



ADDI-DATA GmbH Dieselstraße 3 D-77833 OTTERSWEIER + 49 (0)7223 / 9493 – 0

Attention! Product discontinuation Product discontinuation due to EC RoHS directive More Into: www.add/data.com More Into: www.add/data.com ADDICOM APCI-7300-2, APCI-7420-2, APCI-7500-2(/4C) 1-port, 2-port, 4-port serial interface, for the PCI bus, 3.3 V

1st edition 07/2004

Product information

This manual contains the technical installation and important instructions for correct commissioning and usage, as well as production information according to the current status before printing. The content of this manual and the technical product data may be changed without prior notice. ADDI-DATA GmbH reserves the right to make changes to the technical data and the materials included herein.

Warranty and liability

The user is not permitted to make changes to the product beyond the intended use, or to interfere with the product in any other way.

ADDI-DATA shall not be liable for obvious printing and phrasing errors. In addition, ADDI DATA, if legally permissible, shall not be liable for personal injury or damage to materials caused by improper installation and/or commissioning of the board by the user or improper use, for example, if the board is operated despite faulty safety and protection devices, or if notes in the operating instructions regarding transport, storage, installation, commissioning, operation, thresholds, etc. are not taken into consideration. Liability is further excluded if the operator changes the board or the source code files without authorisation and/or if the operator is guilty of not monitoring the permanent operational capability of working parts and this has led to damage.

Copyright

This manual, which is intended for the operator and its staff only, is protected by copyright. Duplication of the information contained in the operating instructions and of any other product information, or disclosure of this information for use by third parties, is not permitted, unless this right has been granted by the product licence issued. Non-compliance with this could lead to civil and criminal proceedings.

ADDI-DATA software product licence

Please read this licence carefully before using the standard software. The customer is only granted the right to use this software if he/she agrees with the conditions of this licence.

The software must only be used to set up the ADDI-DATA boards.

Reproduction of the software is forbidden (except for back-up and for exchange of faulty data carriers). Disassembly, decompilation, decryption and reverse engineering of the software are forbidden. This licence and the software may be transferred to a third party if this party has acquired a board by purchase, has agreed to all the conditions in this licence contract and the original owner does not keep any copies of the software.

Trademarks

- ADDI-DATA is a registered trademark of ADDI-DATA GmbH.
- Turbo Pascal, Delphi, Borland C, Borland C++ are registered trademarks of Borland Insight Company.
- Microsoft C, Visual C++, Windows XP, 98, Windows 2000, Windows 95, Windows NT, EmbeddedNT and MS DOS are registered trademarks of Microsoft Corporation.
- LabVIEW, LabWindows/CVI, DasyLab, Diadem are registered trademarks of National Instruments Corp.
- CompactPCI is a registered trademark of PCI Industrial Computer Manufacturers Group.
- VxWorks is a registered trademark of Wind River Systems Inc.

WARNING

The following risks result from improper implementation and from use of the board contrary to the regulations:

- Personal injury
- Damage to the MSX-Box, PC and peripherals
- Pollution of the environment
- 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.

1	DEFINITION OF APPLICATION8
1.1	Intended use8
1.2	Usage restrictions8
1.3	General description of the board8
2	USER 11
2.1	Qualification11
2.2	Personal protection11
3	HANDLING OF THE BOARD12
4	TECHNICAL DATA
4.1	Electromagnetic compatibility (EMC)13
4.2	Physical set-up of the board13
4.3	Limit values14
4.3.1 4.3.2	RS232
4.3.3	With optical isolation (MX422-G, MX485-G)
4.4	Component scheme and block diagrams17
5	INSTALLATION OF THE BOARD
5.1	Opening the PC20
5.2	Selecting a free slot20
5.3	Plugging the board into the slot21
5.4	Closing the PC22
6	BOARD CONFIGURATION
6.1	Configuration under Windows XP/200024
6.2	Board test25
6.3	Questions and software downloads on the web25

7	CONNECTING THE PERIPHERAL	26
7.1	Connector pin assignments: standard delivery	26
7.2	Pin assignment: RS422 with handshake signals	27
7.3	Connection cables - APCI-7500-2	28
7.4	Connection examples	29
7.4.1 7.4.2	APCI-7500-2 R\$232 cabling R\$422 cabling R\$485 cabling Current loop (20 mA) cabling APCI-7300-2, APCI-7420-2, APCI-7500-2/4C R\$232 cabling R\$422 cabling R\$485 cabling Current loop (20 mA) cabling.	29 30 31 33 33 33 34
8	TESTING THE BOARD	
8.1	Connecting a shorting plug	
8.2	Testing the board with the MTTTY program	
0.2	R\$422, R\$232 and 20 mA Current Loop R\$485	38
9	REPLACING THE MODULES	40
9.1	Replacing the MX modules	40

