ISO 9001 certified

ADDI-DATA®

Technical support:
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Attention!
Product discontinuation
due to EC RoHS directive
More info: www.addi-data.com

CE

Technical description

ADDICOM PA 7420

2-port serial interface

5th edition 12/2000

Guarantee and responsibility

Basically are effective our "general terms of delivery and payment". The manager receives them at the latest with the invoice. Claims for guarantee and responsibility in case of injuries and material damages are excluded, if they are due to one or some of the following causes:
- if the board has not been used for the intended purpose
- improper installation, operation and maintenance of the board
- if the board has been operated with defective safety devices or with not appropriate or nonfunctioning safety equipment
- nonobservance of the instructions concerning: transport, storage, inserting the board, use, limit values, maintenance, device drivers
- altering the board at the user's own initiative
- altering the source files at the user's own initiative
- not checking properly the parts which are subject to wear
- disasters caused by the intrusion of foreign bodies and by influence beyond the user's control.

Licence for ADDI-DATA software products

Read carefully this licence before using the software ADDISET and ADDIMON. The right for using this software is given to the customer, if he/she agrees to the conditions of this licence.
- this software can only be used for configuring ADDI-DATA boards.
- copying the software is forbidden (except for archiving/ saving data and for replacing defective data carriers).
- deassembling, decompiling, decoding and reverse engineering of the software are forbidden.
- this licence and the software can be transferred to a third party, so far as this party has purchased a board, declares to agree to all the clauses of this licence contract and the preceding owner has not kept copies of the software.

Trademarks

Borland C and Turbo Pascal are registered trademarks of Borland International, INC.
Burr-Brown is a registered trademark of Burr-Brown Corporation
Intel is a registered trademark of Intel Corporation
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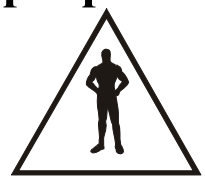
Microsoft, MS-DOS, Visual Basic and Windows are registered trademarks of
Microsoft Corporation

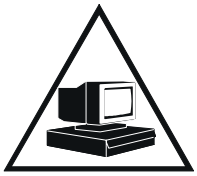
The original version of this manual is in German. You can obtain it on request.

WARNING

In case of wrong uses and if the board is not used for the purpose it is intended:



people may be injured



the board, PC and peripheral may be destroyed

the environment may be polluted

★★★ Protect yourself, the others and the environment★★★

- **Read carefully the safety leaflet (yellow)!**
  If this leaflet is not with the documentation , please contact us and ask for it.

- **Observe the instructions of the manual!**
  Make sure that you do not forget or skip any step. We are not liable for damages resulting from a wrong use of the board.

- **Used symbols**

WARNING!
It designates a possibly dangerous situation.
If the instructions are ignored **the board, PC and/or peripheral may be destroyed**.

IMPORTANT!
designates hints and other useful information.

- **Any question?**

  Our technical support is at your disposal

CE

Declaration of Conformity

This declaration is valid for the following product:

ADDICOM PA 7420

It is made by

ADDI-DATA GmbH
Meß- und Steuerungstechnik
Dieselstraße 3
D-77833 Ottersweier

in sole responsibility and is valid on the understanding that the product is competently installed, used and maintained, according to the respective security regulations as well as to the manufacturer's instructions regarding its intended use.

This declaration states that the product complies with following EC Directives:

- **EWGRL 336/89 of 3.05.1989**
- **EWGRL 31/92 of 28.04.1992**
- **EWGRL 68/93 of 22.07.1993**

This declaration is valid for all units manufactured according to the manufacturing references listed in the form TD1500.020.

Following norms have been applied to test the product regarding electromagnetic compatibility:

- **EN55011/03.91**
- **EN55022/08.94**
- **EN50082-2/03.95**

We point out that

- the conformity and herewith the permission of use expire if the user alters the product without consulting with the manufacturer.
- non-skilled users are to have the operational area of the product and the requirements resulting from it checked prior to putting into operation.
- by using this product in appliances coming under the EC EMC Directive, the user is to make sure they are conform to its regulations prior to putting into operation.
- by using this product in machines / installations coming under the EU Machine Directive, the user is to make sure they are conform to its regulations prior to putting into operation.

A copy of the EMC tests is at your disposal on request.

15 October 1995

Legally valid signature of the manufacturer

Figures

Tables

1 INTENDED PURPOSE OF THE BOARD

The board **PA 7420** provides the personal computer (PC) with two asynchronous serial interfaces for the communication with external devices. The operating mode depends on the version of the basic board **PA 7420** and on the SI modules installed. The operating modes have different features regarding electromagnetic compatibility.

The board is to be used in a free PC ISA slot. The PC is to comply with the EU directive 89/336/EEC and the specifications for EMC protection.

Products complying with these specifications bear the CE mark.

A-version :
- can only be operated in mode RS232.
- low-cost design of the B-version with two RS 232 interfaces: it needs no SI modules.
- has the same functionality and intended purpose as the B-version.

B-version : each interface needs one SI module. The next table lists all the SI modules which can be operated and their intended purpose

Table 1-1: Intended purpose for the different operating modes

Module[1]	Operating mode	Port configuration	Distance between transmitter and receiver [2]	Environment
PM232	RS232	modem control signals connected on the board or externally to the connector	30 m	industry
PM232-G	RS232	modem control signals connected on the board or externally to the connector	30 m	noisy industrial environment
PMTTY	20 mA Current loop	current flows in rest state	1 km	very noisy industrial environment
PM422	RS422		1.2 km	noisy industrial environment
PM422-G	RS422		1.2 km	very noisy industrial environment
PM 485	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or databit	1.2 km	noisy industrial environment
PM485-G	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or databit	1.2 km	very noisy industrial environment

1 **PMxxx-G**: ex. PM232-G means module for the mode RS 232 with option G (optical isolation)
PMTTY means module for the mode 20 mA current loop. Is in its standard version with optical isolation

2 The max. lenghts are for standard interface cables

Connection to the peripheral
with a shielded cable, twisted in pairs.
Connect the peripheral cable so that the differential lines described in the connector pin assignment with "+" and "-" are twisted in pairs

Operating mode RS232: the signal lines are to be twisted in pairs with GND.
The housing of the peripheral connector:
- is to be firmly screwed together with the shield of the cable
- is to assure a low-resistance connection (< 100 mΩ) between the shield and the housing of the PC.

The shield of the cable is to be earthed on both sides.

Uses beyond these specifications are not allowed. The manufacturer is not liable for any damages which would result from the non-observance of this clause.

The use of the board according to its intended purpose includes observing all advices given in this manual and in the safety leaflet.

1.1 Limits of use

The use of the board in a PC could change the PC features regarding noise emission and immunity. Increased noise emission or decreased noise immunity could result in the system not being conform anymore.

If the basic board **PA 7420-B** is used with an optically isolated and a not optically isolated SI module, then the creeping distances may not be observed. The optical isolation would not be safely guaranteed anymore.

Our boards are not to be used for securing emergency stop functions.
The emergency stop functions are to be secured separately.
This securing must not be influenced by the board or the PC.

Make sure that the board remains in the protective blister pack **until it is used**.
Do not remove or alter the identification numbers of the board.
If you do, the guarantee expires.

