

Technical Note: Blue Phantom² troubleshooting procedures

The following Technical Note will provide troubleshooting instructions for events whose could appear in context with the Blue Phantom² equipment. In case that these information will not help to resolve an issue, it is recommended to investigate as much as possible before the next IBA service agent will be consulted to provide a comprehensive report about the situation on site.

Troubleshooting network connection to computer

As far as it is possible, please ask the local IT-administrator for assistance in troubleshooting network connection problems. In some cases, the IT-administrator only does have full access to the network settings at the computer used with the water phantom hard- and software, or is able to provide a free TCP/IP address at the local network.

Problem	Possible reason	Solution
Device cannot be found / is not communicating if connected directly or via local network.	IP / subnet mask is not entered correct.	Ping device. Check IP / subnet settings.
	Device and computer are on different gateways.	Check gateway settings.
	Crossover cable not used if direct connected to computer.	Use crossover cable.
	Any kind of adapter used.	Do not use adapters to get a connection (e.g. USB-Ethernet converter).
	Ethernet cable / pins could be broken or defect. Network socket is defect. Network (cable) defect or not conform to CAT-6. Wrong or defect shielding of network cable (grounding). Ethernet hub / switch defect.	Perform crosscheck with another Ethernet cable / port. Test if direct connection to computer is working. Check if pins on Ethernet port / socket are not bent / broken. Carry out trouble shooting of network cable connection and conditions. If available, use a LAN-test device.

Problem	Possible reason	Solution
Device cannot be found / is not communicating if connected directly or via local network.	Ethernet port might be blocked by other application.	Check if Ethernet port is available.
	Recommended cable length exceeded.	Use an Ethernet minihub and ping device.
	Ethernet port could be deactivated if battery powered laptop.	Check power administration.
	Firewall active and blocks communication.	Deactivate firewall on computer.
	Laptop could have WiFi interface.	Verify if the wireless internetconnection is turned off.
It is impossible to install / modify / setup device on computer.	Operator does not have administration rights.	Log-on with administration rights before you start the program.
XX Setup tool is not accepted by the local network.	Check network firewall settings.	Add the XX Setup tool to the list of applications that are allowed to access to the network.
IP address to device lost.	Operator changed IP address without note or forgot it.	Press the AUX button to return to factory settings.
Communication lost to system.	Ethernet cable unplugged.	Check and re-establish Ethernet connection.
	Loss of power on the Ethernet hub/switch or CCU/emXX.	Check reasons – fuses blown, power blackout.
	If randomly, problems with network might be taken into consideration.	Check network conditions.

Noisy scans

The noise level usually depends on the used measuring mode and time, selected detectors, energy and dose rate, and pulse repetition frequency. Depending on the environmental and measurement conditions, a continuous scan always shows some kind of noise by design, whereby a step by step measured scan will be much smoother.

Even if there are many reasons for to noisy measurement scans (signal >1% peak to peak), the most frequently, causations should be investigated first:

- Reference detector is not in the field (especially when the field size becomes smaller than during phantom setup).
- Reference diode is in field with wrong orientation (white dot at tip must be towards to the focus, see chapter *Step 5b: Diode setup*).
- High voltage is not switched-on or to low (if ionization chambers used), check the electrometer setup in OmniPro-Accept.
- The selected sensitivity range for the used detector is not sufficient – see chapter *CCU electrometer setup* and review the electrometer setup in OmniPro-Accept.
- Ratio (reference division) not activated - review the electrometer setup in OmniPro-Accept.
- Sampling/measuring time too short, especially in step mode scans – revise the measurement queue setup in OmniPro-Accept.
- Scanning speed too high (in continuous mode) or the servo is creating too much waves at the water surface (if the scan is close to) - revise the measurement queue setup in OmniPro-Accept.
- Detector extension cable is too long or the cables do have different length (recommended length is 5m).
- Dust/humidity inside connectors – change against another for testing.
- Detector in bad conditions (humidity, dust, mechanical defect) – check against another if possible.
- Electrometer could be defect or not calibrated – read chapter *Readout CCU boot sequence* in this manual.

