

PROFIBUS-DP-Slave Software



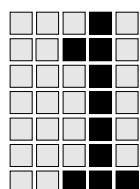
Programmable control systems PSS®

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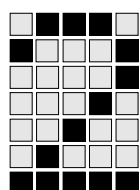
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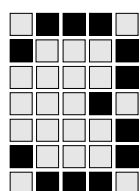
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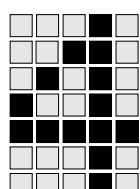
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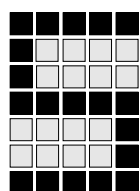
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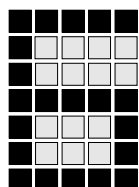
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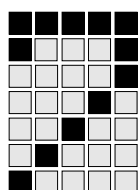
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Standard Function Blocks **SB 230**

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Introduction

This manual describes the communications software for the:

- PSS(1) DP-S module
and
- PSS SB 3006 DP-S compact programmable safety system.

Separate manuals are available for using the respective programmable control systems PSS:

- PROFIBUS-DP-Slave Hardware Manual
- PSS SB 3006 DP-S Shortform
- PSS SB 3006 DP-S Installation Manual

To fully understand this manual you will need to be conversant with the information found in the general documentation for the programmable control systems PSS (System Manual, Installation Manual for the modular PSS and the Programming Manual).

Familiarity with general documentation on PROFIBUS (EN 50170 Volume 2 in the current version) is also required in order to understand bus-specific processes, configurations and terminology. Familiarity with a network configuration tool is also required.

This manual is intended for instruction and should be retained for future reference.

Overview of manual

1 Introduction

The introduction is designed to familiarise you with the contents, structure and specific order of this manual.

2 Overview

This chapter provides information on the most important features of the software package and briefly outlines the application area.

3 Intended use

You **must** read this chapter, as it contains important information on safety regulations and intended use.

Introduction

4 Setting parameters

This chapter describes the parameters, diagnostics and the configuration of input and output data.

5 Commissioning

This chapter describes the commissioning procedure.

6 Standard function blocks

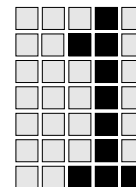
This chapter provides information on the parameters and management of standard function block SB 230.

7 Appendix

The example is designed to provide support when linking standard function block SB 230 into a user program.

Terminology

- The term "safety system", "system" or "PSS" will be used in this manual to refer to the programmable control systems PSS. If the description is only valid for a particular device, the specific product name will be used (e.g. PSS SB 3006 DP-S, PSS(1) DP-S).
- In this manual, data transfer is always regarded as viewed from the PSS: input data / receive data is sent from a PROFIBUS subscriber to the PSS. Output data / send data is sent from the PSS to a PROFIBUS subscriber.



Definition of symbols

Information in this manual that is of particular importance can be identified as follows:



DANGER!

This warning must be heeded! It warns of a **hazardous situation which poses an immediate threat of serious injury and death**, and indicates preventive measures that can be taken.



WARNING!

This warning must be heeded! It warns of a **hazardous situation that could lead to serious injury and death**, and indicates preventive measures that can be taken.



CAUTION!

This refers to a hazard that can lead to a less serious or minor injury plus material damage, and also provides information on preventive measures that can be taken.



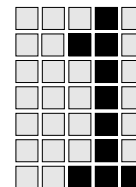
NOTICE

This describes a situation in which the unit(s) could be damaged and also provides information on preventive measures that can be taken.



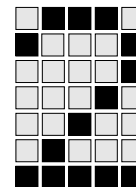
INFORMATION

This gives advice on applications and provides information on special features, as well as highlighting areas within the text that are of particular importance.



Introduction

Notes



Overview

This software package connects the PSS(1) DP-S module or compact programmable safety system PSS SB 3006 DP-S to PROFIBUS-DP. The PSS connection is in accordance with PROFIBUS specification EN 50170 Volume 2.

Software package

Data exchange via PROFIBUS is a Master-Slave communication. The maximum length of data to be exchanged is defined in the master data file (see file PILZ2500.GSD on the disk supplied). Parameters must be set for the Slave prior to communication. For example, parameters describe configuration data, the length of input/output data, station address, etc. Data cannot be exchanged until the Master has received the parameter data record.

The setting of parameters on the PROFIBUS-DP-Slave is supported by standard function blocks. All the required parameters are entered in one data block.

The programmable control systems PSS have been designed for use in plant and machinery safety circuits. They consist of a failsafe (FS) section and a standard (ST) section.

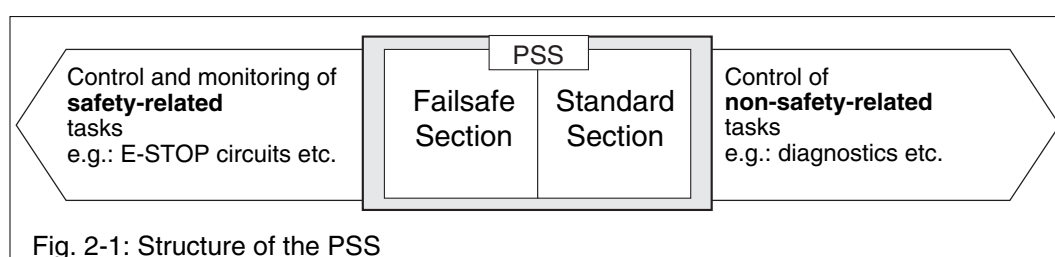
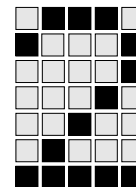


Fig. 2-1: Structure of the PSS

This software package is designed for use in the standard section of a programmable control system PSS.



Overview

Functions

The PROFIBUS-DP-Slave supports the following functions:

- Internal system diagnostics
- Device-related diagnostics
- Transfer of max. 488 bytes of user data



INFORMATION

In this manual, data transfer is always regarded as viewed from the PSS:
Input data is sent from the Master to the PSS, output data is sent from the PSS to the Master.