2 USER

2.1 Qualification

Only persons trained in electronics are entitled to perform the following tasks:

- Installation,
- putting into operation,
- use,
- maintenance.

2.2 Personal protection

Consider the country-specific regulations about
- the prevention of accidents
- electrical and mechanical installations
- radio interference suppression.

3 HANDLING THE BOARD

Fig. 3-1: Wrong handling

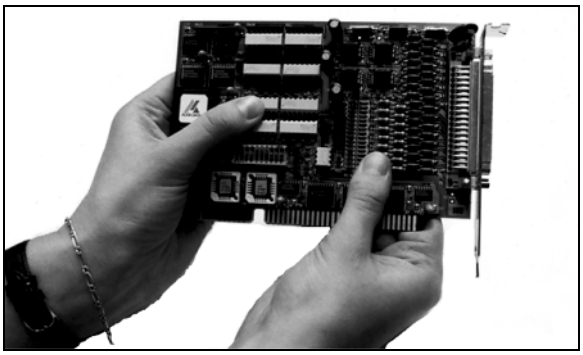
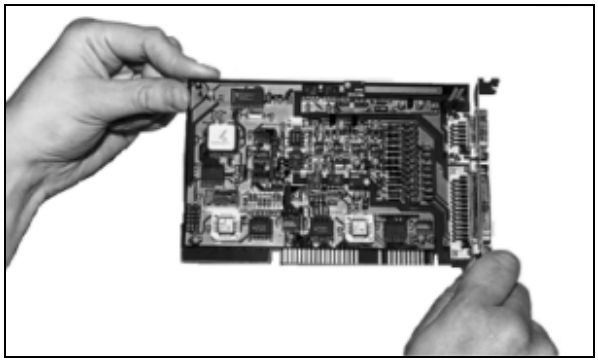


Fig. 3-2: Correct handling



4 TECHNICAL DATA

4.1 Electromagnetic compatibility (EMC)

The board has been subjected to EMC tests in an accredited laboratory in accordance with the norms EN50082-2, EN55011, EN55022. The board complies with the limit values set by the norm EN50082-2 as follows:

	True value	Set value
ESD	4 kV	4 kV
Fields	10 V/m	10 V/m
Burst	4 kV	2 kV
Conducted radio interferences	10 V	10 V

WARNING!
The EMC tests have been carried out in a specific appliance configuration. We guarantee these limit values **only** in this configuration.

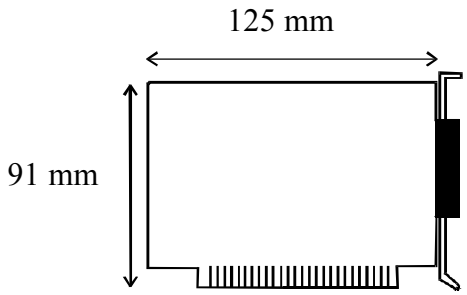
Consider the following aspects:

- your test program must be able to detect operation errors.
- your system must be set up so that you can find out what caused errors.

4.2 Physical set-up of the board

The board is assembled on a 4-layer printed circuit card.

Approximate card dimensions
with components and
SIM modules



Breadth:	19 mm
Weight	A-version: 92 B-version (without modules): 100g
Installation in:	XT or AT slot
Connection to the peripheral	two 9-pin SUB-D connectors

4.3 Versions

The basic board **PA 7420** is available in the following versions:

Version	RS232 on board
PA 7420-A	yes
PA 7420-B	no

4.4 Limit values

Operating temperature: ..... 0 to 60°C
Storage temperature: ..... -25 to 70°C
Relative humidity: ..... 30% to 99% non condensing

Minimum PC requirements:
- operating system ..... MS DOS 3.3 or > Windows 3.1
- bus speed ..... 8 MHz

Energy requirements :
- operating voltage of the PC: ..... 5V ± 5%
- current consumption in mA(without load): typ. See table ± 10%

	PA7420-A	PA7420-B
+ 5 V of the PC	122 mA	164 mA❶

❶ Add to this data the current consumption of the modules on the board (see next table):

	PMxxx[1]	PMxxx-G
RS232	21 mA	48 mA
RS422	5 mA	42 mA
RS485	5 mA	53,5 mA
20mA	51 mA	-

[1] Module **PMTTY (20 mA)** is in its standard version with optical isolation

PM232	CCITT recommendation	V.24
	US norm EIA	RS232
	max. transfer rate	112 kBd
PM232-G	CCITT recommendation	V.24
	US norm EIA	RS232
	max. transfer rate	19200 Bd
	Creeping distance:	3.2 mm
	Test voltage:	1000 VAC
PM422,	CCITT recommendation	V.11
PM485	US norm EIA	RS422, RS485
	Transil diodes:	
	Absorption power 1ms	400 W
	Breakdown voltage	+/- 6,5 V
	max. transfer rate	112 kBd
	max. transfer rate on request ❶	1 MBd
	Short circuit protection	PTC
PM422-G,	CCITT recommendation	V.11
PM485-G	US norm EIA	RS422, RS485
	Transil diodes	
	Absorption power 1 ms	400 W
	Breakdown voltage	± 6,5 V
	max. transfer rate	112 kBd
	max. transfer rate on request ❶	1 MBd
	Short circuit protection	PTC
	Creeping distance:	3.2 mm
	Test voltage:	1000 VAC