Restricted or no axis movement

In some cases, especially after changing hardware components of the **Blue Phantom²** (e.g. CCU, sensors etc), it might happen that the device does not work correctly afterwards. In addition, a wrong handling of the remote control menu can create a restriction of the axis range, too.

The following issues should be checked after booting the system:

- Axis position displayed at the remote control does not agree with the corresponding axis position of the phantom and shows an offset.
⇒ See chapter *Yearly maintenance – Checking position accuracy*.
- One or all axes cannot be moved, neither with the remote control nor with the OmniPro-Accept software. The displayed position of the afflicted axis is somewhere out of the servo range, respectively, more than ± 239 mm (for X and Y-axis) or ± 205 mm (for Z-axis).

⇒ Carry out a zeroing at the actual axis position (see chapter *Redefine zero position*). After this, the axis should work again, even if the zero position displayed at the remote control will not agree with the corresponding axis position. Repeat zeroing according to chapter *Yearly maintenance – Checking position accuracy*.

- At the remote control, all axis positions are displayed with ***.

⇒ Interrupted CAN-bus connection; can be caused by a defect in the servo control cable or connection box – contact your IBA agent.

⇒ In case that you own two different phantom systems from IBA, both with CCU control unit, the wrong servo control cable might be connected to the **Blue Phantom²**; please check label at cable, the article number must be **E1400620**.

- The TMR measurement cannot be started or the range is limited. Software displays water level incorrect and scan out of tank.

⇒ The TMR probe might be zeroed at a wrong position. Drain the phantom and verify that the floater is at the bottom of the TMR pipe. Carry out a zeroing of the TMR probe according to chapter *Redefine zero position*, whereby the TMR probe is labeled with 'W' (water level sensor) at the remote control.

- The OmniPro-Accept software cannot move an axis to a certain position; however, it is possible to move there by using the remote control. The software displays that the scan (queue) does have a restriction.

⇒ This effect might be caused by a Sub-Limit defined with the remote control. Move the axis showing a limitation with the remote control to its physical end positions and redefine Sub-Limit there. Alternative (and probably faster), reboot CCU and redefine Isocenter and Watersurface.

- Impossible to move one or more axis with the remote control, however, with the software the axis can be moved.

⇒ Probably the remote control is defect – contact IBA service.

In case that the malfunction persist, read chapter *Readout CCU boot sequence* in this manual.

Readout CCU boot sequence

The following chapter describes how the booting sequence of the CCU/ **Blue Phantom²** can be readout with a computer. This might be necessary to figure out if all sensors and motors, remote control and the CCU electronic is working correctly, or if there is a malfunction. This information could be helpful when IBA service will be consulted for support, and should being send as a text file and facilitates further analyses in case that a malfunction cannot be fixed by the former described troubleshooting procedures.

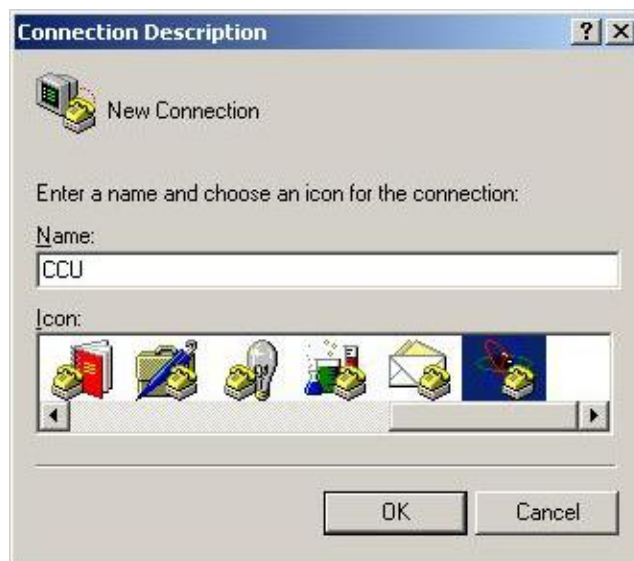
Before the booting sequence can be logged, the following preparations need be done:

- Remove the protection cover from the RS232 port at the CCU's verso.



