Annex A (RS232 Interface)

Characteristics of the RS232 interface

The unit is equipped with an RS232 interface as standard. The 9-pin RS232 connector (designation X9) is located at the rear panel of the unit. A computer can be connected to this interface for remote control. For this purpose a null modem cable is required.

If the unit is equipped with the RS232 interface, either the **RS232 standard** mode or **RS232 PPP** mode can be selected. The selection of the desired mode together with its parameters is made in the SETUP:REMOTE(RS232) menu. See also 3.18.6.5 REMOTE.

RS232 standard mode

In this mode, simple ASCII command strings terminated with <LF> are recognized and processed by the unit. A combination of <CR><LF> as terminator is also accepted. Responses from the unit are always terminated with the characters <CR><LF>.

The RS232-standard mode allows communication with the unit using simple terminals or by means of simple applications also under operating systems without TCP/IP stack. It should be noted that the application itself must ensure transmission security.

Setting parameters

Apart from the different handshake modes, the following parameters can be set in menu SETUP:REMOTE (RS232):STANDARD:

- Baud rate (150 to 115200)

- Number of data bits (7 or 8)

- Number of stop bits (1 or 2)

- Parity (NONE, EVEN or ODD)

After changes have been made to the settings the unit has to be switched off and on again.

Null modem cable

The requirements placed on the null modem cable depend on the selected handshake mode. For NO and XON-XOFF handshake, the crossed wiring of the RX and TX lines suffices. With RTS-CTS handshake the RTS and CTS lines must also be cross-connected.

Binary transmission with byte escaping

Binary data can be transmitted provided that byte escaping is switched on with the remote control command `SYSTem:COMMunicate:SERial:BYTeesc ON`. See also chapter titled "Description of Commands". All ASCII characters less than hexadecimal 20 and the character hexadecimal 7D are byte-escaped. The character is preceded by the escape character and is recoded by means of an exclusive OR operation with the value 20_{hex}. The escape character has the value $7D_{hex}$.

Example:

0	->	7D 20
1	->	7D 21
10	->	7D 30
1F	->	7D 3F
20	->	20
21	->	21
7C	->	7C
7D	->	7D 5D
7E	->	7E
7F	->	7F
80	->	80
81	->	81

RS232 PPP mode

In this mode the TCP/IP protocol with PPP (Point to Point Protocol) is used on the RS232 interface. For simple communication with EB200 a Telnet terminal suffices.

Setting parameters

In the SETUP-REMOTE submenu, the parameters baud rate, IP address and port number can be set.

The IP-address and port number settings will take effect instantaneously. After changing the baud rate the unit has to be switched off and on again.

Null modem cable

If you wish to connect the EB200 to a computer directly by means of a serial link, the cable used must be wired as follows:

Please note that customary null modem cables may not be wired correctly.

Connection layout for a 9-way null modem cable

Serial interface of the computer	Serial interface of EB200		
Signal	Signal		
3	2	TxD	Transmit data
2	3	RxD	Receive data
7	8	RTS	Request to send
8	7	CTS	Clear to send
6,1	4	DSR	Data set ready and Carrier detect
5	5	SG	Signal ground
4	6, 1	DTR	Data terminal ready

Installation of a PPP connection under WindowsNT

The installation described here refers to the Window NT V4.0 setup procedures.

Other Windows versions may vary.

Step 1: Installing the TCP/IP network protocol

If you have already installed TCP/IP, skip this step.

⇒ One after the other click on **Start**, **Settings** and **Control Panel**.

⇒ Double-click on **Network.**

⇒ Click on tab **Protocol.**

⇒ Click on **Add**, then select **TCP/IP** and click **OK.**

After TCP/IP has been installed, the system must be restarted.

Step 2: Installing the Remote Access Service and the virtual EB200 modem

⇒ One after the other click on **Start**, **Settings** and **Control Panel**.

