@C100-PB

Operating Manual
@C100-PB

Edition date/Rev.date:	07.05.2004
Document no-/Rev.-no:	@C100PB-TRS-V-BA-GB-0000-00
Software version:	
File name:	@C100-PB
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"< >" refers to keys on your computer keyboard (e.g. <RETURN>).

Note

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Literature

Revision History

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Note:
The cover of this document shows the current revision status and the corresponding date. Since each individual page has its own revision status and date in the footer, there may be different revision statuses within the document.

Drawings which can be in the appendix have their own revision history.

Document created: 07.05.2004

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1 General description

The **@C100-PB** module contains a controller of the type C165 and forms the interface to the field bus. The Field-Bus-Interface is a Profibus-DP. The bus node address is set by means of two rotary switches.

In addition to the field bus connectivity, the module also contains a Debug interface. A RS232 connection is implemented through the RJ45 plug. With the @ctiveIO Toolkit software the process image of all IO can be visualized. The @BUS plug is integrated in the right hand side cover. This makes docking @Modules at the side possible. Option units as well as: USV etc., connect at the left side.

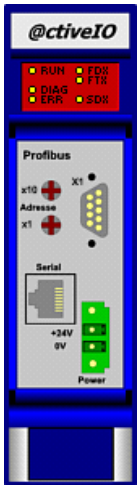


Image: @C100-PB Controller

2 Profibus system presentation

2.1 Basics

The Profibus is a manufacturer independent, open field bus standard with wide scope in production automation and process automation. It is suitable for fast, time-critical uses, and for complex communication task.

Profibus offers functional graduated communication protocols: DP and FMS as transmission technologies according to RS-485, IEC 1158-2 or fiber-optic cable standards.

The communication profile of Profibus includes a uniform bus access procedure. This procedure must be guaranteed, that at any time only a single participant possesses the sending authorization. This becomes guaranteed through the Token-Passing procedure for the communication of complex bus participants (Master) among one another and for the communication of complex participants with the peripherals (Slaves) through the Master-Slave procedure.

2.2 Transmission technologies RS-485

The RS-485 transmission is used most frequently in Profibus. The transmission speed is between 9.6 kBit/s and 12 MBit/s over a twisted pair wire cable.

All devices are connected in a bus structure (line). Each segment can have up to 32 participants switched together. At both the beginning end of a segment, the bus must be terminated through an active bus termination. Both bus terminations must always be supplied with power in order to guarantee undisrupted communication. Should more than 32 bus participants connection be required or network needs to be expanded then a Repeater should be used to connect the single segments.

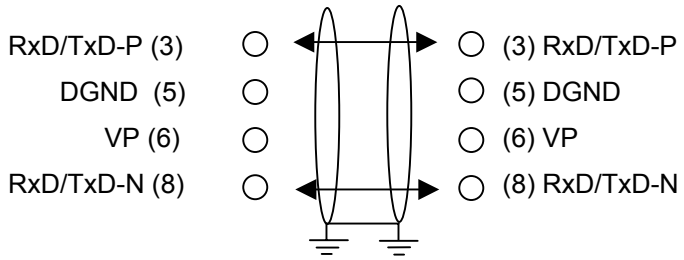


Image: Pin out Profibus connector

The maximum wire length in a segment is dependent on the transmission speed and the cable type. Cable type A is recommended by the Profibus User organization. This is offered by several recognised manufacturers.

Baudrate (kBit/s)	9,6	19,2	93,75	187,5	500	1500	12000
Reach/ Segment	1200m	1200m	1200m	1000m	400m	200m	100m

Abbildung 3: Reichweite in Abhängigkeit der Übertragungsgeschwindigkeit für Kabeltyp A

In connecting the participants it should to be ensured that the data wires do not become interchanged. The shield of the screened data wire should if possible both-ways and well leading over extensive screen clamp at protection earth connected become. Moreover, it should be noted: the data wire should be separated from all high-voltage cables. Knot wires should be avoided absolutely. This is attainable through Profibus connectors available in the market because in these connectors the incoming and outgoing cable is connected directly in the connector.

2.3 Profibus-DP

The DP-Communication profile is for the efficient exchange of data in the field. The data exchanges with the decentralized modules are predominantly cyclic. DP also offers the further expanded acyclic services for the parameterising, the operation, the observation and the alarm treatment of intelligent field devices.

