

Bruker BioSpin



Gradient and Shim Interface Unit for BGA38S User Manual

Version 001

think forward

NMR Spectroscopy

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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.

All rights reserved for the units, circuits, processes and appellations mentioned herein.

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

Eric Schatz and Vincent Brosseau

This manual was edited and desktop published by

Dominique Wurtz

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Wissembourg, France

P/N: Z31904 DWG-Nr: Z4D11080

For further technical assistance on the GRASI/BGA unit, please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

> BRUKER BioSpin SA 34 rue de l'Industrie F-67166 Wissembourg Cedex France

 Phone:
 + 33 388 066 000

 Fax:
 + 33 388 736 820

 Email:
 support-rmn@bruker.fr

 Internet:
 www.bruker.com

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Introduction

1

The GRASI Unit (**GR**radient **A**nd **S**him Interface) is an interface device designed to drive several gradient amplifiers. Its main function is to lead the gradient pulse sequence signals coming from the Gradient Control Unit to the different amplifiers (X, Y, Z and B0 channels). The integrated power control function protects the gradient set connected to the amplifiers from over_voltage, over_current and the duty cycle is controlled to avoid any power excess on the loads.



Figure 1.1. GRASI Unit diagram



Figure 1.2. GRASI Gradient and Shim Unit

Safety



The GRASI is in accordance with the standard IEC/61010-1:2001 safety Requirements for Electrical Equipments.

Instructions

2.1

The GRASI Unit contains live parts. Using the device with cover removed is forbidden.

Risk of electrical shocks! Be sure of voltage absence before every intervention on the device.

The different wirings must be done by an authorized and qualified technician. Use only the provided cables. Never disconnect any cable during the use of the device.

Sprinkling or pouring liquids on the device is forbidden. Use a wet or alcohol soaked rag to clean the EMB.

For corrective actions contact the BRUKER BIOSPIN representative in your country.

Labels

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

2.2.1

2.2

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

	Α	/B/C/D
		E
		F

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

2.2.2

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

BRUKER Made i	n France
A VAC B Hz D KVA E Amps P/N : G G	C Phase F Wires + Gnd

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.

Table 2.1. Danger

DANGER!



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

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

Safety

Installation

3.1.2

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 panel surfaces for dents and scratches.

Claim for damage

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 re-turning the unit if necessary.

Reshipment and repackaging requirements	3.1.3
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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

This GRASI unit 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 GRASI unit has enough area around so that the free air flow into and out of the GRASI unit is not obstructed.

It should, however, be in an environment which conforms, the $5^{\circ}C - 45^{\circ}C$ ($41^{\circ}F - 113^{\circ}F$) 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

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 GRASI unit is a class II of installation category.

Bench operation

The unit can be placed onto a secure flat surface.

System check

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

- The AC input voltage 220-230 VAC ± 15% range must be compatible with.
- All the necessary cables are connected regarding the labels.

Initial turn on procedure

The following list describes how to turn on the GRASI unit and what should be seen as this occurs.

Before starting this procedure, make sure that you have properly followed instructions in the section <u>"System check"</u>.

- 1. Connect the amplifier to the AC line and turn the circuit breaker to ON.
- 2. Observe the indicators on the front panel :
 - The ON/OFF switch lights red.
 - After a few seconds, the 3 front panel LEDs light up red and the initialisation process is started.
- After approximatively one minute, the LEDs turn off. The GRASI unit is ready for use.
- 4. If the LEDs do not turn off, see the "Troubleshooting" on page 15.

3.4

3.2.1

3.2

Operation

4

4.1

General fonctions



Figure 4.1. Functional block diagram

Amplifier selection

The first step before starting is to select the type of amplifier used with the GRASI unit. This selection is performed using a dedicated Web page. This action should be done only by Bruker trained personnel. Choosing a wrong amplifier type can lead to irreversible damage of the entire spectrometer. The selection is done once at the first switch on. Once this selection is made, there should be no reason to select another type of amplifier. If for any reason a change of amplifier type is made, the type of the previously selected amplifier will be saved for safety reasons.

Coil code selection

The Coil Code selection occurs automatically when the SUB-D 37 connector is inserted. The code is detected and in accordance with the selected amplifier, the different limit values for the power control are set. The control function supported by the DSP uses these values to check if a limit is overridden.

