Bruker BioSpin

BLA

Upgrade Controller
Operating & Service Manual

Version 001

think forward

NMR Spectroscopy

The information in this manual may be altered without notice.

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This manual describes the units as they are at the date of printing. On request, the manufacturer shall supply circuit diagrams, lists of components, descriptions, calibrating instructions and any other information for use by qualified personnel of the user, in charge of repairing the parts of the unit which have been stated by the manufacturer to be "repairable". Such supply shall in no event constitute permission to modify or repair the units or approval of the same.

This unit is not designed for any type of use which is not specifically described in this manual. Such use may be hazardous.

This manual was written by

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General Information 1

Introduction 1.1

The BLA Upgrade Controller is an upgrade box for the adaptation of older versions (< AVANCE III) of BRUKER RMN and MRI amplifiers and others too, to the new IPSO console.

- The box is 19" x 1U x 460mm. It has an internal power supply.
- The communication with the console is done via Ethernet.
- The controller can emulate one or two BLA channels.
- The emulated channel characteristics are setup via the embedded service web pages. This implies that no specific software is needed to perform this operation, a web browser is sufficient.
- The firmware for the Upgrade Controller is the same as for the standard BLA E Amplifiers.

Safety 2

The BLA Upgrade Controller is in accordance with the standard 61010-1 safety Requirements for Electrical Equipments.

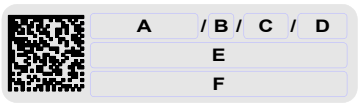
Labels 2.1

Labels are provided to alert operating and service personnel to conditions that may cause personal injury or damage to the equipment from misuse or abuse. Please read the labels and understand their meaning.

Identifying plate 2.1.1

The BLA Upgrade Controller can be identified by an identifying plate at the front panel of the unit that has following information.

Figure 2.1. Identifying plate

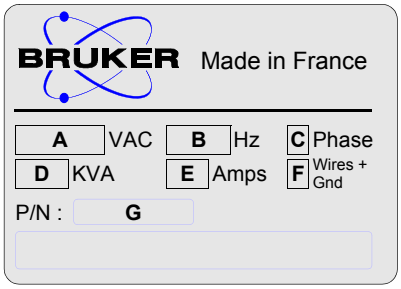


- **(A) Part Number**
  This field indicates the part number of the product.
- **(B) Variant**
  This field indicates the variant number that identifies the production category of the product. The default variant is 00.
- **(C) ECL**
  This field indicates the revision number that identifies the product configuration. The initial revision is 0.00.
- **(D) Serial Number**
  This field indicates the serial number of the product.
- **(E) Type**
  This field contains the designation of the product.
- **(F) Information**
  This field contains additional information about the product.

Manufacturer's nameplate *2.1.2*

The BLA Upgrade Controller can be identified by a manufacturer's nameplate at the back panel of the unit that has following information:

Figure 2.2. Manufacturer's nameplate



- **(A) Voltage**
  This field indicates the input mains voltage of the product.
- **(B) Frequency**
  This field indicates the input mains frequency of the product.
- **(C) Phases**
  This field indicates the number of phases of the mains.
- **(D) Power**
  This field indicates the absorbed power of the product.
- **(E) Current**
  This field indicates the absorbed current of the product.
- **(F) Wires**
  This field indicates number of wires with the ground in the mains cord.
- **(G) Part Number**
  This field indicates the assembly number that identifies the part number of the product.

Warning signs 2.1.3

WARNING! *Risk of electrical shocks*

Figure 2.3. General hazard symbol

Please disconnect line cord before opening or prevent potential hazards such as:

- Electric schock on power supply.
- Contact burn with the heatsink.

Installation 3

The installation of the device must be done only by an authorized and qualified technician, in total accordance with the running standards. Every breakdown due to a non-respect of the following instructions will not be attributable to Bruker and will not be covered by the guarantee clauses.

Initial inspection 3.1

Mechanical check 3.1.1

If damage of the shipping carton is evident, request the carrier's agent to be present when the instrument is unpacked. Check the equipment for damage and inspect the cabinet and panel surfaces for dents and scratches.

Claim for damage 3.1.2

If the unit is mechanically damaged or fails to meet specifications upon receipt, notify BRUKER or our representative immediately. Retain the shipping carton and packing material for the carriers inspection as well as for subsequent use in returning the unit if necessary.

Reshipment and repackaging requirements 3.1.3

Whenever possible, the original carton and packing material should be used for reshipment. If the original packing material is not available, wrap the instrument in heavy paper or plastic. Use a strong shipping container. If a cardboard is used, it should be at least 200 lbs. test material.

Use shock absorbing material around all sides of the instrument to provide a firm cushion and to prevent from movements inside the container wall on each side. Protect the front panel by means of cardboard spacers inserted between the front panel and the shipping carton. Make sure that the instrument cannot move in the container during shipping. Seal the carton with a good grade of shipping tape and mark the container :

" FRAGILE ELECTRONIC INSTRUMENT."

Environment requirements *3.1.4*

This controller is build for inside use only on a maximum high level of 2000m above sea level (6600 feet).
No specific cooling or ventilation is required.
Be sure that the controller has enough area around so that the free air flow into and out of the controller is not obstruct.
It should, however, be in an environment which conforms to the 5°C - 45°C (41°F - 113°F) thermal specifications, a 80% maximum relative humidity of air and a contamination level of 2 (means a normal only non conductive contamination, temporary conductivity due to condensation is possible).

Installation requirements *3.2*

No special precautions are necessary. Mount the equipment in an area which is relatively free of vibration, and has sufficient room for cable connections.
The amplifier is a class II of installation category.

Bench operation *3.2.1*

The unit can be placed onto a secure flat surface.

Power requirements *3.3*

The controller is designed with a built-in switched power supply. The main line connector is a CEI 10A.

