



DIN EN ISO 9001:2000
certified



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Attention!
Product discontinuation
due to EC RoHS directive
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Technical description

ADDICOM APCI-7300,
APCI-7420, APCI-7500

1-port/2-port/4-port serial interfaces

Edition: 07.02-1/2006

Product information

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Declaration of Conformity

Document-Number/Month-Year: B-25801 / 09.2000

Manufacturer/Importer: ADDI-DATA GmbH
Dieselstraße 3
D-77833 OTTERSWEIER

Type: **APCI-7300**

Product description: **Board to be inserted in a PCI 32-bit/5 V slot of a PC
1-port serial interface
for SI modules PM232 (-G), PM422(-G), PM485(-G), PMTTY**

The above named product complies with the following European directives:

Directive 72/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

The following norms have been applied:

IEC 61010-1 2002-08

IEC 61326-2 2004

2004/11/10

Date

H. G. G. H.

Legally valid signature of the manufacturer



Declaration of Conformity

Document-Number/Month-Year: B-25822 / 09.2000

Manufacturer/Importer: ADDI-DATA GmbH
Dieselstraße 3
D-77833 OTTERSWEIER

Type: **APCI-7420**

Product description: **Board to be inserted in a PCI 32-bit/5 V slot of a PC
2-port serial interface
for SI modules PM232 (-G), PM422(-G), PM485(-G), PMTTY**

The above named product complies with the following European directives:

Directive 72/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

The following norms have been applied:

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Declaration of Conformity

Document-Number/Month-Year: B-25802 / 09.2000

Manufacturer/Importer: ADDI-DATA GmbH
Dieselstraße 3
D-77833 OTTERSWEIER

Type: **APCI-7500**

Product description: **Board to be inserted in a PCI 32-bit/5 V slot of a PC
4-port serial interface
for SI modules PM232 (-G), PM422(-G), PM485(-G), PMTTY and
for MX modules MX232 (-G), MX422(-G), MX485(-G), MXTTY**

The above named product complies with the following European directives:

Directive 72/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

The following norms have been applied:

IEC 61010-1 2002-08

IEC 61326-2 2004

2004/11/10

Date

Legally valid signature of the manufacturer

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 precautions (yellow leaflet).**

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:**



IMPORTANT!

designates hints and other useful information.



WARNING!

It designates a possibly dangerous situation.

If the instructions are ignored the board, PC and/or peripheral may be destroyed.

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1 INTENDED PURPOSE OF THE BOARD

The boards **APCI-7xxx**¹ must be inserted in a PC with PCI 5V/32-bit slots, which is used as electrical equipment for measurement, control and laboratory use as defined in the norm IEC 61010-1.

The PC is to comply with the norm IEC61326 for measurement, control and laboratory use and with the specifications for EMC protection.

Products complying with these specifications bear the CE mark.

The board **APCI-7xxx** provides the personal computer (PC) with 1-port (APCI-7300), a 2-port (APCI-7420) or a 4-port (APCI-7500) asynchronous serial interface for the communication with external devices. The operating mode of the interface depends on the SI or MX modules installed.

The board is to be connected to the peripheral through a shielded cable, which shielding should be grounded on both ends.

Minimum specifications of the connection cable:

- metallized plastic hoods
- shielded cable
- cable shield folded back and firmly screwed to the connector housing.

The board supports serial communication through 1, 2 or 4 asynchronous serial ports. The intended purpose of the board depends on the following parameters (See Table 1-1).

¹ Common name for the boards APCI-7300, APCI-740, APCI-7500

Table 1-1: Intended purpose depending on the operating mode

Module ¹	Operating mode	Port configuration	Distance between transmitter and receiver ²	Environment
PM232 MX232	RS232	modem control signals connected on the board (through ADDIREG) or externally to the connector	30 m	industry
PM232-G MX232-G	RS232	modem control signals connected on the board (through ADDIREG) or externally to the connector	30 m	noisy industrial environment
PMTTY MXTTY	20 mA Current loop	current flows in rest state	1 km	very noisy industrial environment
PM422 MX422	RS422		1.2 km	noisy industrial environment
PM422-G MX422-G	RS422		1.2 km	very noisy industrial environment
PM485 MX485	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or data bit	1.2 km	noisy industrial environment
PM485-G MX485-G	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or data bit	1.2 km	very noisy industrial environment

¹ PMxxx-G: ex. PM232-G: module for the mode RS 232 with option G (optical isolation)
PMTTY: module for the mode 20 mA current loop. It is optically isolated as a standard.

² The max. lengths are for standard interface cables

1.1 Limits of use

If the basic board is used with optically isolated modules and non isolated modules, then the safety built by the creeping distance of 3.2 mm is not ensured for the non isolated modules.

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.

Check the shielding capacity of the PC housing and cable prior to putting the device into operation.

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

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.

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.

For all operating modes, the signal lines are to be twisted in pairs with GND. Use exclusively connection cable with twisted pairs.

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 ($< 100 \text{ m}\Omega$) between the shield and the housing of the PC.

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

The APCI-7xxx board is not to be used as safety related part 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.

The installation of the board APCI-7xxx in sites lying under risk of explosion is excluded.

Make sure that the board remains in its 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 works:

- installation
- use,
- maintenance.

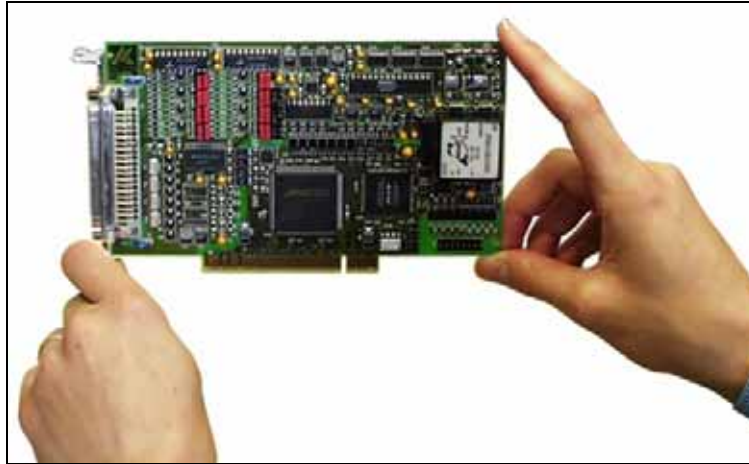
2.2 Personal protection

Consider the country-specific regulations about:

- the prevention of accidents
- electrical and mechanical installations
- radio interference suppression.

3 HANDLING OF THE BOARD

Fig. 3-1: Correct handling



4 TECHNICAL DATA

4.1 Electromagnetic compatibility (EMC)

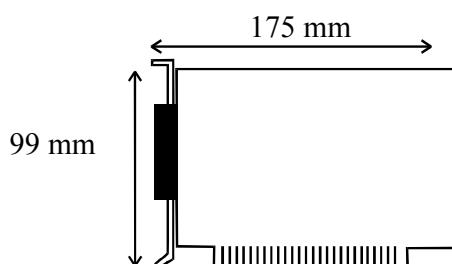
The board has been subjected to EMC tests in an accredited laboratory. The board complies with the limit values set by the norms IEC61326 as follows:

	True value	Set value
ESD (Discharge by contact/air)	4/8 kV	4/8 kV
Fields	10 V/m	10 V/m
Burst	4 kV	2 kV
Conducted radio interferences	10 V	10 V
Noise emissions.....	B class	

4.2 Physical set-up of the board

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

Dimensions:



Weight:	approx. 160 g
Installation in:	32/64-bit PCI slot 5 V
Connection to the peripheral:	
APCI-7300:	9-pin SUB-D male connector
APCI-7420:	2 x 9-pin SUB-D male connector
APCI-7500:	37-pin SUB-D male connector

4.3 Limit values

Max. altitude: 2000 m
 Operating temperature: 0 to 60°C
 Storage temperature: -25 to 70°C
 Relative humidity: 30% to 99% non condensing

Minimum PC requirements:

PCI BIOS from Version 1.0

Bus speed: < 33 MHz
 Operating system: Windows NT, 98, 2000, XP

Energy requirements:

- Operating voltage of the PC: 5 V \pm 5%
- Current consumption (without load): typ. see table \pm 10%

	APCI-7300	APCI-7420	APCI-7500
+ 5 V from PC	94.4 mA	122 mA	123.7 mA

Add to this data the current consumption of the used modules according to the following table:

	PMxxx ¹	MXxxx	PMxxx-G	MXxxx-G
RS 232	21 mA	10 mA	48 mA	86 mA
RS 422	5 mA	10 mA	42 mA	46 mA
RS 485	5 mA	10 mA	54 mA	58 mA
20 mA	51 mA	75 mA	-	-
MX 422-PEP ²	-	-	-	66 mA

¹ Module **PMTTY** or **MXTTY (20 mA)** is optically isolated as a standard.

² with software handshake (RTS CTS version)

4.3.1 RS232

CCITT recommendation: V.24
 US-Norm EIA: RS 232

Without optical isolation

	PM232	MX232
Max. transfer rate:	115.2 kBaud	1 Mbaud
Transfer rate on request.....	-	up to 2.5 MBaud
ESD protection	-	15 kV

With optical isolation

	PM232-G	MX232-G
Max. transfer rate:	115.2 kBaud	1 Mbaud
Transfer rate on request.....	-	up to 2.5 MBaud
ESD protection	15 kV	15 kV
Creeping distance:	3.2 mm	3.2 mm
Test voltage:	1000 VAC	1000 VAC
Short-circuit protection:		

4.3.2 RS422, RS485

CCITT recommendation: V.11
 US norm EIA: RS422, RS485

Without optical isolation

	PM422, PM485	MX422, MX485
Max. transfer rate:	115.2 kBaud	1 Mbaud
Transfer rate on request.....	-	up to 2.5 MBaud
ESD protection	-	15 kV
Transorb diodes:	400 W	
Absorption power	1ms	
Short-circuit protection:	PTC	

With optical isolation

	PM422-G, PM485-G	MX422-G, MX485-G
Max. transfer rate:	115.2 kBaud	1 Mbaud
Transfer rate on request.....	-	up to 2.5 MBaud
ESD protection	-	15 kV
Transorb diodes:	400 W	
Absorption power	1ms	
Creeping distance:	3.2 mm	3.2 mm
Test voltage:	1000 VAC	1000 VAC
Short-circuit protection:	PTC	

4.3.3 20mA current loop

	PMTTY	MXTTY
Max. Baudrate:	19.2 kBaud	19.2 kBaud
Transorb diodes:	400 W	400 W
Absorption power	1ms	
Creeping distance:	3.2 mm	3.2 mm
Test voltage:	1000 VAC	1000 VAC
Load:	500 Ω	500 Ω
Voltage reversal and short-circuit protection through Transorb diodes		

❶ The standard basic board with SI modules (PMxxx): The basic board has a transfer rate of max. 115.2 kBd in its standard delivery (with standard quartz).

❷ Basic board with MX modules and 1MBd configuration (Option): Please check if the quartz frequency is correctly set in ADDIREG or in the device manager of your operating system. See 6.1 for Windows NT and 6.2 for Windows XP/2000/98.

The 1MBaud transfer rate can only be programmed with the device drivers delivered with the board.