Powering up

The GRASI Unit is switched on helps the "ON/OFF" button located on the front panel.

Initialisation process

The initialisation process needs about one minute to be completed. During the initialisation process, the output channels are calibrated and the offset corrected.

Important : After switching on the GRASI Unit, the switch light lights red. A few seconds after switching on, the three front panel LEDs light up red and remain lightened for about one minute. This is the external sign for the operator to announce initialisation process. Once the three front panel LEDs switched off, the GRASI Unit is ready for operation. Please note that during initialisation process, no commands should be sent to the GRASI Unit.

Calibration

Before the device can be used for imaging application, all calibration steps must be done according to the ParaVision/TopSpin tune-up procedure.

14 (41)

Warning : Danger harware damage. Missing or wrong calibration settings can lead to destruction of gradient hardware and insufficient image quality.

4.1.2

4.1.4

4.1.5

4.1.3

4.1.1

Error messages

When an error occurs, this is announced by the three front panel LEDs. The error description is as follows :

Table 4.1. Troubleshooting

Description of the message	Nature of the error	Troubleshooting
Over_voltage LED lights red	A voltage limit has been overridden	Check the gradient set and the amplifier output
Over_current LED lights red	A current limit has been overridden	Check the gradient set and the amplifier output
Duty Cycle LED lights red	The duty cycle limit has been overridden	Check the pulse program
The three LEDs light red together in blinking mode	No limit values available, the DSP control could not be started	Check if an amplifier is selected, check if the Coil Code is selected
The three LEDs are blinking in turn	An internal error occurred	HW-Reset the GRASI Unit

Operation

Technical description

5.1

General description

The GRASI is a 19" unit with following dimensions :

- Height : 2U
- Width : 19"
- Depth : 460mm
- Weight : 8kg



Figure 5.1. Housing dimensions

Power requirements

The GRASI Unit is powered by the mains input.

Main characteristics

- AC input voltage range : 100~240VAC ±10%
- AC inrush current : 40A at 230VAC
- Power consumption : 220VAC 300mA
- Fuses : 2A T 250VAC

5.2

Front panel connectors



Figure 5.2. Figure 7 : BNC female connector

 Table 5.1.
 BNC female of Monitor X definition

Pins	Descriptions
1	MONITOR_X
2	MONITOR_X_GND

Table 5.2. BNC female of Monitor Y definition

Pins	Descriptions
1	MONITOR_Y
2	MONITOR_Y_GND

Table 5.3. BNC female of Monitor Z definition

Pins	Descriptions
1	MONITOR_Z
2	MONITOR_Z_GND

Pins	Descriptions
1	MONITOR_B0
2	MONITOR_B0_GND

Front panel indicators

5.4

The front panel is equiped with three red LED's to indicate different errors.

- Overvoltage
- Overcurrent
- Duty Cycle



Figure 5.3. Red led indicator

Front panel buttons

This unit is equiped with a "RESET" button to reset errors.



Figure 5.4. Error reset button

	Rear	panel	conne	ctors
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Gradient Coil Code connector from Gradient set

5.6.1

5.6

Coil Code Interface Connector from Coil to GRASI.



Figure 5.5. Sub-D 37 pin female connector

Pins	Descriptions	To use	Pins	Descriptions	To use
1	SCHALT_GND	Used	20	TC_4	Unused
2	SCHALT_A0	Used	21	TC_5	Unused
3	SCHALT_A1	Used	22	TC_6	Unused
4	SCHALT_A2	Used	23	PT100_GND	Unused
5	SHIM_P5V (Interlock)	Unused	24	TC_GND	Unused
6	SHIM_GND (Interlock)	Unused	25	SCREEN	Unused
7	GRAD_P5V (Interlock)	Unused	26	NC	Unused
8	GRAD_GND (Interlock)	Unused	27	NC	Unused
9	PT100_1	Unused	28	NC	Unused
10	PT100_2	Unused	29	NC	Unused
11	PT100_3	Unused	30	NC	Unused
12	PT100_4	Unused	31	NC	Unused
13	PT100_5	Unused	32	NC	Unused
14	PT100_6	Unused	33	NC	Unused
15	SCHALT_A3 (reserve)	Used	34	NC	Unused
16	SCHALT_A4 (reserve)	Used	35	NC	Unused
17	TC_1	Unused	36	NC	Unused
18	TC_2	Unused	37	NC	Unused
19	TC_3	Unused			

Table 5.5. Sub-D 37 pin female definition

Status and Command connector from GPSCU

5.6.2

Status and Command connectors from GPSCU to GRASI on each channel.



