

Orion

Manual



ITECH Instruments, 2011

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1 PC Setup

1.1 Using the Ethernet interface

1.1.1 Ethernet connection when using a DHCP server

If you have a DHCP server (most DSL routers include one of those) then nothing special has to be done. The PC and the Orion will receive their IP settings from the DHCP server and the PC will find the Orion automatically.

1.1.2 Ethernet connection without DHCP server

If the Orion cannot find a DHCP server then it will set itself to a factory defined address in the range 169.254.x.y.¹

It is possible to simply set the PC on automatic TCP address. Windows will then select automatically an IP address in the same subnet. However this will take some time (1-2 minutes).

The other option is therefore to set the PC on an arbitrary address in the same subnet (e.g.169.254.1.1).

The IP address in the Orion can be changed in order to adapt it to the standards at the customers site. ITECH delivers a program to do this setup. This program is described in chapter 2 of this manual.

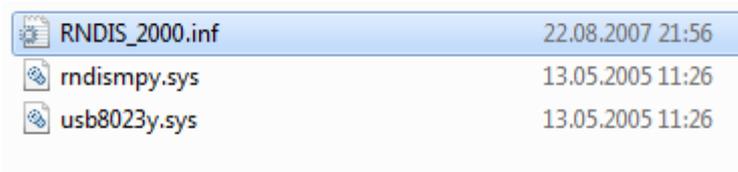
1.2 Using the USB interface

The USB interface is used as “IP over USB” device. This means that the driver software will set up a virtual Ethernet card and then the communication will run using the TCP/IP protocol in the same way as it would run over a real Ethernet cable.

The installation of the driver will depend on the operating system.

1.2.1 Windows 2000

For Windows 2000 three files are required for installing the driver:



RNDIS_2000.inf	22.08.2007 21:56
rndismpy.sys	13.05.2005 11:26
usb8023y.sys	13.05.2005 11:26

Wait until the Orion has finished starting and then connect it to the PC. The Hardware Wizard should then pop up.

Select manual installation and then select the above shown RNDIS_2000.inf file as driver.

¹ x and y depend on the Ethernet hardware address (MAC-ID) of the Orion. The address will therefore be different for each device.

1.2.2 Windows XP

Windows XP already contains the driver but doesn't know it. One therefore needs only a .inf file for the installation.

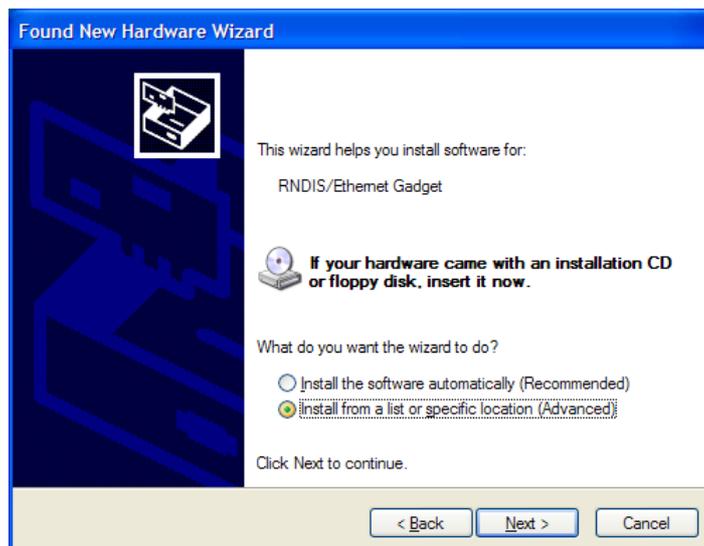


Wait until the Orion has finished starting and then connect it to the PC.

After connecting the device the new hardware wizard dialog box will pop up and ask if you want to connect to Windows Update. Select “No” and press Ok.