RS 485: transfer at 1 MBaud only works when the transmitter is controlled through DTR, RTS or data bit.

4.4 Component scheme

Fig. 4-1: Component scheme of the APCI-7xxx
(Basic board with SI modules)

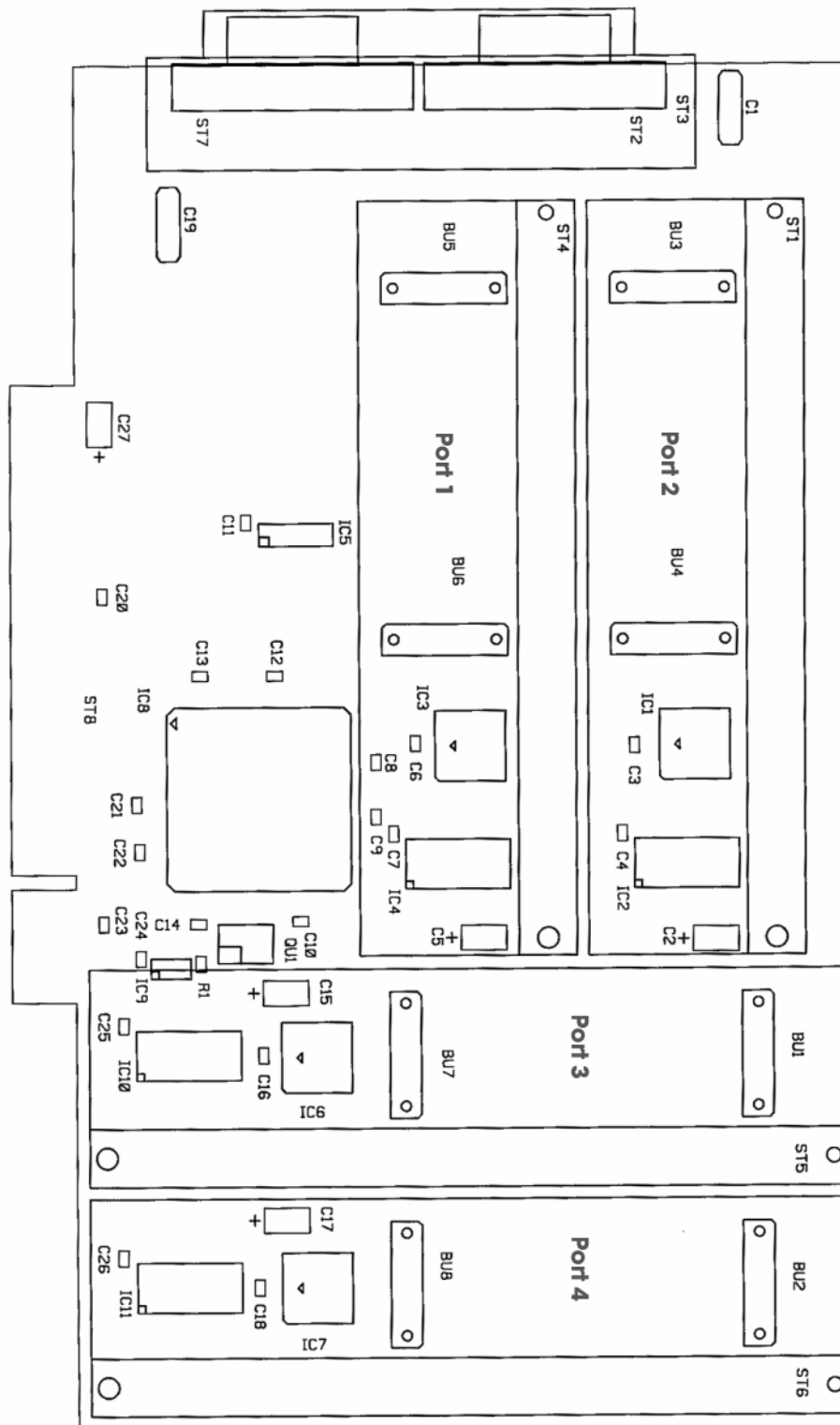


Fig. 4-2: Block diagram of the APCI-7300

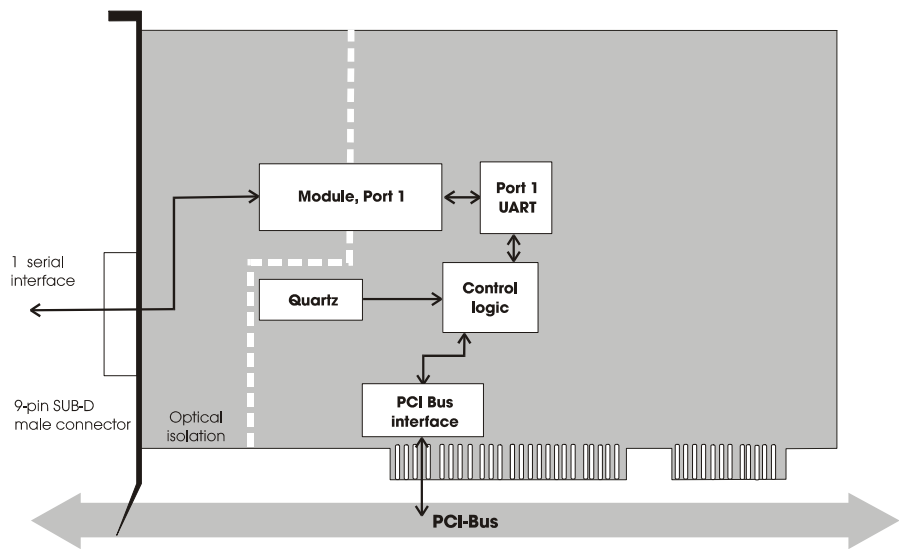


Fig. 4-3: Block diagram of the APCI-7420

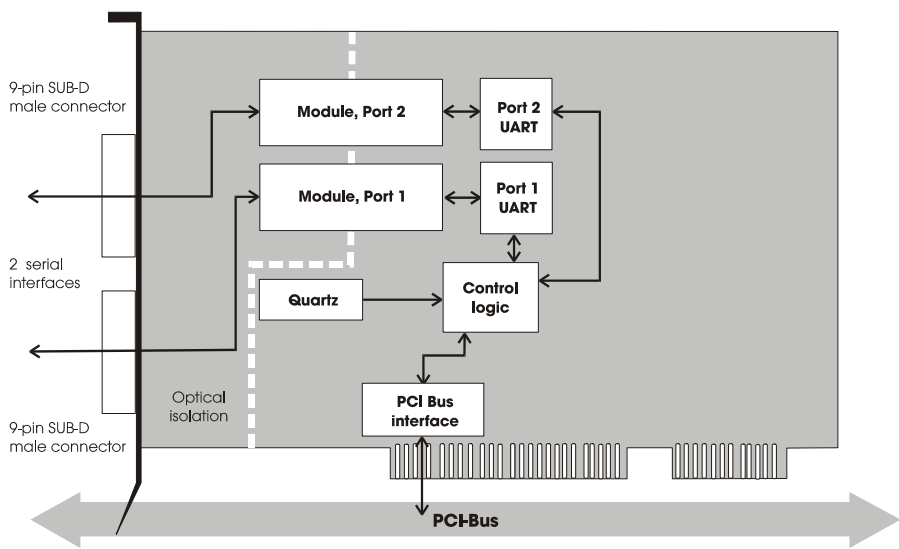
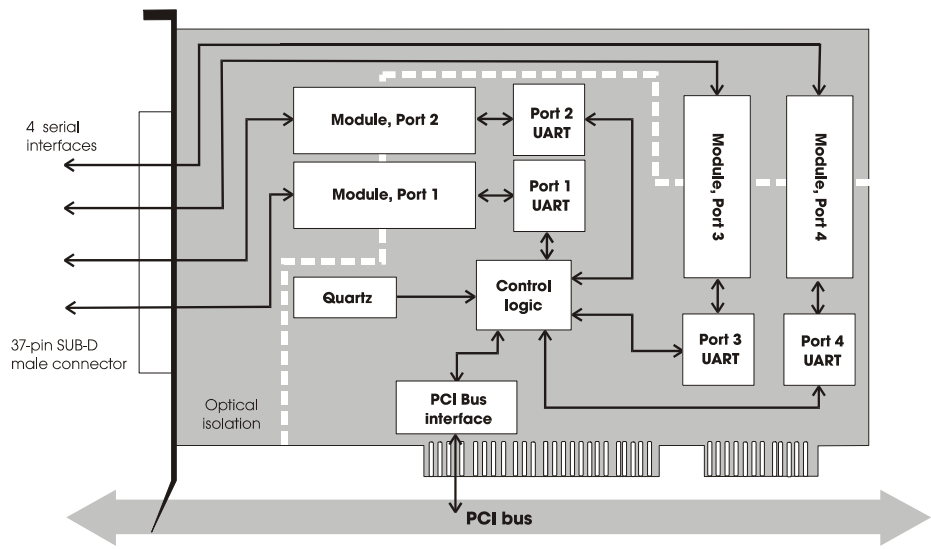


Fig. 4-4: Block diagram of the APCI-7300



5 INSTALLATION OF THE BOARD



IMPORTANT!

Do observe the safety precautions (yellow leaflet)!

5.1 Opening the PC

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

5.2 Selecting a free slot

Insert the board in a free PCI-5V slot (32-bit).

Fig. 5-1: PCI-5V slot (32-bit)



32 bits

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.

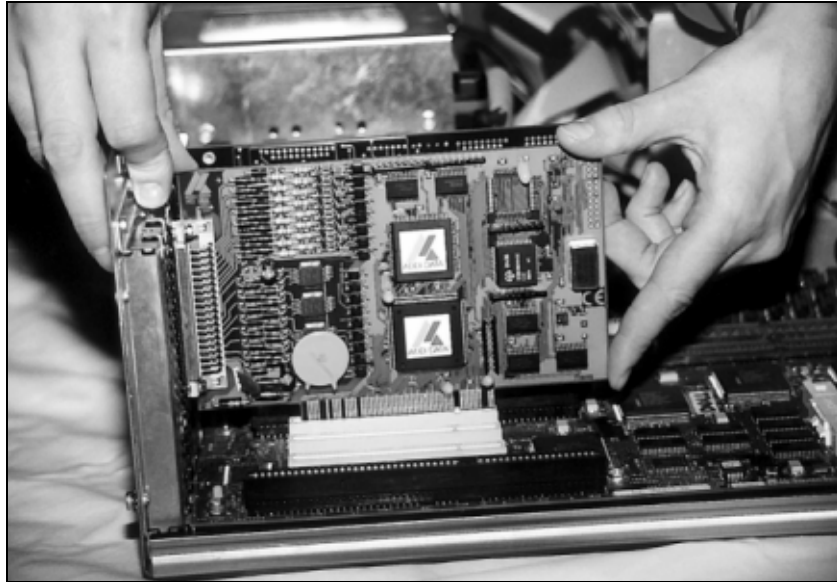
Discharge yourself from electrostatic charges.

Take the board out of its protective pack.