One Phase Line requirements :

AC input voltage :	90-264VAC
Input current max :	0.7A
Inrush current max :	30A
Frequency :	47-440Hz

System check *3.4*

Before applying power for the first time the following items should be checked:

- The AC input voltage must be compatible with the power supply (90-264VAC).
- An external blanking (gating) pulse must be supplied to the controller in order the unit to function. Ensure that this pulse has a proper level and logic polarity.
- The internal blanking (gating) output has the same polarity as the blanking input and goes to the amplifier input
- The controller has a nominal input level of +4dBm. Ensure that the system drivers are operating at these levels.
- Check the RJ45 connection between Upgrade Controller, the Ethernet switch and the workstation.

- Check the Ethernet switch power.

Initial turn on procedure *3.5*

The following list describes how to turn on the BLA Upgrade Controller and what should be seen as this occurs.

Before starting this procedure, make sure that you have properly followed instructions in the section ***"System check" on page 12***.

1. Set the circuit breaker to ON so it is lighted.
2. After initialisation (a few seconds), the controller LED on the front panel READY is ON.
3. The green LED on the amplifier RJ45 connector lights up.
4. The system is now fully operational and the 2 channels for emulating the amplifiers channels are ready.

Operation 4

Front Panel 4.1

The BLA Upgrade Controller front panel is provided with 1 power on switch with red ON light, 1 ready green LED indicator, 2 RF input SMA connectors, 2 RF output SMA connectors, 2 blanking input BNC connectors, 2 blanking output BNC connectors and 1 Ethernet interface RJ45 connector.

Indicators 4.1.1

Normal operation is indicated when following light and LED are ON.

Table 4.1. Indicators assignment

Fonctions	Descriptions
READY	Green LED indicates that the controller is ok.
POWER ON	Red light in ON/OFF switch indicates that the AC supply is applied.

Coaxial Connectors 4.1.2

Table 4.2. Coaxial RF and blanking connectors assignment

Connectors	Descriptions
I1, I2	RF nominal inputs +4dBm, SMA type connector (female).
O1, O2	RF nominal outputs +4dBm, SMA type connector (female).
BLK1 IN, BLK2 IN	Blanking signals, BNC type connector (female). TTL logic, 5V = blanking ON, 0V = blanking OFF. When blanking signal is at TTL level high (+5V), no gating is applied to the amplifier stages, and no RF Power is possible. When blanking signal is at TTL level low (0V), the amplifier stages are gated and RF Power is possible.
BLK1 OUT, BLK2 OUT	Blanking signals, BNC type connector (female). TTL logic, 5V = blanking ON, 0V = blanking OFF. When blanking signal is at TTL level high (+5V), no gating is applied to the amplifier stages, and no RF Power is possible. When blanking signal is at TTL level low (0V), the amplifier stages are gated and RF Power is possible.

Interface Connector Ethernet 10/100 4.1.3

The RJ45 connector for the Ethernet 10/100 Mbps link is mounted directly on the controller interface board.

Figure 4.1. RJ45 8 pin connector

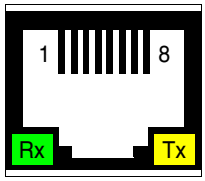


Table 4.3. RJ45 8 pin connector assignment

Pins	Descriptions	Pins	Descriptions
1	Transmit + (Tx+)	4	N/A
2	Transmit - (Tx-)	5	N/A
3	Receive + (Rx+)	6	Receive - (Rx-)

Device Design 4.1.4

Figure 4.2. BLA Upgrade Controller Front Panel Design

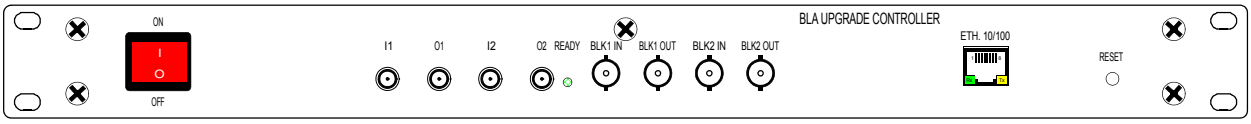
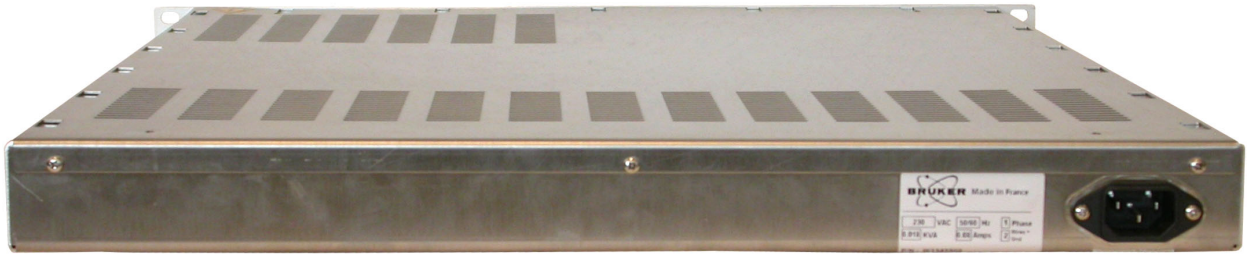


Figure 4.3. BLA Upgrade Controller Front Panel View

Rear panel *4.1.5*

The rear Panel of the BLA Upgrade Controller is free of elements in exception of the three pole (2P + E) line filter socket.