The output data is sent from a central control (Master) cyclicly to the Slave and input data is also read cyclicly. With this the bus cycle time should be shorter than the program cycle time of the central automation system, that amounts in many cases to about 10ms. Next to the cyclic utility data transmission, there are also functions in DP for diagnosis and starting to order.

Profibus-DP is distinguished between three different devices types. These are:

DP-Master class1 (DPM1)
It is centered about a central control, that exchanges information in a dedicated messages cycle, cyclicly with the decentralized stations (Slaves). Typical devices are SPS or PC.

DP-Master class 2 (DPM2)
Devices of this type are engineering, plannings or operator devices. These are used in the commissioning, maintenance and diagnosis in order to configure the connected devices, to evaluate readings and parameters as well as to query the device condition.

Slave
A Slave is a periphery device (E/A, drives, HMI, valves, measuring transducer), that reads input information and delivers output information to the periphery.

The data traffic between DPM1 and the Slaves is organised into the parameterisation, configuration and data transfer phase.
After the run-up of a Slave this waits for the parameter data. These include are the standard information and the further possible user specific parameter data. The Slave evaluates the data and accepts this or leaves it off.

The configuration data will be sent, when the data is accepted by the Slave. In this data, the number of input and output bytes is determined. If the Slave is a modular device, then a configuration byte can be determined for each module. In this byte the amount of input-/output data is stored. If the Slave has received the data, then these will become checked. The result of the check yields either a correct, incorrect or an adaptable configuration. If the configuration is correct, the Slave goes into the data transfer phase and data can be exchanged.

2.4 Configuration and parameterisation of Slaves at Profibus-Master

There is an electronic device data sheet (GSD-file) for each Profibus device. In this file, the specific device features of a Profibus device are detefined. GSD-files are allocated by the manufacturer for all Profibus devices.
The GSD-file describe the features of a device type clearly and completely in a precisely determined format. The GSD-file is produced by the manufacturer individually for each device type and is made available to the user as a text file. This file is required by the configuration software of the Profibus-Master so that it can address the connected device.

2.5 Diagnosis

The Profibus-DP offers extensive diagnosis functions and therefore enables fast error idendification. The diagnosis messages are transmitted over the bus and are summarized in the Master. They are divided in three areas:

- Stations-oriented diagnosis:
  Messages relating to the general operative readiness of a participant.
- Module-oriented diagnosis:
  These messages indicate that in an certain module of the participant a diagnosis is available.
- Port-oriented diagnosis:
  The message is caused on an single In-/Out bit (port) for example a short circuit on output 7.

2.6 Bus cycle time

The buses cycle time is calculated how follows:

t_{DP} = [Token time + GAP + (number of stations x Offset) + (I/O-Bytes quantity x 11)] x Bit time

t_{DP} = [70 + 403 + (number of stations x 246) + (quantity I/O-Bytes x 11)] x Bit time

Example: 1 Station, 2 I/O-Bytes, Baudrate 1,5MBaud (Bit time 0,66µs)
T_{DP} = [70 + 403 + (1 x 246) + (2 x 11)] x 0,66µs = 0,49ms

3 Profibus-Module @C100-PB

3.1 Interfaces

The @C100-PB module has different interfaces. These are the fieldbus connection, a serial connection, the power supply and the @BUS to connect other @Modules.

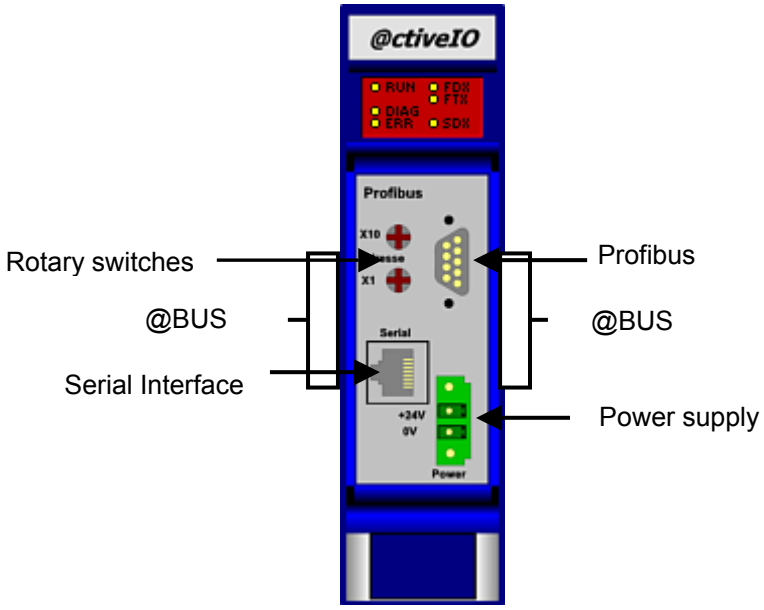


Image: @C100-PB

Profibus connection
The 9-pole SUBD female is for connection of the Profibus. Commercial Profibus connectors can be used.