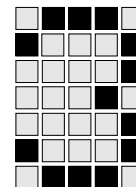
Range

The software package consists of:

- one disk and
- one operating manual: PROFIBUS-DP-Slave Software

The disk contains:

- Standard function blocks SB 230, SB 231, SB 232
- Master data files:
 - PILZ2500.GSD (German)
 - PILZ2500.GSE (English)
 - PILZ2500.GSF (French)
- One sample program



Intended Use

This software package is designed to connect a programmable control system PSS to PROFIBUS-DP. It is essential to use a suitable module or compact safety system.

This software package is intended for use with the following programmable control systems PSS:

- PSS DP-S module when using a module rack from the PSS 3000 series.
- PSS1 DP-S module when using a module rack from the PSS 3100 series.
- PSS SB 3006 DP-S programmable safety system as a compact device.

The safety systems are passive subscribers (Slaves) on PROFIBUS-DP. They meet standard EN 50170 Volume 2, PROFIBUS.

Disregard of the information in this manual and use of the software package outside the specifications described here will be deemed as improper application.

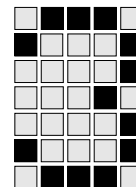


INFORMATION

This software package is exclusively for use in **non-safety-related** applications. It must be used in the standard section of the PSS.

Conditions for operation:

- The module must be installed in accordance with the PROFIBUS DP-Slave Hardware Manual and the relevant "Installation Manual" for the programmable safety system.
- You must be familiar with and adhere to standard EN 50170 Volume 2, PROFIBUS.



Intended Use

Standard function block SB 230

SB 230 may be used with the following functions and parameters:

- PROFIBUS-DP connection
- To trigger a slave reset
- To trigger static diagnostics
- Permitted data lengths:

Input data: 0 ... 108 words (set via parameters)

Output data: 0 ... 108 words (set via parameters)

Diagnostic data: 4 ... 35 words (set via parameters)

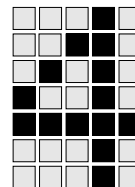
Configuration data: 1 ... 244 bytes (set via parameters)

Please note that the overall data length may be a max. of 1472 Bytes. Information on calculating the data length can be found in the section entitled "Setting data blocks".



INFORMATION

SB 230 **must** be called up in the user program as part of each cycle.



Setting Parameters

Before operating the PSS(1) DP-S and PSS SB 3006 DP-S, a number of parameters must be established and then entered in a data block. You can use any free data block or amend the data block supplied (DB 050).

Data block configuration:

Data word	Contents
DW 0000 ... DW 0127	Input data from the Master to the PSS
DW 0128 ... DW 0255	Output data from the PSS to the Master
DW 0256 ... DW 0383	Diagnostic data
DW 0384 ... DW 0511	Configuration data
DW 0512 ... DW 0767	Reserved
DW 0768 ... DW 1023	Control and status information

Setting Parameters

Diagnostics

The diagnostics function provides information about the PSS / Slave to the Master. The standard divides diagnostic information into two areas:

- Internal system diagnostic data
- External diagnostic data
 - device-specific diagnostic data
 - user-specific diagnostic data

Internal system and device-specific diagnostic data is transferred automatically. If the PSS(1) DP-S or PSS SB 3006 DP-S receives a diagnostic message, it will inform the Master that it is present. The Slave cannot send the diagnostic data until the Master requests it. During transmission, I/O data traffic (transfer of usable data) is interrupted.

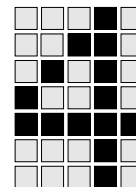
It is also possible to transfer user-specific messages (diagnostic data). The time of transfer for user-specific messages can be set individually. The user establishes the event which will trigger the transfer of diagnostic data.

Application example: a machine's operating status is to be transmitted constantly (e.g. 10 Bytes). If a certain temperature is exceeded, additional data will be required (e.g. 40 Bytes). The 10 Bytes for operating status will be transferred within the usable data; the 40 Bytes of additional data will be transferred in diagnostics mode. This means that in normal operation, only small amounts of data are transferred and the communication speed will be high. In exceptional cases (when the temperature is exceeded), larger amounts of data must be transferred and the communication speed will be reduced.

Internal system diagnostics

Standard function block SB 230 prepares data for internal system diagnostics:

Byte 1 Bit 6:	Prm_Fault
Byte 1 Bit 3:	Ext_Diag
Byte 1 Bit 1:	Station_Not_Ready



Byte 2 Bit 1: Stat_Diag
Byte 2 Bit 0: Prm_Req
Byte 3 Bit 7: Ext_Diag_Overflow

Byte 5-6: ID-number 2500_H (ID-number assigned through PROFIBUS User Organisation)



INFORMATION

For details of what the parameters mean, please refer to the PROFIBUS standard EN 50170 Volume 2.

External diagnostics

On the PSS(1) DP-S and PSS SB 3006 DP-S, external diagnostics are limited to device-related diagnostics. ID and channel-related diagnostics are only sensible if more than 61 Bytes of user-specific diagnostic data are to be transferred. These diagnostic types are not described in this manual. Please refer to EN 50170 and note also that these applications may not be possible with all Master-Slave configurations.

Device-related diagnostics

Device-related diagnostics automatically detect whether the PSS is in a RUN or STOP condition. A maximum of 61 Bytes of memory is available for additional user-specific messages.

Device-related diagnostics without user-specific messages:

Only 2 data bytes are required for this type of diagnostics: one data byte for the coding and one for the contents. The two data bytes correspond to Bytes 7 and 8.

Enter the following values in the data block:

⋮

DW 0259

DL	DR
Byte 8	Byte 7

...