Figure 4.4. BLA Upgrade Controller Rear Panel View



Technical Description

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System Overview 5.1

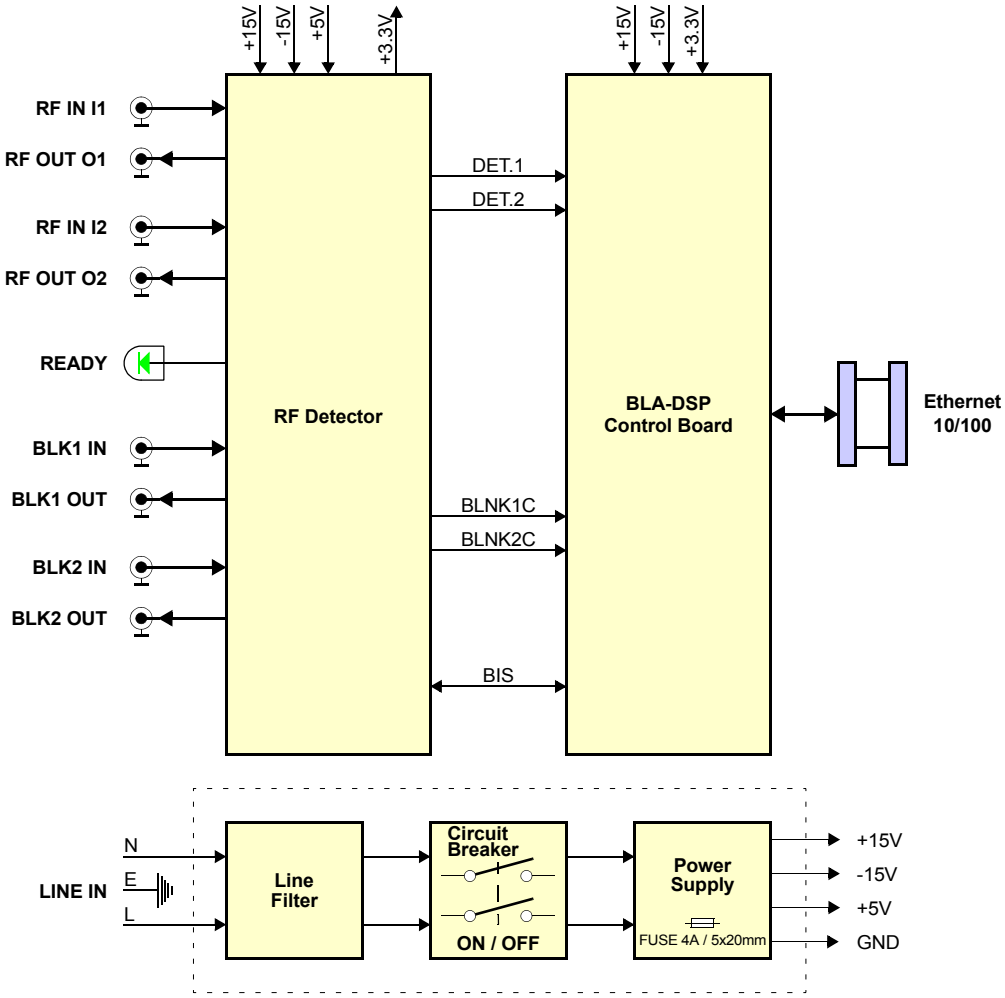
The BLA Upgrade Controller supports 2 amplifier channels.

It needs the RF inputs and blanking inputs for detecting the RF routing.

The RF signal is available at the RF output and the blanking is available at the blanking output.

The communication with the console is done with the Ethernet interface. It allows to technical description of the amplifiers connected to the controller.

Figure 5.1. BLA Upgrade Controller System Block Diagram



Theory of operation 5.2

RF Path and Detectors 5.2.1

The RF signals and blanking goes throught the BLA Upgrade Controller only for checking the RF routing.

BLA Control Board 5.2.2

The CPU unit manages the information of the channel, BIS and amplifier specifics. A Reset button may be used for reinitializing the control board on the front panel.

Ethernet Controller 5.2.3

The Ethernet Controller communicates with the spectrometer.

Warning: the operating of the Ethernet link requires a Spectrometer Management Software such as TOP SPIN .

Servicing the BLA Upgrade Controller 6

Configuration, diagnosis and servicing access to the BLA Upgrade Controller relies on HTTP, allowing service access with any web browser.

Accessing the BLA Upgrade Controller 6.1

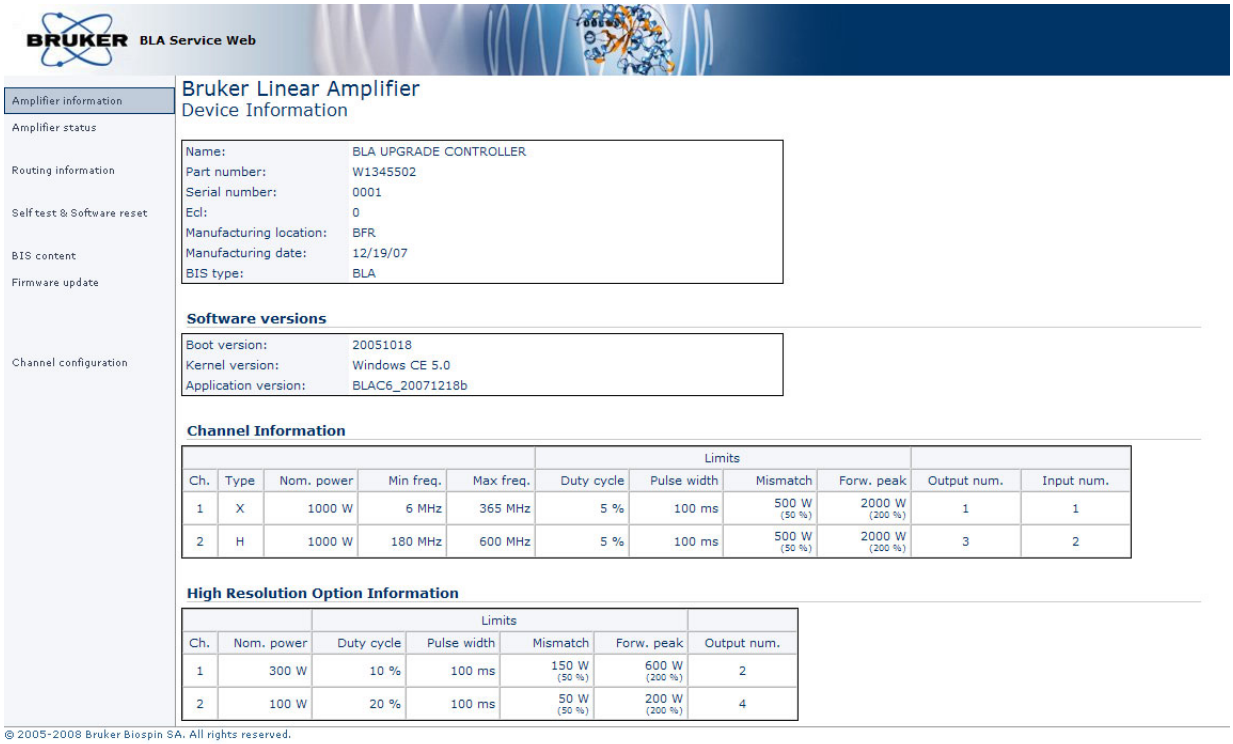
The BLA Upgrade Controller is accessible via the BLA control board with its IP address.