- Establish a connection to the computer by usage of a standard RS232 cable (0-modem cable) type 9pin-SubD female-female.
- At the computer, go to "Start → Programs → Accessories → Communications → HyperTerminal".
- When the HyperTerminal will be opened, the following settings need be done (the windows open automatically):

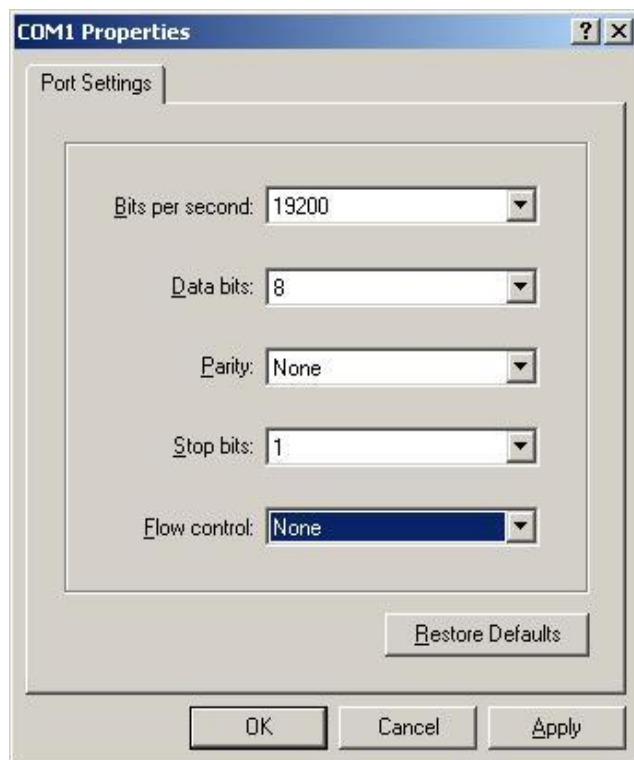
1. Enter a name for the connection.



2. Select the connection – COM-port.



3. Define COM-port properties/settings as shown below.



4. Switch on the CCU – the HyperTerminal tool will start logging.

```

CCU - HyperTerminal
File Edit View Call Transfer Help
*****
*                               *
*           Water Phantom       *
*           IBA GROUP           *
*                               *
*****
MQX 2.50d 1 1191 2383 1191
Get Factory 2 1758883
InitSystem2 1758 3517 1758
Get Factory 3 13001709
RSR: Watchdog Timer Reset3001
JTAGID: MCF5485 (revision 3)
init transmit can
Firmware Version 03.12 on Mar 16 2010 at 16:36:40
FLASH U5      Intel 28F128J3

FLASH U6      Intel 28F128J3

Flash address = fe200000
Flash address = fe200000
-----
| XPLD VERIFY PASS! |
-----
Xport dir f0000000
No Module EEPROM Initialization
No Base board EEPROM Initialization_

```

5. When the CCU booting routine is done, the program stops logging. If there is a failure in the booting, then there will be an ongoing running line with the same text inside.
6. With File → Save As, the data can be saved as a txt-file for being opened in Notepad etc.

Analysis of logged booting sequence

The logged booting sequence of a normal working CCU/ **Blue Phantom²** system can look like the following example. The numbers in circles will link to further explanations at the end of this text.

```

MQX 2.50
Boot main_task() from 01.06.2005
flash fe240000
Loading image
-----|
*****
*                               *
*           Water Phantom       *
*           IBA GROUP           *
*                               *
*****
MQX 2.50

InitSystem

RSR: Watchdog Timer Reset
JTAGID: MCF5485 (revision 3)

Firmware Version 03.12 on Mar 16 2010 at 16:36:40
FLASH U5      Intel 28F128J3

FLASH U6      Intel 28F128J3