DW 0812 KF 04

⋮

Setting Parameters

Contents of data word DW 0259 DR: Header byte 7:

Bit No.	7	6	5	4	3	2	1	0
	0	0	0	0	0	0	1	0
Code for Device-related diagnostics						Block length in Bytes including Header byte: 2 Bytes		



INFORMATION

In the case of device-related diagnostics without user-specific messages, **DW 0259 DR** will always contain **02**.

The PSS(1) DP-S or PSS SB 3006 DP-S registers in DW 0259 DL:
Header byte 8:

Bit No.	7	6	5	4	3	2	1	0
	x	x	x	x	x	x	x	0/1
Not used							0: ST section of PSS in RUN mode 1: ST section of PSS in STOP mode	

The PSS(1) DP-S or PSS SB 3006 DP-S uses a hardware signal to detect whether the PSS standard section is in a RUN or STOP condition.

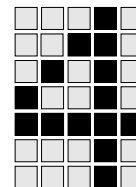


INFORMATION

This type of diagnostics is only possible if the slave has been fully initialised by the PSS and has been recognised by the Master.

The length of the diagnostic data must be entered in DW 0812. Diagnostic data has a length of at least 4 words:

- 3 words of internal diagnostic data in DW 0256, 0257 and 0258
- + 1 word in DW 0259 (as described).



Device-related diagnostics with user-specific messages:

Device-related diagnostics can be extended by a maximum of 61 Bytes with user-specific messages. These messages are entered in the data block from DW 0260.

Enter the following values in the data block:

...	DL	DR
DW 0259	Byte 8	Byte 7

DW 0260

... User-specific messages

DW 0383

...

DW 0812 KF Length of diagnostic data

...

Contents of data word DW 0259 DR: Header byte 7:

	MSB							LSB
Bit No.	7	6	5	4	3	2	1	0
	0	0	x	x	x	x	x	x
Code for device-related diagnostics							Length of user messages: 2 ... 63 relates to 2 ... 63 Bytes	

If the length entered in DW 0259 is greater than 2, the user messages will follow on from DW 0260 (Byte 9). If the length entered is less than 2, device-specific diagnostics will not be possible.

Contents of data word DW 0259 DL: Byte 8:

In DW 0259 DL the PSS(1) DP-S or PSS SB 3006 DP-S registers whether the PSS standard section is in a RUN or STOP condition (see page 4-4).

The length of the diagnostic data must be entered in DW 0812. This is composed of:

- 3 words of internal diagnostic data (DW 0256+DW 0257+DW 0258)
- + 1 word of device-specific diagnostic data (DW 0259)
- + x words user-specific data.

Setting Parameters

Configuring input and output data

The length of the input and output data plus data consistency are all established through the configuration. Data consistency can refer to a single word or to the whole data length. The maximum data length of the input or output data is 122 words (244 Bytes). The configuration of the Master, PSS(1) DP-S or PSS SB 3006 DP-S must match (see also Chapter 6, page 6-4).



INFORMATION

The PSS(1) DP-S or PSS SB 3006 DP-S transfers all data word by word. As the PSS CPU always accesses the Slave word by word, byte structures are not supported.

There are two ways of configuring the PSS(1) DP-S or PSS SB 3006 DP-S: either through a simple ID-format which establishes the length, consistency and direction of communication, or by means of a special ID which allows for additional data through a separate length byte. The configuration is undertaken in an “ID-Byte”.

Simple ID-Format

The simple ID-format is suitable for transmissions of up to a maximum of 16 words. With larger transmissions you will either need to use several ID-bytes in succession or the special ID-format.

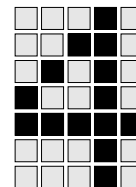
Enter the following parameters in the data block:

- When only output or input data is being transferred, or when input and output data of the same length is to be transferred simultaneously:

⋮	DL	DR
DW 0384	00	ID-Byte
⋮		
DW 0813	Length of the configuration data in Bytes	

- When input and output data of different lengths is to be transferred simultaneously:

⋮	DL	DR
DW 0384	Input ID-Byte	Output ID-Byte
⋮		
DW 0813	Length of the configuration data in Bytes	



Contents of ID-Byte:

Bit No.	7	6	5	4	3	2	1	0
	x	1	x	x	x	x	x	x
								Length of data: 0000 ... 1111 corresponds to 1 ... 16 words
								Input / Output
								00 = Special ID-format
								01 = PSS output data
								10 = PSS input data
								11 = PSS input and output data
								Data structure: 1: Word, 0: Byte
								We recommend you set Bit 6 = 1 (Word)
								Consistency: 0: for one word, 1: for the whole data length

The length of the configuration data must be entered in bytes in DW 0813. The length is 1, if only one byte is used, or two if both bytes of data word DW 0384 are used.

Examples: Consistency always over the whole data length

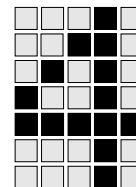
			DW 0384	
1 word output	1101 0000 _B	D0 _H	00	D0
16 words output	1101 1111 _B	DF _H	00	DF
1 word input	1110 0000 _B	E0 _H	00	E0
16 words input	1110 1111 _B	EF _H	00	EF
Input and output, 1 word each	1111 0000 _B	F0 _H	00	F0
Input and output, 12 words each	1111 1011 _B	FB _H	00	FB
1 word output and 2 words input	1101 0000 _B 1110 0001 _B	D0 _H E0 _H	E0	D0
15 words output and 16 words input	1101 1110 _B 1110 1111 _B	DE _H EF _H	EF	DE

- When only output or input data is to be transferred:

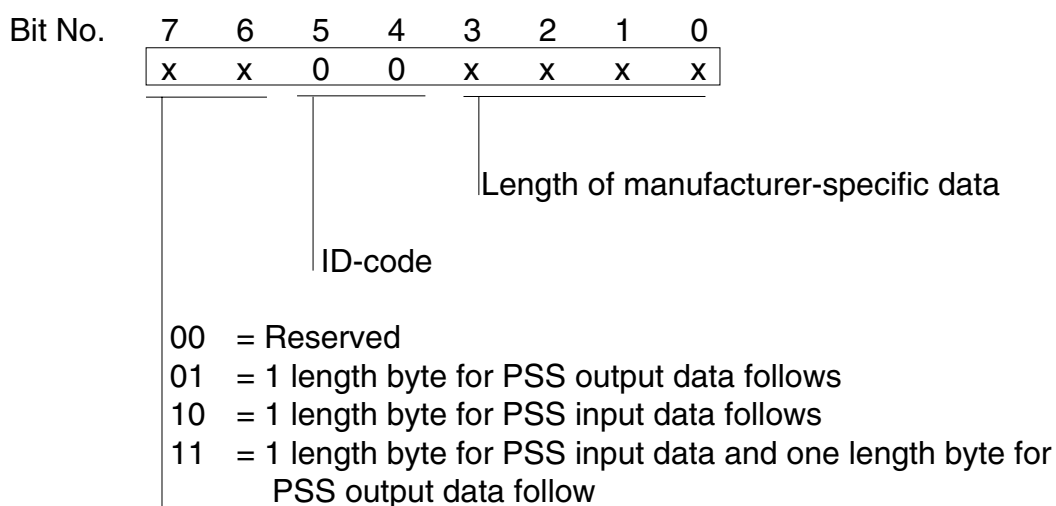
- When input and output data is to be transferred simultaneously:

- When more than 64 Bytes of input and output data are to be transferred simultaneously. Data must be transferred consecutively: first the 64 Bytes and then the remaining Bytes:

PROFIBUS-DP-Slave Operating Manual



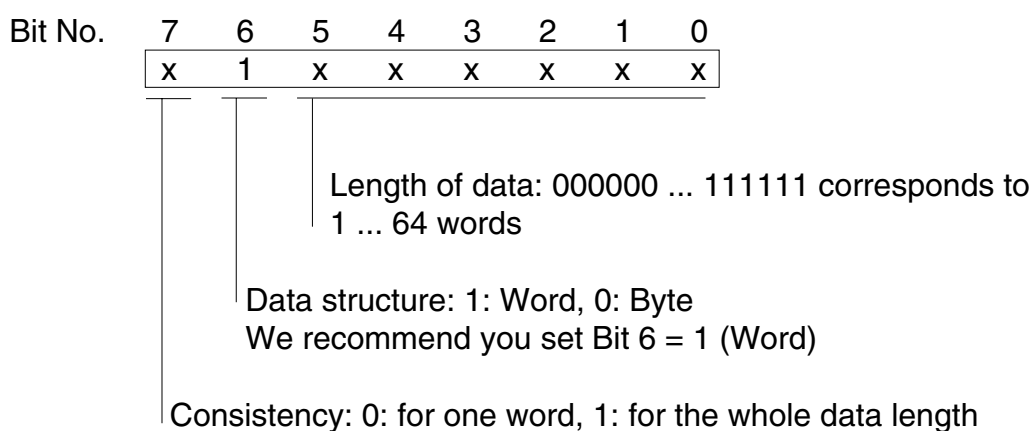
ID-Byte:



INFORMATION

Manufacturer-specific data is not pre-assigned by Pilz. Users may enter their own data - please refer to the standard.
 If no data is to be entered, enter the value 0 in Bits 0 ... 3 .

Length-Byte:



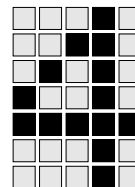
INFORMATION

The amount of configuration data must be entered in Bytes in DW 0813.

Setting Parameters

Examples: Consistency always over the whole data length

			DL	DR
1 word output	0100 0000 _B 1100 0000 _B	40 _H C0 _H	CO	40
16 words output	0100 0000 _B 1100 1111 _B	40 _H CF _H	CF	40
1 word input	1000 0000 _B 1100 0000 _B	80 _H C0 _H	C0	80
64 words input	1000 0000 _B 1111 1111 _B	80 _H FF _H	FF	80
Input and o/p, 2 words each	1100 0000 _B 1100 0001 _B 1100 0001 _B	C0 _H C1 _H C1 _H	C1 00	C0 C1
Input and o/p, 16 words each	1100 0000 _B 1100 1111 _B 1100 1111 _B	C0 _H CF _H CF _H	CF 00	C0 CF
Input and o/p, 64 words each	1100 0000 _B 1111 1111 _B 1111 1111 _B	C0 _H FF _H FF _H	FF 00	C0 FF
2 words input and 3 words output	1100 0000 _B 1100 0001 _B 1100 0010 _B	C0 _H C1 _H C2 _H	C1 00	C0 C2
16 words input and 4 words output	1100 0000 _B 1100 1111 _B 1100 0011 _B	C0 _H CF _H C3 _H	CF 00	C0 C3



122 words input and 2 words output

1st ID-Byte for input data

1000 0000_B 80_H

Length-Byte for input data (64 words)

1111 1111_B FF_H

2nd ID-Byte for output data

0100 0000_B 40_H

Length-Byte for output data

1100 0001_B C1_H

3rd ID-Byte for input data

1000 0000_B 80_H

Length-Byte for input data (58 words)

1111 1001_B F9_H

FF	80
C1	40
F9	80

Setting data blocks

Enter the values in a data block, as shown overleaf. In addition to diagnostic and configuration data, the following data words must be written:

- The first 128 data words are reserved for input data and the next 128 for output data.
- Enter the maximum length of the diagnostic data in data word DW 0783. This value means that a memory area is reserved for the diagnostic data during initialisation. The value max_diag_len is stated in bytes and must be at least equal to the length in words of the diagnostic data in data word DW 0812.



INFORMATION

DW 0812 should be entered in words and DW 0783 in bytes!

- “F5” should always be entered in data word DW 0795.
- The station address should be entered in data word DW 0800. This address must be identical to the address set on the front plate.
- In data word DW 0801, enter the transmission sequence for the I/O-data and the user-specific diagnostic data:
 - 0: (default; Motorola) The PSS sends the left data byte to the Master first, followed by the right data byte.
 - 1: (Intel) the PSS transmits the right data byte first, followed by the left data byte.