The IP address is given during "cf" by using TOPSPIN 2.xx software on the workstation.

To access the BLA Upgrade Controller, type "ha" in TOPSPIN 2.xx and choose the BLA that should be accessed or start your favourite web browser and type the given IP address as URL.

You should get the following start screen.

Figure 6.1. Device Information

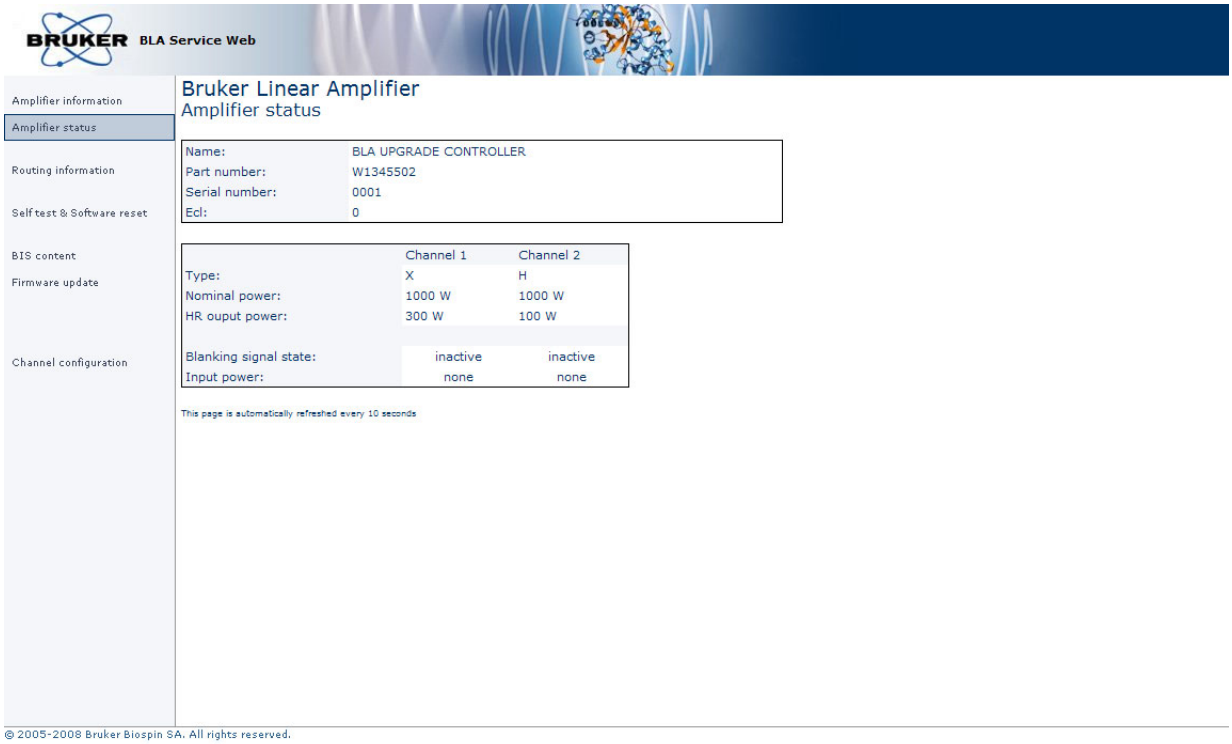


The left panel is the navigation menu. It can be used to navigate through the service pages.

Device status *6.1.1*

Leads you to a page which gives information about the current status of the different channels of the controller.