Pin out	
1	n.c.
2	n.c.
3	PB_B
4	PB_RTS
5	PB_GND
6	+5V=
7	n.c.
8	PB_A
9	n.c.

Top view

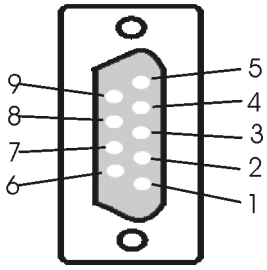


Image: 9pol. SUBD Buchse

Rotary switches
The bus node address will be set by means of two rotary switches.

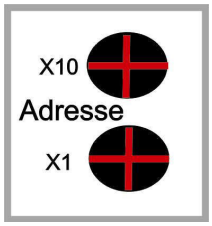


Image: rotary switches X1 and X10

Serial Interface
The serial interface is implemented over a RJ45 socket. This interface is a RS232 and serves for configuring and debugging, which can be carried out using the @ctiveIO-Toolkit software.

Pin out	
1	TxD RS232
2	RxD RS232
3	reserved
4	reserved
5	0V
6	n.c.
7	reserved for RS485+
8	reserved for RS485-

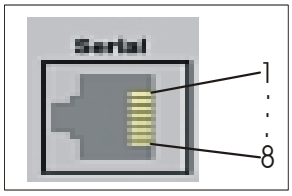


Image: RJ45 socket (top view)

Power supply
For operation of the module a +24VDC voltage is required. This is connected to a 2-pole power-connector.

Pin out	
1	+24V DC
2	0V

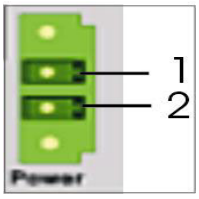


Image: power supply (top view)

@BUS
The @BUS is a serial bus and is located on the left and right side of the module. At the left side of the module different option units can be connected as well as a USV. At the right side of the module the IO-Modules can be connected.

3.2 Configuration and parameterisation

For configuration and parameterisation in the Profibus-Master, there is the GSD-file ´TRS_05D2.gsd´. The GSD-file is available on the TRS product CD. This GSD-file must be made available for the configuration software.

An @Modul can contain two Prints, in the Profibus configuration, a identifier must be given for each Print. These identifiers will give slot location.

The following image shows the configuration with the SIMATIC manager. In the example, a @C100-PB module with four @2810 and two @5200 Prints was configured.