Figures

Fig.	3-1: Correct handling	12
Fig.	4-1: Component scheme of the APCI-7xx-2	17
Fig.	4-2: Block diagram of the APCI-7300-2	18
Fig.	4-3: Block diagram of the APCI-7420-2	18
Fig.	4-4: Block diagram of the APCI-7500-2	19
Fig.	4-5: Block diagram of the APCI-7500-2/4C	19
Fig.	5-1: Slot types	20
Fig.	5-2: Opening the blister pack	21
	5-3: Inserting the board	
Fig.	5-4: Fastening the board at the back cover	22
	6-4: FIFO settings with the Device Manager	
Fig.	6-5: Setting example with the Device Manager: RS485	25
	7-1: 37-pin SUB-D male connector	
	7-2: 9-pin SUB-D male connector	
	7-3: Connection cable \$1074 (4 x 25-pin)	
Fig.	7-4: Connection cable ST075 (4 x 9-pin)	29
	7-5: RS232 cabling - 4-port interface	
-	7-6: RS422 cabling - 4-port interface	
-	7-7: RS485 cabling - 4-port interface	
0	7-8: Active transmission/active reception 4-port serial interface	
<u> </u>	7-9: Active transmission/passive reception 4-port serial interface	
-	7-10: Passive transmission/active reception 4-port serial interface	
-	7-11: Passive transmission/passive reception 4-port serial interface	
-	7-12: RS232 cabling - 9-pin connector	
	7-13: R\$422 cabling - 9-pin connector	
-	7-14: R\$485 cabling - 9-pin connector	
<u> </u>	7-15: Active transmission/active reception 9-pin connector	
<u> </u>	7-16: Active transmission/passive reception 9-pin connector	
-	7-17: Passive transmission/active reception 9-pin connector	
-	7-18: Passive transmission/passive reception 9-pin connector	
-	8-1: Connection of the shorting plug for the RS232 mode	
	8-2: Connection of the shorting plug for the R\$422 mode	
Fig.	8-3: Connection of the shorting plug for the 20 mA current loop acti	
	transmission/passive reception	37
Fig.	8-4: Connection of the shorting plug for the 20 mA current loop	<u> </u>
	passive transmission/ active reception	
	8-5: The MTTTY program	
	8-6: Handshake configuration for the board test	39
Fig.		39 40

Tables

Table 1-1: Intended purpose depending on the operating mo	ode9
Table 7-1: Pin assignment of the 37-pin connector	
Table 7-2: Pin assignment of the 9-pin connector	
Table 7-3: Pin assignment of the 37-pin connector: RS422 with	h handshake
signals	
Table 7-4: Pin assignment of the 9-pin connector: RS422 with	handshake
signals	

1 DEFINITION OF APPLICATION

1.1 Intended use

The board **APCI-7xx-2**¹ must be inserted in a PC with PCI 3.3 V/32-bit slots, which is used as electrical equipment for measurement, control and laboratory pursuant to the norm IEC 61010-1.

1.2 Usage restrictions

The APCI-7xx-2 board must not to be used as safety related part for securing emergency stop functions.

The board must <u>not</u> be used in potentially explosive atmospheres.

1.3 General description of the board

The board **APCI-7xx-2** provides the personal computer (PC) with 1-port (APCI-7300-2), a 2-port (APCI-7420-2) or a 4-port (APCI-7500-2 and APCI-7500-2/4C) asynchronous serial interface for the communication with external devices. The operating mode of the interface depends on the 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 use of the board depends on the following parameters (See Table 1-1).

¹ Common designation in the manaul for the boards APCI-7300-2, APCI-7420-2, APCI-7500-2, APCI-7500-2/4C

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

Table 1-1: Different communication operating modes

If the basic board **APCI-7xx-2** 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 includes observing all advises given in this manual and in the safety leaflet.

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

 $^{^2}$ The max. lengths are for standard interface cables

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 m Ω) between the shield and the housing of the PC.

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

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.

