

PBX-21

Technical Information Profi-Bus-Box System

Please keep for further use !

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Italics and **bold** type are used for the title of a document or to emphasize text passages.

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"< >" refers to keys on your computer keyboard (e.g. <RETURN>).

Note

Text following the "NOTE" symbol describes important features of the respective product.

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Index of Modifications

i

Note

The cover of this document shows the current revision status and the date of the last changes. Since each individual page has its own revision status and date in the footer, this means that there may be several different revision statuses in the same document.

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Modification	Date
This guide does not contain a detailed description of individual submodules. For the technical characteristics of specific components, refer to the separate documentation in each case.	19.11.1996
Correction of the terminal assignments on page 11: Pin 7, non connect Pin 8, L2_A Profibus A	29.01.1997
Description supplemented with the following modules: ■ MDIO 16 ■ MINC 2 ■ MPWM 2	17.09.1997
Additional notes for the parameterization of the PBX-21 and the MSS1-2 submodule	09.02.1999

Table of Contents

1 The TRS Fieldbus System	5
2 Functional Description of the PBX-21 Hardware	6
2.1 Front Panel Designs	6
2.2 Configurations	6
2.3 Parameterization	7
2.4 Submodules	7
2.5 Status Messages	10
3 Installation Information	10
4 Terminal Assignments	11
5 Technical Data	12
6 Type Code	13

1 The TRS Fieldbus System

TRS (TR-Systemtechnik) offers universal **I/O** boxes for different field bus systems. Using these boxes and an intelligent central module, you can solve complex open- and closed-loop control tasks. Each I/O box consists of a **basic module** containing four slots for fitting **submodules**. The table below shows possible fitting variants for existing submodules:

Submodule		Slot 1	Slot 2	Slot 3	Slot 4
MDI-8	8 digital inputs	NO	Yes	Yes	Yes
MDO-8	8 digital outputs, 24V/0.5 A	NO	Yes	Yes	Yes
MDM-8	8 digital outputs, 24V/2.0 A	NO	Yes	Yes	Yes
MAC-8	8 digital inputs, 110/220 V AC	NO	Yes	Yes	Yes
MDR-8	8 relays	NO	Yes	Yes	Yes
MDIO-16	16 digital in-/outputs	Yes	Yes	Yes	Yes
MAI-4	4 analog inputs, resolution: 12/16 bits	Yes	Yes	Yes	Yes
MAO-4	4 analog outputs, resolution: 16 bits	Yes	Yes	Yes	Yes
MSSI-2	2 synchronous serial interfaces	Yes	Yes	Yes	Yes
MINC-2	2 incremental encoders	Yes	Yes	Yes	Yes
MHAS-2	2 HAS encoders	Yes	Yes	Yes	Yes
MPWM-2	2 pulse width modulation outputs, 24V/2.0A	Yes	Yes	Yes	Yes

Basic modules can be supplied for the following Fieldbus Systems:

Profibus-DP
CAN-Bus (Device-Net)
Lightbus

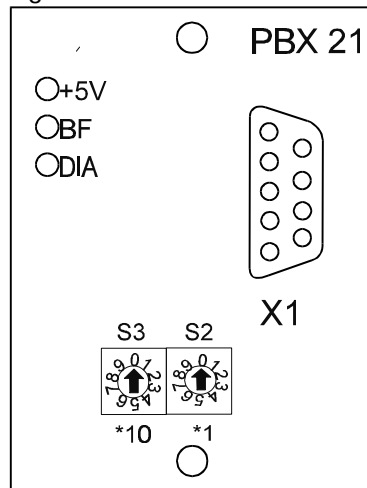
This document describes the PBX-21 Profibus Basic Module. Separate descriptions are available for the Basic Modules of other Fieldbus Systems.

2 Functional Description of the PBX-21 Hardware

2.1 Front Panel Designs

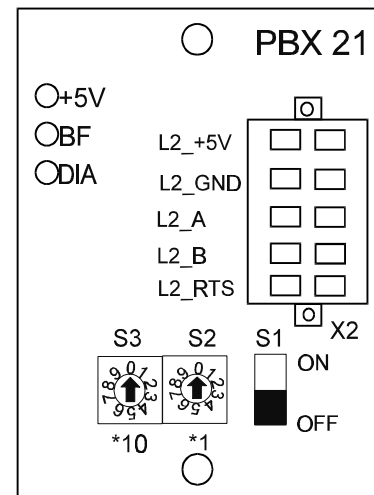
There are two variants for the front panel: one has a five-pin Phoenix male connector (see also Device-Net) and the other has a nine-pin SUB-D female connector.