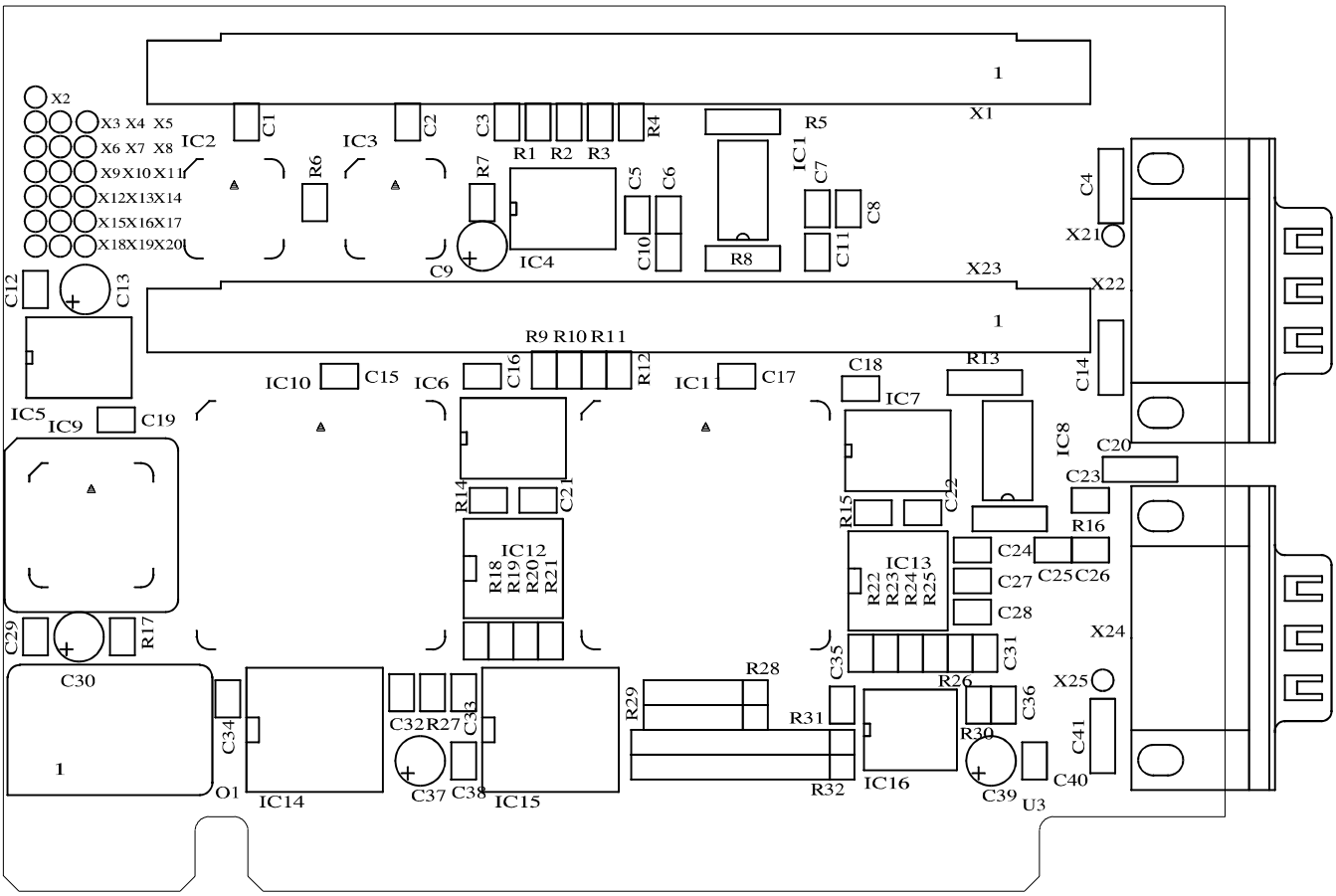
❶ The standard basic board has a transfer rate of 112 kBd. If you wish to transmit at 1MBd, then the basic board has to be configured again in our house.

1MBd configuration: consider that the divider factors for the programming of the transfer rate do not comply with the PC standard anymore. The 1M Bd transfer rate can only be programmed with specific device drivers.

RS 485: transfer at 1 MBd only works when the transmitter is controlled through DTR, RTS or databit.

PMTTY	20mA Current Loop	
	max. transfer rate	19200 Bd
	Transil diodes:	
	Absorption power 1ms	300 W
	Breakdown voltage	+/- 26 V
	Creeping distance	3.2 mm
	Test voltage	1000 VAC
	max. load resistance	500 Ω

4.4 Component scheme



5 INSTALLATION

IMPORTANT!
If you want to install simultaneously **several** ADDI-DATA Plug & Play boards, consider the following procedure.

- **Install and configure** the boards one after the other.
  You will thus avoid configuration errors.

1. Switch off the PC
2. Install the **first** board
3. Start the PC

4. Install ADDIREG (only once)
5. Configure the board

6. Install the driver and eventually the software examples.

7. Switch off the PC
8. Install the **second** board
9. Start the PC
10. Configure the second board
11. Install the driver and eventually the software examples.

IMPORTANT!
First install the ADDIREG programm before installing and starting the other applications of the board**.**

5.1 Inserting the board

IMPORTANT!
Do observe the *safety instructions.*

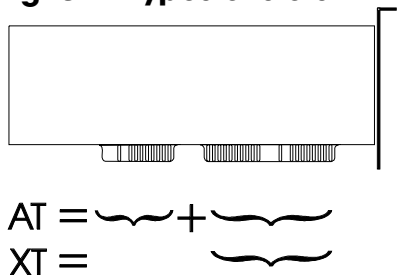
5.1.1 Opening the PC

- Switch off your PC and all the units connected to the PC.
- Pull the PC's mains plug from the socket.
- Open your PC as described in the manual of the PC manufacturer.

5.1.2 Selecting a free slot

Two types of ISA slots are available: XT and AT.

Fig. 5-1: Types of slots



If necessary, the board can also be used in EISA slots under certain conditions. See in the PC manual which types of slots are free.

1. Decide in which type of slot to insert the board**.**

2. Remove the back cover of the selected slot according to the instructions of the PC manufacturer. Keep the back cover. You will need it if you remove the board.

3. Discharge yourself from electrostatic charges:

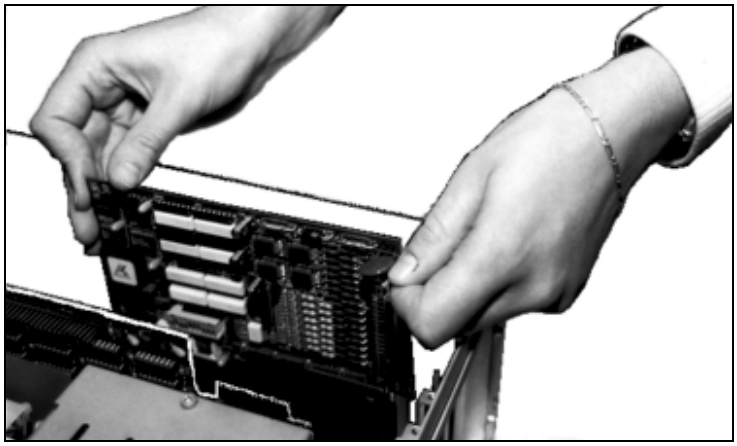
4. Take the board out of its protective blister pack.

Fig. 5-2: Opening the protective blister pack

5.1.3 Plugging the board into the slot

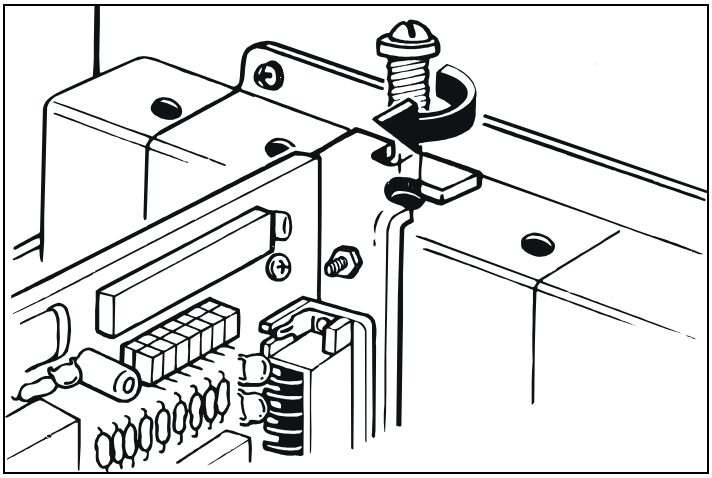
- **Discharge yourself from electrostatic charges**
- Insert the board **vertically into the chosen slot.**

Fig. 5-3: Inserting the board



- **Fasten the board** to the rear of the PC housing with the screw which was fixed on the back cover.