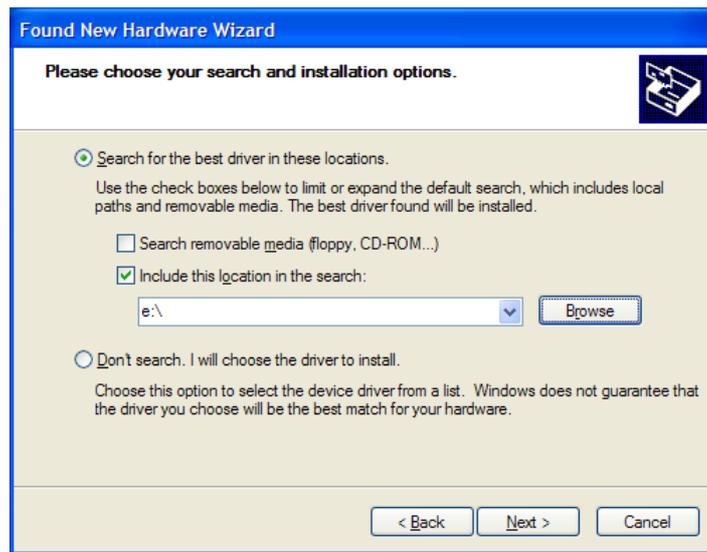


The next box names the device (RNDIS/Ethernet Gadget). Select “Install from a list or specific location” and press ok.



Now, windows will ask where the driver can be found. Make sure that the search path contains the

file LINUX.INF. You should have received this device together with the InterWinner nuclear spectroscopy software².



Windows will then display a warning message that the software did not pass the “Windows Logo” test. Select “Continue Anyway”.

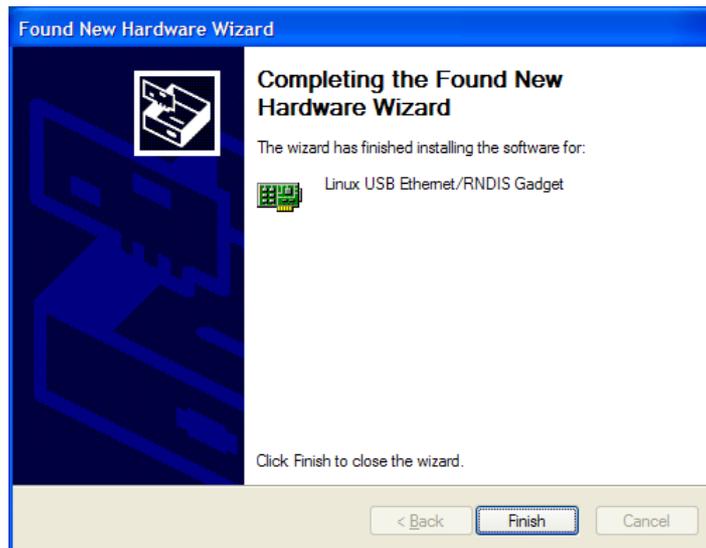


² Otherwise you can download it from <http://www.itech-instruments.com/support>

Windows will then install the driver. Depending on you PC this may take a while.



A dialog box will inform you about the correct installation of the driver.



The Orion includes a minimal DHCP server. Therefore the IP address of the PC will be set automatically. Just leave the IP settings on “Obtain an IP address automatically”.

1.2.3 Windows Vista

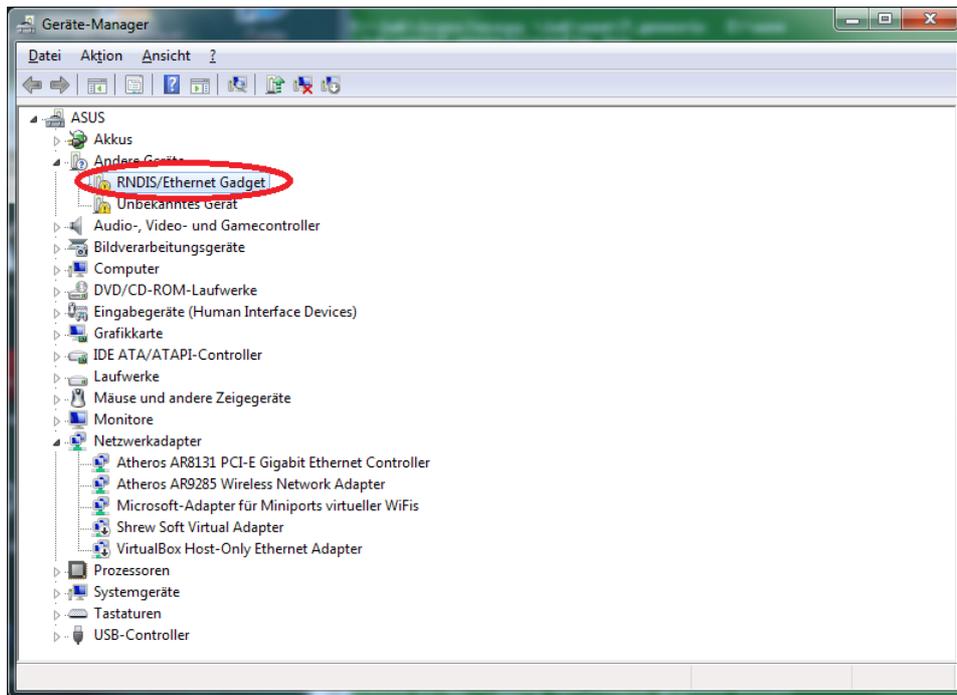
Windows Vista will automatically detect the Orion and install the appropriate generic driver. No manual interactions are necessary.