Figure 1



(Standard Version)

Figure 2



(On request)

Switch S1 (Figure 2) is for terminating the bus line at the end of the bus. If you are using a PBX-21 with a SUB-D connection (Figure 1), the terminal resistor is switched-in in the connector. (The connector is available from SIEMENS).

You use switches S2 and S3 (Figures 1/2) to set the Profibus address.

2.2 Configurations

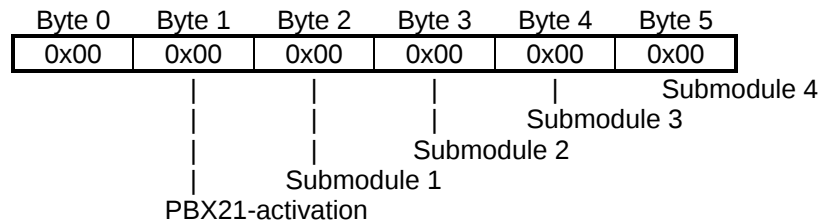
You configure the module in a slot-oriented way. This means that you enter the identifiers in the same order as you plug in submodules in the basic module.

The following identifiers are possible in this context:

Submodule	Identifier	
MDO 8, MDM 8, MDR 8	1 byte output	1 * 0x20
MDI 8	1 byte input	1 * 0x10
MDIO 16	1 byte in-/output	1 * 0x30, 1 * 0x00
	2 byte input	1 * 0x11
	2 byte output	1 * 0x21
	1 byte input, 1 byte in-/output	1 * 0x10, 1 * 0x30
	1 byte in-/output, 1 byte output	1 * 0x30, 1 * 0x20
MSSI 2	2 * 2 words, input consistent	2 * 0xD1
MAI 4	4 * 1 word input	4 * 0x50
MAO 4	4 * 1 word output	4 * 0x60
MINC 2	2 * 5 byte in-/output consistent	2 * 0xB4
MPWM 2	2 * 2 words in-/output	2 * 0x71
MHAS 2	In preparation	

2.3 Parameterization

Six bytes are available for the parameterization of the PBX-21 module. For each submodul one parameter byte is available. Depending on submodule, the parameter byte has a different importance (see also chapter "Submodules").



2.4 Submodules

MDO 8

The eight digital outputs need one byte to write the outputs.

MDI 8

The eight digital outputs need one byte to read the inputs.

MDIO16

Each by configuration, this module has up to 16 outputs or inputs. In this context the in-/output configuration can be decided of the user by the entry of the corresponding Profibus-identifier.

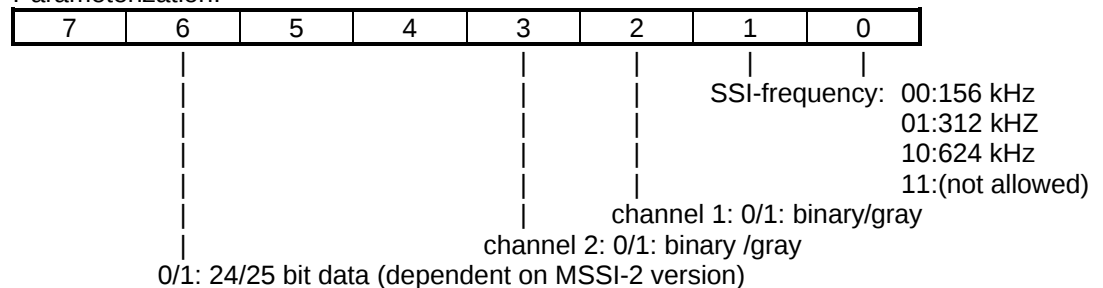
MSSI 2

This module has two SSI inputs. Each input has a maximum resolution of 25 bits. Data is output in Motorola format.

Message frame structure:

Channel 1 actual value				Channel 2 actual value			
MSB			LSB	MSB			LSB

Parameterization:



MAI 4

The MAI 4 module has four analog inputs. Each analog input returns a 16-bit value. Data is output in Motorola format.

Message frame structure:

Channel 1		Channel 2		Channel 3		Channel 4	
HByte	LByte	HByte	LByte	HByte	LByte	HByte	LByte

MAO 4

The MAO 4 module has four analog outputs. Each analog output is 16 bits in size. Data is input in Motorola format.