```

```

Flash address = fe200000
Flash address = fe200000
+-----+
| XPLD VERIFY PASS! |
+-----+
Xport dir f0000000
No Module EEPROM Initialization
No Base board EEPROM Initialization
Default values
324155 357603 310272 0
Beging initialization of the first 6 ASICS...
Asic Status 20
Asic Status 20
Asic Status 20
Asic Status 0
Asic Status 0
Asic Status 20

6 Asics are started

ASIC 000000 000000 1 000000 2 000000 3 000000 4 000000 5
ASIC 16777215 16777215 16777215 262914 262914 16777215

ASICS initialized!

Asics are stopped

Check One wire bus
I-BUTTON 0x1c 0x28 0xfb 0xe2 0x3 0x0 0x0 0x3e
I-BUTTON 0x1c 0x68 0x4 0xdf 0x3 0x0 0x0 0x22
I-BUTTON 0x1c 0x34 0x0 0xe3 0x3 0x0 0x0 0x67
I-BUTTON 0x1c 0x74 0x83 0xe5 0x3 0x0 0x0 0xeb
I-BUTTON 0x1c 0x32 0x39 0xe4 0x3 0x0 0x0 0x96
I-BUTTON 0x1c 0x72 0xd8 0xf2 0x3 0x0 0x0 0xb0
I-BUTTON 0x1c 0x2a 0xf7 0xf8 0x3 0x0 0x0 0x3c
I-BUTTON 0x1c 0x6a 0xe2 0xe9 0x3 0x0 0x0 0x25
I-BUTTON 0x1c 0x3e 0x42 0x74 0x3 0x0 0x0 0x6a
I-BUTTON 0x1c 0x7e 0x27 0x12 0x4 0x0 0x0 0x4a
I-BUTTON 0x1c 0x29 0xf4 0xe5 0x3 0x0 0x0 0xd7
I-BUTTON 0x1c 0x69 0x80 0xeb 0x3 0x0 0x0 0xb0
I-BUTTON 0x1c 0x33 0x5a 0xf5 0x3 0x0 0x0 0x7e
I-BUTTON 0x1c 0x73 0xb5 0xe7 0x3 0x0 0x0 0xf4
I-BUTTON number 14
I_Button task
I_BUTTON check
I_Button and flash equal
Start reading from Main Flash End reading Main Flash
Sensor I_BUTTON 0 check
Sensor I_Button 0 and flash equal
Start reading from Sensor Flash
Start reading flash End reading Sensor Flash
Sensor I_BUTTON 1 check