1.2.4 Windows 7

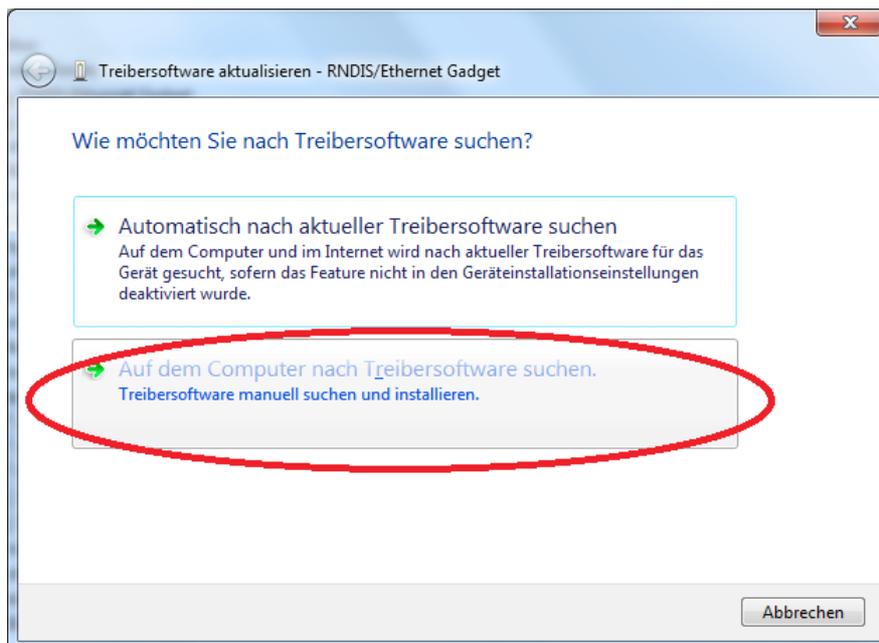
Windows seven already includes the necessary driver. However, it is not installed automatically.

Wait until the Orion has finished starting and then connect it to the PC. The Hardware Wizard should then pop up.

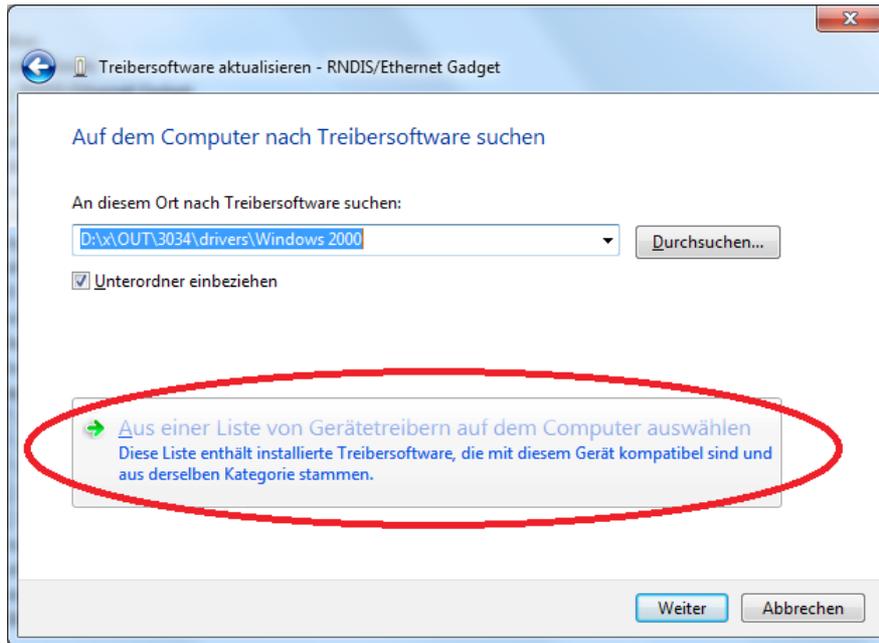
The open the device manager and select the RNDIS entry. Click with the right mouse button and select "Update driver".