Figure 5.6. Sub-D 15 pin male connector

Pins	Descriptions	Pins	Descriptions
1	SHIELD (2, 9)	9	IN+
2	IN-	10	NC
3	NC	11	RESET
4	VOLT MON	12	SHIELD (4, 11)
5	EN+	13	CURR MON
6	EN-	14	NORMAL
7	SHIELD (13, 14)	15	CLK
8	SHIELD (5, 6, 15)		· · · · · · · · · · · · · · · · · · ·

Table 5.6.Sub-D 15 pin male definition

Status and Command connector to amplifier

5.6.3

Status and Command connector from GRASI to Amplifier on each channel.



Figure 5.7. Sub-D 15 pin female connector

Pins	Descriptions	Pins	Descriptions
1	SHIELD (2, 9)	9	IN+
2	IN-	10	NC
3	NC	11	RESET
4	VOLT MON	12	SHIELD (4, 11)
5	EN+	13	CURR MON
6	EN-	14	NORMAL
7	SHIELD (13, 14)	15	CLK
8	SHIELD (5, 6, 15)		

Interlock Binder connector



Figure 5.8. Binder 2 pin female connector

Table 5.8	Rinder 2 ni	n female	definition
	Dilluci Z pi	ricinale	ucinnuon

Pins	Descriptions
1	INTERLOCK
2	INTERLOCK_GND

Coil Code Binder connector

Coil Code Binder from GRASI to GPSCU.



Figure 5.9. Binder 6 pin female connector

Table 5.9.

Binder 6 pin female definition

Pins	Descriptions	Pins	Descriptions
1	GND	4	A2
2	A0	5	A3
3	A1	6	A4

5.6.5

5.6.4

B0 Output +/-10V Twinaxe.



Figure 5.10. Twinaxe connector

Table 5 10	Twinaxe definition

Pins	Descriptions
1	B0_OUT+
2	B0_OUT-
3	SHIELD

Interface Connector Ethernet 10/100

The RJ45 connector for the Ethernet 10/100 Mbps link is mounted directly on the CPU-A Board.



Figure 5.11. RJ45 8 pin connector

Table 5.11. RJ45 8 pin definition

Pins	Descriptions	Pins	Descriptions
1	Transmit + (Tx+)	5	N/A
2	Transmit - (Tx-)	6	Receive - (Rx-)
3	Receive + (Rx+)	7	N/A
4	N/A	8	N/A

5.6.7

Rear panel overview



Figure 5.12. Rear panel view

5.7

Servicing the GRASI

Diagnosis and servicing access to the GRASI unit relies on HTTP, allowing service access with any web browser.

Accessing the GRASI unit

6.1

The GRASI Gradient and Shim Interface Unit for BGA38S is accessible via the CPU-A board with its IP address.

The IP address is given during "cf" by using TOPSPIN 2.xx software under PARAVISION 5 on the workstation.

In case of problems :

- Check the RJ45 cabling between GRASI, Ethernet switch and workstation.
- Check the Ethernet switch power.
- Check if the green LED on the GRASI RJ45 connector lights up.

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

Some of these pages are only status pages to inform the operator, some other pages allow to modify several parameters of the GRASI unit.

You should get the following start screen.

Sub Toolbar Information

Device Information

This page shows the main information of the device.

On the left frame, the operator can choose a submenu to get the remaining information concerning the device.

GRASI Control Unit Device information Same: GRASI Control Unit Part number: 0001 Edited in the same	Urdient and Shim Interface (GRASI) Information Basic Operations Maintenance Diagnostics atton Information GRASI Control Unit Part number: UNIT status Serial number: 0001 Editor Editor Information Basic Operations BFR Manufacturing location: BFR Manufacturing location: BFR BIS type: BGAU Software versions Boot version: 20060124 Kernel version: 1.2 00060124 Kernel version: Application version: 1.2 - GRASI1B_20081030 Settings version: Settings version: 1.2 Current status Amplifier name: C700 (code:3) Coil name: Device status: Ready Editor						
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		k forward	Device status:	Ready	<u></u>		

Figure 6.1. Device Information

6.2.1

Device Status

Select the tab "Information", then the item "Device status".