Setting Parameters

- Enter the length of the input data in data word DW 0810 and the length of the output data in data word DW 0811.
- Always enter "0" in data words DW 0814 and DW 0815.

Data block configuration:

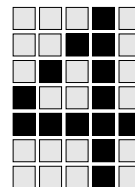


NOTICE

Only edit data words and output data that are shaded grey.

Data words 256, 257, 512 ... 782, 784 ... 794, 796 ... 799, 802 ... 809 and 816 ... 1023 cannot be amended!

Data word	Type	Contents
<i>DW 0000...DW 0127</i>		<i>Input data Master --> PSS</i>
<i>DW 0128...DW 0255</i>		<i>Output data PSS --> Master</i>
DW 0256		Reserved for internal diagnostic data
DW 0257		Reserved for internal diagnostic data
DW 0258	KH	ID number: 2500 hex
DW 0259	KH	Device-specific diagnostic data [Byte]
		1 Byte Header (DR 0259)
		+ 1 Byte Pilz diagnostics (DL 0259)
		+ x Byte user diagnostics (DR 0260ff)
DW 0260...DW 0383	KH	User-specific diagnostic data
DW 0384...DW 0511	KH	Configuration data
DW 0512...DW 0782		Reserved
DW 0783	KF	max_diag_len [Byte] (>2 x DW 0812)
DW 0784...DW 0794		Reserved
DW 0795	KH	Only F5 hex is permitted
DW 0796...DW 0799		Reserved
DW 0800	KF	Slave address 0 ... 126 Equals coding switch on the module
DW 0801	KF	Transmission sequence of Bytes 0 or 1
DW 0802...DW 0809		Reserved
DW 0810	KF	Length of input data 0 - 122 [Words]
DW 0811	KF	Length of output data 0 - 122 [Words]
DW 0812	KF	Length of diagnostic data 4 - 35 [Words] 3 words internal diagnostics (DW 0256 ... DW 0258) x words device-specific diagnostics (= DW 0259 / 2)



Data word	Type	Contents
DW 0813	KF	Amount of configuration data 1- 244 [Byte] (DW 0384ff)
DW 0814	KF	Only 0 is permitted
DW 0815	KF	Only 0 is permitted
DW 0816...DW 1023		Reserved



NOTICE

The data length may be a maximum of 1472 Bytes. The maximum data length is calculated as follows:

- 3 x length of the input data
- + 3 x length of the output data
- + 2 x length of the diagnostic data
- + 4 x length of the configuration data
- + 120 Byte

Examples

Example 1:

12 words input and output: configuration byte FB_H ;

Length of configuration data: 1 Byte

Diagnostics: 3 words of internal diagnostic data

1 word of device-related diagnostic data

Data word	Contents	Description
DW 0000 - DW 0011	...	Input data
DW 0128 - DW 0139	...	Output data
DW 0258	KH 2500	ID-number
DW 0259	KH 0002	Device-related diagnostics
DW 0384	KH 00FB	Configuration data
DW 0783	KF 10	max_diag_len [Byte]
DW 0795	KH F5	Pre-assigned
DW 0800	KF 1	Slave address [0-126]
DW 0801	KF 0	Transmission sequence
DW 0810	KF 12	Length of input data in words
DW 0811	KF 12	Length of output data in words
DW 0812	KF 4	Length of diagnostic data in words
DW 0813	KF 1	Amount of configuration data in bytes
DW 0814	KF 0	Pre-assigned
DW 0815	KF 0	Pre-assigned

Setting Parameters

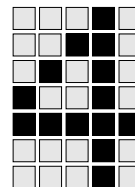
Example 2:

64 words output, special configuration byte: 40, Length byte: FF

Diagnostics: 3 words of internal diagnostic data

1 word of device-related diagnostic data

Data word	Contents	Description
DW 0128 - DW 0191	...	Output data
DW 0258	KH 2500	ID-Number
DW 0259	KH 0002	Device-related diagnostics
DW 0384	KH FF40	Configuration data
DW 0783	KF 10	max_diag_len [Byte]
DW 0795	KH F5	Pre-assigned
DW 0801	KF 0	Transmission sequence
DW 0800	KF 1	Slave address [0-126]
DW 0810	KF 0	Length of input data in words
DW 0811	KF 64	Length of output data in words
DW 0812	KF 4	Length of diagnostic data in words
DW 0813	KF 2	Amount of configuration data in bytes
DW 0814	KF 0	Pre-assigned
DW 0815	KF 0	Pre-assigned



Example 3:

2 words input and 1 word output,

Special configuration byte: C0,

Length byte input: C1

Length byte output: C0

Diagnostics: 3 words of internal diagnostic data

1 word of device-related diagnostic data

Data word	Contents	Description
DW 0000 - DW0001	...	Input data
DW 0128	...	Output data
DW 0258	KH 2500	ID-Number
DW 0259	KH 0002	Device-related diagnostics
DW 0384	KH C1C0	Configuration data
DW 0385	KH 00C0	
DW 0783	KF 10	max_diag_len [Byte]
DW 0795	KH F5	Pre-assigned
DW 0800	KF 1	Slave address [0-126]
DW 0801	KF 0	Transmission sequence
DW 0810	KF 2	Length of input data in words
DW 0811	KF 1	Length of output data in words
DW 0812	KF 4	Length of diagnostic data in words
DW 0813	KF 3	Amount of configuration data in bytes
DW 0814	KF 0	Pre-assigned
DW 0815	KF 0	Pre-assigned

Setting Parameters

Example 4 :