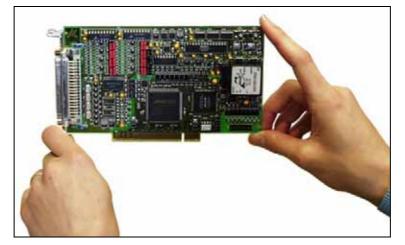
2.2 Personal protection

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

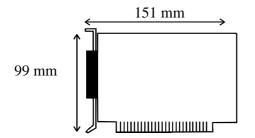
The board has been subjected to EMC tests in an accredited laboratory. The board complies with the limit values set by the norms IEC61326 as follows:

	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

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 3.3 V
Connection to the peripheral:	
APCI-7300-2:	9-pin SUB-D male connector
APCI-7420-2:	2 x 9-pin male SUD-D male connector
APCI-7500-2:	. 37-pin SUB-D male connector
APCI-7500-2/4C:	4 x 9-pin SUB-D male connector

Connection cables for the APCI-7500-2¹: **ST074:** 37-pin SUB-D female connector to 4 x 25-pin SUB-D male connector **ST075:**

37-pin SUB-D female connector to 4 x 9-pin SUB-D male connector

¹ Not included in the standard delivery.

4.3 Limit values

Max. altitude:	2000 m
Operating temperature:	0 to 60°C
Storage temperature:	-25 to 70°C
Relative humidity:	

Minimum PC requirements: PCI BIOS from Version 1.0

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

Energy requirements:

- Operating voltage of the PC: 5 V $\pm\,5\%$

- Current consumption (without load): typ. see table $\pm 10\%$

_	APCI-7300-2	APCI-7400-2	APCI-7500-2
+ 5 V from the PC	160 mA	160 mA	160 mA

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

	MXxxx	MXxxx-G
RS 232	10 mA	86 mA
RS 422	10 mA	46 mA
RS 485	10 mA	58 mA
20 mA	75 mA	-
MX 422-PEP ¹	-	66 mA

¹ mit Software-Handshake (RTS CTS Version)

4.3.1 RS232

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

Without optical isolation (MX232)

Max. transfer rate:	1 Mbaud
Transfer rate on request	up to 2.5 MBaud
ESD protection	

With optical isolation (MX232-G)

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

4.3.2 RS422, RS485

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

Without optical isolation (MX422, MX485)

Max. transfer rate:	1 Mbaud
Transfer rate on request	up to 2.5 MBaud
ESD protection	15 kV
Transorb diodes	

With optical isolation (MX422-G, MX485-G)

Max. transfer rate:	1 Mbaud
Transfer rate on request	up to 2.5 MBaud
ESD protection	15 kV
Creeping distance:	
Test voltage:	1000 VAC
Short-circuit protection	

4.3.3 20mA current loop (MXTTY)

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

• Basic board 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 XP/2000.