```

②

③

④

④

Sensor I_Button 1 and flash equal	
Start reading from Sensor Flash	
Start reading flash End reading Sensor Flash	
Sensor I_BUTTON 2 check	④
Sensor I_Button 2 and flash equal	
Start reading from Sensor Flash	
Start reading flash End reading Sensor Flash	
Driver I_BUTTON 0 check	⑤
Driver I_Button 0 and flash equal	
Start reading from Driver Flash	
Start reading driver flash End reading Driver Flash	
Driver I_BUTTON 1 check	⑤
Driver I_Button 1 and flash equal	
Start reading from Driver Flash	
Start reading driver flash End reading Driver Flash	
Driver I_BUTTON 2 check	⑤
Driver I_Button 2 and flash equal	
Start reading from Driver Flash	
Start reading driver flash End reading Driver Flash	
TMR Sensor I_BUTTON not present	⑤
6 Asics are started	
Write Multiplikators	
Asics are stopped	
ASIC Multi f1000000 - 4624830 (4691be)	⑥
ASIC Offset f1000000 - 80826 (13bba)	
ASIC Multi f1000100 - 4618641 (467991)	
ASIC Offset f1000100 - 113856 (1bcc0)	
ASIC Multi f1000200 - 4624830 (4691be)	
ASIC Offset f1000200 - 80826 (13bba)	

```

ASIC Multi f1000300 - 0 (0)
ASIC Offset f1000300 - 0 (0)
ASIC Multi f1000400 - 0 (0)
ASIC Offset f1000400 - 0 (0)
ASIC Multi f1000500 - 0 (0)
ASIC Offset f1000500 - 0 (0)

6 Asics are started

Range 0 478 0 478 0 410x min 563x max 85y min 596y max 118z min 515z
max 105
fact 480 65535 1000000
Electrometer1 EEPROM ID
No Electrometer1 EEPROM Initialization
Electrometer 1 Pass
Electrometer2 EEPROM ID
No Electrometer2 EEPROM Initialization
Electrometer 2 Pass
***** FLEXCAN *****
CAN Bus bit rate: 1000kbps.
Message buffer 0 used for Tx and Rx.
Interrupt Mode: Enabled
Operation Mode: TX and RX --> Normal
*****

Ready
Create server
EndInitSystem
Electrometer 1 815 666 1000 1181900 1746813 13001709
Address 169.254.1.1:1222
Electrometer 2 997 975 1000 1191700 1758883 13001709
Get Factory 1 0
Get Factory 2 0
Get Factory 3 0
Get Factory 1 1191700
Threshold 1 1191 2383 1191
Get Factory 2 1758883
Threshold 2 1758 3517 1758
Get Factory 3 13001709
Threshold 3 13001 26003 13001
Start monitoring
init Transmit can
HandPendant version 3.0

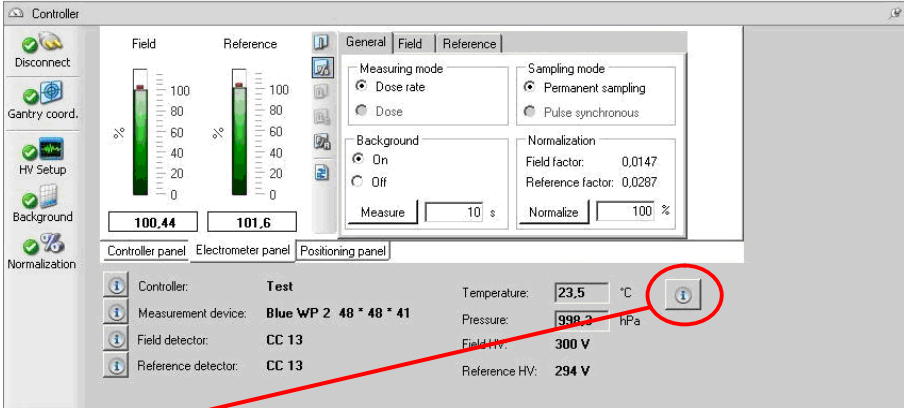
```

Item	Description
①	Identification of installed CCU Firmware version.
②	Identification of ASIC modules, whereby the highlighted numbers are referring to: 0 = X-axis; 1 = Y-axis; 2 = Z-axis; 3 + 4 are empty; 5 = TMR sensor.
③	Sum of i-buttons, whereby 14 = 3D-phantom without TMR probe; 16 = 3D-phantom with TMR probe.
④	Positioning sensor check (numbers referring to dimension, see ②). If serial number of sensor i-button is not equal to information in flash, sensor i-button information will be load into flash; otherwise, existing information from flash will be used. In case that a sensor is missing, "not present" will be displayed and the lines below are empty.
⑤	Servomotor (and TMR sensor) check (numbers referring to dimension, see ②). If serial number of motor (and TMR sensor) i-button is not equal to information in flash, the new i-button information will be load into flash; otherwise, existing information from flash will be used. In case that a motor or the TMR is missing, "not present" will be displayed and the lines below are empty.
⑥	Reading of ASIC data and factors, highlighted numbers are referring to the dimensions so far as available, see ②.
⑦	Identification of phantom dimensions, here 480mm (X-dimension), 480mm (Y-dimension) and 410mm (Z-dimension). Values calculated from $d_{\min} - d_{\max}$ value of the corresponding sensor (in this example $x_{\min} = 563$, $x_{\max} = 85$, $y_{\min} = 596$, $y_{\max} = 118$, $z_{\min} = 515$, $z_{\max} = 105$).
⑧	Identification of electrometer; if no electrometer found, the "Electrometer x Pass" line is missing.
⑨	Reading electrometer calibration – the first group of three number blocks after the electrometer number do display the gain factor, the second block with three numbers belongs to the background factor. If the first and second block shows 0 0 0 , the electrometer is not connected. Does the first block show 1000 1000 1000 , and the second block shows 0 0 0 , the electrometer has not been calibrated.
⑩	This line shows the IP address of the CCU and port number.
⑪	Last step activates the remote control and displays the firmware version of the hand pendant (missing if not connected).