Fig. 5-4: Fastening the board at the back cover



- **Tighten all the loosen screws.**

5.1.4 Closing the PC

- **Close** your PC as described in the manual of the PC manufacturer.

5.2 Software installation

The board is delivered with a CD-ROM.
The CD contains:
- ADDIREG for Windows NT 4.0 and Windows 95/98.
  You can also download the latest version of the ADDIREG program from Internet.
- Standard software for the ADDI-DATA boards:
  - 32-bit for Windows NT/95/98.

5.2.1 Installation under MS-DOS and Windows 3.11

To install the board under MS-DOS, the "ADDICOM-ADDIDATA software driver" is available on request.

5.2.2 Installation under Windows NT/95/98

- Select the directory PA7420\WinNT-9x\Disk1.
- Start the set-up program "setup.exe" (double click)
- Select one of the 3 parameters
  1- typical
  2- compact
  3- custom

Proceed as indicated on the screen and read attentively the "Software License" and "Readme". In "custom", you can select your operating system.
The installation program gives you further instructions.

5.3 Board configuration with ADDIREG

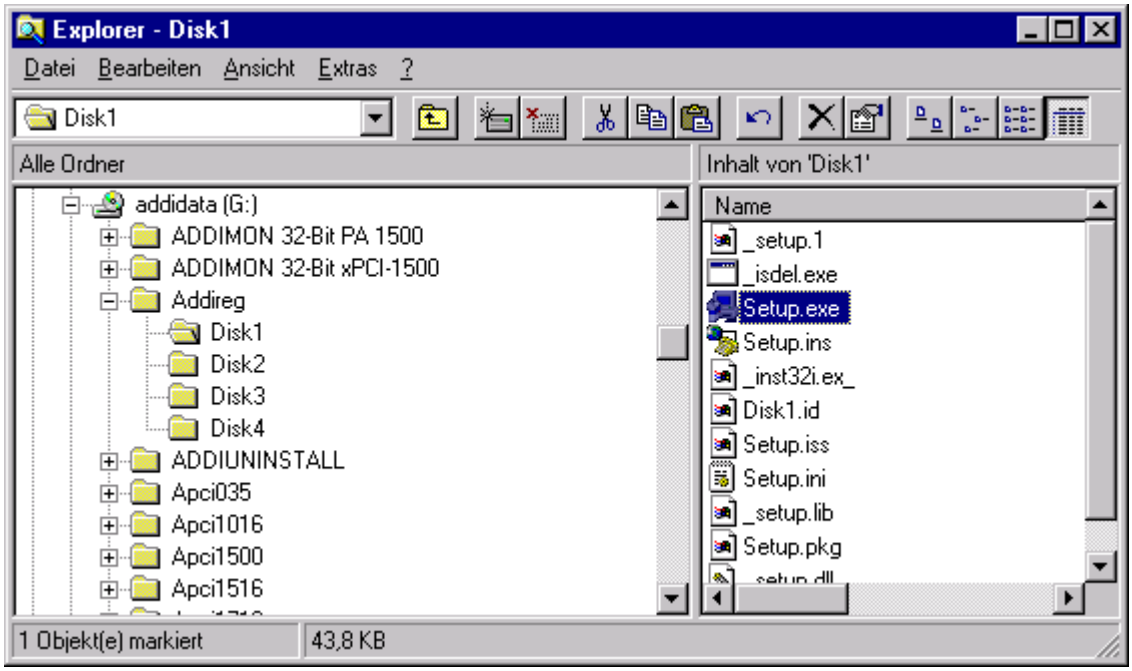
The ADDIREG registration program is a 32-bit program for Windows NT 4.0/95. The user can register all hardware information necessary to operate the ADDI-DATA PC boards.

IMPORTANT!
If you use one or several resources of the board, you cannot start the ADDIREG program.

5.3.1 ADDIREG installation

- Change to the CD drive.

Fig. 5-5: Installation of the ADDIREG program



- Start the set-up program "setup.exe" (double click)
- Select one of the 3 parameters
  1- typical
  2- compact
  3- custom

Proceed as indicated on the screen and read attentively the "Software License" and "Readme". In "custom", you can select your operating system.
The installation program gives you further instructions.

If the message "Der Keyboard Kernel wurde noch nicht gestartet, ... soll der Kernel jetzt gestartet werden?" (Problem when installing the system) is displayed by starting the program, deinstall the ADDIREG program and install it anew.

5.3.2 Program description

IMPORTANT!
Insert the ADDI-DATA boards to be registered before starting the ADDIREG program.

If the board is not inserted, the user cannot test the registration.
Once the program is called up, the following dialog box appears:

Fig. 5-6: ADDIREG registration program

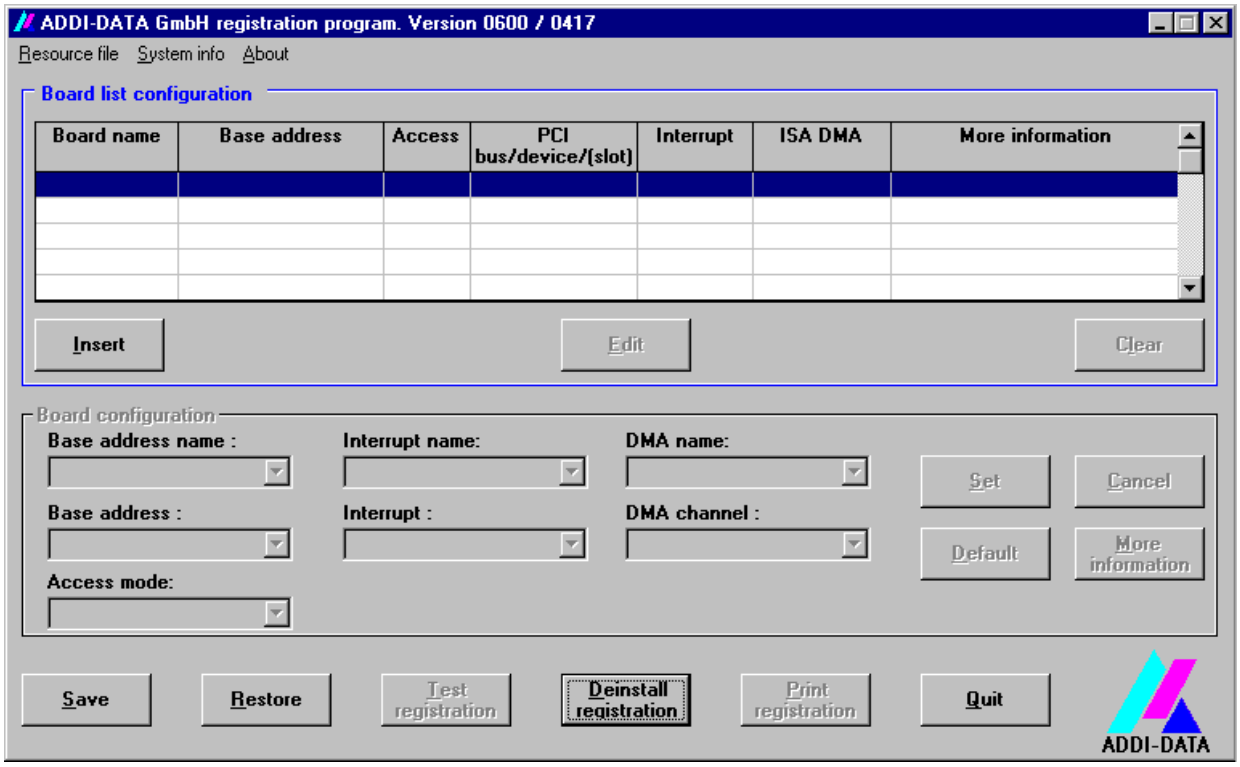


Table:

The table in the middle lists the registered boards and their respective parameters.