5.3 Plugging the board into the slot

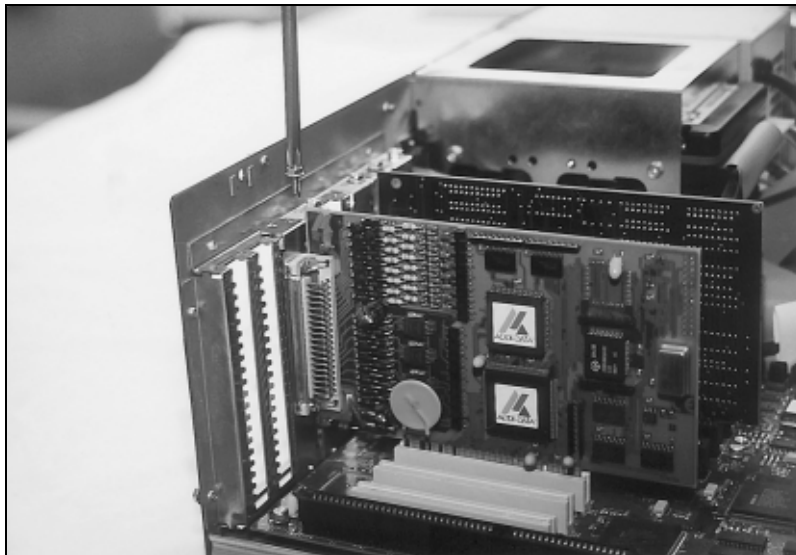
- ◆ Insert the board vertically into the chosen slot.

Fig. 5-2: Inserting the board



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

Fig. 5-3: Fastening the board at the back cover



- ◆ Tighten all the loosen screws.

5.4 Closing the PC

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

6 SOFTWARE

In this chapter you will find a description of the delivered software and its possible applications.



IMPORTANT!

Further information for installing and uninstalling the different drivers is to be found in the delivered description **"Instatlations instructions for the PCI bus"**.

A link to the corresponding PDF file is available in the navigation pane (Bookmarks) of Acrobat Reader.

The board is supplied with a driver CD-ROM (CD 1) containing:

- ADDICOM programming samples with API function for the ADDI-DATA boards in 32 bits.
- ADDIREG for Windows NT 4.0



IMPORTANT!

If you run the board unter Windows XP/2000/98, the ADDIREG configuration programm shall not be used.

The device manager of Windows XP/2000/98 sets the configuration of the inserted board.

6.1 Board registration unter Windows NT



IMPORTANT!

First insert the board to be registered, before you start ADDIREG.

If the board is not inserted in the PC, the registration cannot be tested.

When starting ADDIREG, the following window is displayed:

Fig. 6-1: ADDIREG registration program (example)

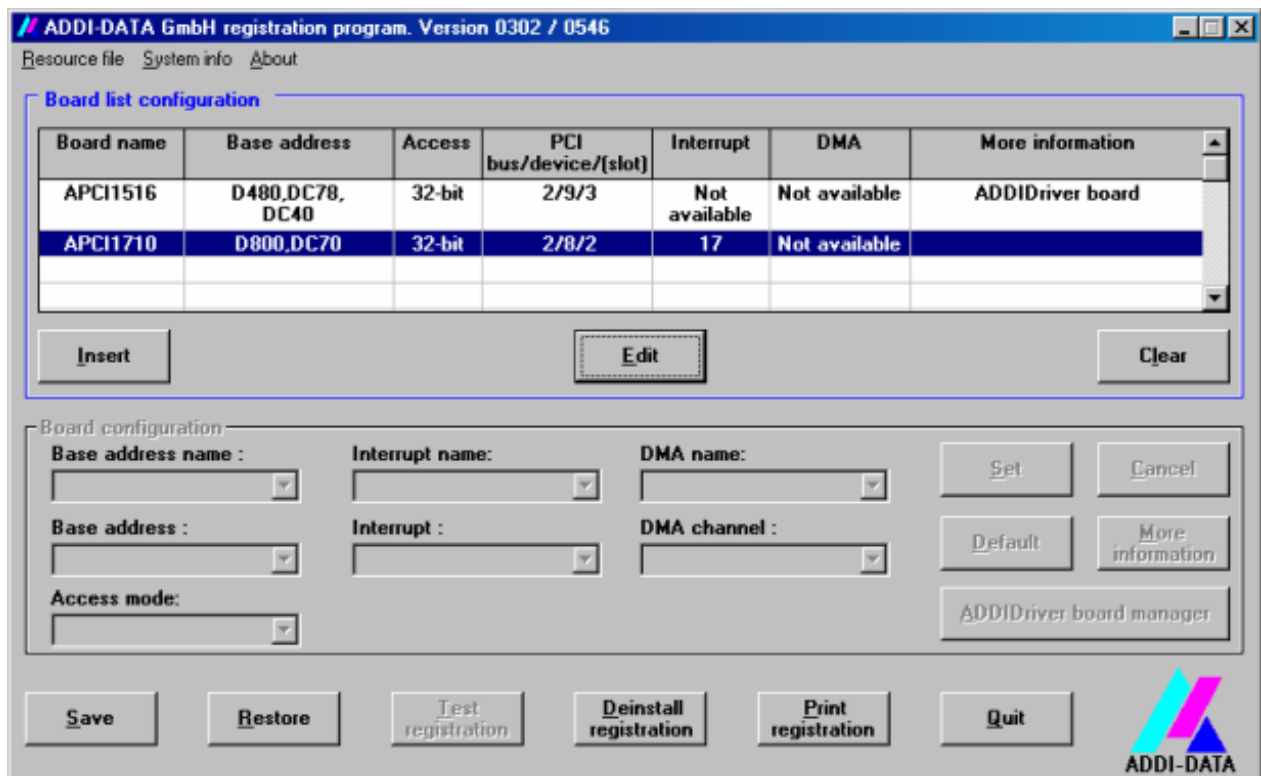


Table:**Board name:**

Names of the different registered boards (e.g.: APCI-1710). When you start the program for the first time, no board is registered in this table.

Base address:

Selected base address of the board. For PCI boards the base address is allocated through BIOS.

Access:

Selection of the access mode for the ADDI-DATA digital boards.
Access in 8-bit or 16-bit or 32-bit mode.

PCI bus/device/(slot):

Number of the used PCI bus, slot, and device. If the board is no PCI board, the message "NO" is displayed.

Interrupt:

Used interrupt of the board. If the board supports no interrupt, the message "Not available" is displayed. **For PCI boards the interrupt is allocated through BIOS.**

DMA (ISA boards only):

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

More information:

Additional information like the identifier string or the installed COM interfaces. It also displays whether the board is programmed with ADDIDRIVER or if a **PCI DMA** memory is allocated to the board.

Text boxes:**Base address name:**

Description of the used base addresses for the board. Select a name through the pull-down menu. The corresponding address range is displayed in the field below (Base address).

Interrupt name:

Description of the used IRQ lines for the board. Select a name through the pull-down menu. The corresponding interrupt line is displayed in the field below (Interrupt).

DMA name (for ISA boards only):

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

DMA channel (for ISA boards only):

Selection of the used DMA channel.

Buttons:

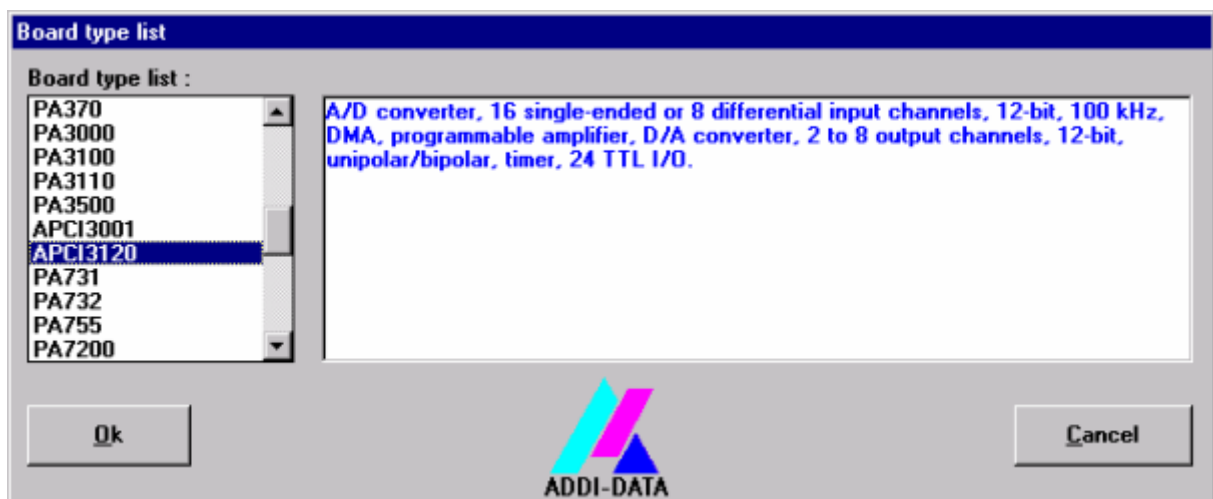
Edit:

Selection of the highlighted board with the different parameters set in the text boxes.

Insert:

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

Fig. 6-2: Board list under ADDIREG



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 parametered 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 (not available for the boards with ADDIPACK)

You can change the board specific parameters like the identifier string, the COM number, the operating mode of a communication board, etc... (See 6.1.1)
If your board does not support these information, you cannot activate this button.

**IMPORTANT!**

The configuration is only set once you activated it with OK **and** confirm through "Set" and then "Save" in the main window of ADDIREG.

ADDIDriver Board Manager (for ADDIPACK boards only)

Under Edit/ADDIDriver Board Manager you can check or change the current settings of the board set through the ADDEVICE Manager. ADDevice Manager starts and displays a list of all resources available for the virtual board.

Save:

Saves the parameters and registers the board.

Restore:

Reactivates the previous parameters and registration.

Test registration:

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

Deinstall registration:

Deinstalls the registrations of all boards listed in the table and deletes the entries of the boards in the Windows Registry.

Print registration:

Prints the registration parameter on your standard printer.

Quit:

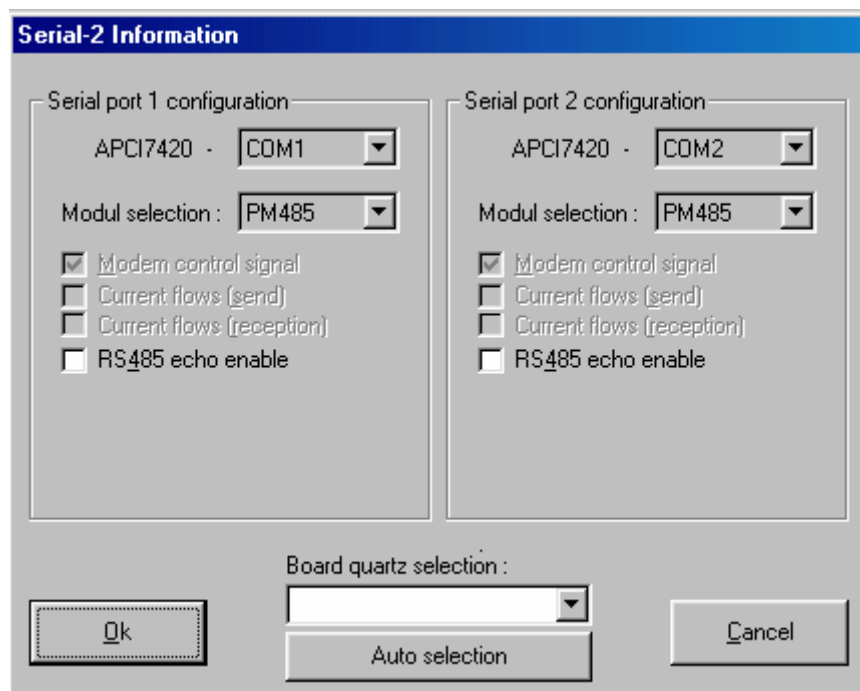
Ends the ADDIREG program.