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 and block diagrams

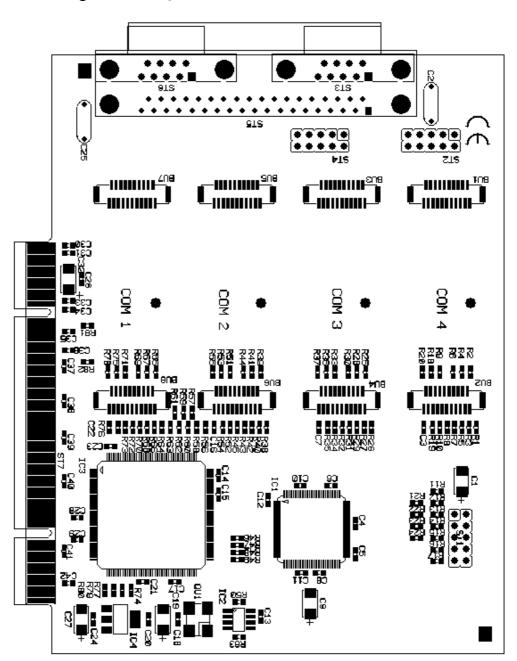


Fig. 4-1: Component scheme of the APCI-7xx-2

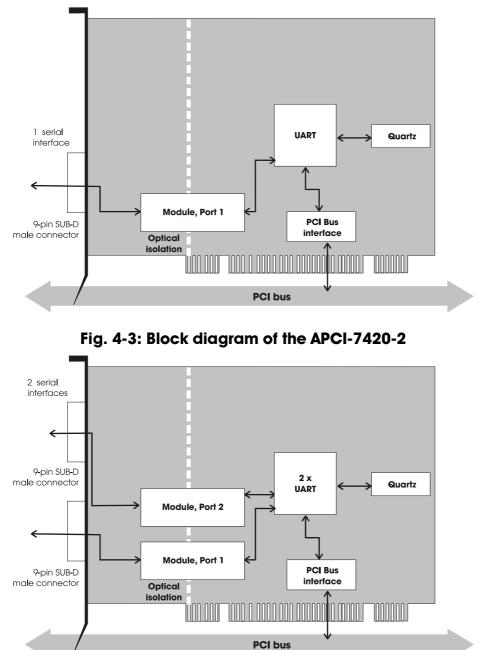


Fig. 4-2: Block diagram of the APCI-7300-2

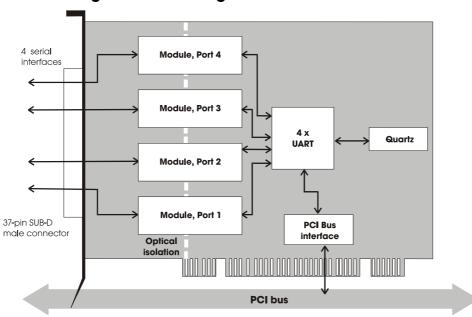
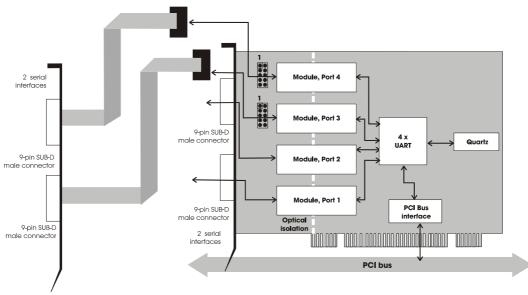


Fig. 4-4: Block diagram of the APCI-7500-2





5 INSTALLATION OF THE BOARD

The interrupt lines and base address of the baord are allocated by the BIOS of the PC syste through software. No setting is then required before inserting 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-3.3V slot (32/64-bit).

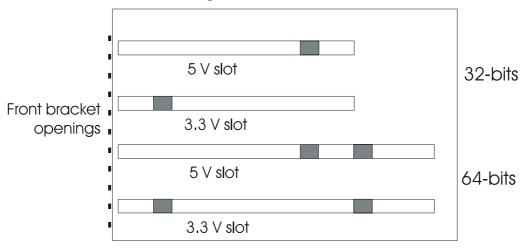


Fig. 5-1: Slot types

• 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 blister pack.

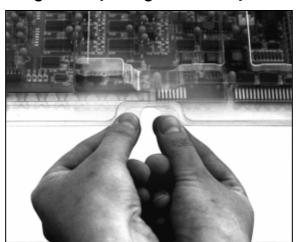
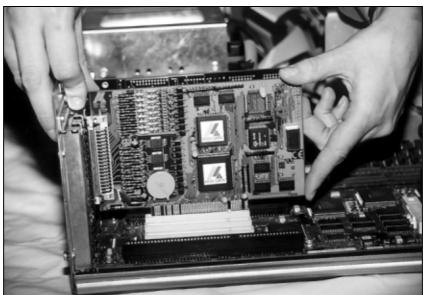


Fig. 5-2: Opening the blister pack

5.3 Plugging the board into the slot

♦ Insert the board **vertically into the chosen slot**.





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

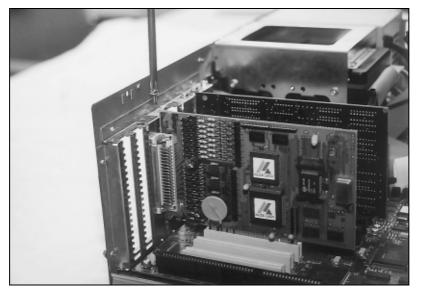


Fig. 5-4: Fastening the board at the back cover

◆ Tighten all the loosen screws.

5.4 Closing the PC

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

6 BOARD CONFIGURATION

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

IMPORTANT! Further information drivers is to be for

Further information for installing and uninstalling the different drivers is to be found in the delivered description **"Installation 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 (CD1) containing:

- ADDICOM software samples with API function for the ADDI-DATA boards in 32-bits

IMPORTANT! The board can only be run under Windows XP/2000.