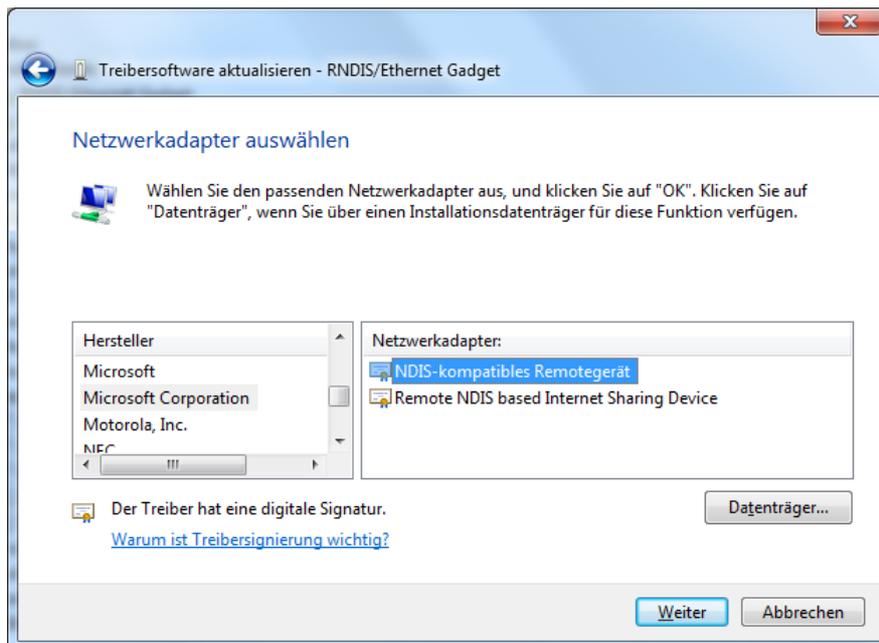
Click on "Manual install



- Click on "Select from a list"



- Select "Microsoft Corporation" (not "Microsoft"!)