6.1.1 "More information" dialog box for serial interfaces

ADDIREG can differentiate a PCI serial interface from the other standard PCI 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. 6-3: Communication board



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IMPORTANT!

You can change the quartz frequency only if you have required the option "Quarz modification" on your board.

In "Board quartz selection" you can adapt the quartz frequency (in Hz). The ADDI-DATA boards are set with a standard quartz frequency of 1843200 Hz.

6.1.2 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 Fig. 6-1 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.

6.1.3 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.

Registration test

Under "Test registration" 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.

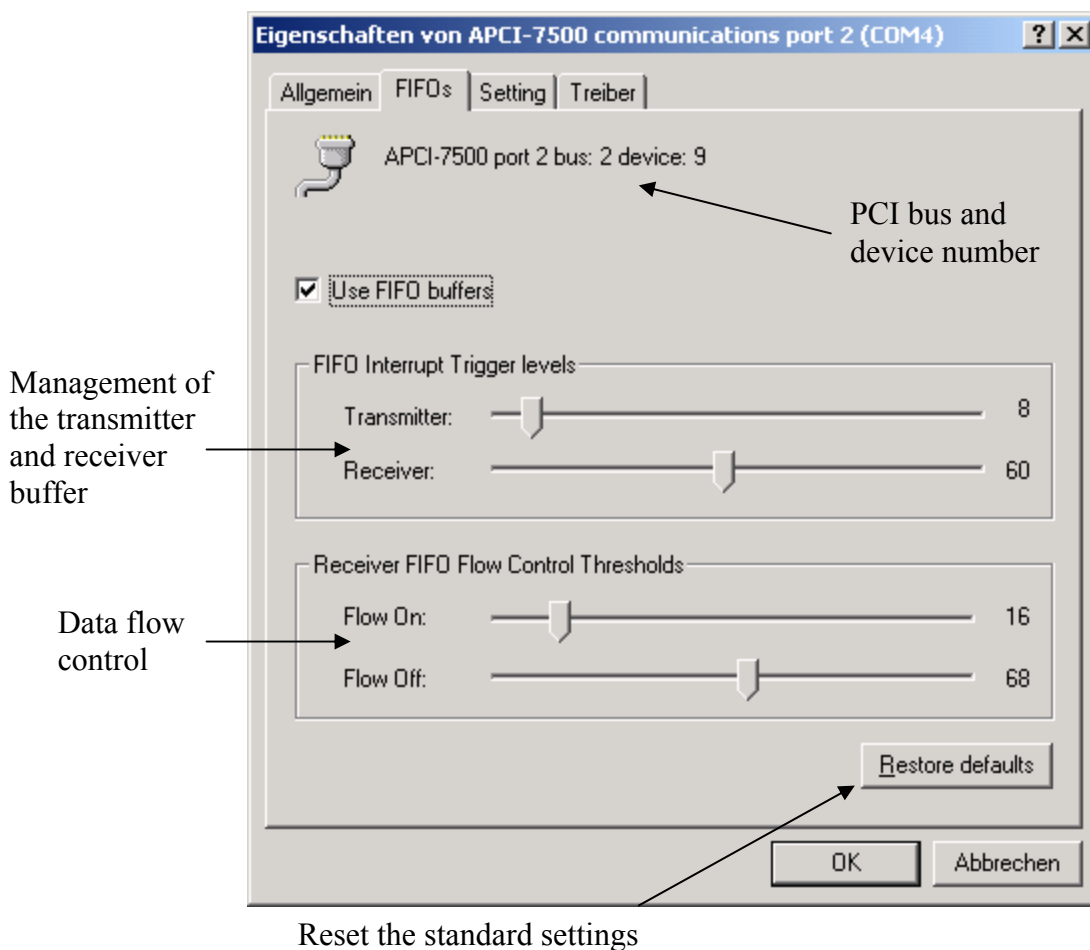
6.2 Configuration under Windows XP/2000/98

In the Windows device manager you can set the different interfaces according to your requirements through double clic.

Start the device manager of your operating system under Start/(Settings)/Control panel/System

In the "FIFO" register the following settings are possible:

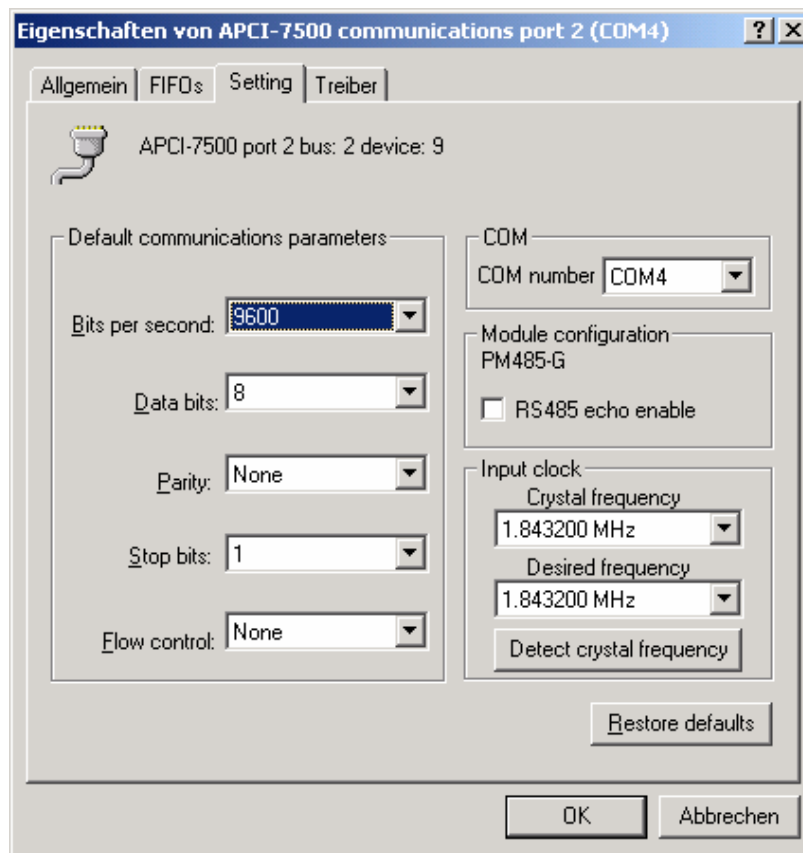
Fig. 6-4: FIFO settings with the Device Manager



In "Setting" you adapt the operating mode to the used interface.

You can select the quartz frequency for example and decide whether the modem control signals for RS232 are internally connected.

Fig. 6-5: Setting example with the Device Manager: RS485



6.3 Board test

You can test if your board is not correctly installed with a shorting plug and the test software MTTY.

The setup file for the test software MTTY is supplied on the CD-ROM under CD/MMTTY. The program is described in chapter 8.

6.4 Questions and software downloads on the web

Do not hesitate to e-mail us your questions.

per e-mail: **info@addi-data.de** or **hotline@addi-data.de**

Free downloads of standard software

You can download the latest version of the software for the board **APCI-7xxx**.

<http://www.addi-data.com>

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IMPORTANT!

Before using the board or in case of malfunction during operation, check if there is an update of the product (technical description, driver). The current version can be found on the internet or contact us directly.

7 CONNECTING THE PERIPHERAL

7.1 Connector pin assignments: standard delivery

Fig. 7-1: 37-pin SUB-D male connector

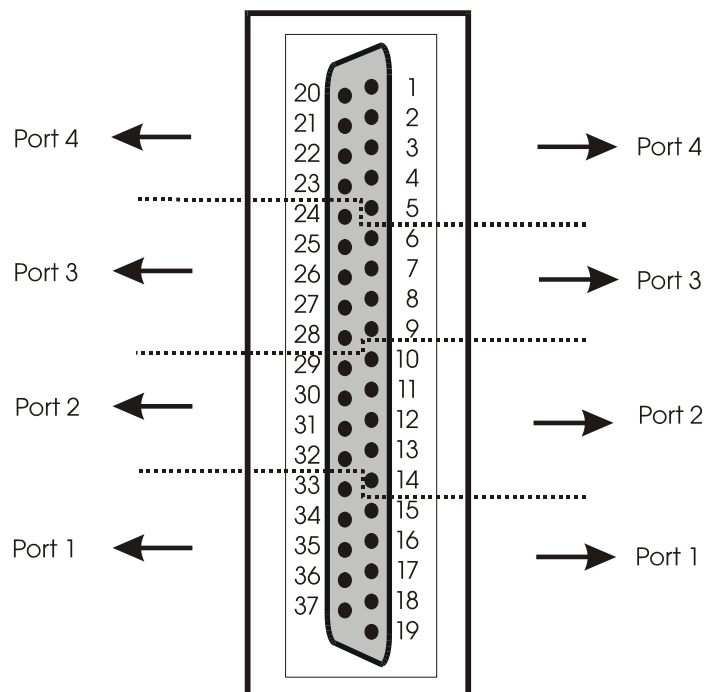


Table 7-1: Pin assignment

RS485	RS422	Current Loop	RS232	Pin	Pin	RS232	Current Loop	RS422	RS485	
120 Ω	100 Ω	Tsource	DSR	20	1	CD	+XMIT-CL-DATA	TA		Port 4
		Rsource	RTS	21	2	RxD	-XMIT-CL-DATA	TB		
Tx/Rx-	RB	-RCV-CL-DATA	CTS	22	3	TxD	+RCV-CL-DATA	RA	Tx/Rx+	
			RI	23	4	DTR			Rab (1)	
	TA	+XMIT-CL-DATA	CD	24	5	GND	GND	GND	GND	Port 3
	TB	-XMIT-CL-DATA	RxD	25	6	DSR		100 Ω	120 Ω	
Tx/Rx+	RA	+RCV-CL-DATA	TxD	26	7	RTS	Tsource			
Rab (1)			DTR	27	8	CTS	Rsource			
GND	GND	GND	GND	28	9	RI	-RCV-CL-DATA	RB	Tx/Rx-	Port 2
120 Ω	100 Ω	Tsource	DSR	29	10	CD	+XMIT-CL-DATA	TA		
		Rsource	RTS	30	11	RxD	-XMIT-CL-DATA	TB		
Tx/Rx-	RB	-RCV-CL-DATA	CTS	31	12	TxD	+RCV-CL-DATA	RA	Tx/Rx+	
			RI	32	13	DTR			Rab (1)	Port 1
	TA	+XMIT-CL-DATA	CD	33	14	GND	GND	GND	GND	
	TB	-XMIT-CL-DATA	RxD	34	15	DSR		100 Ω	120 Ω	
Tx/Rx+	RA	+RCV-CL-DATA	TxD	35	16	RTS	Tsource			
Rab (1)			DTR	36	17	CTS	Rsource			Port 1
GND	GND	GND	GND	37	18	RI	-RCV-CL-DATA	RB	Tx/Rx-	
					19					

TA: Tx422+ RA: Rx422+

TB: Tx422- RB: Rx422-

Rab: Connection to a terminal resistor

(1): Cable connection to 100Ω/120Ω terminates the RS422/RS485 lines with the 100Ω/120Ω resistor.