Hardware events recorded by OmniPro-Accept

During every measurement with OmniPro-Accept and the **Blue Phantom²**, the software is recording all events occurring at the connected hardware as soon as the connection to the CCU has been established. This record starts immediately after the controller is connected to the software (by usage of the Connect button in the electrometer panel), but is not saved automatically. Closing and re-opening the software and re-establishing the connection to the CCU will result in a new event record. The same if another, different CCU will be used (by selection under Common Settings – Controllers) even if the software has not been closed.

Any event related to the connected hardware will be logged in this record; however, not all of them are important. The events will be entered into a table, called 'Info List' with different columns: Type (e.g. 'Information', 'Warning' or 'Error'), Time Stamp and Message. Events of the type 'Warning' or 'Error' will be indicated by a blinking "i" icon in the control panel.



The screenshot shows the 'Controller' panel with two vertical bar graphs for 'Field' (100.44) and 'Reference' (101.6). Below the graphs are tabs for 'Controller panel', 'Electrometer panel', and 'Positioning panel'. A red circle highlights an information icon (i) next to the 'Test' section. Below this, the 'Info List' window is open, displaying a table of events.

Type	Time Stamp	Message
Error	11:26:52 AM	0x30005 - Electrometer 2 high overflo...
Error	10:02:16 AM	0x2000E - Bias 2 tolerance voltage er...
Error	10:02:16 AM	0x2000D - Bias 1 tolerance voltage er...
Error	10:02:16 AM	0x10008 - System Run error: Voltage ...
Warning	10:01:51 AM	0x30001 - Electrometer 1 overflow error
Warning	10:01:51 AM	0x30002 - Electrometer 1 high overflo...

Clicking this "i" button, the Info List will be opened in a separate window to read the record. With the right mouse button, the table can be saved as a txt-file for being analyzed deeper or send to IBA service for evaluation.

Not all of the logged events might have influence to the measurements, some errors could appear only as long as the setup has not been accomplished (e.g. electrometer over- or underflow errors). Therefore, the report needs to be handled a little bit carefully before a conclusion will be done (see also *Technical Note CCU error codes*).

However, if there is a visible influence to the measurements or uncertainty, the Info List as well a detailed report should be send to IBA Dosimetry or local distributor for further support.

Messages at the remote control screen / red error LED at CCU

In case that a warning or error message will be displayed at the remote control screen (e.g. “An event occurred in the CCU, please restart CCU.”) or the red error LED is lighted at the CCU, the Info List of the OmniPro-Accept control panel might provide some more details about the issue. However, only if the controller is connected to the OmniPro-Accept control panel at that time (see before).

Should a malfunction (displayed by the remote control or red LED) reoccur frequently, try to establish the connection to the OmniPro-Accept control panel as soon as the CCU has booted to get the earliest event logged. Is this malfunction a real handicap and cannot be solved by a revise of the setup, it is recommended to contact the next IBA service agent or helpdesk (mail to: service@iba-group.com) and to send a detailed description of the setup and event as well the Info List as a text file.

CAUTION

CAUTION

HOT PLUGGING

It is not permitted to connect or disconnect cables to the CCU or **Blue Phantom²** when the controller is powered or HV switched on. This could cause malfunctions, hardware defects and error messages.

With reference to the caution above, events described in this chapter might be caused by hot plugging, too.

In case of any questions, please contact us under:

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Service Department
Bahnhofstrasse 5
DE-90592 Schwarzenbruck
Germany

Service hotline:
phone: +49 9128 607 38
fax: + 49 9128 607 10
<mailto:service@iba-group.com>

Reference:

PW-04-002-510-003 04_ENG Blue Phantom² User's Guide; 9 Troubleshooting, p129