This page shows the device status.

When a fault is detected, the corresponding item is in red color.

	Gradient and Shim Interf	ace (GRASI)		
	Information Ba	sic uperations Maintenanc	e Diagnostics	
	Device Status			
Information Device information	Control board temperature	: 31.0°C		
Device status	General			
BIS content	CPU-Board initialization er	ror		
	CPU-Board hardware erro	r		
	Control-Board initialization	n error		
	Control-Board hardware e	irroi:		
	Amplifier pot selected			
	Coil not connected			
	Power monitoring stopped			
	DSP watchdog fault			
	LVDS clock not present			
	Channel-X	Channel-Y	Channel-Z	Channel-B0
		05520000526000	Board initialization error	Board initialization error
	Board initialization error			
nink forward	Board initialization error Board hardware error			
nink forward	Board initialization error Board hardware error Board not ready			
nink forward	Board initialization error Board hardware error Board not ready Duty Cycle error			
nink forward	Board initialization error Board hardware error Board not ready Duty Cycle error Over current error			

Figure 6.2. Device Status

BIS Content

This page shows the BIS content of the different GRASI channels. It also shows the BIS content of the CPU board and the Controller board.

nformation		
Bruker Gradient U	nits	BRUKEF
	Gradient and Shim I	Interface (GRASI)
	Information	Basic Operations Maintenance Diagnostics
	BIS content	
Information		
Device information	BIS Id:	4
Device status	BIS description:	GRASI Control Unit
BIS content	BIS type:	BGAU
	BIS content:	bis,1,2006/10/2,2048,BGAD,1# \$rd,W1522129,0001,01,45FR,20080702# \$ham,GRASI Control Unit# \$ba8d,1,0,W1500350,0032,01,5RASI Control Board# \$chanCrk,1,0,0:830000# \$c'cl04,1,0,0:830000# \$c'cl04,1,0,0:830000# \$c'cl04,1,0,0:830000# \$c'cl04,1,0,0:830000# \$c'cl04,1,0,0:830000#
	BIS Id:	5
	BIS description:	GRASI CPU Board
	BIS type:	BGACPU
	BIS content:	505,1,200000,2049,05,03,070,1 \$Prd,W1252043,0312,0,5FR,20080806# \$Nam,GRA52043,0312,0PLBoard# \$EndBis,e4.fe#
nink forward	BIS Id	0
IIIK IOI Walu	BIS description:	GRASI Chappel Board
	BIS type:	BGACH
	BIS content:	\$bis,1,20080702,2048,BGACH,1# \$Prd,W1522074,0134,01,BFR,20080702# \$Nam,SRASIChannel Board# \$EndBis,8a,eb#
	BIS Id:	1
	BIS description:	GRASI Channel Board
	BIS type:	BGACH
	BIS content:	\$Bis,1,20080702,2048,BGACH,1# \$Prd,W1522074,0107,01,j6FK,20080702# \$Nam,5GAS1 Channel Board#
		\$EndBis,80,80#
	pre ta	\$Enabls,xd,ex#
	BIS Id:	\$EndBis,sa,ee≠
	BIS Id: BIS description: BIS trace	2 GRASI Channel Board

Figure 6.3. BIS Content

Offsets

6.3.1

6.3

Select the tab "Basic Operations", then click on the "Offsets" item.

This page shows the current offsets values for each channel, used for the zerocompensation.

You may modify them manually or execute the auto-compensation by activating the "*Start*" button.

Information				
Bruker Gradient Unit	ts			BRUKER
	Gradient and Shim Interface (GRASI)	-		
	Information Basic Operations	Maintenance Dia	gnostics	
Basic Operations	Offsets			
Offsets	Channel-X	Channel-Y	Channel-Z	Channel-B0
Reset error	Offset value 2.290 %	2.358 %	0.362 %	-35.553 %
	Zero compensation Start Gain calibrati	on Start Gain calibration	Start Gain calibration	Start Gain calibration
think forward				

Figure 6.4. Offsets

Reset Error

Select the tab "Basic Operations".

If necessary, click the item "Reset error" on the left menu.

This has the same effect as the "Reset error" button on the GRASI front panel.