Board name:
Names of the different registered boards (e.g.: APCI-3120).
When you start the program for the first time, no board is registered in this table.

Base address:
Selected base address of the board.

Access:
Selection of the access mode for the ADDI-DATA digital boards.
Access in 8-bit or 16-bit.

PCI bus/device (slot):
Used PCI slot. If the board is no PCI board, the message "NO" is displayed.

Interrupt:
Used interrupt of the board. If the board uses no interrupt, the message "Not available" is displayed.

ISA DMA:
Indicates the selected DMA channel or "Not available" if the board uses no DMA.

More information:
Additional information like the identifier string (e.g.: PCI1500-50) or the installed COM interfaces.

Text boxes:

Under the table you will find 6 text boxes in which you can change the parameters of the board.

Base address name:
When the board operates with several base addresses (One for port 1, one for port 2, etc.) you can select which base address is to be changed.

Base address:
In this box you can select the base addresses of your PC board. The free base addresses are listed. The used base addresses do not appear in this box.

Interrupt name:
When the board must support different interrupt lines (common or single interrupts), you can select them in this box.

Interrupt:
Selection of the interrupt number which the board is to use.

DMA name:
When the board supports 2 DMA channels, you can select which DMA channel is to be changed.

DMA channel:
Selection of the used DMA channel.

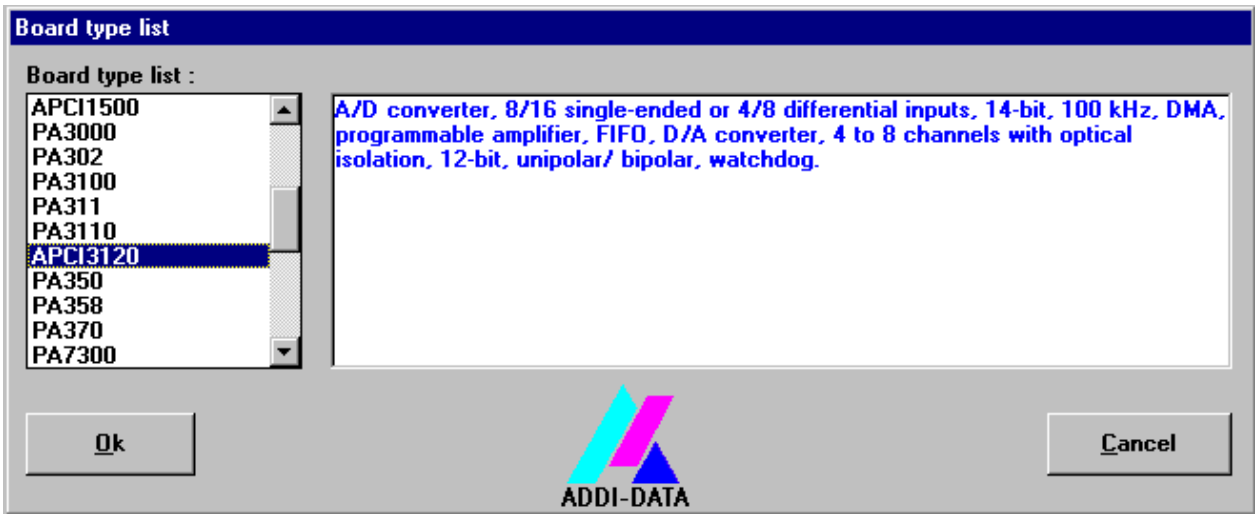
Buttons:

Edit[1]:
Selection of the highlighted board with the different parameters set in the text boxes. Click on Edit to activate the data or click twice on the selected board.

Insert:
When you want to insert a new board, click on "Insert". The following dialog window appears.

1 "x": Keyboard shortcut. e.g.: "Alt + e" for Edit

Fig. 5-7: Inserting a new board



All boards you can register are listed on the left. Select the wished board. (The corresponding line is highlighted). On the right you can read technical information about the board(s). Activate with "OK"; You come back to the former screen.

Clear:
You can delete the registration of a board. Select the board to be deleted and click on "Clear".

Set:
Sets the parameterised board configuration. The configuration should be set before you save it.

Cancel:
Reactivates the former parameters of the saved configuration.

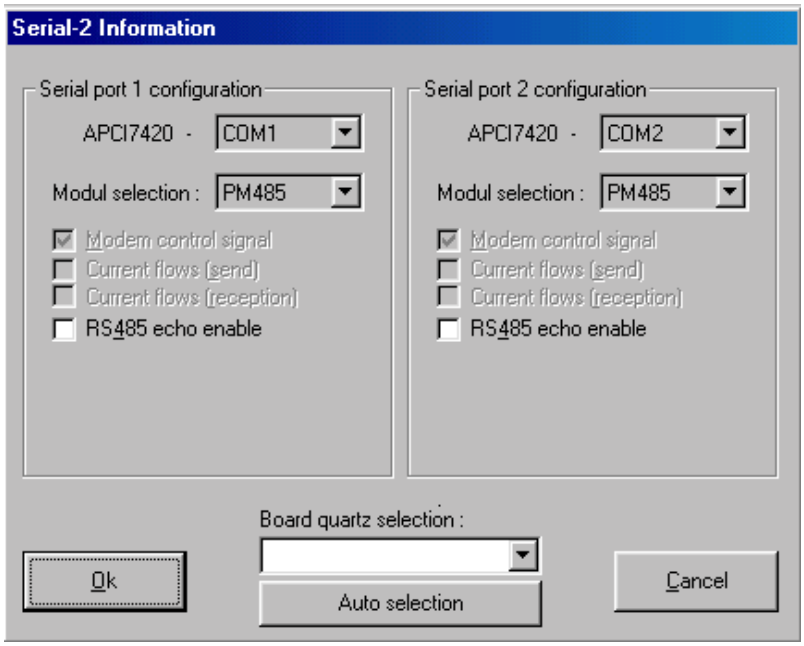
Default:
Sets the standard parameters of the board.

More information:
You can change the board specific parameters like the Identifier string, the COM number, the operating mode of a communication board, etc...
If your board does not support these information, you can not activate this button.

Communication boards:
The following figure is the example of 2 serial interfaces.

If you use the standard driver for Windows, you can select the COM number. Several options like "Module selection" and the different parameters can only be activated if the functions are available.

Fig. 5-8: Communication board



If you use the standard software for Windows, you can select the COM number. If you use the ADDI-DATA driver, you can select the identifier string for each module.
Several options like "Module selection" and the different parameters can only be activated if the functions are available.

Save:
Saves the parameters and register the board.

Restore:
Reactivates the last saved parameters and registration.