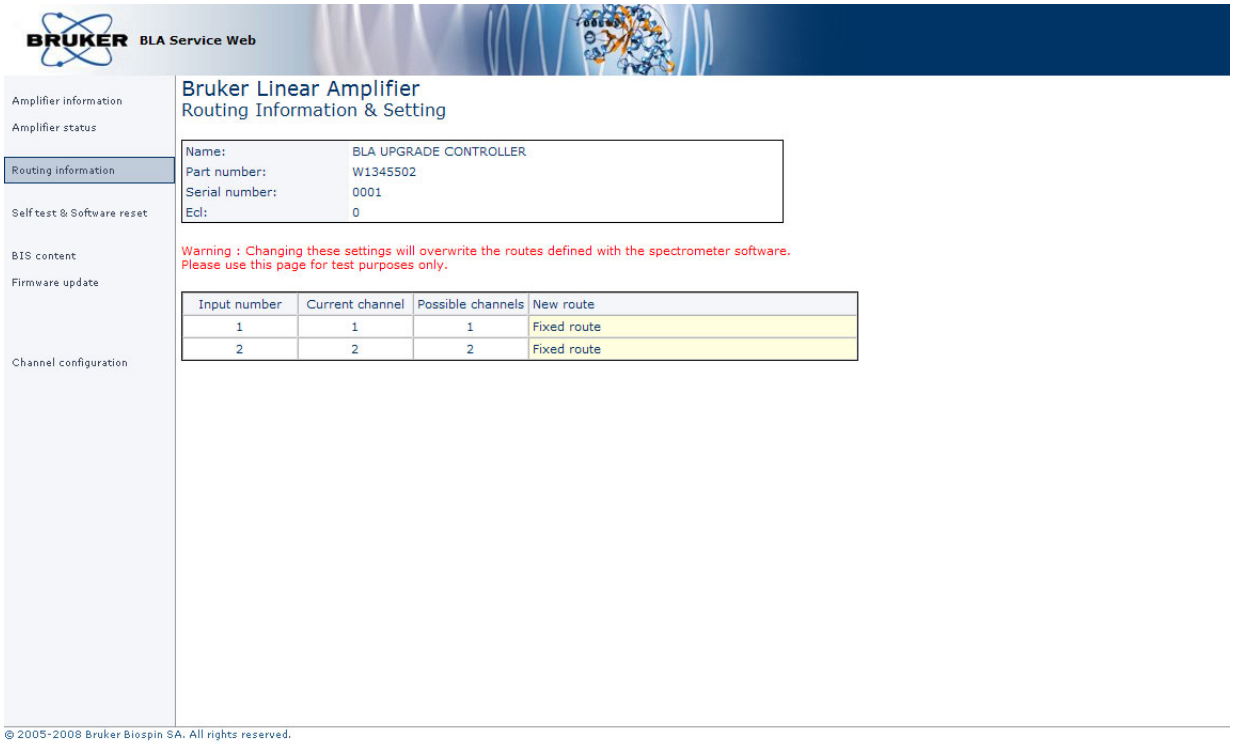
Figure 6.2. Amplifier status



Routing information *6.1.2*

Leads you to a page giving information about the current routed RF path at the upgrade controller inputs and outputs.

Figure 6.3. Routing information



In a BLA Upgrade Controller the routing is fixed.

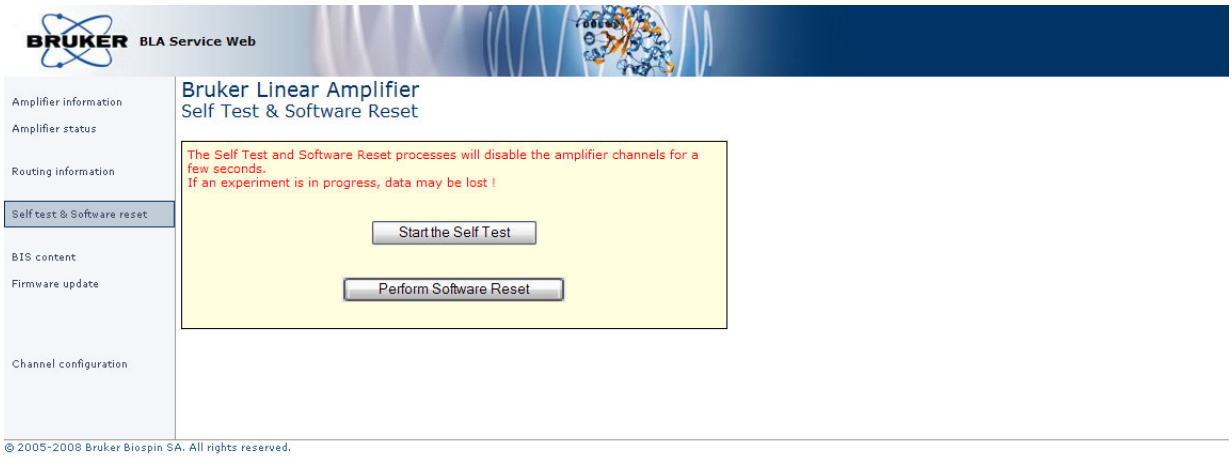
- Input 1 to Output 1.
- Input 2 to Output 2.

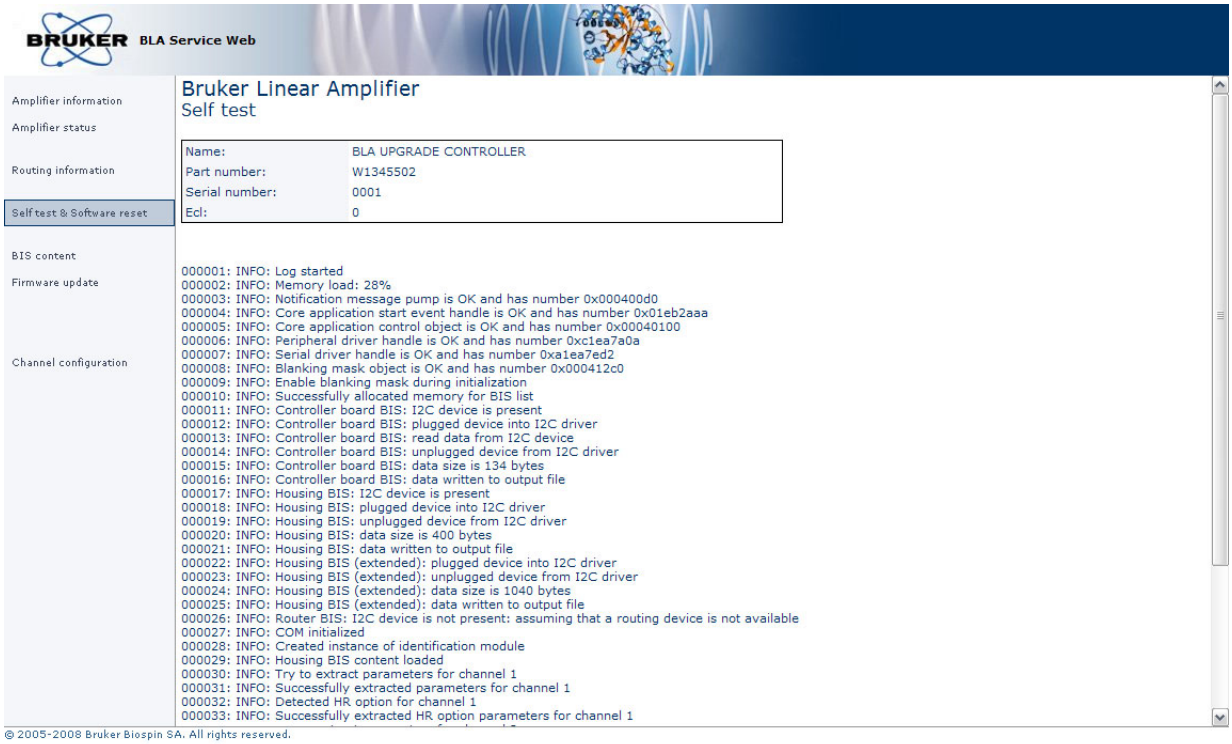
Self-test & software reset *6.1.3*

Leads you to a page allowing you to do a self-test on the BLA control board (Hardware test) and to do a software reset.