Fig. 7-2: 9-pin SUB-D male connector

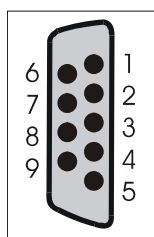


Table 7-2: Pin assignment of the 9-pin connector

RS485	RS422	Current Loop	RS232	Pin	Pin	RS232	Current Loop	RS422	RS485
120 Ω	100 Ω		DSR	6	1	CD	+XMIT-CL-DATA	TA	
		Tsource	RTS	7	2	RxD	-XMIT-CL-DATA	TB	
		Rsource	CTS	8	3	TxD	+RCV-CL-DATA	RA	Tx/Rx+
Tx/Rx-	RB	-RCV-CL-DATA	RI	9	4	DTR		Rab (1)	
					5	GND	GND	GND	GND

TA: Tx422+ RA: Rx422+

TB: Tx422- RB: Rx422-

Rab: Connection to a terminal resistor

(1): Cable connection to 100 Ω /120 Ω terminates the RS422/RS485 lines with the 100 Ω /120 Ω resistor.

7.2 Pin assignment: RS422 with handshake signals

With the module MX422-PEP you can use the modem control signals RTS and CTS in RS422 mode.

**Table 7-3: Pin assignment of the 37-pin connector:
RS422 with handshake signals**

	RS422	Pin	Pin	RS422	
Port 4	IA	20	1	TA	Port 4
	CB	21	2	TB	
	CA	22	3	RA	
	RB	23	4	IB	
Port 3	TA	24	5	GND	Port 3
	TB	25	6	IA	
	RA	26	7	CB	
	IB	27	8	CA	
Port 2	GND	28	9	RB	Port 2
	IA	29	10	TA	
	CB	30	11	TB	
	CA	31	12	RA	
Port 1	RB	32	13	IB	Port 1
	TA	33	14	GND	
	TB	34	15	IA	
	RA	35	16	CB	
	IB	36	17	CA	
	GND	37	18	RB	
			19		

TA: Tx422+ RA: Rx422+

TB: Tx422- RB: Rx422-

IA: CTS+ CA: RTS+

IB: CTS- CB: RTS-

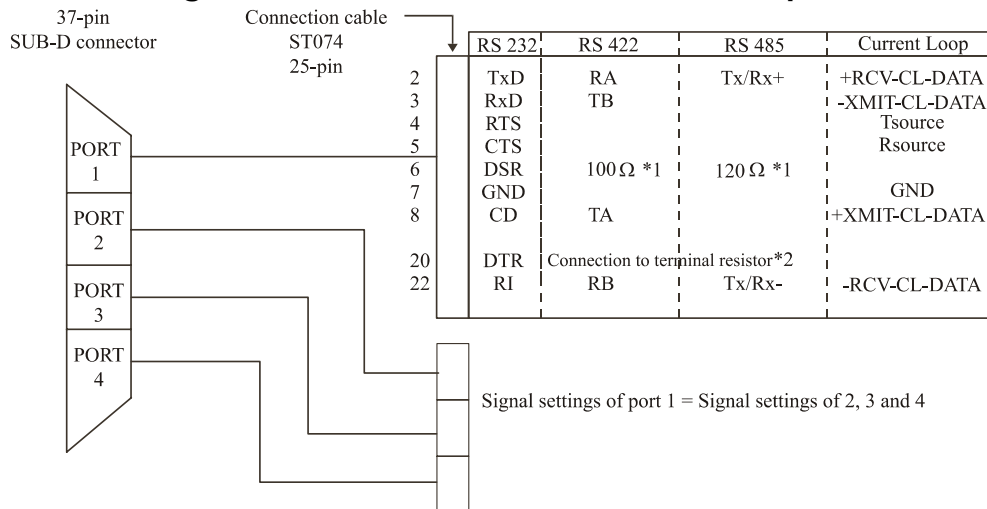
**Table 7-4: Pin assignment of the 9-pin connector:
RS422 with handshake signals**

RS422	Pin	Pin	RS422
IA	6	1	TA
CB	7	2	TB
CA	8	3	RA
RB	9	4	IB
		5	GND

TA: Tx422+ RA: Rx422+
 TB: Tx422- RB: Rx422-
 IA: CTS+ CA: RTS+
 IB: CTS- CB: RTS-

7.3 Connection cables - 4-port serial interface

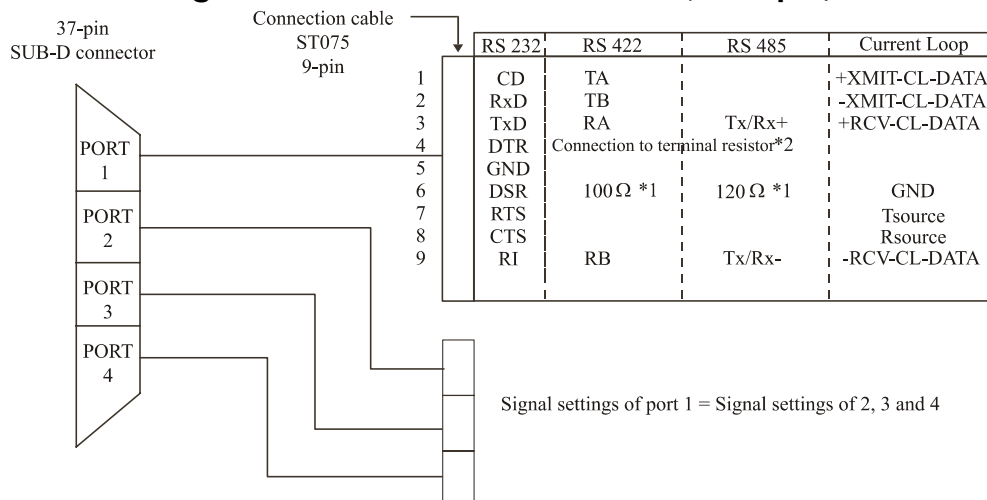
Fig. 7-3: Connection cable ST074 (4 x 25-pin)



* 1 Resistor integrated on the SI module

* 2 Cable connection to 100Ω/120Ω terminates the RS422/RS485 lines with 100Ω/120Ω resistor. (Wire bridges between pin 20 and 6)

Fig. 7-4: Connection cable ST075 (4 x 9-pin)



* 1 Resistor integrated on the SI module

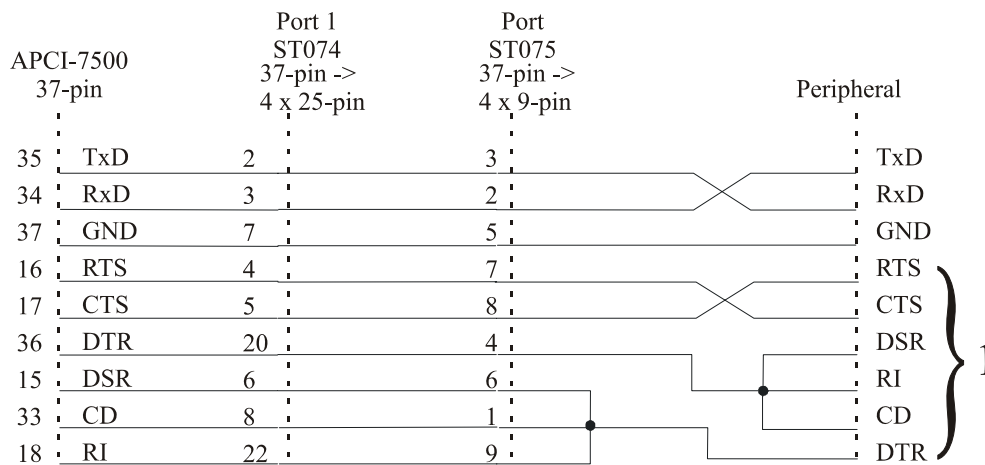
* 2 Cable connection to 100Ω/120Ω terminates the RS422/RS485 lines with 100Ω/120Ω resistor. (Wire bridges between pin 20 and 6)

7.4 Connection examples

7.4.1 APCI-7500

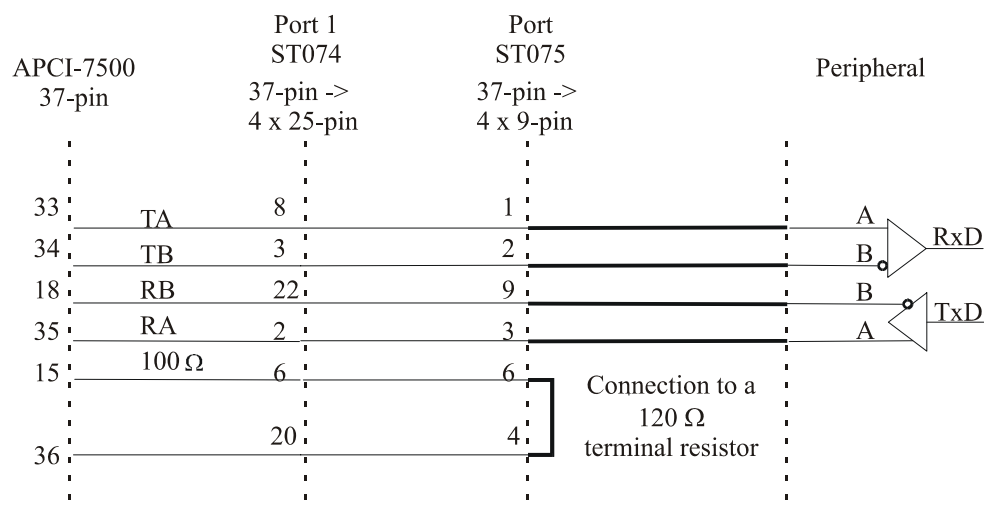
RS232 cabling

Fig. 7-5: RS232 cabling - 4-port serial interface



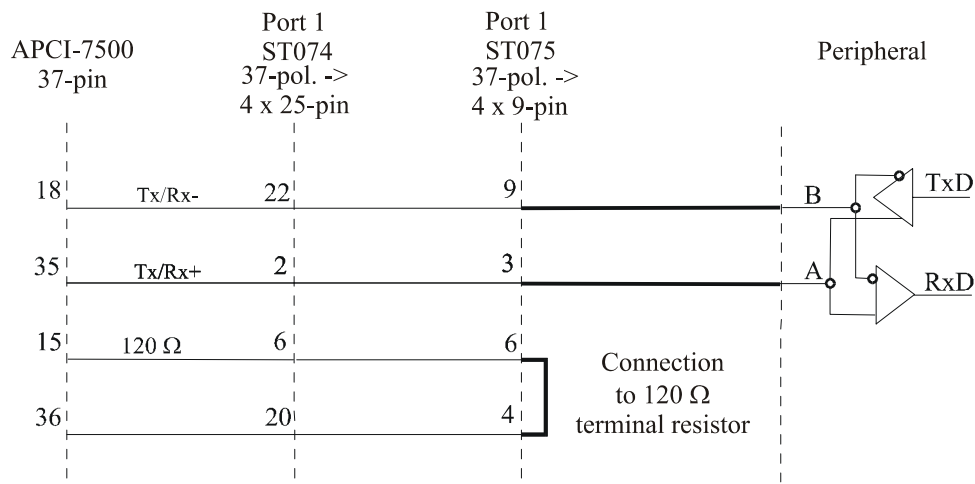
RS422 cabling

Fig. 7-6: RS422 cabling - 4-port serial interface



RS485 cabling

Fig. 7-7: RS485 cabling - 4-port serial interface



Current loop (20 mA) 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.