Test registration:
Controls if there is a conflict between the board and other devices.
A message indicates the parameter which has generated the conflict. If there is no conflict, "OK" is displayed.

Deinstall registration:
Deinstalls the registrations of all board listed in the table.

Print registration:
Prints the registration parameter on your standard printer.

Quit:
Quits the ADDIREG program.

5.3.2 Registering a new board

IMPORTANT!
To register a new board, you must have administrator rights.
Only an administrator is allowed to register a new board or change a registration.

- Call up the ADDIREG program. The figure 5-6 is displayed on the screen. Click on "Insert". Select the wished board.
- Click on "OK". The default address, interrupt, and the other parameters are automatically set in the lower fields. The parameters are listed in the lower fields. If the parameters are not automatically set by the BIOS, you can change these parameters. Click on the wished scroll function(s) and choose a new value. Activate your selection with click.
- Once the wished configuration is set, click on "Set".
- Save the configuration with "Save".
  You can test if the registration is "OK".
  This test controls if the registration is right and if the board is present.
  If the test has been successfully completed you can quit the ADDIREG program.
  The board is initialised with the set parameters and can now be operated.

In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

5.3.3 Changing the registration of a board

IMPORTANT!
To register a new board, you must have administrator rights.
Only an administrator is allowed to register a new board or change a registration.

- Call up the ADDIREG program. Select the board to be changed. The board parameters (Base address, DMA channel, ..) are listed in the lower fields.
- Click on the parameter(s) you want to set and open the scroll function(s).
- Select a new value. Activate it with a click.
  Repeat the operation for each parameter to be modified.
- Once the wished configuration is set, click on "Set".
- Save the configuration with "Save".
- You can test if the registration is "OK".
  This test controls if the registration is right and if the board is present.
  If the test has been successfully completed you can quit the ADDIREG program.
  The board is initialised with the set parameters and can now be operated.

- In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

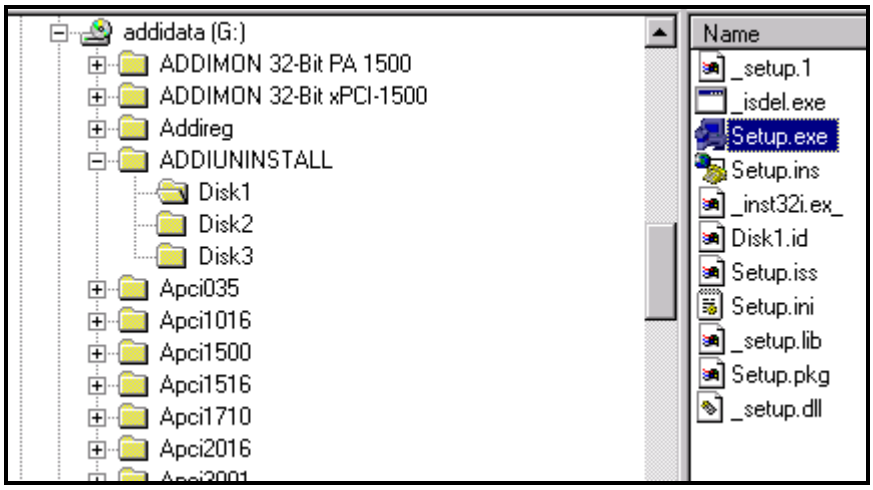
5.4 The ADDI-UNINSTALL programm

5.4.1 ADDI-UNINSTALL installation

The ADDI_UNINSTALL program is delivered on the CD-ROM.

- Change to the CD drive and start the setup file (double click).

Fig. 5-9: Installation of the ADDI-UNINSTALL program

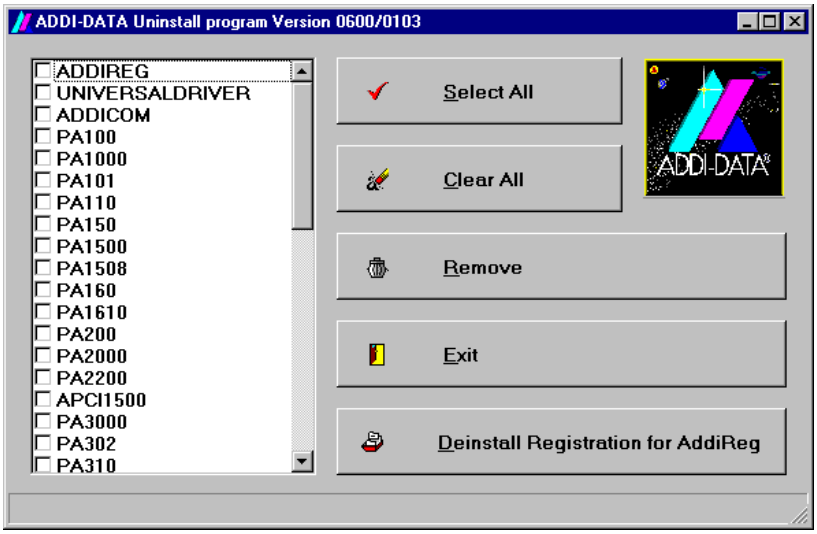


- Proceed as indicated on the screen.

5.4.2 Software uninstalling with ADDI-UNINSTALL

- Start the ADDI_UNINSTALL program.

Fig. 5-10: The ADDI_UNINSTALL program



- Select the software or the driver to be deinstalled.
  Enter it in the corresponding check box.

- Click on "Remove". Proceed as indicated until the complete removal of the program.

Uninstall ADDIREG

- Click on "Deinstall registration for AddiReg".
- Proceed as indicated until the complete removal of ADDIREG.

You can also download the ADDI-UNINSTALL program from the Internet.

5.5 Software downloads from the Internet

Do not hesitate to visit us or e-mail your questions.
Our Internet page is accessed:
- per e-mail: info@addi-data.de
- per Internet : http://www.addi-data.de. or
  http://www.addi-data.com

Free downloads of the standard software
You can download the latest version of the software for the board **PA 7420**.

6 CONNECTING THE PERIPHERAL

6.1 Connector pin assignment

Fig. 6-1: 9-pin SUB-D connector

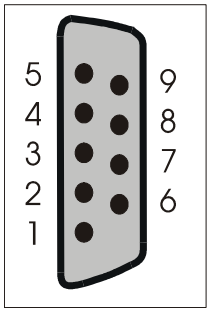


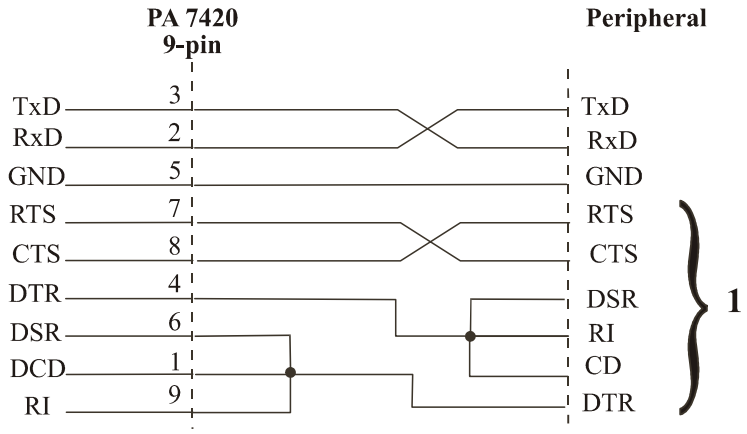
Table 6-1: Pin assignment according to the used mode