⇒ Double-click on **Network.**

⇒ Click on tab **Services.**

⇒ Click on **Add**, then select **Remote Access Service** and click **OK.**

Now you need to insert the WindowsNT Installation CD.

⇒ Enter the CD-ROM drive location.

The computer updates the system files on hard disk from your Windows NT CD (RAS Setup).

⇒ In the window "Add RAS Service", click on **Install Modem** and check **Do not detect my modem...**.
Click on **Next**.
If the RAS service is already installed then the modem with the icon "Modem" will be installed in the Control Panel.

⇒ Click on **Have Disk...** and insert your EB200 Utilities Disk. Let the computer read the setup file from the appropriate directory by clicking on **Browse**. Select the file EB200.inf ("Open"). Confirm the next dialog with **OK**. The description of this configuration is: "PPP connection to EB200 via nullmodem".

⇒ Click on **Next**. Now the appropriate COM interface needs to be selected. Click on **Next**, then click on **Finish**.

In the next dialog, a pull-down list of RAS devices appears.

⇒ Select the "PPP connection to EB200 via nullmodem" and click on **OK**.

⇒ In the "Remote Access Setup" window, select your EB200 port and click on **Continue**.

⇒ The final prompt "Restart computer" can be answered with **No** because the following step requires a reboot of the system anyway.

Step 3: Installing the service pack

Following each installation of a new service, the current service pack has to be installed anew to update all programs. Otherwise, the programs and services may not function properly. For simple operating procedures Service Pack 5 suffices. In the event that large amounts of data are to be transferred to EB200 (with the Nagle algorithm being off) Service Pack 6 needs to be installed.

⇒ Use the WindowsNT Explorer to start UPDATE.EXE in subdirectory I386 on the service pack CD. Answer deinstallation query with "No" to restart the computer.

Step 4: Generating icon for link setup

⇒ Copy the file EB200.PBK from the EB200-Utilities disk to a folder on your hard disk.

⇒ Use the right mouse button to drag the file EB200.PBK from your folder to the desktop. Thus a link is generated.

Step 5: Connecting to the EB200

⇒ Ensure that the serial port of your computer is connected to the EB 200 via null modem cable.

⇒ Complete the configuration under
   - **More**
   - **Edit entry and modem properties**
   - **Server**
   Only **TCP/IP** should be activated. IPX/SPX-compatible, NetBEUI, software compression and LCP-expansions for PPP should be off.

⇒ Double-click the icon **EB200.PBK** to start the remote data transmission network. Click on **Dial** without entering a subscriber number.

⇒ As a password, enter any string or leave the field empty.

⇒ Check in the login window whether TCP/IP has been started successfully. Protocols other than IPX are irrelevant.

⇒ Click on **Do not request failed protocols** and **Accept**.

⇒ Click on **Do not show** in the "Link is being set up" window.

Installation of a PPP connection under Windows 95/98/ME

Step 1: Installing the TCP/IP network protocol

If you have already installed TCP/IP, skip this step.

⇒ One after the other click on **Start**, **Settings** and **Control Panel**.

⇒ Double-click on **Network.**

⇒ Click on tab **Protocol.**

⇒ Click on **Add**, then select **Microsoft**, then select **TCP/IP** and click **OK.**

After TCP/IP has been installed, the system must be restarted.

Step 2: Installing the virtual EB200 modem

⇒ One after the other click on **Start**, **Settings**, **Control Panel** and **Modems.**

⇒ Click on **Add**, then select **Don't detect my modem...** and click on **Next.**

⇒ In the next dialog, click on **Have Disk.**

⇒ Use **Browse** to find the **EB200W95.INF** or the **EB200W98.INF** file on your hard disk or on your EB200 utilities disk and click on **OK**.

⇒ Click on **OK** once again.

⇒ Select **EB200 Connection via Nullmodem** and click on **Next.**

⇒ Select a serial port you wish to use for EB200 remote control and click on **Next**.

The messages "Please wait while Windows installs your modem" and "Your modem has been set up successfully" appear.

⇒ Click on **Finish**.