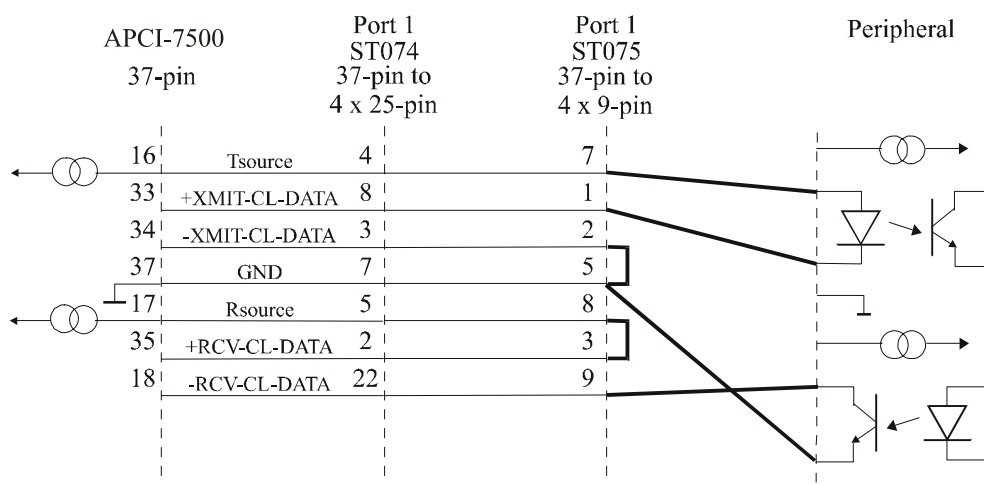
Fig. 7-8: Active transmission/active reception
4-port serial interface

Fig. 7-9: Active transmission/passive reception
4-port serial interface

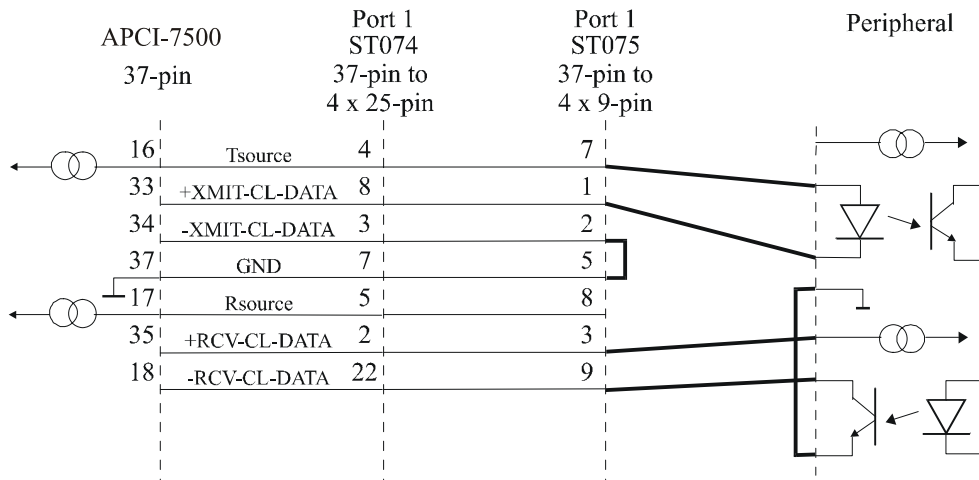


Fig. 7-10: Passive transmission/active reception
4-port serial interface

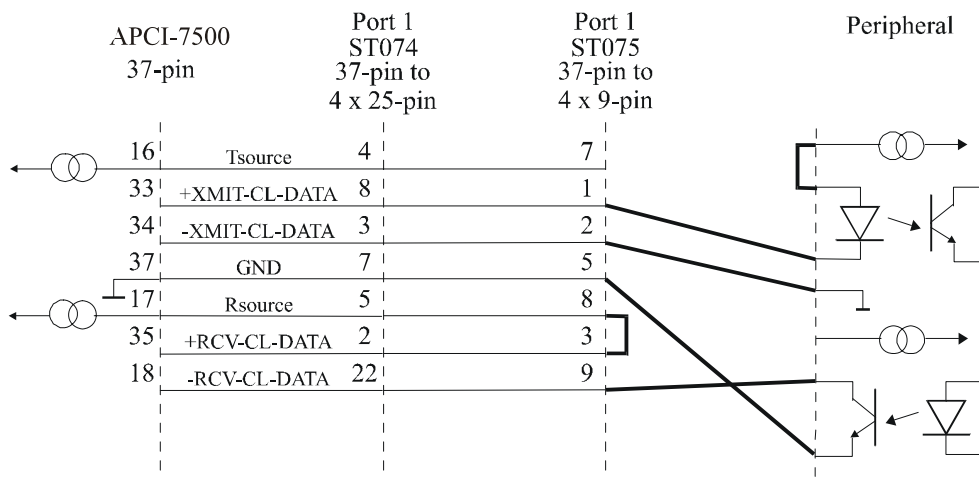
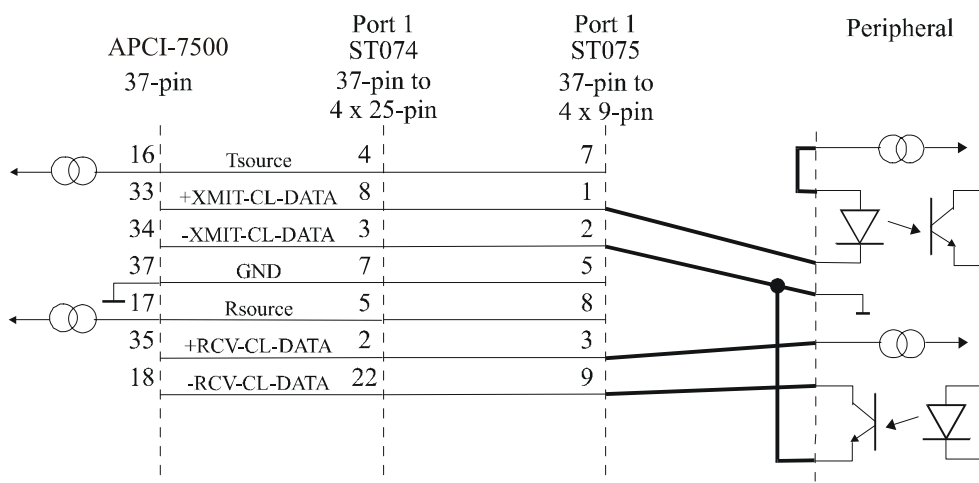


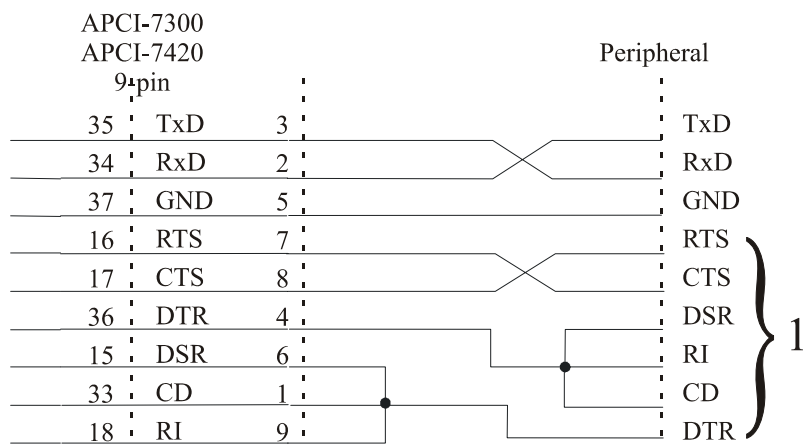
Fig. 7-11: Passive transmission/passive reception
4-port serial interface



7.4.2 APCI-7300 and APCI-7420

RS232 cabling

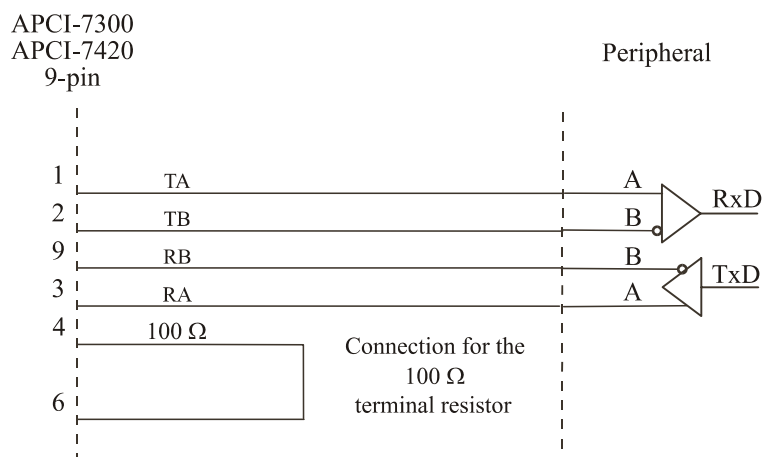
Fig. 7-12: RS232 cabling - 1-port and 2-port serial interface



1 If the modem control signals are not used, they must be either connected on the board (settings through ADDIREG) or externally driven to the connector via solder bridge.