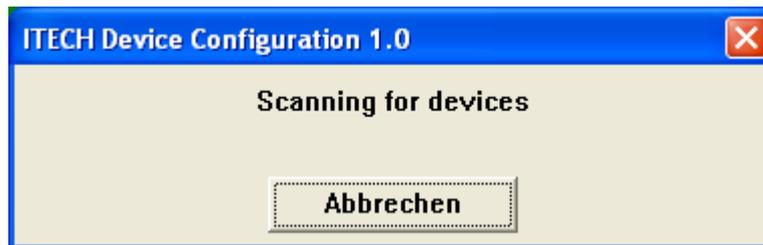


2 The ITECH Device configuration program

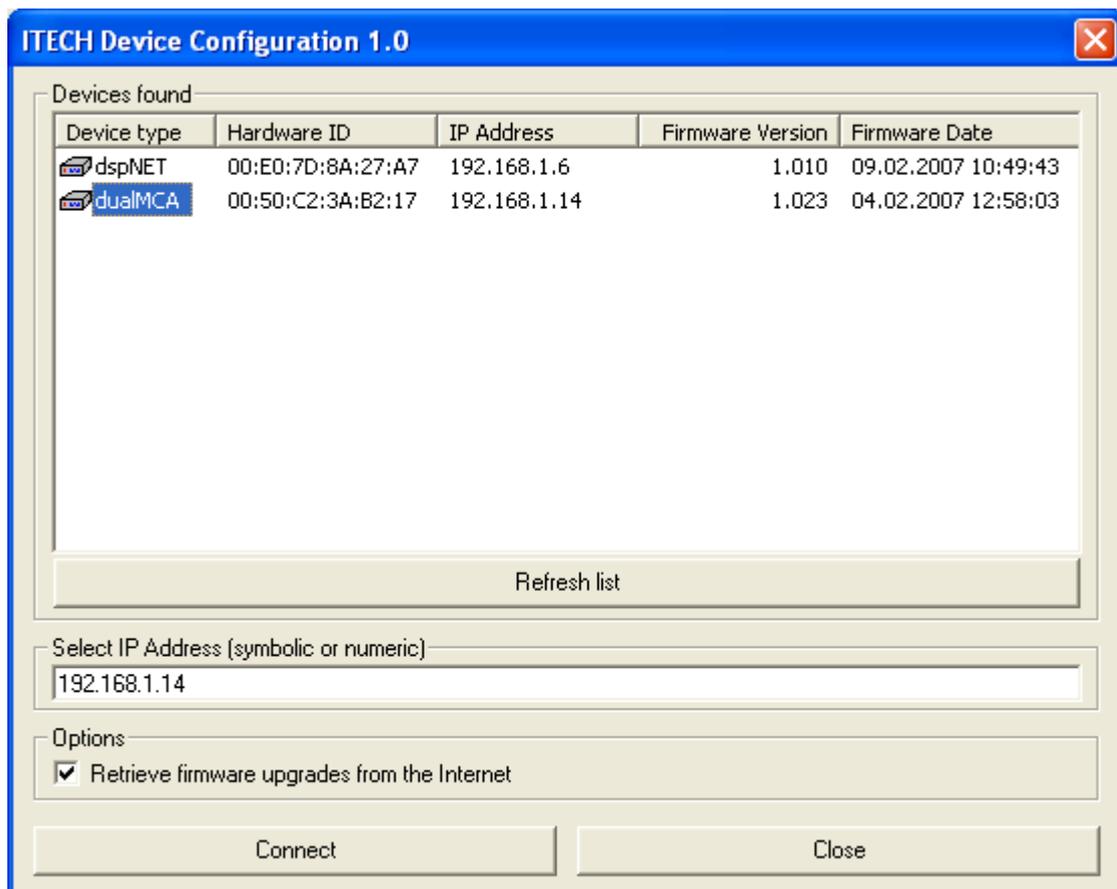
The ITECH Device Configuration program is used to select the IP addresses in ITECH Ethernet connected devices. It is also used to install new firmware versions into the device.

This program can currently be used with the dualMCA, the dspNET, the quadADC, the quadMCS and the Orion and will be extended for upcoming devices.

When the program is started it first scans for devices present in the current subnet. During the scan the following dialog box is shown.



When the scan is completed a dialog box with the devices found is shown.



The list view shows the devices found together with the detected firmware versions and the IP addresses under which those devices are visible. Below the box is a “Refresh” button which will invoke a new device scan.

The software however can only detect devices in the local subnet. It will of course not search the entire Internet. Therefore there is a IP Address input field so that the user can manually enter the IP of a device reachable over the Internet. It is also possible to use a symbolic name here if the devices is registered by some name server.

In the options box one can select if the program should try to download new firmware upgrades from the ITECH Instruments Web server. Those will be stored in the directory where the configuration program resides if this directory is writable. If this is not the case (e.g. if the software is run from a CD ROM) then the firmware files will be stored in a subdirectory named itech.firmware of the users temporary directory (usually C:\Documents and Settings\User_Name\Local Settings\Temp\itech.firmware)

If the automatic download is not possible then one also can retrieve the firmware images manually (for instance by e-mail) and put them in one of the places shown above.

2.1 Device configuration dialog box

After selecting a device one can press “Connect” in order to connect to this device. After a successful connection the following dialog box will appear:

The screenshot shows a dialog box titled "Device configuration". It contains the following fields and options:

- Device type:** dualMCA
- Hardware ID:** 00:50:C2:3A:B2:17
- Current Firmware version:** 1.023
- Upload a new firmware version:** Button
- Ethernet IP address:**
 - automatic using a DHCP server
 - automatic if DHCP server is found, otherwise manually selected
 - always manually selected IP
 - IP Selection:** 10.0.0.101
 - Gateway:** (empty)
- USB IP address:**
 - IP Selection:** 10.0.1.101
- Buttons:** OK, Abbrechen

In the first block the device type and current firmware version are described. A new firmware version can be installed by pressing the corresponding button.

Ethernet IP address

In the next box one can select the IP address used for the Ethernet interface of the module³. There are three different modes:

1) automatic using a DHCP server⁴

³ Each device/computer in a network must use a different IP address.

⁴ A DHCP server distributes the Ethernet addresses to the different computers. Most DSL or WLAN routers include

In this mode the module will wait for a DHCP server during the boot process.

Attention: Do not activate this mode unless you are sure that you have a working DHCP server. The device will not start without server!