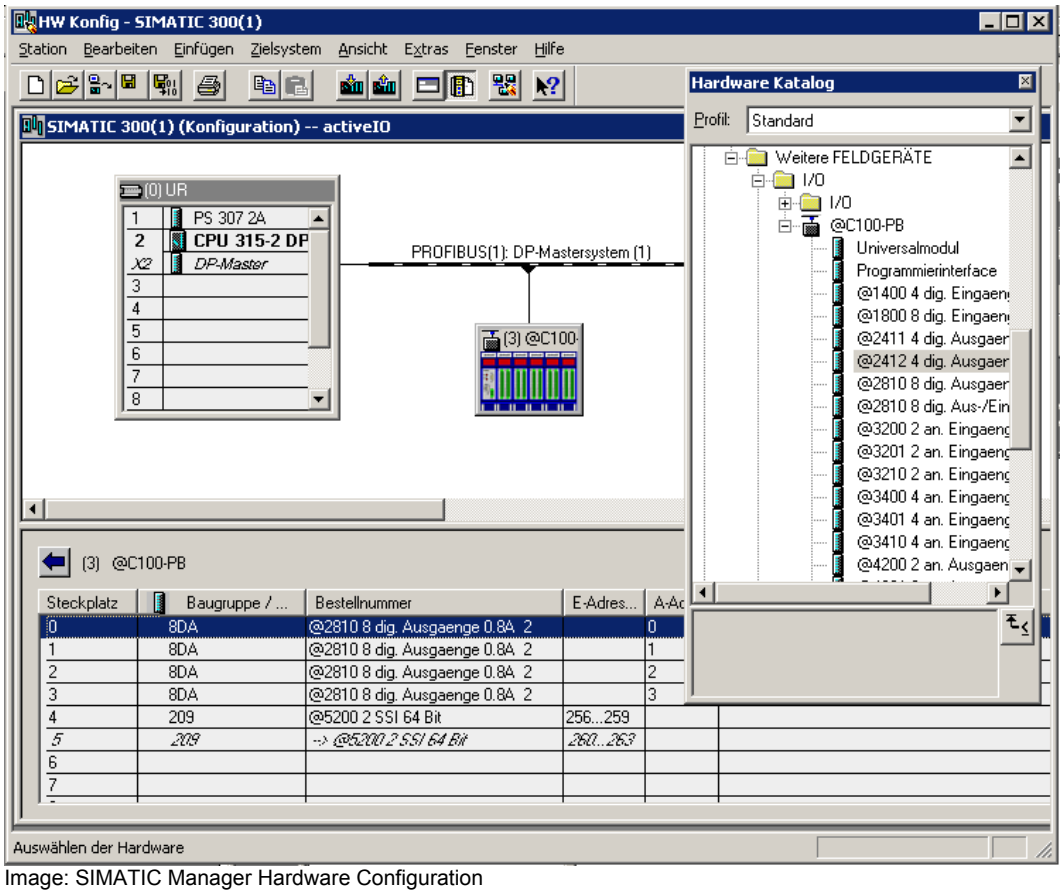


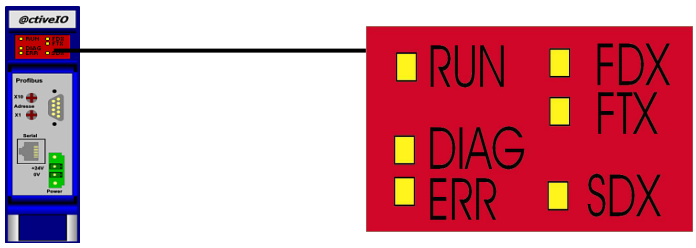
Image: SIMATIC Manager Hardware Configuration

The interface connections and also single modules can be configured through parameterisation, if these have parameter data.

The Slave interface connection has the following parameter data:

Parameter data	Select	Description
Module parameter settings	- activ - deactivated	If the module parameter setting is **activated**, then the module parameters which can be adjusted at the individual modules are activated by the Profibus. If the module parameter setting is **deactivated**, then the stored module parameters are used. These were transferred before using the @ctive Toolkit software.
Data format	- Intel - Motorola	adjusting of the data format

3.2.1 Description of the LEDs



On the front side of the module are different LEDs to show the operating state.

RUN: Lit after the initialization of the processor
DIAG: The diagnosis LED is lit if diagnosis information can be selected for e.g. error message.
ERR: Lit always if the module isn´t on the Profibus. An error is also indicated if the ERR LED flashes.
FDX: Data interchange over the Profibus.
FTX: Module sends data over the Profibus.
SDX: Data interchange over @BUS.

3.2.2 Commissioning

The@modules must be connected before switching the power supply on. After switching the power supply on the RUN LED comes on and the DIAG and ERR LED flash briefly. In case of an error the ERR LED is lit and in case of a module error the DIAG LED is lit too. In the start-up the identity numbers of the@modules are read-in and, if parameter data is applicable, this is transferred to the@modules.

3.2.3 Description errror number

error number	description
1	System bus Xilinx couldn't be loaded
2	System bus Parity-Error
3	System bus Timeout
4	System bus-Xilinx doesn´t answer
5	System bus Xilinx doesn't give a receipt
6	@Print was removed while powered or is faulty. Print missing or faulty information is after the Print number which is in fault information.
7	System bus Watchdog triggered
10	No communication with Profibus protocol chip
20	NVRAM switchover in 8 bit mode faulty
21	Faults at the flash delete
22	Faults at the flash write
23	Faulty checking sum in the flash
40	Print number was changed after parameter setting
41	A Print was replaced by a Print after parameter setting with another function
80	Module SSI-IN or module SSI-OUT not available

3.3 Firmware update

A firmware update can be carried out with the help of a special serial cable. This cable has a switch for the processor, with which it can be set into Bootstrap-Loader mode. To do this, activate the switch and then the power up the @C100 PB module. If the RUN, DIAG and ERR LED remain dark the processor is in Bootstrap-Loader mode. A firmware update can be carried out now with special software.