6.1 Configuration under Windows XP/2000

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:

	Eigenschaften von APCI-7500 communications port 2 (COM4)
	Allgemein FIFOs Setting Treiber
	APCI-7500 port 2 bus: 2 device: 9 PCI bus and device number
Management of the transmitter and receiver buffer	FIFO Interrupt Trigger levels Transmitter: 8 Receiver: 60
	Receiver FIFO Flow Control Thresholds
Data flow	Flow On: 16
control	Flow Off: 68
	<u>R</u> estore defaults
	OK Abbrechen

Fig. 6-1: FIFO settings with the Device Manager

Reset the standard settings

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.

Eigenschaften von APCI-7500 communic	ations port 2 (COM4)
Allgemein FIFOs Setting Treiber	
APCI-7500 port 2 bus: 2 device: 9	
Default communications parameters	COM COM number COM4
Bits per second:	Module configuration PM485-G
Data bits: 8	RS485 echo enable
Parity: None	Input clock Crystal frequency
Stop bits: 1	1.843200 MHz Desired frequency 1.843200 MHz
Elow control: None	Detect crystal frequency
	<u>R</u> estore defaults
	OK Abbrechen

Fig. 6-2: Setting example with the Device Manager: RS485

6.2 Board test

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

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

6.3 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-7xx-2

http://www.addi-data.de or http://www.addi-data.com.

7 CONNECTING THE PERIPHERAL

7.1 Connector pin assignments: standard delivery

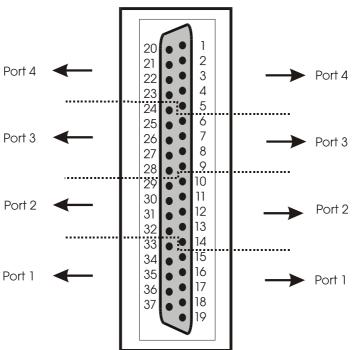


Fig. 7-1: 37-pin SUB-D male connector

Table 7-1: Pin assignment of the 37-pin connector

RS485	RS422	Current Loop	RS232	Pin		RS232	Current Loop	RS422	RS485	
					Pin					
120 Ω	100 Ω		DSR	20	1	CD	+XMIT-CL-DATA	ТА		ĺ
		Tsource	RTS	21	2	RxD	-XMIT-CL-DATA	ТВ		Port 4
		Rsource	CTS	22	3	TxD	+RCV-CL-DATA	RA	Tx/Rx+	
Tx/Rx-	RB	-RCV-CL-DATA	RI	23	4	DTR		Rat	0(1)	
	TA	+XMIT-CL-DATA	CD	24	5	GND	GND	GND	GND	
	TB	-XMIT-CL-DATA	RxD	25	6	DSR		100 Ω	120 Ω	
Tx/Rx+	RA	+RCV-CL-DATA	TxD	26	7	RTS	Tsource			Port 3
Rat	(1)		DTR	27	8	CTS	Rsource			
GND	GND	GND	GND	28	9	RI	-RCV-CL-DATA	RB	Tx/Rx-	
120 Ω	100 Ω		DSR	29	10	CD	+XMIT-CL-DATA	TA		
		Tsource	RTS	30	11	RxD	-XMIT-CL-DATA	TB		Port 2
		Rsource	CTS	31	12	TxD	+RCV-CL-DATA	RA	Tx/Rx+	
Tx/Rx-	RB	-RCV-CL-DATA	RI	32	13	DTR		Rat	b (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			Port 1
Rat	0(1)		DTR	36	17	CTS	Rsource			
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 $100\Omega/120\Omega$ terminates the RS422/RS485 lines with the $100\Omega/120\Omega$ resitor.

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

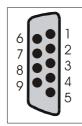


Table 7-2: Pin assignment of the 9-pin connector

RS485	RS422	Current Loop	RS232	Pin	Pin	RS232	Current Loop	RS422	RS485
120 Ω	100Ω		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 $100\Omega/120\Omega$ terminates the RS422/RS485 lines with the $100\Omega/120\Omega$ resitor.