100 words input and output

Configuration byte: C0

Length byte input (64 words): FF

Length byte output (64 words): FF

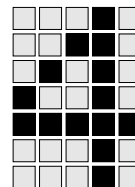
Configuration byte: C0

Length byte input (36 words): E3

Length byte output (36 words): E3

Diagnostics: 3 words of internal diagnostic data
 1 word of device-related diagnostic data
 50 bytes of user-specific diagnostic data

Data word	Contents	Description
DW 0000 - DW 0099	...	Input data
DW 0128 - DW 0227	...	Output data
DW 0258	KH 2500	ID-number
DW 0259	KH 0052	Device-related diagnostics
DW 0384	KH FFC0	Configuration data
DW 0385	KH C0FF	
DW 0386	KH E3E3	
DW 0783	KF 58	max_diag_len [Byte]
DW 0795	KH F5	Pre-assigned
DW 0800	KF 1	Slave address [0-126]
DW 0801	KF 0	Transmission sequence
DW 0810	KF 100	Length of input data in words
DW 0811	KF 100	Length of output data in words
DW 0812	KF 29	Length of diagnostic data in words
DW 0813	KF 6	Amount of configuration data in bytes
DW 0814	KF 0	Pre-assigned
DW 0815	KF 0	Pre-assigned



Example 5:

2 words input and 1 word output

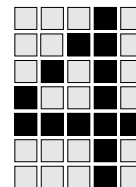
Configuration byte: C0

Length byte input: C1

Length byte output: C0

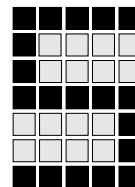
Diagnostics: 3 words of internal diagnostic data
1 word of device-related diagnostic data
2 bytes of user-specific diagnostic data

Data word	Contents	Description
DW 0000 - DW 0001	...	Input data
DW 0128	...	Output data
DW 0258	KH 2500	ID-number
DW 0259	KH 0004	Device-related diagnostics
DW 0260	KH xxxx	User-specific diagnostic data
DW 0384	KH C1C0	Configuration data
DW 0385	KH 00C0	
DW 0783	KF 10	max_diag_len [Byte]
DW 0795	KH F5	Pre-assigned
DW 0800	KF 1	Slave address [0-126]
DW 0801	KF 0	Transmission sequence
DW 0810	KF 2	Length of input data in words
DW 0811	KF 1	Length of output data in words
DW 0812	KF 5	Length of diagnostic data in words
DW 0813	KF 3	Amount of configuration data in bytes
DW 0814	KF 0	Pre-assigned
DW 0815	KF 0	Pre-assigned



Setting Parameters

Notes



Commissioning

Configuration

Before commissioning, the following values need to be established:

- The number of inputs and outputs in words
- The amount of diagnostic data in words
- Station address (see PROFIBUS-DP-Slave Hardware Manual or PSS SB 3006 DP-S Shortform).

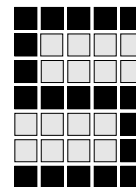
The Master can be configured using the configuration data and the data from the unit's master data file.

Commissioning Sequence

Requirement

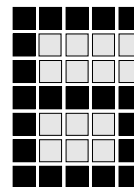
The module must have been installed in accordance with the instructions provided in the PROFIBUS-DP-Slave Hardware Manual or PSS SB 3006 DP-S Shortform. Master and Slave must be ready for operation.

- Create a cold-start organisation block, OB 020, and state the necessary parameters in a data block; enter the slave module under hardware registry in DB 004; an example for OB 020 can be found in the Appendix.
- Establish the parameters for standard function block SB 230 (see Chapter 6 for further details).
- **SB 230 must be called up in each PSS cycle.**
- Transfer the following blocks to the PSS:
 - OB 001 and OB 020
 - SB 230, SB 231 and SB 232
 - DB 4, DB 5 and the data block containing the parameters
 - any additional blocks required by the user.
- After configuration, output parameter *ERR* on standard function block SB 230 can no longer register an error. It should display: *ERR* = KH 2000. Any other value indicates an error. For further information please refer to Chapter 6, "Standard Function Blocks".



Commissioning

Notes



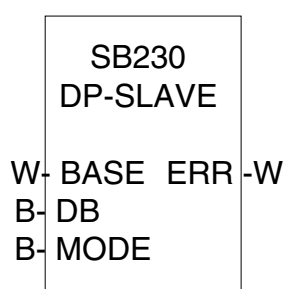
Standard Function Blocks

SB 230

Function

- Communication between the PSS and PROFIBUS-DP-Slave
- Trigger a Slave reset
- Trigger static diagnostics

Block Header



W: Word, B: Byte

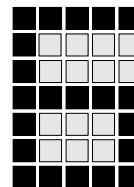
Parameters

- Input parameters
 - BASE: Module's start address (Offset)
The module occupies 1024 words after the start address.
These words may **not** be accessed.
 - MODE: = 01: Static diagnostics
= 02: Reset:
All other values: Data exchange (Data_exchange):
 - DB: Data block
- Output parameters
 - ERR: Error message (see table below)

ERR (hex)	Key	Cause/Remedy
0001	DP_SL_ERR_DPS2_LENGTH	Total length calculated for diagnostic, parameter, input and output data is too high; reduce the data length!
0002	DP_SL_ERR_DPS2_INIT	Hardware initialisation error; Change PSS(1) DP-S module or PSS SB 3006 DP-S