⇒ Close the modem properties dialog.

Step 3: Creating a new dial-up networking connection for the EB200 remote control

⇒ Click on **Dial-Up Networking.**

⇒ Click on **Make New Connection.**

⇒ Enter any name for the new connection to be made (example: "EB200 Connection").

⇒ In the pull-down list **"Select a modem:"**, select **EB200 Connection via Nullmodem.**

⇒ Click on **Next.**

⇒ In the next dialog, enter any **area code** (must be entered), **telephone number** (must be entered) and **country code**.

⇒ Click on **Next.**

⇒ Click on **Finish.**

Step 4: Connecting to the EB200

⇒ Ensure that the serial port of your computer is connected to the EB200 via null modem cable.

⇒ Clear the entry in the routing table if one is available. For this open the DOS box (click on **Start** and **Execute...** and enter **COMMAND**.
The entry is cleared by entering, in the command line, the command `route delete <IP-address>`. <IP-address> corresponds to the IP-address set in EB200 (default 192.0.0.2), and possibly also to the network address 192.0.0.0 .
eg: `route delete 192.0.0.2`

⇒ Click on **Dial-Up Networking.**

⇒ In the Dial-Up Networking window double-click on the connection entry for the EB200 you have created within step 3 (example: "EB200 Connection").

You can create a shortcut by dragging this entry on the desktop.

A "Connect To" dialog appears.

⇒ Complete the configuration under **Properties - Server:** Only **TCP/IP** should be activated. IPX/SPX-compatible, NetBEUI, software compression and LCP-expansions for PPP should be off.

⇒ Enter any **phone number** and click on **Connect** without entering any other parameters.

If the protocol is established, a message window appears

Connected to "(place holder for EB200 Conn)"

Connected at 115200 bps

Duration: xxx:xx:xxx

Now the system is ready to send and receive data via PPP if an appropriate program such as Telnet is used.

If the error 650 is reported back this may be due to different baud rate settings on the two sides.

If the error 651 is reported back this may be due to the fact that the cable used differs from the one stipulated.

Installation of a PPP connection under Windows 2000

Step 1: Installing the TCP/IP network protocol

If you have already installed TCP/IP, skip this step.

⇒ One after the other click on **Start**, **Settings** and **Control Panel**.

⇒ Double-click on **Network and Dial-up Connections**

⇒ Click on **LAN Area Connections** with the right mouse button and select **Properties**

⇒ **Internet Protocol (TCP/IP) Install...** if it is not jet available.

Step 2: Installing the virtual EB200 modem

⇒ One after the other click on **Start**, **Settings**, **Control Panel**

⇒ Double-click on **Phone and Modem Options**

⇒ If you are asked for a phone number, insert any number and click **Next**

⇒ Select **Modems** and click the button **Add**

⇒ Mark **Don't detect my modem; I will select it from a list** and click **Next**

⇒ In the next dialog, click on **Have Disk....**

⇒ Use **Browse** to find the **EB200Win2000.INF** file on your hard disk or on your EB200 Utility Disk and click on **Open.**

⇒ Click on **OK** once again.

⇒ Click on **Next**.

⇒ Select a serial port you wish to use for EB200 remote control.

⇒ Click on **Next**.

⇒ In the following dialog **Digital Signature Not Found** click **Yes**

⇒ Click on **Finish** and **OK**

Step 3:   Creating a new dial-up networking connection for the EB200 remote control

⇒ One after the other click on **Start**, **Settings**, **Control Panel**

⇒ Double-click on **Network and Dial-up Connections.**

⇒ Double-click on **Make New Connection.**

⇒ Click on **Next.**

⇒ Select **Connect directly to another computer.**

⇒ Click on **Next.**

⇒ Click on **Guest.**

⇒ Click on **Next.**

⇒ In the pull-down list "Select a modem:", select **PPP-Connection to EB200 via Null modem (COM1 or COM2).**

⇒ Click on **Next.**

⇒ Select **For all Users**

⇒ Click on **Next.**

⇒ May be change the title to "**Direct Connection to EB200**"

⇒ Click on **Finish.**

Step 4: Connecting to the EB200

⇒ Click **Properties** to complete the configuration.