7.2 Pin assignment: R\$422 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:R\$422 with handshake signals

	RS422	Pin	Pin	RS422	
	IA	20	1	TA	
Port 4	CB	21	2	TB	Port 4
	CA	22	2 3	RA	
	RB	23	4	IB	
	TA	24	5	GND	
	TB	25	6	IA	
Port 3	RA	26	7	CB	Port 3
	IB	27	8	CA	
	GND	28	9	RB	
	IA	29	10	TA	
Port 2	CB	30	11	TB	Port 2
	CA	31	12	RA	
	RB	32	13	IB	
	TA	33	14	GND	
	TB	34	15	IA	
Port 1	RA	35	16	CB	Port 1
	IB	36	17	CA	
	GND	37	18	RB	
			19		
RA:	Rx42	2+			
RB:	Rx42	2-			
KD.	11742				
CA:	RTS-	ł			

IA:	CTS+	CA:	RTS+
IB:	CTS-	CB:	RTS-

Tx422+

Tx422-

TA:

TB:

TA:

TB:

IA:

IB:

CTS-

		RS422	Pin	Pin	RS422
		IA	6	1	TA
		CB	7	2 3	TB
		CA	8	3	RA
		RB	9	4	IB
				5	GND
Tx422+	RA:	Rx422	2+		
Tx422-	RB:	Rx422	2-		
CTS+	CA:	RTS+			

RTS-

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

7.3 **Connection cables - APCI-7500-2**

CB:

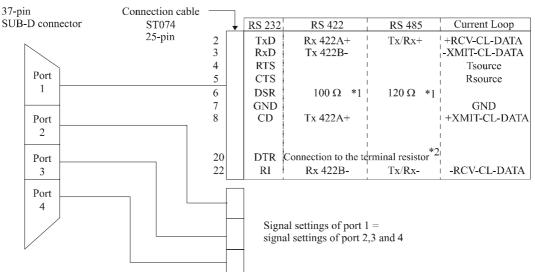


Fig. 7-3: Connection cable ST074 (4 x 25-pin)

* 1 Resistor integrated on the MX module

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

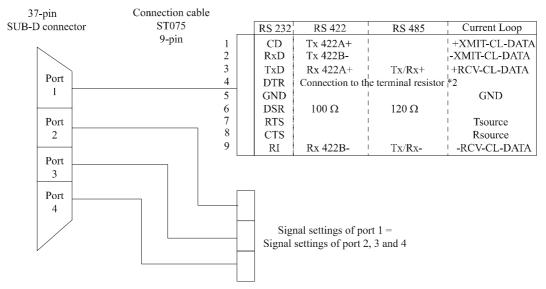


Fig. 7-4: Connection cable ST075 (4 x 9-pin)

- * 1 Resistor integrated on the MX module
- * 2 Cable connection to $100\Omega/120\Omega$ terminates the RS422/RS485 lines with $100\Omega/120\Omega$ resistor. (Wire bridges betweeen pin 20 and 6)

7.4 Connection examples

7.4.1 APCI-7500-2

RS232 cabling

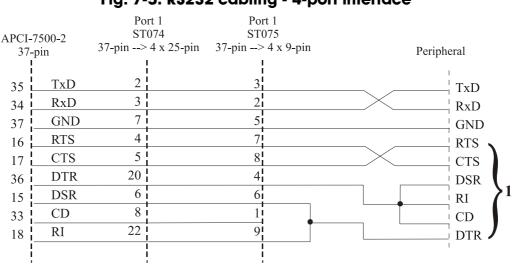
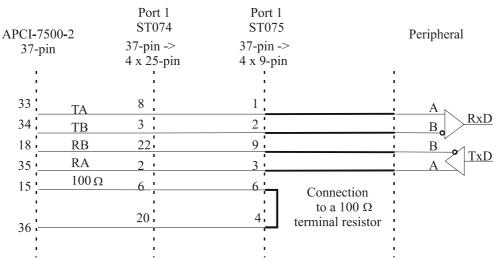


Fig. 7-5: RS232 cabling - 4-port interface

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

RS422 cabling





R\$485 cabling

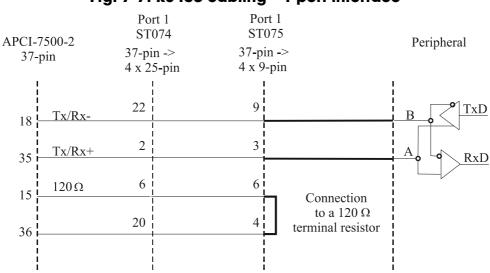


Fig. 7-7: RS485 cabling - 4-port interface

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: Current Loop - Active transmission/active reception 4-port serial interface