Message frame structure:

Channel 1		Channel 2		Channel 3		Channel 4	
HByte	LByte	HByte	LByte	HByte	LByte	HByte	LByte

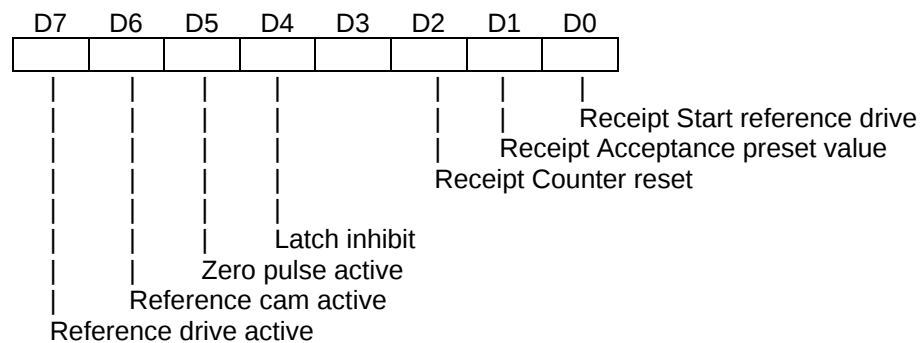
MINC 2

This module has two incremental counter inputs. The counters return a maximum value of 32 bits. In addition, the two inputs have two inputs between them, i.e. one status and one command byte. A preset value to be transferred can be 32 bits in size.

Message frame structure input:

Channel 1					Channel 2				
MSB			LSB	STAT	MSB			LSB	STAT

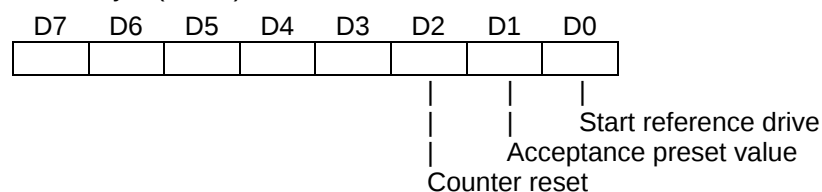
Statusbyte (STAT):



Message frame structure output:

Channel 1					Channel 2				
MSB			LSB	CTRL	MSB			LSB	CTRL

Controlbyte (CTRL):



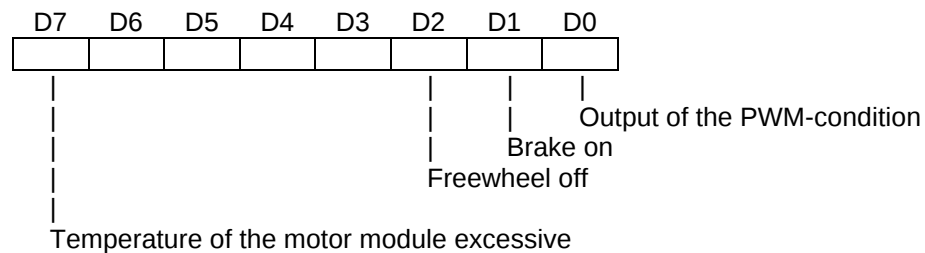
MPWM 2

This module has two pulse width modulation outputs. The pulse wideness is input as a 16 bit-value.

Message frame structure input:

Channel 1				Channel 2			
STAT				STAT			

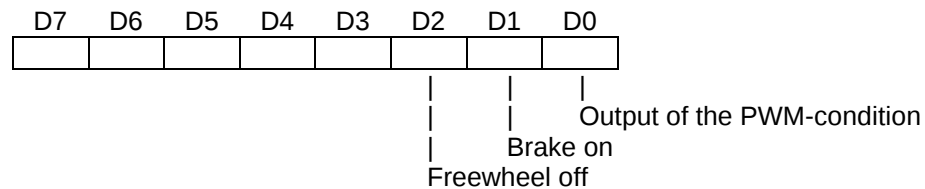
Statusbyte (STAT):



Message frame structure output:

Channel 1				Channel 2			
CTRL	TPER	Pulse wideness		CTRL	TPER	Pulse wideness	
		HByte	LByte			HByte	LByte

Controlbyte (CTRL):



Cycle duration (TPER):
 Informations cycle duration

MHAS 2

This module has two HAS inputs. Each input has a resolution of 25 bits and a 16 bit error counter.