⇒ Select **General.**

⇒ Click **Configure** to suit the computer baudrate (for example. 115200) with the EB200 setting.

⇒ From the other settings only **Enable hardware flow control** should be enabled.

⇒ Click **OK**

⇒ Select **Networking**

⇒ Select only **Internet Protocol (TCP/IP).**

⇒ Click **Settings.**

⇒ Switch off all the following **Enable LCP extensions, Enable software compression, Negotiate multi-link for single-link connection**

⇒ Click **OK**

⇒ Click **OK**

⇒ Ensure that the right serial port of your computer is connected to the RS232 X8 connector of your EB200 via null modem cable.

⇒ Click on **Connect** without entering any other parameters. This starts the dial process.

If the protocol is established, a "Connected" message window appears in less than 5 sec. A quick start modem symbol is added to the right lower corner of your screen.

Now the system is ready to send and receive data via PPP if an appropriate program such as Telnet is used.

Error messages:

Error 650:   The baud rate settings might not correspond.

Error 651:   Possibly, the null modem cable does not correspond to the default.

Error 777:   There might be no connection to a switched-on EB200. .

Note:
Before connecting clear the entry in the routing table if one is available.
*For this click on **Start** and **Execute...** and enter a command (the DOS box opens).*
*A possible entry can be checked by the command **route print**.*
*The entry is cleared by entering in the command **route delete <IP-address>**. <IP-address>*
corresponds to the IP-address set in EB200 (default 192.0.0.2), and possibly also to the network
address 192.0.0.0 .
Example: route delete 192.0.0.2

Installation of a PPP connection under Windows XP

Step 1: Installing the TCP/IP network protocol

⇒ If you have already installed TCP/IP, skip this step.

⇒ One after the other click on **Start**, **Settings** and **Control Panel**.

⇒ Double-click on **Network and Dial-up Connections**

⇒ Click on **LAN Area Connections** with the right mouse button and select **Properties**

⇒ **Internet Protocol (TCP/IP) Install...** if it is not jet available.

Step 2: Installing the virtual EB200 modem

⇒ One after the other click on **Start**, **Control Panel, Switch to Classic View**

⇒ Double-click on **Phone and Modem Options**

⇒ If you are asked for a phone number, insert any number and click **Next**

⇒ Select **Modems** and click the button **Add**

⇒ Mark **Don't detect my modem; I will select it from a list** and click **Next**

⇒ In the next dialog, click on **Have Disk....**

⇒ Use **Browse** to find the **EB200WinXP.INF** file on your hard disk or on your EB200 Utility Disk and click on **Open.**

⇒ Click on **OK** once again.

⇒ Click on **Next**.

⇒ Select a serial port you wish to use for EB200 remote control.

⇒ Click on **Next**.

⇒ In the following dialog **Digital Signature Not Found** click **Continue Anyway**

⇒ Click on **Finish** and **OK**

Step 3: Creating a new dial-up networking connection for the EB200 remote control

⇒   One after the other click on **Start**, **Control Panel**

⇒   Double-click on **Network Connections.**

⇒   Double-click on **Make New Connection.**

⇒   Click on **Next.**

⇒   Select **Setup an Advanced Connection.**

⇒   Click on **Next.**

⇒   Select **Connect directly to another computer.**

⇒   Click on **Next.**

⇒   Type in "**Direct Connection to EB200**" as **Computer Name**

⇒   Click on **Next.**

⇒   Click on **Guest.**

⇒   Click on **Next.**

⇒   In the pull-down list "Select a modem:", select **PPP-Connection to EB200 via Null modem (COM1 or COM2).**

⇒   Click on **Next.**

⇒   Select **For all Users**

⇒   Click on **Next.**

⇒   Click on **Finish.**

Step 4: Connecting to the EB200

⇒ Click **Properties** to complete the configuration.