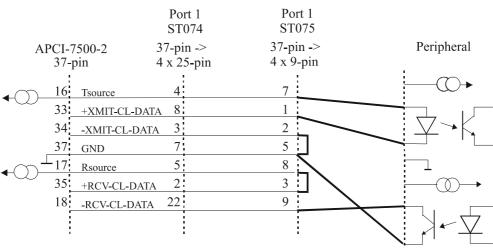
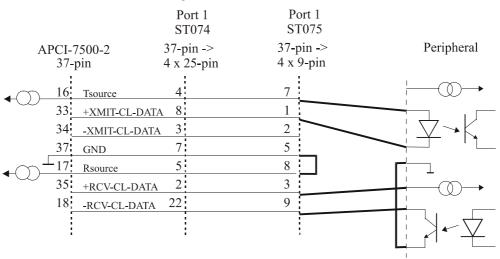


Fig. 7-9: Current Loop - Active transmission/passive reception 4-port serial interface



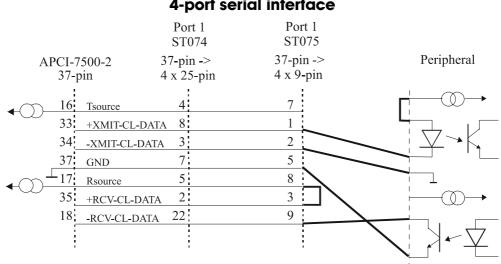
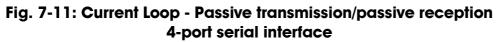
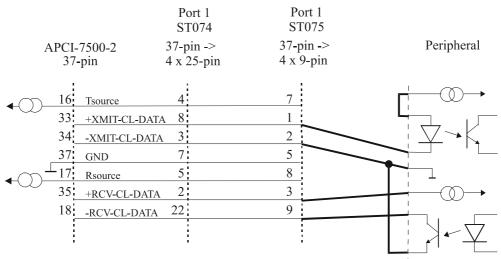


Fig. 7-10: Current Loop - Passive transmission/active reception 4-port serial interface





7.4.2 APCI-7300-2, APCI-7420-2, APCI-7500-2/4C

RS232 cabling

Fig. 7-12: I	RS232 c	cabling - 9-pin co	nnector
APCI-7300-2			
APCI-7420-2			
APCI-7500-2/4C		Р	eripheral
9-pin	1		
35 TxD	3		TxD
34 RxD	2		RxD
37 GND	5		GND
16 RTS	7		RTS
17 CTS	8		CTS
36 DTR	4		DSR
15 DSR	6		RI
33 CD	1		CD
18 RI	9		$\{DTR}$

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

RS422 cabling

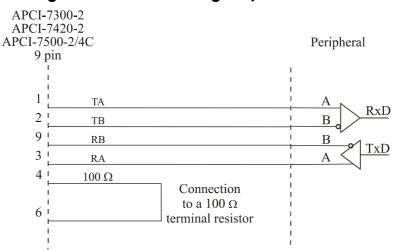


Fig. 7-13: RS422 cabling - 9-pin connector

RS485 cabling

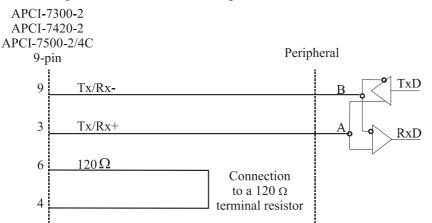


Fig. 7-14: RS485 cabling - 9-pin connector

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.



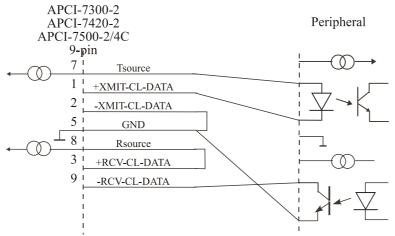


Fig. 7-16: Current Loop - Active transmission/passive reception 9-pin connector

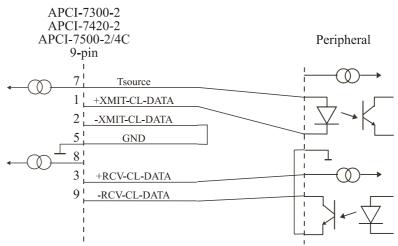


Fig. 7-17: Current Loop - Passive transmission/active reception 9-pin connector

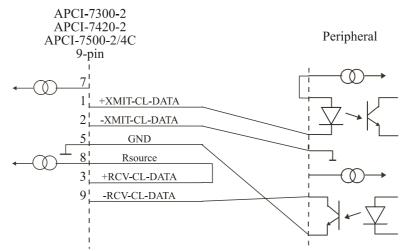
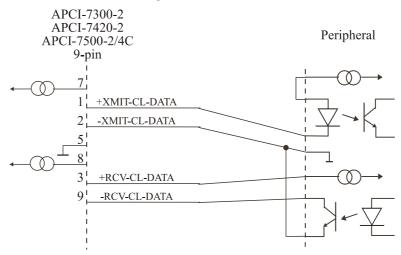