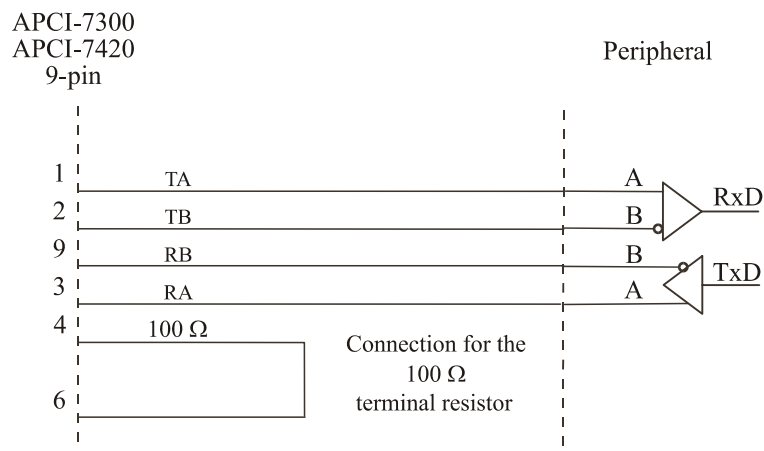
RS422 cabling

Fig. 7-13: RS422 cabling - 1-port and 2-port serial interface



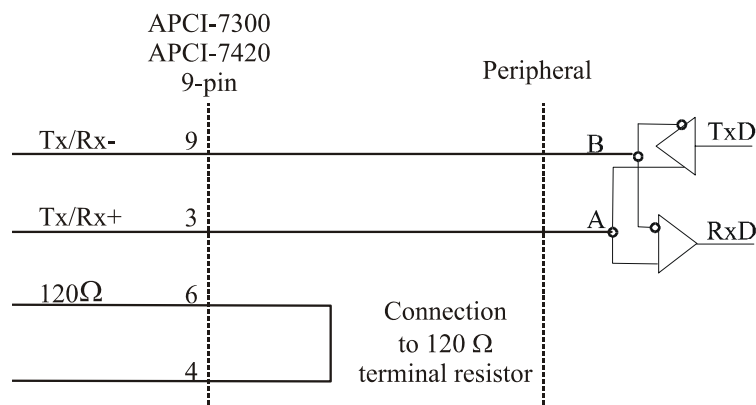
RS422 cabling

Fig. 7-14: RS422 cabling - 1-port and 2-port serial interface



RS485 cabling

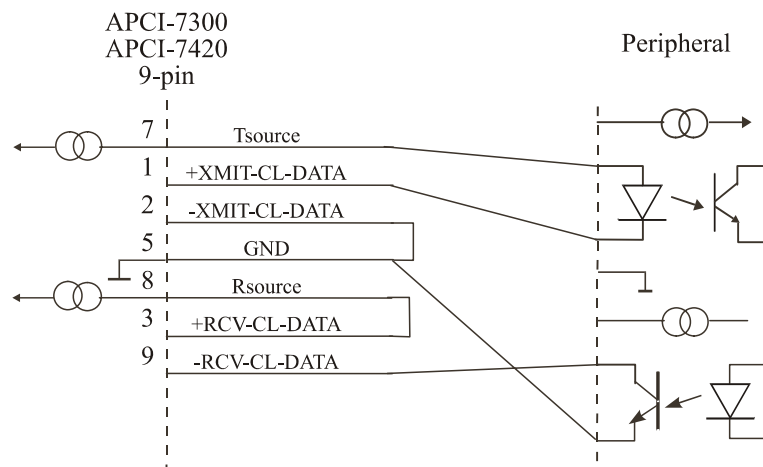
Fig. 7-15: RS485 cabling - 1-port and 2-port serial interface



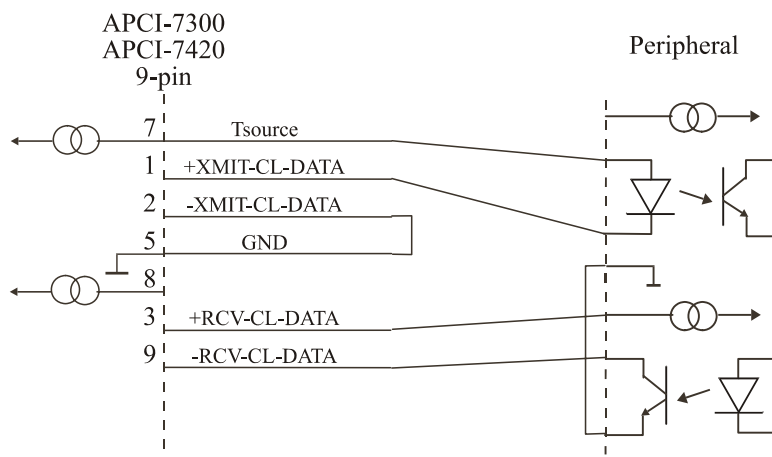
Current loop (20 mA) cabling

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.

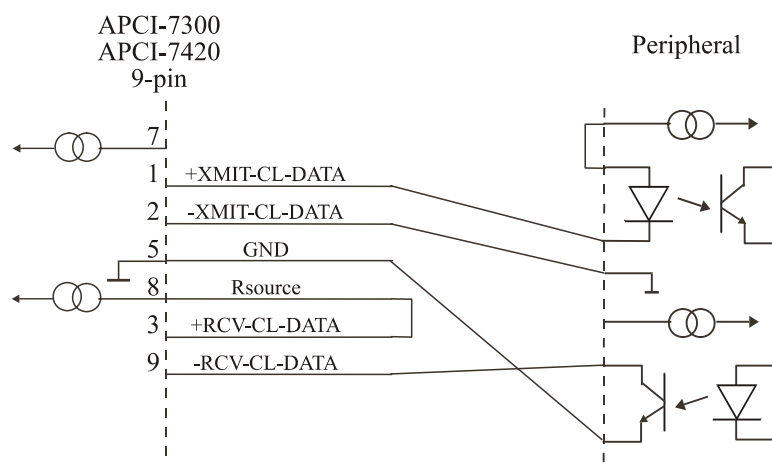
**Fig. 7-16: Active transmission/active reception
1-port and 2-port serial interface**



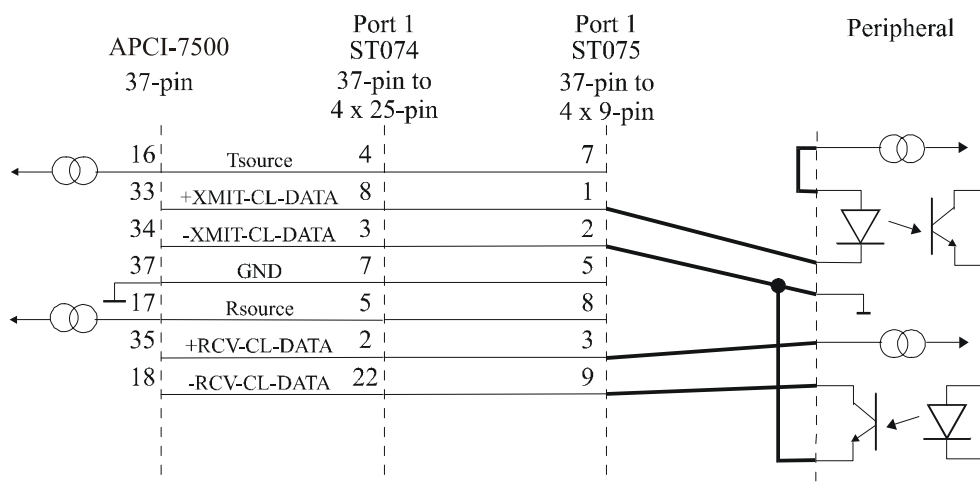
**Fig. 7-17: Active transmission/passive reception
1-port and 2-port serial interface**



**Fig. 7-18: Passive transmission/active reception
1-port and 2-port serial interface**



**Fig. 7-19: Passive transmission/passive reception
1-port and 2-port serial interface**



8 TESTING THE BOARD

8.1 Connecting a shorting plug

When using the shorting plug described below and the test program **MTTTY** you can carry out a self-test on the board.

Please note the signal connection of the different ports through the 9-pin shorting plug for the test.

Fig. 8-1: Connection of the shorting plug for the RS232 mode

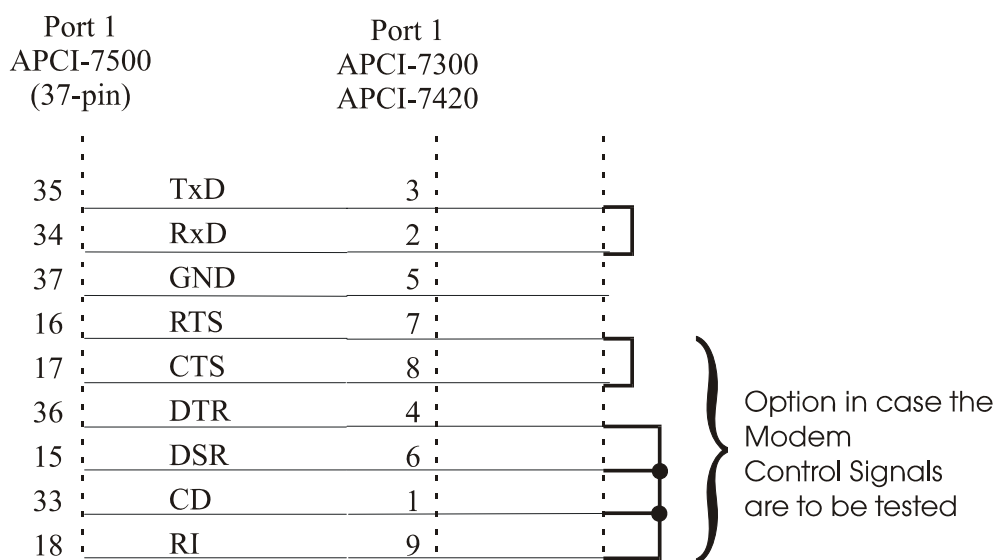


Fig. 8-2: Connection of the shorting plug for the RS422 mode

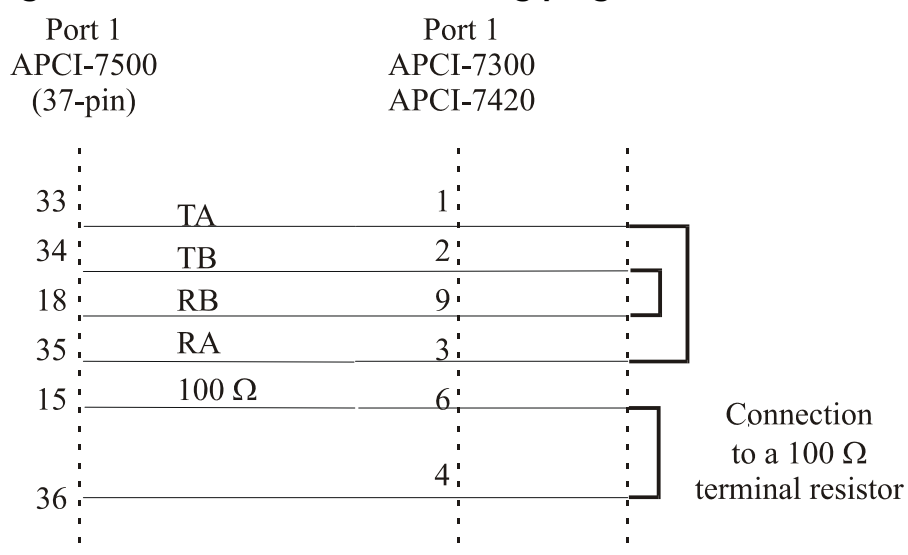


Fig. 8-3: Connection of the shorting plug for the 20 mA current loop active transmission/passive reception