Both operations can be done if the BLA Upgrade Controller doesn't work correctly.

Figure 6.4. Self-test and report





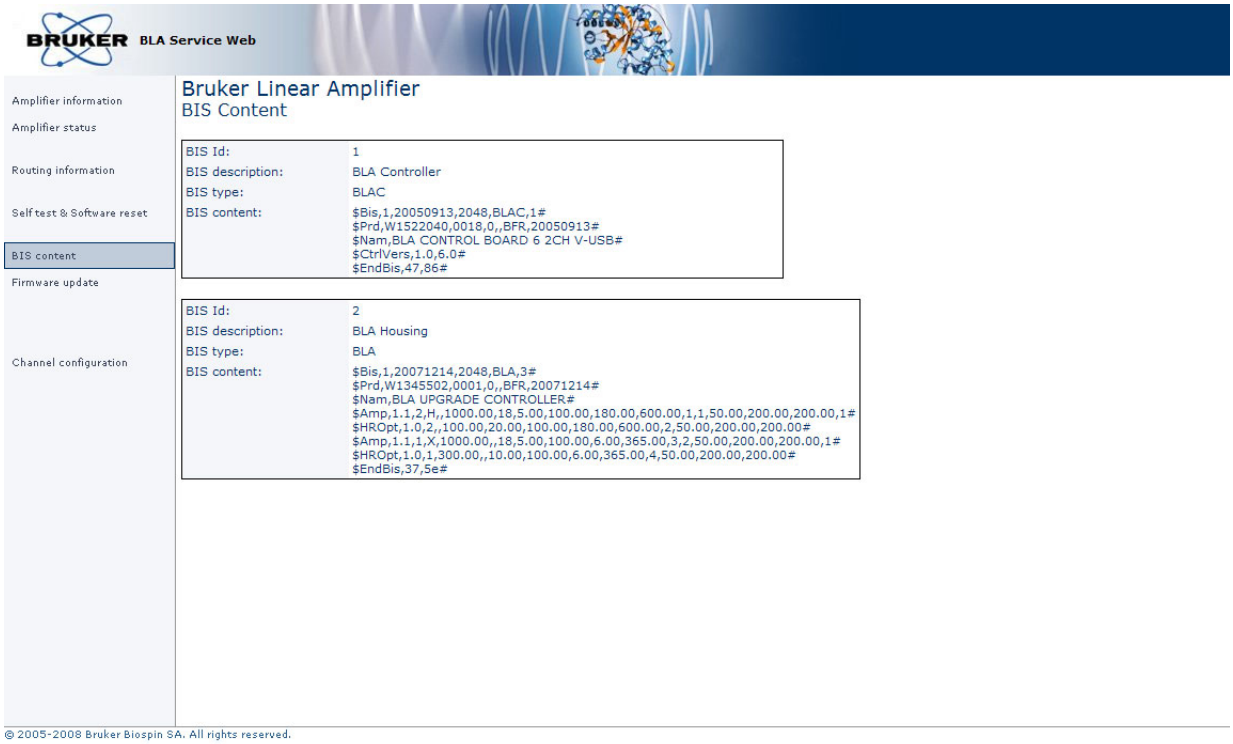
Read the warnings, press **Start the self-test**.

You should have only blue lines in the report .

BIS content *6.1.4*

Leads you to a page giving information about the current BIS programmed on the upgrade controller.