⇒ Select **General.**

⇒ Click **Configure** to suit the computer baudrate (for example. 115200) with the EB200 setting.

⇒ From the other settings only **Enable hardware flow control** should be enabled.

⇒ Click **OK**

⇒ Select **Options**

⇒ Select only "**Display progress while connecting**"

⇒ Select **Networking**

⇒ Select only **Internet Protocol (TCP/IP).**

⇒ Click **Settings.**

⇒ Switch off all the following **Enable LCP extensions, Enable software compression, Negotiate multi-link for single-link connection**

⇒ Click **OK**

⇒ Click **OK**

⇒ Ensure that the right serial port of your computer is connected to the RS232 X8 connector of your EB200 via null modem cable.

⇒ Click on **Connect** without entering any other parameters. This starts the dial process.

If the protocol is established, a "Connected" message window appears in less than 5 sec. A quick start modem symbol is added to the right lower corner of your screen.

Now the system is ready to send and receive data via PPP if an appropriate program such as Telnet is

used.

Error messages:

Error 650:   The baud rate settings might not correspond.

Error 651:   Possibly, the null modem cable does not correspond to the default.

Error 777:   There might be no connection to a switched-on EB200. .

Note:
Before connecting clear the entry in the routing table if one is available.
For this click on **Start** *and* **Execute...** *and enter a command (the DOS box opens).*
A possible entry can be checked by the command **route print***.*
The entry is cleared by entering in the command **route delete <IP-address>***. <IP-address>*
corresponds to the IP-address set in EB200 (default 192.0.0.2), and possibly also to the network
address 192.0.0.0 .
Example: *route delete 192.0.0.2*

Installation of a PPP connection under Linux

In order to establish a PPP connection between a Linux system and the EB200 via null modem cable just enter following command (superuser/root rights for the system are required):

```
pppd /dev/ttyS0 115200 192.0.0.17:192.0.0.2 asyncmap ffffffff crtscts
defaultroute
```

Description of parameters:

`/dev/ttyS0`	for COM1:
`/dev/ttyS1`	for COM2:
`115200`	transmission rate in baud
`192.0.0.17:192.0.0.2`	local IP address : IP address of the EB200

`crtscts`   sets the H/W flow check on (`nocrtscts` sets the H/W flow check off). If nothing is specified, the current settings are used for the serial interface.

`defaultroute` specifies the "channel" which addresses computers or networks that were not explicitly entered into the routing tables

asyncmap ffffffff   specifies, which characters should be "escaped".

Testing the protocol on the low-level

⇒ Open a DOS box (click on **Start** and **Run**... and enter **COMMAND**)

⇒ On the Command line prompt, type

```
ping 192.0.0.2
```

whereby 192.0.0.2 is the IP address of your EB200.

This may differ from your specific settings (see --> SETUP --> REMOTE --> IP-ADDRESS).

If the protocol is established, the EB200 sends following message:

```
Reply from 192.0.0.2: bytes=32 time=16ms TTL=64
```


If the protocol could not be established, the following error message will appear:

```
Destination host unreachable
```

At this time it seems that there is a protocol conflict in Windows 95 which does not allow to disconnect the protocol correctly. If you have problems with establishing the connection, try a power-down/power-up cycle with the EB200.

Testing the protocol on the EB 200 command level

The established link can now be used for controlling the EB200 via a terminal program such as Telnet or another application program which is capable of doing PPP. Setup the host name (IP address) and the port number in your remote control program according to the settings in the EB200 (menu: SETUP:REMOTE). The EB200 default settings are:

BAUDRATE:	115.2 k
IP ADDRESS:	192.0.0.2
PORT:	5555

For testing the link, the EB 200 identification string may be checked.

In your terminal program enter: ***idn?**

Following this entry, the response string

ROHDE&SCHWARZ,EB200,xxx.xxx/xxx,V0x.xx-4052.4654.00

will be displayed.