	Gradient and Shim In	erface (GRASI)	
	Information	Basic Operations Maintenance	Diagnostics
	Device informa	tion	
Basic Operations	mana	20107 0 11 11 1/	
Offsets	Name:	GRASI Control Unit	
Reset error	Serial number:	0001	
	Ecl:	01	
	Manufacturing location	BFR	
	Manufacturing date:	2/7/2008	
	BIS type:	BGAU	
	Software versions		
	Boot version:	20060124 Windows 05 5 9	
	Application version:	1 2 - CRASTIR 20081030	
	Settings version:	1.2	
	eoungs rerstern	de 1 fec	
	Current status		
	Amplifier name:	C700 (code:3)	
	Coil name:	BGA 38S2 (code:13)	
nink forward	Device status:	Ready	
	WARNING : the monito	ring signal (measurable on the front panel) an	nd the real output signal have opposite signs

Figure 6.5. Reset Error

Sub Toolbar Maintenance	6.4
Settings Update	6.4.1

When necessary, some settings may be updated or upgraded via BRUKER data files. In this case, select the tab "Maintenance", then the item "Settings update" in the left menu.

Select the settings file with the browser, then click the "*Update*" button to start the update process.

Information					🛛
Bruker Gradient Uni	its				BRUKER
	Gradient and Shim I	Interface (GRASI)			
	Information	Basic Operations	Maintenance	Diagnostics	
Maintenance	Settings upda	ite			
Settings update Firmware update Device reset	You are . This tool of the su The dev	about to update the setting should only be used by tra pport service. vice may not work anym	s. ined personal, and ore in case of in	in any case only with the permission	
	Enter new settings f	ile path below, then click th	e Update button: Browse		
	Update Be patient, this oper Please wait until a n Don't refresh this pa	ration can take several min nessage indicates that the c age or reset the device afte	utes. Jownload has finish r having started th	ied. e download process.	
think forward	I				

Figure 6.6. Settings Update

Firmware Update

Select the tab "Maintenance", then the item "Firmware update" in the left menu.

This page allows the operator to update the firmware of the internal CPU of the device.

The operator will have to choose the correct file using the "**Browse...**" button and then click the "**Update**" button to start the update process. This process may request several minutes. Please do not quit before the window changes and informs that the update was successful. The two windows are the following:

Maintenance					
Bruker Gradient Uni	ts			BR	JKER
	Gradient and Shim I	interface (GRASI)			
	Information	Basic Operations	Maintenance	Diagnostics	
Naintenance Settings update Firmware update Device reset	Firmware upo This tool of the su The dev	late about to update the firmwe should only be used by tra pport service. vice may not work anyn	are. ained personal, an nore in case of ir	l in any case only with the permission nproper use of this tool.	
	Enter new firmware Update By clicking this butto Be patient, this oper Please wait until a m Don't refresh this pat	image path below, then of on, I accept the terms and ration can take several min ressage indicates that the age or reset the amplifer a	ick the Update bu Browse conditions of the E nutes. download has finis fiter having starter	ton: nd-User License Agreement. red. the download process.	
think forward	This software is subj use with, and for lice you to legal action.	ect to the terms and condi nsed end users of the Bru	tions of the accom ker Gradient Uni	enving end-user license agreement (EULA), and i t. Any other use of this software is strictly prohibit	s provided only for ed and may subject



Figure 6.7. Firmware Update

Device Reset

Select the tab "Maintenance", then the item "Device reset" in the left menu.

On this page, the operator is allowed to reset the GRASI unit.

In order to avoid an undesired reset, the operator will have to confirm by clicking the "*Perform Software Reset*" button.

Resetting the device sets it into the same state as after the first turn on.

Maintenance	
Bruker Gradient Units	KER
Gradient and Shim Interface (GRASI)	
Information Basic Operations Maintenance Diagnostics	
Software reset	
Settings update Firmware update Device reset If an experiment is in progress, data may be lost !	
Perform Software Reset	
think forward	
UNITIK TOT WATCH	

Figure 6.8. Device Reset

Sub Toolbar Diagnostics

Event Log

Select the tab "Diagnostics", then the item "Event log" in the left menu.

On this page, the operator can verify which actions have been performed and which events happened since the unit has been switched on.