3.4 Technical data

Controller	
Type	**@C100-PB**
Power supply	24V DC +/- 20%
Polarity protection	protected against wrong polarity
Input protection	30V overvoltage, surge
Operating current	120mA unencumbered, power supply with soft start features
Fieldbus	Profibus-DP
Baudrate	Automatic detection to 12Mbaud
Serial Interface	RS232
CPU specification:	
Flash memory	1 MByte (16 Bit)
SRAM	512 kByte (16 Bit)
CPU clock	44 MHz
Profibus specifications:	
Pofibus controller	SPC3 or compatible
System specifications:	
Hardware supervisor system	temperature control
	power control
	hardware watchdog
	power fail system
	supports UPS
Dimension	105 x 80mm
Weight	280g incl. connector
Operating temperature	0°C ...+55°C
Storage temperature	-20°C ...+70°C

4 Software @ctiveIO-Toolkit

With this software the @modules can be parametrized and diagnosis is also possible. A connection to the module is via the RS232 interface of the PC. The RS232 is implemented through a RJ45 socket at the module. The transfer-cable is available in two variants:

@COMLINK-cable
: Serial connection cable between PC and @Control module (@C100-PB).

@BOOTLINK-cable
: With this variant there is still a switch at the plug for the Bootstrap-Loader mode for a firmware update, with which the module can be writen to.

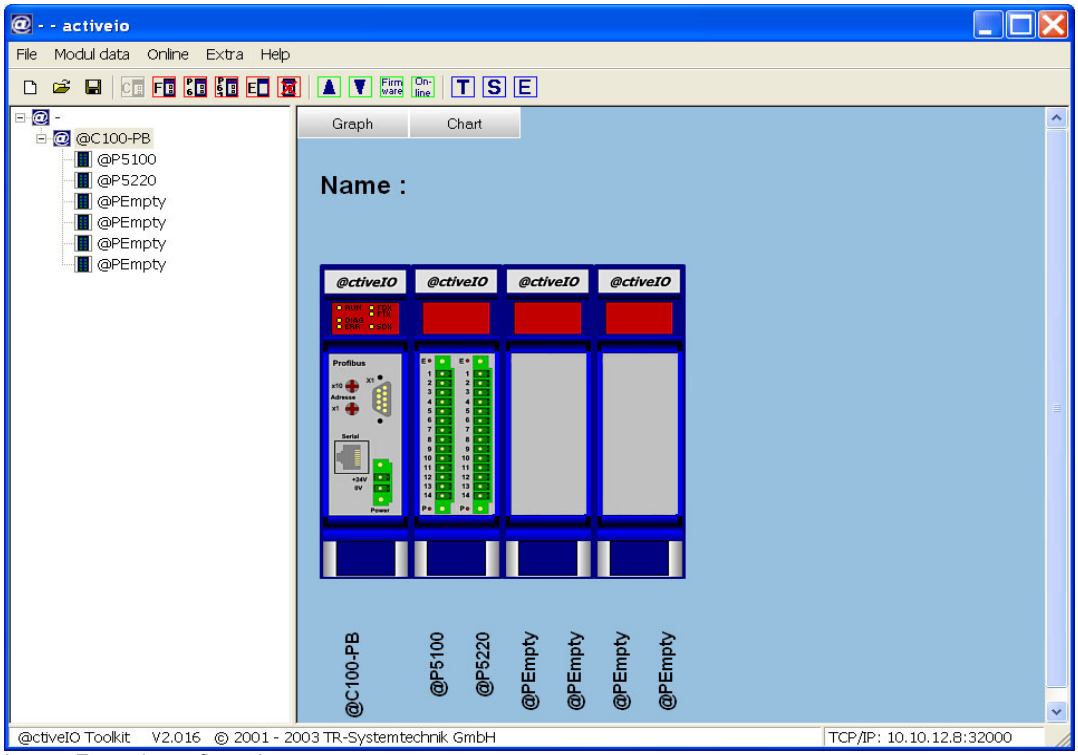


Image: Example configuration

5 Literature note/ helpful links

- TRS-Product CD

  Internet: http://www.tr-systemtechnik.de/

- Profibus **Internet:** http://www.profibus.com/