Fig. 7-18: Current Loop - Passive transmission/passive reception 9-pin connector



8 TESTING THE BOARD

8.1 Connecting a shorting plug

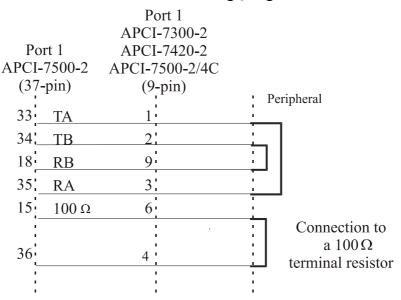
When using the shorting plug described below and the test program **MTTTY** you can carry out a self-test on the board.

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

Port APCI-7 (37-p	500-2	Por APCI-7 APCI-7 APCI-75 (9-p	/300-2 /420-2 00-2/4C		
35 L	TxD	3			
34	RxD	2			
37	GND	5			
16	RTS	7			
17	CTS	8			
36	DTR	4			In option if the
15	DSR	6		$\langle \rangle$	modem control
33	CD	1			signals are to be tested
18	RI	9		J	

Fig. 8-1: Connection of the shorting plug for the R\$232 mode





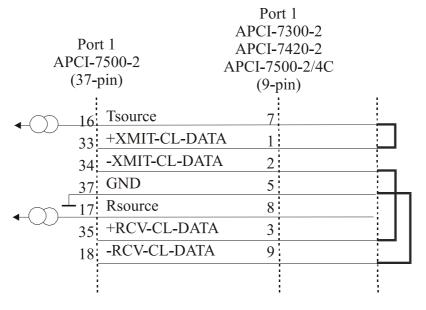


Fig. 8-3: Connection of the shorting plug for the 20 mA current loop active transmission/passive reception

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

APCI-	rt 1 7500-2 pin)	Port 1 APCI-7300-2 APCI-7420-2 APCI-7500-2/4 (9-pin)	2 4C	Peripheral
33	TA	1		
34_	ТВ	2	;	
18	RB	9		
35	RA	3		
15	100 Ω	6		
36_		4		Connection to a 100Ω terminal resistor

8.2 Testing the board with the MTTTY 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.

Multi-threaded TTY				
<u>File ITY</u> Transfer <u>H</u> elp				
Port Baud Parity COM1 9600 None	Data Bits Stop Bits 8 1	└ Local Echo ✓ Display Errors	No Reading	
Font Comm Events Flow Contro	I Timeouts	CR => CR/LF	No Events No Status	
				<u> </u>
Test der seriellen Schnittstelle COM1				_
				•
Modem Status CTS IV DSR IV RING IV RLSD (CD)	Comm Status	TX Char 1:Sta	atus message go 🔄	
	DSR Hold XOFF Sent TX RLSD Hold EOF Sent RX	Chars: 0	F	

Fig. 8-5: The MTTTY 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 figure below). 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.

Hardware Control Settings	OK
CTS Output Control	Cancel
DSR Sensitivity (Input Control)	<u>R</u> ts/Cts
DTR Control: RTS Control:	<u>D</u> tr/Dsr
	⊻off/Xon
Software Control Settings	None
XON/XOFF Output Control	
XON/XOFF Input Control	
Continue sending after XOFF sent	
XON Limit: XOFF Limit:	
XON Char: XOFF Char:	

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 in the Device Manager of Windows 2000/XP.

◆ 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

IMP

1

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 MX modules

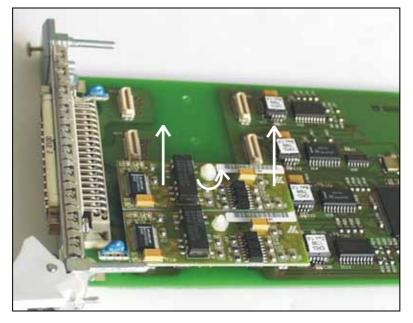


Fig. 9-1: Removing the MX module

Fig. 9-2: Inserting the MX module