Standard Function Blocks

ERR (hex)	Key	Cause/Remedy
0003	DP_SL_ERR_SSA_IND	Master attempting to change slave address; reconfigure Master
0004	DP_SL_ERR_DIAG_LEN	Diagnostic data length is incorrect; Change data length
0005	DP_SL_ERR_CFG_LEN	Configuration data length is incorrect; Change length
0006	DP_SL_ERR_PRM_LEN	Parameter data length is incorrect; Change length
0007	DP_SL_ERR_IO_LEN	Data length is incorrect (inputs or outputs); Change length
0008	DP_SL_ERR_DP_WD_TIMEOUT	Master monitoring has elapsed;
0009	DP_SL_ERR_WRONG_ADRESS	Invalid station address has been set; Set a valid address (0 - 126) on the switch and in the data block
000A	DP_SL_ERR_IDENT_NR_P	Incorrect ID-number in data block; Correct ID-number: 2500 hex.
000B	DP_SL_ERR_WRONG_DB_NR	Invalid DB number; select a valid DB
000C	DP_SL_ERR_IO_NULL_PTR	Input and output data length equal zero; check the configuration data
1000	DP_SL_ERR_SLAVE_NOT_READY	Slave does not respond or is busy; Reset the module
1001	DP_SL_ERR_WRONG_SLAVE_STATE	Undefined slave condition; reset or restart module
1002	DP_SL_ERR_DIAG_DATA_AREA_NOT_READY	Access to DPR denied; reset or restart module
1003	DP_SL_ERR_CFG_DATA_AREA_NOT_READY	Access to DPR denied; reset or restart module
00FA	DP_SL_ERR_DPRAM_TIMEOUT	PSS not enabling the DPR or DPR is defective; reset or restart module
00FB	DP_SL_ERR_SET_PRM	Parameter data on Master and Slave do not match; check the configuration data
00FC	DP_SL_ERR_MASTER_NOT_READY	Master not available, bus interrupted when starting the slave



Standard Function Blocks

ERR (hex)	Key	Cause/Remedy
00FD	DP_SL_ERR_CHK_CFG	Configuration data on Master and Slave do not match; check the configuration data on the Slave and the Master. See “Copying the Slave configuration from the Master configuration”, page 6-4
00FE	DP_SL_ERR_BUS_FAULT	No communication between Master and Slave, e.g. incorrect slave ID-number on the Master, Bus interrupted during data exchange, Master switched off; Establish cause and rectify
00FF	DP_SL_ERR_FATAL	Hardware error; change PSS(1) DP-S module or PSS SB 3006 DP-S
2000	DP_SL_NO_ERROR	No error detected
2001	DP_SL_ERR_SLAVE_NOT_READY	Slave does not respond or is busy; Reset the module
2002	DP_SL_ERR_DIAG_DATA_AREA_NOT_READY	PSS not enabling the DPR or DPR is defective; Change PSS(1) DP-S module or PSS 3006 DP-S.
2003	DP_SL_ERR_IN_DATA_AREA_NOT_READY	PSS not enabling the DPR or DPR is defective; Change PSS(1) DP-S module or PSS 3006 DP-S.
2004	DP_SL_ERR_OUT_DATA_AREA_NOT_READY	PSS not enabling the DPR or DPR is defective; Change PSS(1) DP-S module or PSS 3006 DP-S.
2005	DP_SL_RESET_MODE	A reset has been triggered.
2006	DP_SL_ERR_ILLEGAL_MODE	Invalid mode has been set
2007	DP_SL_ERR_ILLEGAL_SLAVE_STATE	Undefined slave condition; reset or restart the module.



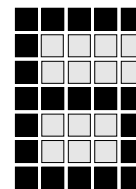
INFORMATION

Standard function blocks SB 231 and SB 232 must also be transmitted to the controller in addition to SB 230. However, parameters do not need to be set for them, nor do they need to be called up.



NOTICE

The flag range MW 059.00 ... MW 063.16 is reserved for temporary flags. This range may not be used for global parameters, nor for SB input or output parameters, otherwise the flags used in the SB will be overwritten.



Standard Function Blocks

Copying the Slave configuration from the Master configuration

The configuration data for the Slave is located in the data block from DW 0384 (see Chapter 4, “Setting Parameters”), while the configuration data for the Master is entered from DW 0830. The length of the configuration data is entered in DR of DW 0830. This is followed by the data.

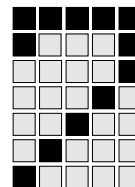
Compare the values on the Master and the Slave and ensure they match. The following table provides information on the entries.



NOTICE

The addresses of the data block in which the Master writes the configuration data can be found in the “DP Master” column. The data block addresses for the Slave configuration data can be found in the “PSS (DP Slave)” column. The Slave's configuration data must be checked and, if necessary, adjusted to that of the DP Master.

Configuration	DP Master	PSS (DP Slave)	Example			
			Contents		Input data [Words]	Output data [Words]
			Type	Value		
Amount of configuration data [Bytes]	DR 0830	DW 0813	KH	06		
1st configuration data byte	DL 0830	DR 0384	KH	C0		
2nd configuration data byte	DR 0831	DL 0384	KH	CD	14	
3rd configuration data byte	DL 0831	DR 0385	KH	CF		16
4th configuration data byte	DR 0832	DL 0385	KH	C0		
5th configuration data byte	DL 0832	DR 0386	KH	41	2	
6th configuration data byte	DR 0833	DL 0386	KH	40		1
...	...	...	...	...	...	...
Sum total of input data [Words]		DW 0810	KF	16	16	
Sum total of output data [Words]		DW 0811	KF	17		17



Appendix

Example

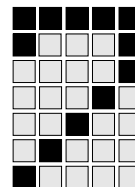
Data block DB 050 is selected for setting the parameters. The data block is configured in OB 020. The configuration corresponds to Example 5 in Chapter 4. SB 230 is called up in OB 001.