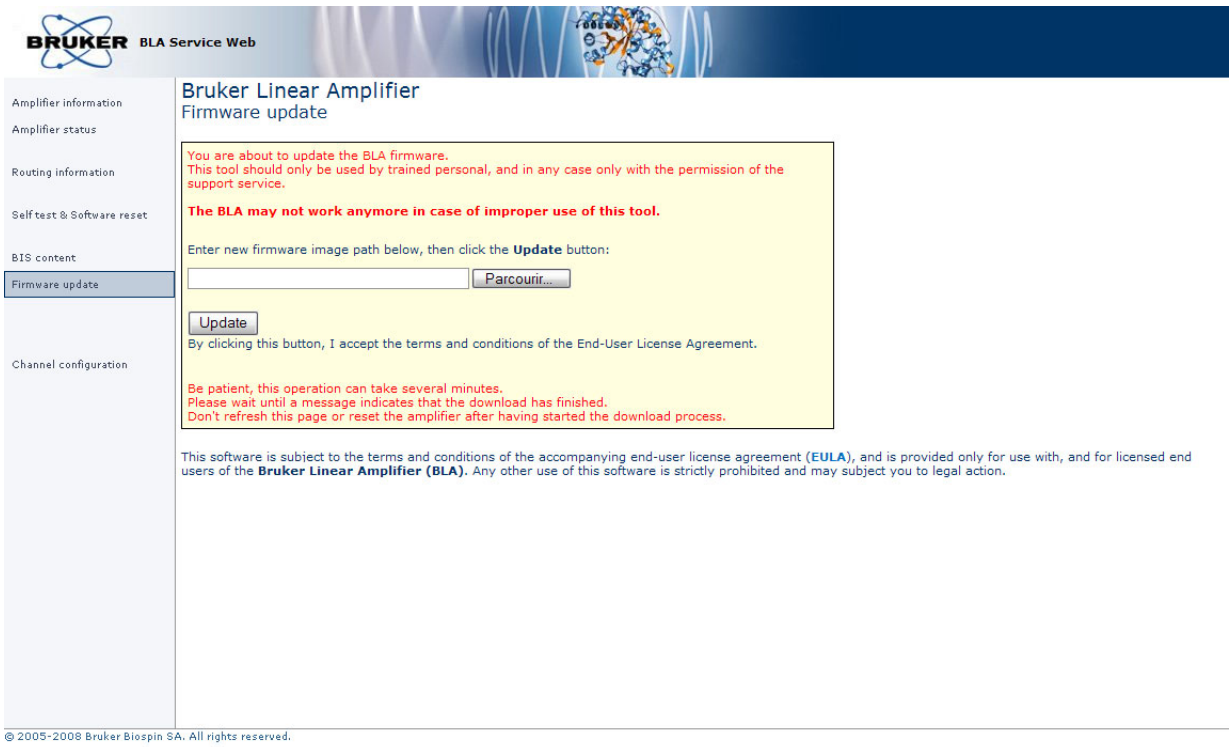
Figure 6.5. BIS content



Firmware update *6.1.5*

Leads you to a page allowing you to download new firmware.

Figure 6.6. Firmware update



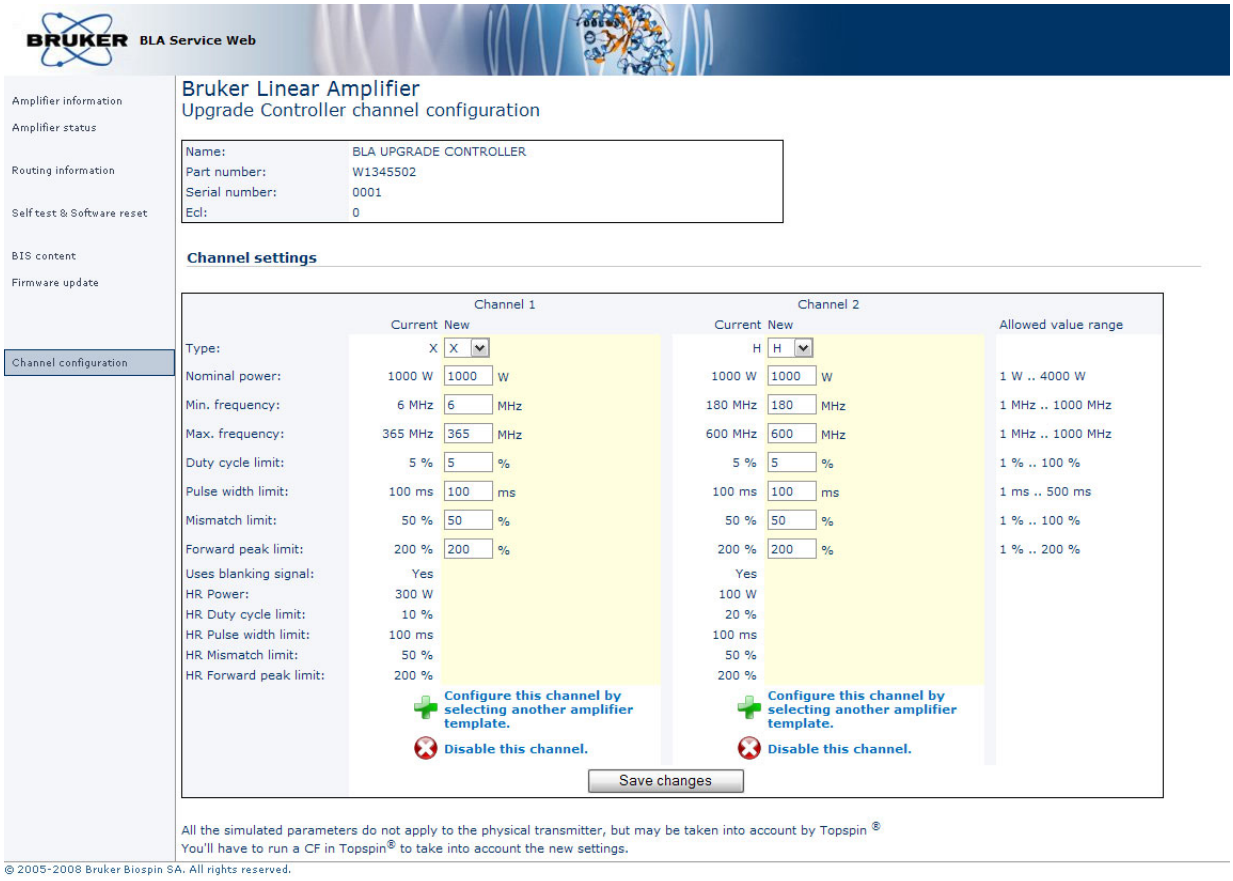
Read the warnings, press the Browse button for selecting the new firmware file to download and press **Update**. Download the new firmware will take a few minutes.

NOTE : This button caption depends on your operating system language settings

Channel configuration *6.1.6*

This page is used to configure the two amplifiers channels emulated by the upgrade controller. The following interface is displayed

Figure 6.7. Channel configuration



The page is divided in two parts, one for each emulated channel. Please note that the channel numbers on this page refers to the upgrade controller signal input/ output numbering and not to the "real" channel numbers inside their respective housings.

