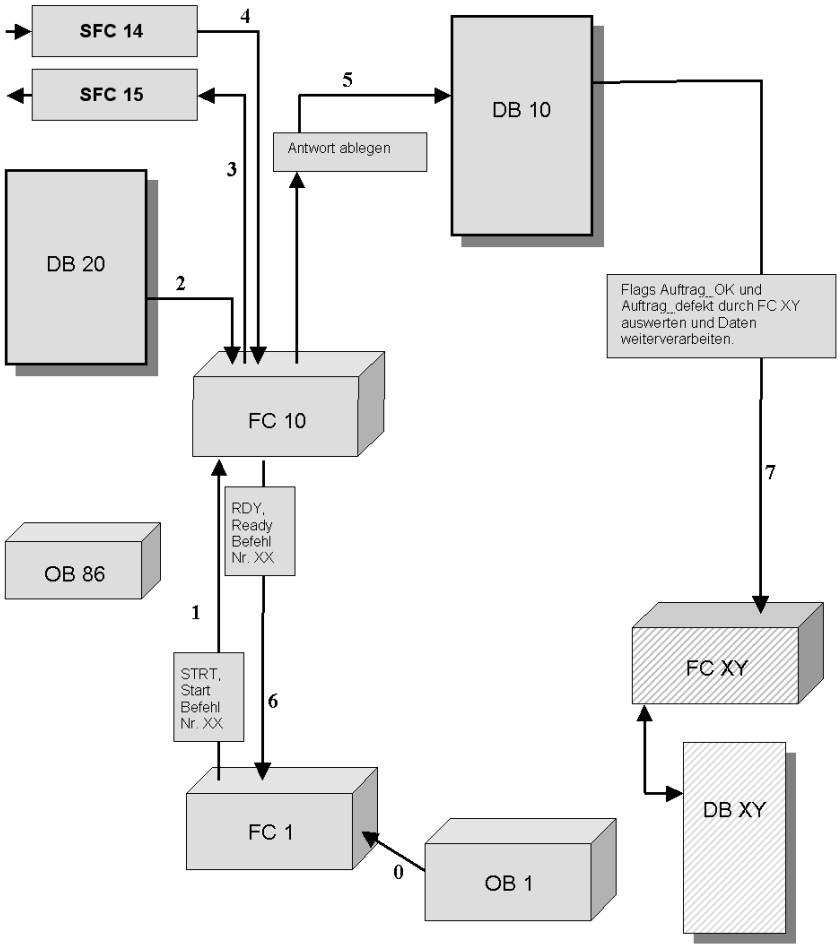
Command 006
Writing external event text group1

UDT10 Universal data type. In UDT10, the structure of the input and output data channel of the device is defined.

VAT1 The created variables table enables checking the data communication and allows controlling command processing.



5.5.3 Block diagram of the demonstration program



0:OB 1 is automatically processed cyclically by the CPU of the PLC.

1)	The FC 1 is also invoked cyclically by the PLC. If flag 30.3 "StartTransferCyclically" is set, command processing is started in the FC 1 by treating the first command using FC 10 which then becomes the LOGOSCREEN fd.
2)	FC 10 loads the desired command from the DB 20 and treats the respective information.
3)	The data telegram is entered in to the PLC process image by the FC 10 and thus transmitted to the LOGOSCREEN fd.
4)	The LOGOSCREEN fd processes the received data telegram and provides a feedback message to FC 10 in the PLC process image.
5)	The FC 10 compares the response with the transmission telegram, evaluates and saves the response in the DB 10 for the following PLC program.

6)	Via the RDY flag, FC 1 receives the signal that processing of a command is completed. If this information is received by FC 1, the next command is immediately transmitted to the LOGOSCREEN fd.
7)	In practice, the collected data or the data to be transmitted to the LOGOSCREEN fd is evaluated or treated by different PLC program functions. The result is that a check whether or not data is correct has to be performed prior to starting data interpretion. The two control flags in the telegram header (job OK and job defective) must be checked.
1... 8	Processing sequence

JUMO cannot guarantee that the components or extensions specified above ensure fault-free machine line operation because error processing must always be specifically defined for each machine.

5.5.4 Timing of acyclical data

The acyclical data transmission allows universal access to numerous data and parameters accessible via Modbus (no configuration and program changes). However, it results in an extended updating time due to the larger number of processing steps.

5.5.5 Commands (GSD generator)

If additional information concerning the "Commands" used within the GSD generator is required, please refer to the interface description B 706585.2.0.
The configuration of the GSD file is designed for installation on SIMATIC S7. Should installation problems with other controls be encountered, delete all Preset=1 entries.
⇨ Chapter 3.3.4

In this case, in the PLC process image, it is also necessary to set up the variables selected in the GSD generator in the correct order.

5 Technical data of the devices

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