OB 020 Cold start ST

```
:A   DB 004           ;Registered hardware on standard section
:L   KH B220          ;Enter the code of the module (B220)
:T   DW 0027          ;on slot 7
:
:A   DB 005           ;Start address for Slave module
:L   KH 0000          ;Start address (Offset) is 0
:T   DW 0007          ;Slave module on slot 7
:
:L   KH 0000          ;Reset the used flag
:T   MB 000.00        ;in OB 001
:T   MW 030.00        ;
:T   MW 010.00        ;
:
:A   DB 050           ;Data block for setting the parameters
                        ;(input parameter "DB" from SB 230)
:L   KH 2500          ;ID-Number
:T   DW 0258          ;
:
:L   KH 0004          ;Length of the diagnostic data [Bytes]
:T   DW 0259          ;
:
:L   KH C1C0          ;Configuration data
:T   DW 0384          ;
:L   KH 00C0          ;
:T   DW 0385          ;
:
:L   KF 0010          ;Reserved
:T   DW 0783          ;
:
:L   KH 00F5          ;Reserved
:T   DW 0795          ;
:
:L   KF 0001          ;Station address [0-126]
:T   DW 0800          ;
```

Appendix

:L	KF 0000	;Reserved
:T	DW 0801	;
:L	KF 000002	;Length of input data [Words]
:T	DW 0810	;
:L	KF 000001	;Length of output data [Words]
:T	DW 0811	;
:L	KF 000005	;Length of diagnostic data [Words]
:T	DW 0812	;
:L	KF 000003	;Amount of configuration data [Bytes]
:T	DW 0813	;
:		
:L	KF 000000	;Reserved
:T	DW 0814	;
:L	KF 000000	;Reserved
:T	DW 0815	



Appendix

OB 001

Comment: Segment 00

```
*****
*      Sample program      *****
*****
*
*      2 Words input data      *
*      1 Word output data      *
*      1 Word diagnostic data  *
*
* Key to      inputs / outputs:      *
*      E 02.00  triggers a module reset      *
*      E 02.01  Slave goes to a static diagnostic condition      *
*
* Cyclical data transfer      :      *
* PSS -> Master(output data):      *
*      AW 0.0 -> DW 0128 -> Master      *
*
* PSS <- Master(input data):      *
*      EW 1.0 <- DW 0000 <- Master      *
*      EW 1.16 <- DW 0001 <- Master      *
*
* If an error occurs in the FS Section of the PSS (M113.01 = 1),      *
* the slave module will go to a static diagnostic condition.      *
* In the example, the value KH FFFF is sent to the Master as diagnostic      *
* data.      *
```

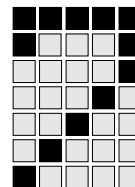
```
*****
```

```
:L      E 02.00
:SPB = reset
:L      E 02.01
:SPB = stat.diag
:L      KF 000000
:T      MB 000.00
:SPA = start
reset:      Segment 01
:L      KB 002
:T      MB 000.00
:SPA = start
```

Appendix

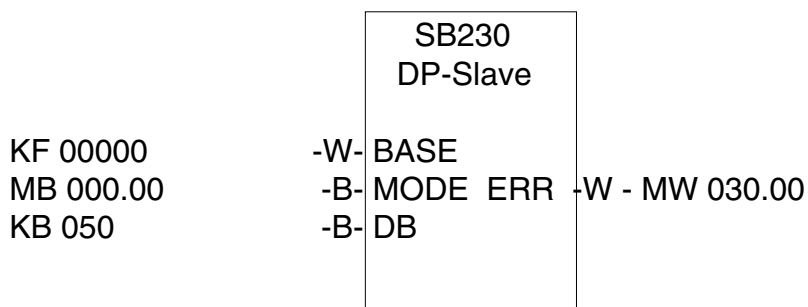
```
stat.diag: Segment 02
:L KB 001
:T MB 000.00
start: Segment 03
:A DB 050
:L DW 0000
:T EW 01.00
:L DW 0001
:T EW 01.16
:
:L AW 00.00
:T DW 0128
:
:LN M 113.01 .FS_no_ERR/ERR status FS, 0 = no error, 1 = err
:SPB = no_err
:L KH FFFF
:T DW 0260
:L KH 0000
:L KB 001
:T MB 000.00
no_err: Segment 05
:
```

```
*****
*      Input parameters:                                     *
* -Base: Module's XW-Offset                                   *
* -Mode: KB001 -stat.Diagnostics                             *
*      KB002 -Module reset                                    *
*      KB000 -Data-Exchange                                   *
* -DB:  Data block KB 011-KB 127 or -KB 255                   *
*      (from operating system version 9)                       *
*                                                             *
* Output parameters:                                         *
* -Fehl: Error evaluation                                     *
*      KH 2000: No errors                                     *
*      see chapter entitled "Standard function blocks"        *
*****
```



Appendix

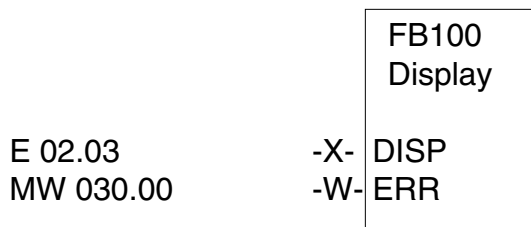
:
:CAL SB 230



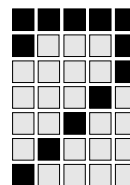
Display ERR : Segment 06

```
*****
*FB 100 *****
*****
* Input parameters:                                     *
*   -Disp: 1 = Errors output to the display              *
*           0 = Errors not output to the display         *
*   -ERR: Flag word which is output to the display      *
*   M 010.00 internal flag                              *
*   *****
```

:
: CAL FB 100



end: Segment xx
:BE



Appendix

Changes in the documentation

Changes from Version II to Version III

Master data file was amended.

Changes from Version III to Version IV

The manual is also now valid for the PSS SB 3006 DP-S. Editorially the manual has been completely revised. The division of chapters has been amended.

The master data file has been removed from the manual completely (Appendix).

Old page	New page	Change
5-2	6-2	Error 00FD: Note added
5-3	6-3	Section: "Copying the Slave configuration from the Master configuration"

Changes from Version IV to Version V

Old page	New page	Change
-	6-2	New: ERR 000C, 00FB, 00FC
-	6-3	New: ERR 2006

Changes in Version 19 419-06

Old page	New page	Change
3-2	3-2	Section "Standard function block SB 230" was amended, note added
4-13	4-13	Section "NOTICE" was amended



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