2.5 Status Messages

Three LEDs provide information about the status of the module:
LEDs seen from top to bottom:

LED	Colour	Meaning
+5V	Green	+5-V supply voltage
BF	Red	Bus Failure
DIA	Red	Diagnostics

+ 5-V LED

This lights up after you switch on the supply voltage.

BF LED

This lights up if there is a bus error. A bus error can occur if you configured the module wrong or carried out bus cabling incorrectly.

DIA LED

This lights up diagnostics data is present.

3 Installation Information

Mounting

You mount the PBX-21 in a decentralized position at the machine or in the switching cabinet by simply screwing it on to a mounting rail complying with DIN EN 50022 or DIN EN 50035.

4 Terminal Assignments

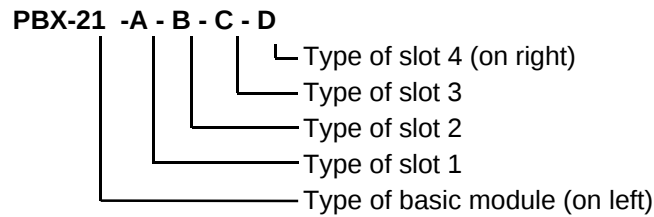
Connector X1:

Pin	Signal	Meaning
1		
2		
3	L2_B	Profibus B
4	L2_RTS	RTS
5	L2_GND	Ground
6	L2_+5V	+5V
7		
8	L2_A	Profibus A
9		

5 Technical Data

Inputs/Outputs	Max. of 24 digital I/Os or max. of 16 analog I/Os, 8 SSIs, 8 incremental encoders, 8 HAS encoders, 8 PMW outputs or a mixture of galvanically decoupled submodules (max. of 4). Divided into 4 slots that can be fitted byte-by-byte with input or output modules (MDI, MDO, MDM, MAC, MDR) in slots 2, 3 and 4. (MAI, MAO, MSSi, MINC, MHAS, MPWM) in slots 1, 2, 3 and 4. LED status indicator on all MD modules
Input Specifications	See input modules for PBX-21
Output Specifications	See output modules for PBX-21
Output Monitoring	Watchdog circuit
Data Connection	Profibus DP, 9-pin SUB-D male connector
Transfer Rate	Maximum of 12 Mbps
Supply Voltage	24 V DC ($\pm 20\%$)
Current Consumption	Approx. 0.1 A (without submodules)
Housing Form	Closed, screw-mountable on mounting rail complying with DIN EN 50022, 50035
Dimensions (B $\times$ H $\times$ T)	315 $\times$ 76 $\times$ 68 mm
Weight	Approx. 750 g
Operating Temperature	$\pm 0..+55^{\circ}$ C
Storage Temperature	$-20..+70^{\circ}$ C

6 Type Code



Type No.	Designation	Description
	PBX-21	Profi-Bus-Box System, basic module for maximum of 4 Interface modules
Slot 1		MDIO16, MAI4, MAO4, MSSI2, MINC2, MHAS2, MPWM2
Slots 2, 3 & 4		MDI8, MDO8, MDM8, MDR8, MAC8 as well as MDIO16, MAI4, MAO4, MSSI2, MINC2, MHAS2, MPWM2
		Submodules:
-A	MAB	Cover plate instead of a submodule
-B	MDI8	Submodule, 8 digital inputs, 24 V DC
-C	MDO8	Submodule, 8 digital outputs 24 V DC/0.5A
-D	MDIO16	Submodule 16 digital in-/outputs
-E	MDR8-001	Submodule, 8 relays, same as "F", without suppressor circuit
-F	MDR8	Submodule, 8 relays, outputs, max. of 220 V AC/2.0A
-G	MAC8-110	Submodule, 8 digital AC inputs 110 V AC
-H	MAC8-220	Submodule, 8 digital AC inputs 220 V AC
-K	MDM8	Submodule, 8 digital DMOS power outputs 24V/2.0A
-L	MAI4-12	Submodule, 4 analog inputs
-N	MAI4-16	Submodule, 4 analog inputs
-M	MAO4	Submodule, 4 analog outputs
-O	MSSI-2	Submodule, 2 SSI interfaces
-P	MINC-2	Submodule, 2 incremental counters
-R	MHAS-2	Submodule, 2 high-speed asynchronous interfaces
-S	MPWM-2	Submodule, 2 pulse width modulation outputs 24 V/2.0 A
Example: Basic module fitted with (from left to right): 4 analog inputs 8 digital outputs, 24 V/0.5 A 8 digital outputs, 24 V/2.0 A Empty spare slot Order No. : PBX-21-LCKA		