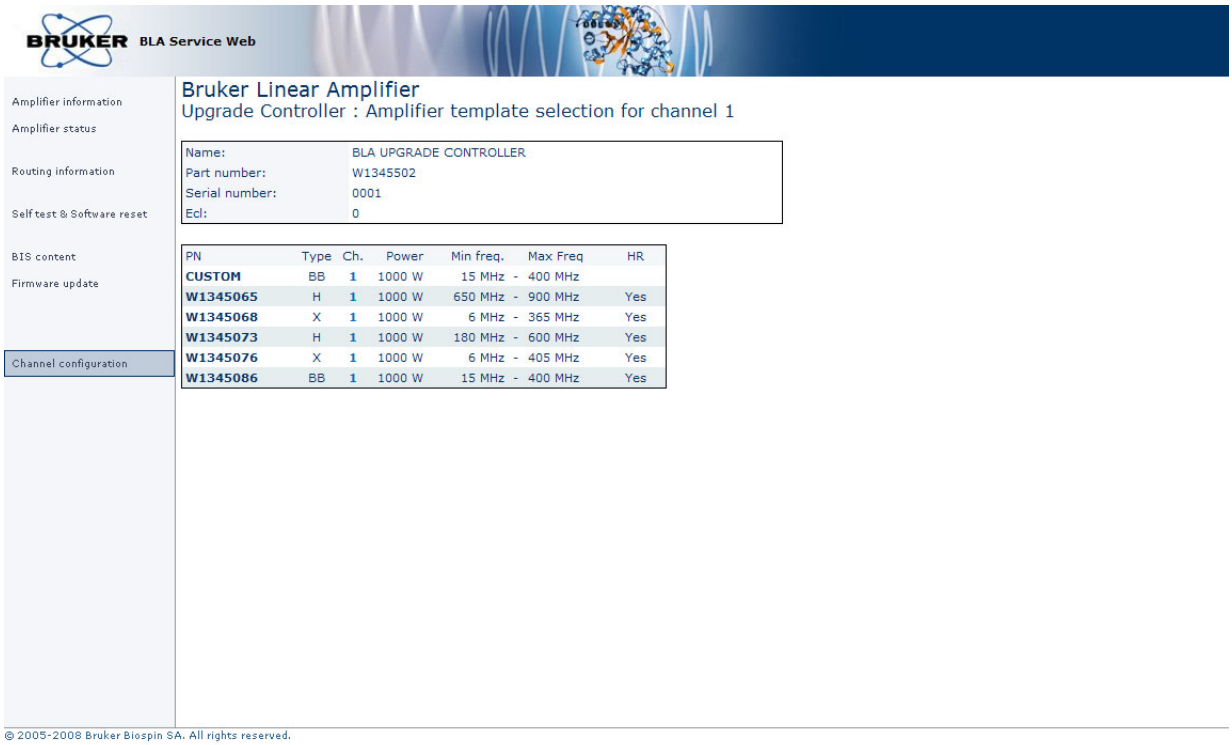
*Note: these parameters are "**simulated**" parameters wich may be different from the actual parameters of the physical transmitters. The latter cannot be changed via the BLA Upgrade Controller box.*

the configuration of the emulated channels can be changed by following these steps:

- Click on the link "**Configure this channel by selecting another amplifier template**" in the column corresponding to the upgrade controller channel to be configured. The next page is displayed.

*Caution: if changes were made in the channel settings the "**Save changes**" button must be clicked before selecting a new amplifier template. Otherwise all channel settings changes will be lost.*

Figure 6.8. Amplifier template selection



- The template is chosen by clicking on the channel number of the amplifier part number to emulate.

Note: HR transmitters are transmitters wich have a high power output (e.g. Solid) and a low power output (e.g. High Resolution).
Example of HR transmitters : BLAX1000 and BLAH1000.

*Note: if an amplifier channel without HR option has to be emulated (e.g. for a non Bruker amplifier), the user can choose the "**CUSTOM**" amplifier part number. The channel characteristics can then be adjusted later (see the next step).*

Note: an amplifier with a HR output is seen as an "one channel amplifier". Such a device will consequently only consume one upgrade controller channel. This means that only one upgrade controller is sufficient to emulate two amplifiers with HR outputs.

Caution: the changes will take effect immediately, in other words the previous channel configuration will be lost as soon as the channel is clicked. In order to cancel the change, the "previous page" button of the web browser must be used before clicking on the channel number.

- After applying the template, the channel configuration page (see ***"Channel configuration" on page 28***) is displayed again. The channel characteristics can now be adjusted if needed.

Note: by clicking the "Save changes" button the changes will be saved for both emulated channels.

*Note: if one or more values are out of range (see the most right column for the allowed ranges), they will be displayed in red after clicking the "**Save changes**" button. If this happens no changes will be applied at all, even if all the values are valid for one of the channels.*

*Caution: after clicking the "**Save changes**" button, all the settings will be saved, there is consequently no way to get back the previous settings if needed.*

- If an upgrade controller channel is not used, it must be disabled by clicking on the link "**Disable this channel**". If this operation is not done, the "cf" command in TopSpin® will fail.

*Note: the two channels cannot be disabled at the same time. This is why the "**Disable this channel**" disappears when there is only one channel which is enabled.*

- In order for the changes to take effect in the spectrometer system, a CF command must be executed in TopSpin®.

Specifications 7

General specifications 7.1

Table 7.1. BLA Upgrade Controller RF specifications

Frequency range	5 to 1000MHz
Insertion Losses	< 0.2dB
Maximum Input Power	+8dBm max.
IN / OUT Impedance	50Ω
Input V.S.W.R.	1,2 max.
Output Harmonics (2nd order)	-45dBc
Output Harmonics (3rd order)	-45dBc
Amplitude Droop	< ±0.5% max.
Amplitude stability versus temperature	< ±0.05% / °C

Table 7.2. AC Power Supply

AC Input Voltage	90-264V
Frequency	47-440Hz
AC Input Current	0.08A (230V)
AC Input Power	20VA
In rush current	30A (230V)
Leakage current	< 0.75mA
AC Fuse	4A 250V

Table 7.3. Internal DC Power Supply

Voltage	+5V, +15V, -15V
Current DC	5A (+5V), 2.3A (+15V), 0.5A (-15V)

Table 7.4. BLA Upgrade Controller Common Specifications

Front Panel Indicator	Controller Ready
Front Panel Interfaces	1 x I/O 8 pins RJ45 connector,
Front Panel controls	AC Line ON / OFF
Front Panel connectors	2 x RF input, 2 x RF output, 2 x gating input, 2 x gating output
Rear Panel Interface	AC Line in socket
Cooling System	Free air convection
Temperature limits	+5°C to +45°C
Size	19" rack cabinet x 1U height x 460mm depth
Weight	5.7kg

Figures

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