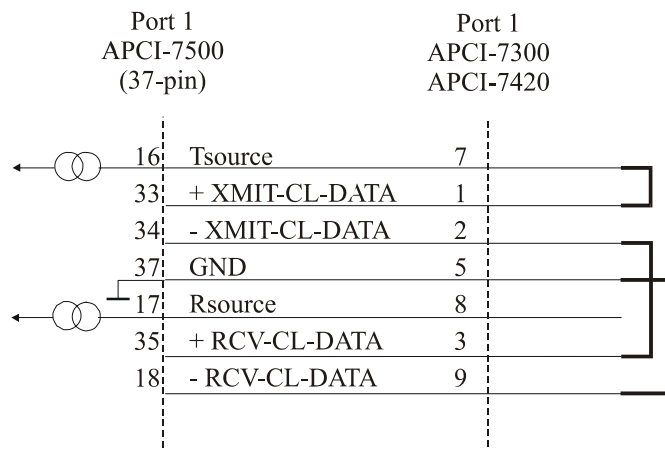
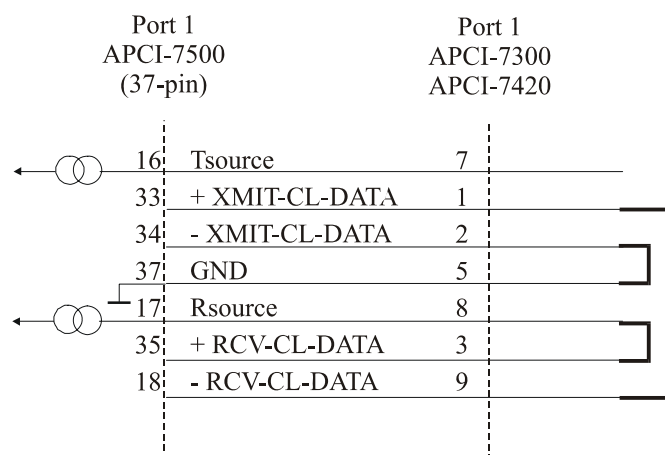


Fig. 8-4: Connection of the shorting plug for the 20 mA current loop passive transmission/ active reception



8.2 Testing the board with the MTTY program

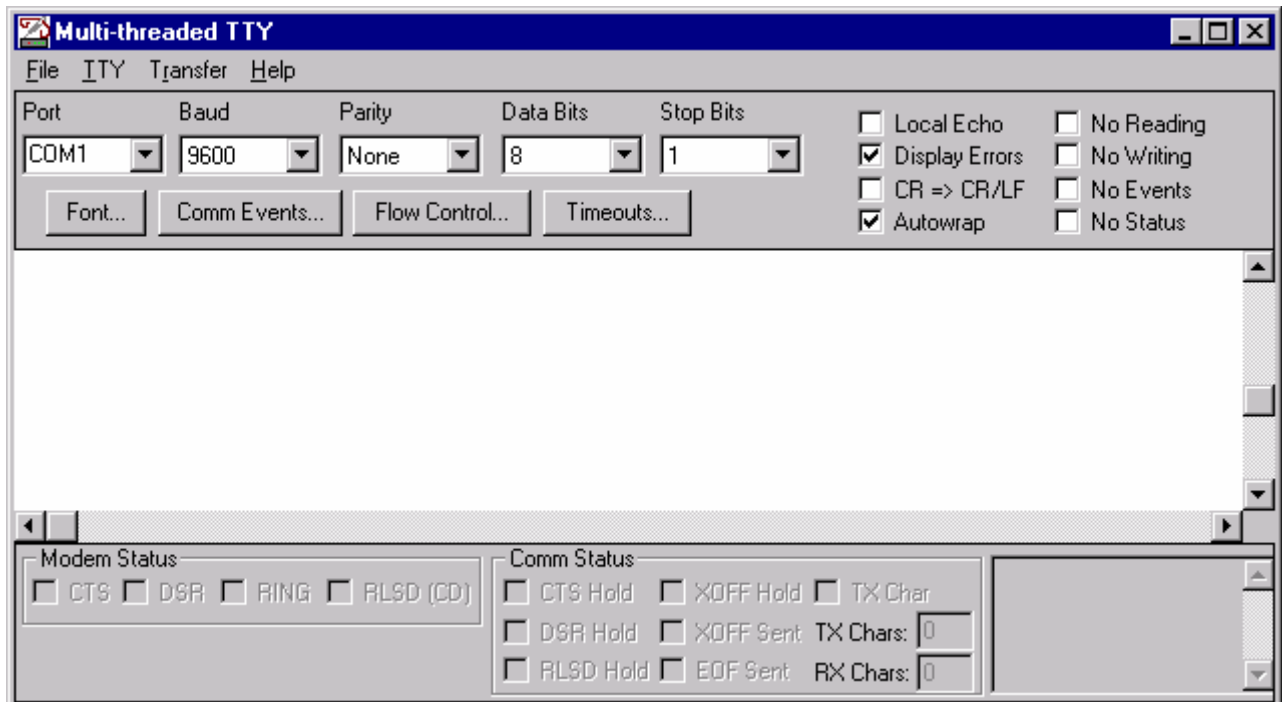
RS422, RS232 and 20 mA Current Loop

◆ Install the program on your PC.

The program is delivered on the ADDI-DATA driver CD-RoM CD1. Under CD/MTTTY start the setup.exe file.

The following windows opens.

Fig. 8-5: The MTTY program



◆ Select the right COM interface under "Port".

◆ Connect it with "File/Connect".

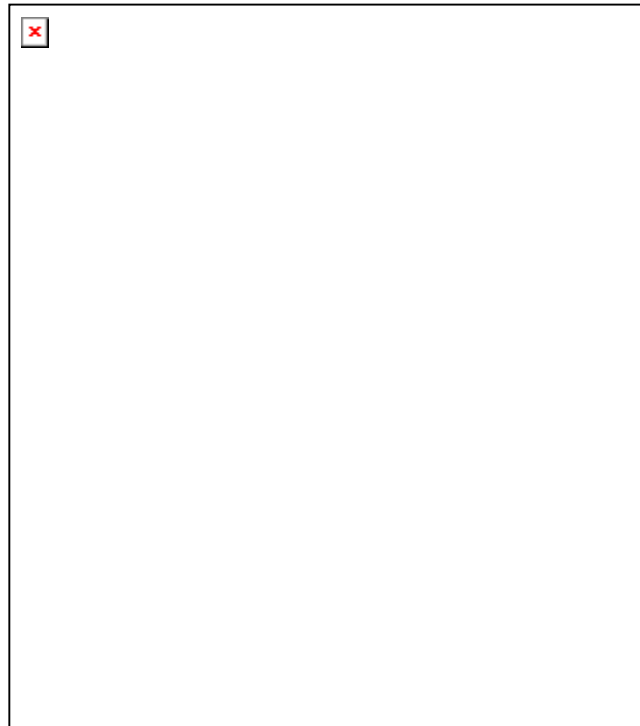
If the shorting plug is connected, each key stroke (= Data transmission) must result in the corresponding key character displayed on the screen (= Data reception). If the test is successfully carried out, the board works.

Once the port is initialised the state of the "Modem Control Signals" can be read in **Modem Status**. If the RTS signal is set, the CTS state is displayed under Modem Status. For DTR the 3 other fields are set.

In the above menu under "TTY/Flow Control" you can configure the Handshake of the Modem Control Signals according to your application (See Fig. 8-6). The settings are displayed in the field "Comm Status".

The field at the bottom right of the main window is a text field for error or state indication messages.

Fig. 8-6: Handshake configuration for the board test



RS485



IMPORTANT!

For testing the RS485 mode, the shorting plug is not used.

This operating mode must be first set through ADDIREG or in the Device Manager of Windows 2000.

◆ **In the ADDIREG main window click on "More Information".**

The window for the communication board (See Fig. 6-4) is displayed.

◆ **Select "RS485 ECHO enable" for the required COM and click on OK.**

◆ **In main windows confirm the configuration with "Set" and "Save".**
or

◆ **In Device Manager of Windows 2000 select "RS485 ECHO enable" in the "Setting register" and confirm with "OK".**

Start MTTTY and test through key stroke if the interface works correctly.

9 REPLACING THE MODULES



IMPORTANT!

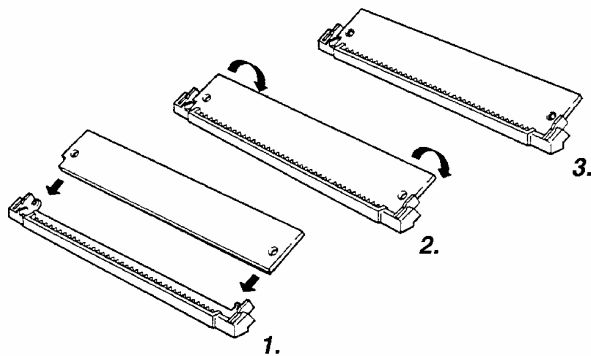
We advise you to send us the board if a module is to be replaced.

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 advises*.
- Insert/remove the module carefully according to the following illustrations.

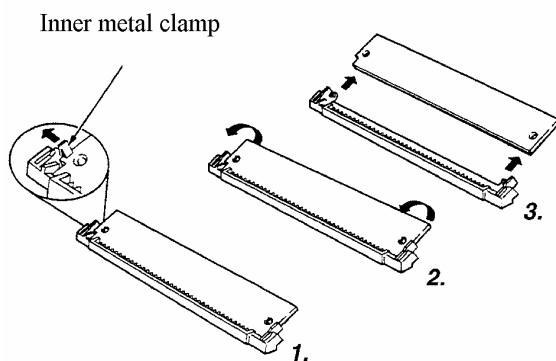
9.1 Replacing the SI modules

Fig. 9-1: Inserting the 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. 9-2: Removing a SI module



4. Bend the inner metal clamp carefully apart, until the SI-module can be removed from the socket.
5. Remove the SI-Module from the socket.

9.2 Replacing the MX modules

Fig. 9-3: Removing the MX module

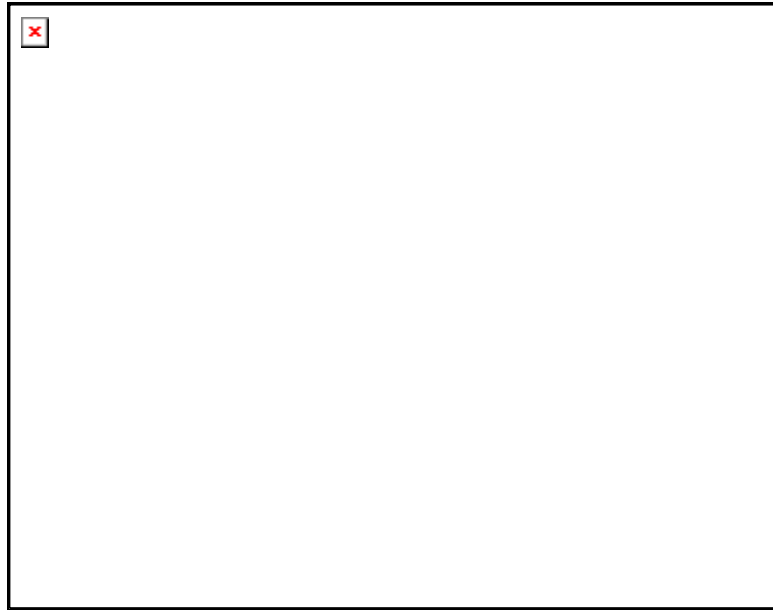


Fig. 9-4: Inserting an MX module