2) automatic if DHCP server is found, otherwise manually

In this mode, the device will try to find a DHCP server. If none is found then the boot process continues using the given IP address. This is the default mode for the device.

3) always manually selected IP

In this mode the device will ignore any DHCP server and will always use the selected IP address. Please note that the devices are usually delivered with an IP in the range 169.254.x.y.

USB IP Address

The USB interface of the Orion uses “IP over USB” as protocol. The default IP address is in the range 10.x.y.58. The x and y depend on the serial number of the device which makes sure that every device is in its own subnet.

such a DHCP server.

3 Front panel

3.1 Front panel LEDs

The front panel features six LEDs. The purpose of these LEDs is the following:

- Power: This LED is always lighted while the device is switched on
- Comm: This LED is lighted while the Orion is processing a command sent by the computer
- Warning: This LED is blinking when the device is selected in the ITECH Device Configuration software thus providing an easy identification. It is also lighted if the internal firmware has stopped.
- Acq.: This LED is lighted during an acquisition.
- Event: This LED blinks shortly if the Orion processes an event. It gives therefore a rough visual indication of the count rate.
- HV: This LED indicated that the high voltage is enabled.

3.2 Touch screen

The main user interface is realized using a color TFT touch screen. This touch screen permits to see the status of the device, control the acquisition, analyze the spectrum, export the spectra on a USB stick and many more.

The use of the touch screen is explained in detail in chapter 5 of this manual.

4 Back panel

All the connection to the Orion are done on the back side. In the following, the different connectors are explained starting with the topmost row and in left to right order.



4.1 HV+ and HV-

Those are the SHV outputs for the high voltage produced by the Orion. Only one of the two is usable at a time.

4.2 Power switch

This switch is used to switch on and off the device

4.3 DC IN

The Orion is powered through this jack. DC voltages between 9 and 18 Volts (12V recommended) can be used. The connector type is 2,1 x 5,5 mm, center positive.

4.4 PREAMP POWER

This D-Sub9 connector is used in order to supply the power for the preamplifier. It also includes has a pin for the HV shutdown (detector warm) signal.

Pin #	Signal
1	GND
2	GND
3	Not connected
4	+12 V
5	Not connected
6	-24 V
7	+24 V
8	Detector warm
9	-12 V

4.5 HV LED Indicators

Those LED's reflect the status of the high voltage. The green and yellow LED's indicate that the positive or negative high voltage is enabled.

The red LED indicates that a HV failure, usually the signal that the detector is warm, is detected.

4.6 Digital IO

This female D-Sub25 plug contains different digital input and output signals.



The pinout used is the following

Pin #	Signal
1	Serial Debug Port - TXD
2	Serial Debug Port - RXD
3	GND
4	Not connected
5	Digital input #7
6	Digital input #6
7	Digital input #5
8	Digital input #4
9	Digital input #3
10	Digital input #2
11	Digital input #1

Pin #	Signal
12	Digital input #0
13	GND
14	Serial RS232 Port - TXD
15	Serial RS232 Port - RXD
16	Serial RS232 Port - RTS
17	Serial RS232 Port - CTS
18	GND
19	Digital output / SCA output #4
20	Digital output / SCA output #3
21	Digital output / SCA output #2
22	Digital output / SCA output #1
23	Digital output / SCA output #0
24	GND
25	+5 V

The pin 1 is the top right pin, the pin 14 the low right pin. The pin numbers are also shown directly on the connector.

The digital inputs are L-TTL (0V / 3.3V) and 5V tolerant. There is an internal pull-down resistor, the unconnected state is therefore 0. Signals should have at least a duration of 800 ns in order to be detected reliably.

The digital outputs are TTL standard (0V / 5V). They can be configured either as digital outputs (for sample changer control, external LED connection or similar) or as SCA outputs. The ROI interval can be set for each output separately and the SCA pulse length can be configured by software.

4.7 HV Shutdown

This BNC connector is used for the HV shutdown / detector warm signal. The polarity of this signal is set using the front panel or the InterWinner software.

This connector is internally connected to the pin 8 of the PREAM POWER connectors

4.8 INPUT

This BNC connector is the signal input. Signals between -10V and +10V (dynamic range 13 V) can be accepted. The input is internally terminated with 1kOhm.

4.9 INHIBIT

This is a TTL logic input used for the inhibit signal emitted by transistor reset preamplifiers.