Pin	RS422/485	RS232	Current Loop
1	Tx +	DCD	DCD
2	Tx -	RxD	RxD
3	Rx+ Tx+	TxD	TxD
4	RT connec.	DTR	DTR
5	-	GND	GND
6	R100/200	DSR	DSR
7	-	RTS	RTS
8	-	CTS	CTS
9	Rx- Tx-	RI	RI

6.2 Connection examples

6.2.1 RS232 cabling

Fig. 6-2: RS232 cabling

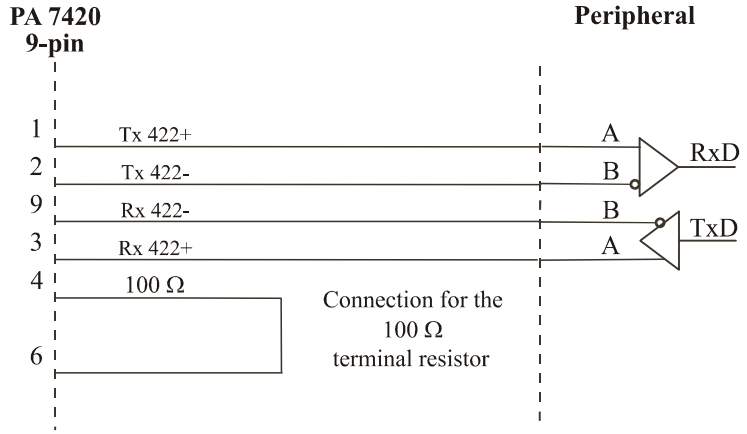


1 The connections are not necessary when the modem control signals are connected on the board (See chapter 5 *Installation*).

6.2.2 RS422 cabling

Terminal resistor: 100 Ω

Fig. 6-3: RS422 cabling



6.2.3 RS485 cabling

Terminal resistor: 120 Ω

Fig. 6-4: RS485 cabling

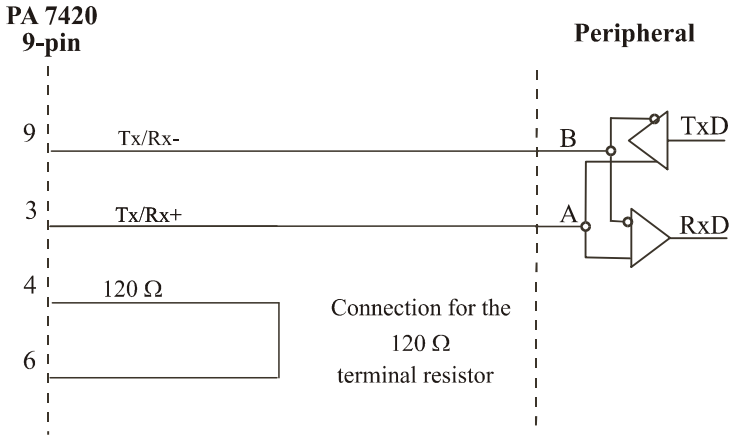
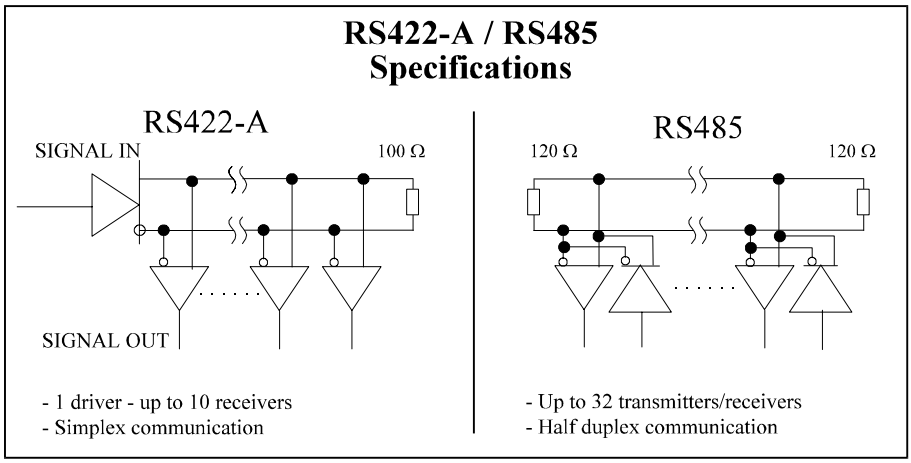


Fig. 6-5: Multipoint system



6.2.4 20 mA current Loop cabling

Active / passive : When a transmitter and a receiver communicate, one of them has to supply the necessary current. If the transmitter supplies the current, it is active. The receiver is passive.
In reverse, if the receiver supplies the current, it is active.