4.10 GATE

This BNC connector can be used as a gate. Changes of the state are written into the list mode data stream. It is then up to the software to interpret these events as gate or synchronization signal.

4.11 ETHERNET

This is a standard Ethernet connector for network the network connection. The protocol used is TCP/IP.

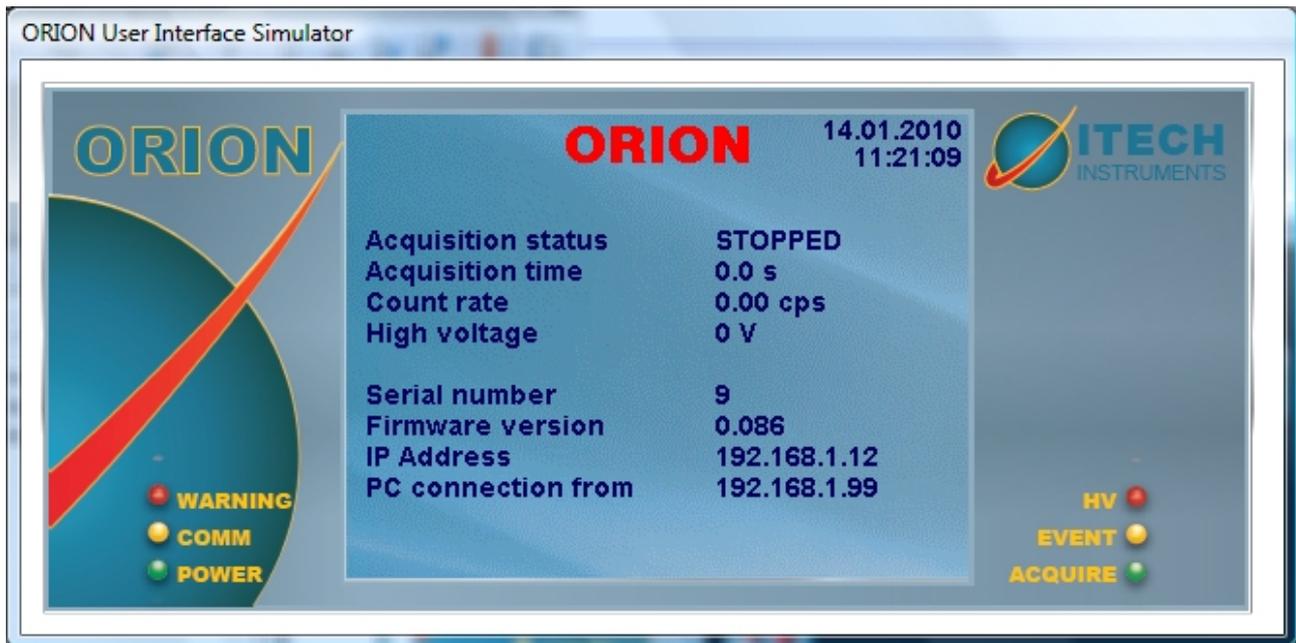
4.12 USB HOST

This is a standard USB Host connector. It is used in order to copy the internal spectrum storage on a normal USB memory stick and can also be used for different extensions. (e.g. Wifi, GPS)

4.13 USB DEVICE

This connector is used to hook the device to a computer. It can be used instead of the Ethernet connection.

5 Touch screen interface



6 Data formats

6.1 Spectra

The spectra are stored on the device and can be copied to a USB memory stick. The spectra names are stored in a subdirectory named accordingly to the month of the acquisition (e.g. 2010-01) and the spectrum name is constructed in the form

NNNN-YYMMDD-HHMMSS.spe

where:

NNNN	is the serial number of the Orion used
YY	is the year with two digits
MM	is the month
DD	is the day
HH	is the hour (0-23) of the acquisition
MM	is the minute and
SS	is the second.

The spectrum names are therefore guaranteed to be unique also when several Orions are used.

The spectrum file format is a compressed format which can be read using the InterWinner software.

6.2 List mode files

The list mode files stored by the InterWinner software have the same name as the spectrum name in InterWinner but with the extension .LIST.

The file starts with a header of 32 bytes length containing 8 32bit words.

Offset/Bytes	Description
0	Header, always 3327483392
4	Header, always 1267282944
8	Device type, 9 for Orion
12	Option word
16	Time of creation (ANSI format)
20	Currently unused
24	Currently unused
28	Currently unused

The events are stored after this header as continuous series of 32 bit words.