Fig. 6-6: Active transmission / active reception

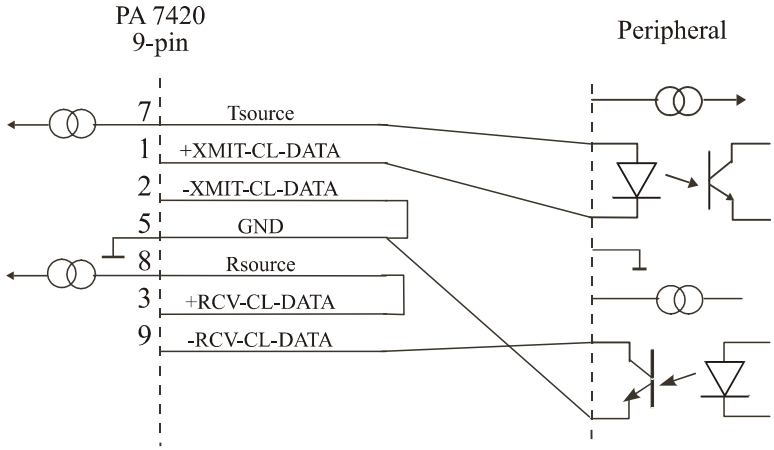


Fig. 6-7: Active transmission / passive reception

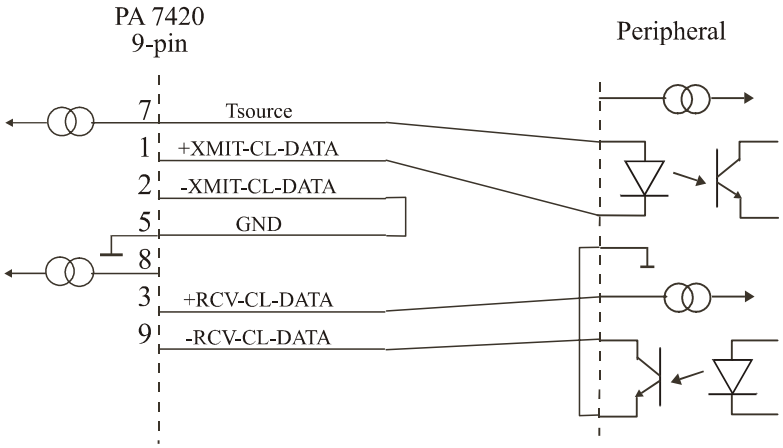


Fig. 6-8: Passive transmission / active reception

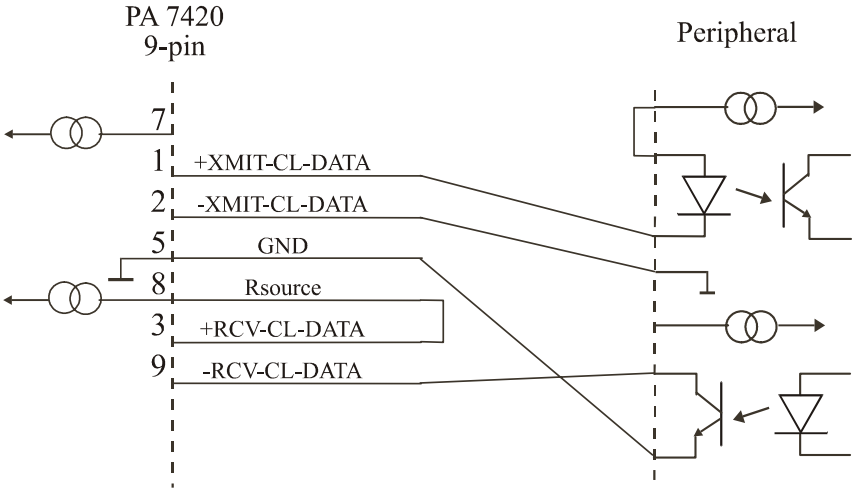


Fig. 6-9: Passive transmission / passive reception

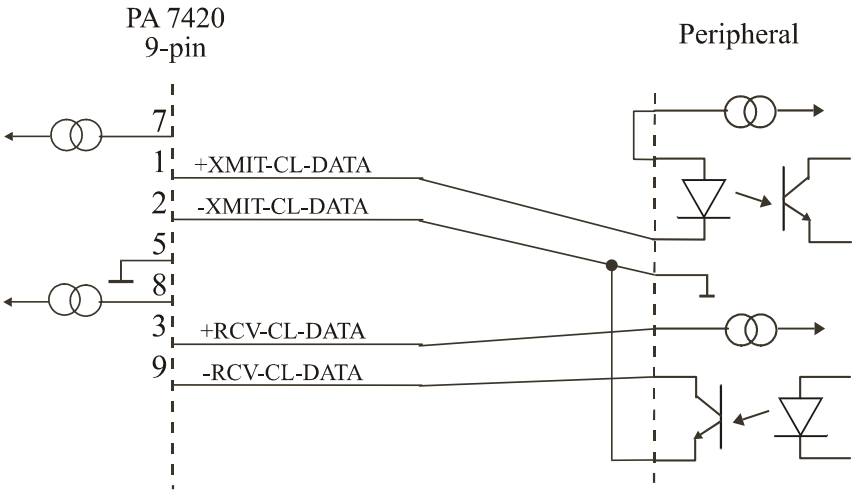
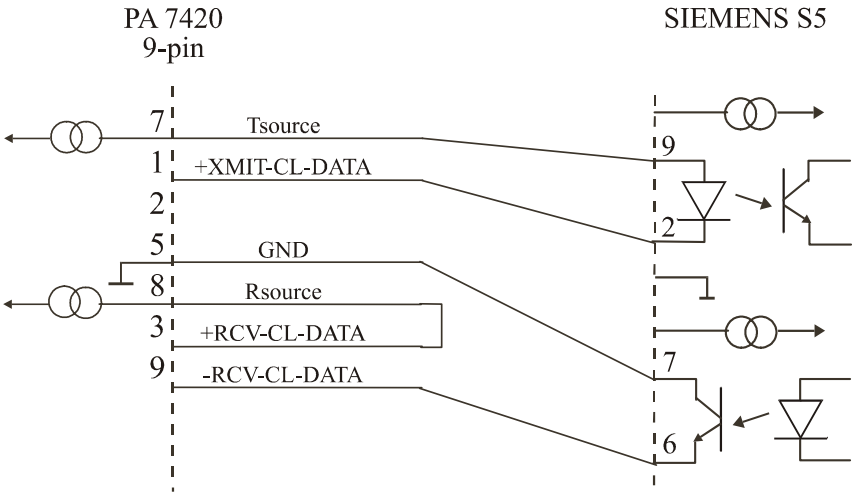


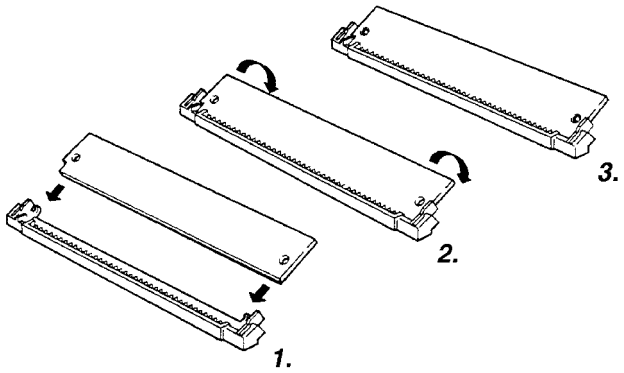
Fig. 6-10: Connection to a PLC (Siemens S5)



7 REPLACING THE SI MODULES

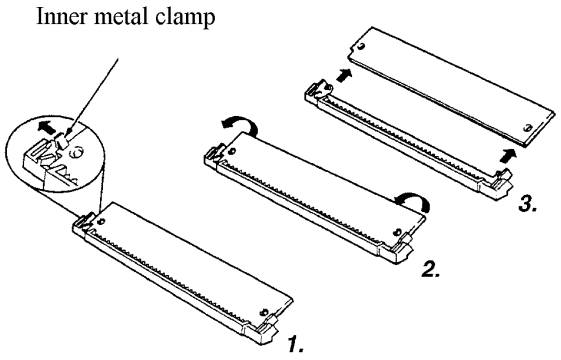
IMPORTANT!
We advise you to send us the board if a module is to be replaced.
If you wish to effect the replacement yourself, consider the following:
- Observe the possible combinations according to the intended purpose of the board
- Do observe the *Security advices*
- Insert/remove the module carefully according to the following illustrations.

Fig. 7-1: Inserting a SI module



1. Hold the SI-Module so that its connector is directed toward the guide rail in the centre of the socket.
2. Pull the SI-Module downward until it clicks in place.
3. The SI-Module is installed on the board. If the module is not properly installed, take it out and install it again.

Fig. 7-2: Removing a SI module



1. Bend the inner metal clamp carefully apart, until the SI-Module can be removed from the socket.
2. Remove the SI-Module from the socket.

8 STANDARD SOFTWARE

To install the 2 ports of the **PA 7420** please use the standard drivers which are delivered with Windows NT 4.0. You can read additional information about the Windows API functions for the settings and the use of the serial interfaces in:

„SERIAL COMMUNICATION in WIN32“

Moreover you will find application examples in Delphi 2.0 and VC ++ 5.0.

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