Bruker Gradient Ur	iits		BRUKE		
	Gradient	and Shim Int	iterface (GRASI)		
	Infor	mation	Basic Operations Maintenance Diagnostics		
	Event	loa			
Diagnostics	LVCIIC	log			
Event lea	Line	Severity	Message		
Evenciog	00001	INFO	[MAIN] Firmware version : 1.2 - GRASI1B_20081030		
	00002	INFO	[UPNP] Message Queue created		
	00003	INFO	[GRASI] initializing peripheral bus handle		
	00004	INFO	[GRASI] PLD version : [01]		
	00005	INFO	[GRASI] initializing I2C bus handle		
	00006	INFO	[GRASI] initializing CPU board		
	00007	INFO	[GRASI] initializing CONTROL board		
	00008	INFO	[GRASI] initializing CHANNEL X board		
	00009	INFO	[GRASI] initializing CHANNEL Y board		
	00010	INFO	[GRASI] initializing CHANNEL Z board		
	00011	INFO	[GRASI] initializing CHANNEL B0 board		
	00012	INFO	[SETTINGS] version : 1.2		
	00013	INFO	[SETTINGS] amplifier[3:C700] limits selected		
	00014	INFO	[SETTINGS] coil[13:BGA 38S2] limits selected		
	00015	INFO	[SETTINGS] scale factor [0.830] used		
ink forward	00016	INFO	[SETTINGS] Pulse Width Limit on X : 3.486 ms		
IIIK IUI walu	00017	INFO	[SETTINGS] Pulse Width Limit on Y : 3.475 ms		
	00018	INFO	[SETTINGS] Pulse Width Limit on Z : 3.460 ms		
	00019	INFO	[SETTINGS] Current Limit : 253.0 A => 3.614 V		
	00020	INFO	[SETTINGS] Voltage Limit : 315.0 V => 3.150 V		
	00021	INFO	[CHANNEL_X] setting potentiometer value to 10.0V		
	00022	INFO	[CHANNEL_Y] setting potentiometer value to 10.0V		
	00023	INFO	[CHANNEL_Z] setting potentiometer value to 10.0V		
	00024	INFO	[CHANNEL_B0] setting potentiometer value to 10.0V		
	00025	INFO	[MAIN] starting WebServices server		
	00026	INFO	[MAIN] starting main loop		
	00027	INFO	[CHANNEL_X] offset regulation started with 1.250000V (0.000%) @35.0°C, 0.400mV/°		
	00028	INFO	[CHANNEL_Y] offset regulation started with 1.250000V (0.000%) @35.0°C, 0.400mV/°		
	00029	INFO	[CHANNEL_Z] offset regulation started with 1.250000V (0.000%) @35.0°C, 0.400mV/°		
	00030	INFO	[CHANNEL_B0] offset regulation started with 1.250000V (0.000%) @35.0°C, 0.400mV/°		
	00031	WARNING	G [GRASI] amplifiers enabled		

Figure 6.9. Event Log

Specification

General specifications

Constant Internal Protection	Overcurrent, Overvoltage and Duty Cycle Overriding detection on the 4 channels
Front Panel Indicators	ON / OFF switch light Overvoltage, Overcurrent and Duty Cycle error LEDs
Front Panel Connectors	4 x BNC, Input Monitor for channel X, Y, Z and B0
Front Panel Controls	AC Line ON / OFF, Error Reset button
Rear Panel Indicators	Ethernet status LEDs
Rear Panel Connectors	AC Line Connector 1 x SUB-D 37 Coil Code Connector from Gradient Set 1 x 2 pin BINDER Interlock Connector 1 x 6 pin BINDER Coil Code Connector to GPSCU 1 x TWINAXE B0 Output Connector 1 x LVDS Connector 1 x LVDS Connector 1 x USB B Connector 2 x USB A Connector 1 x SUB-D 15 from GRASI channel B0 to Amplifier B0 Connector 1 x SUB-D 15 from GRASI channel X to Amplifier X Connector 1 x SUB-D 15 from GRASI channel X to Amplifier Y Connector 1 x SUB-D 15 from GRASI channel Z to Amplifier Z Connector 1 x SUB-D 15 from GRASI channel Z to Amplifier Z Connector 1 x SUB-D 15 from GRASI channel Z to Amplifier Z Connector 1 x SUB-D 15 from GPSCU to GRASI Channel B0 Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel Z Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel X Connector 1 x SUB-D 15 from GPSCU to GRASI Channel Z Connector 1 x SUB-D 15 from GPSCU to GRASI Channel Z Connector
Rear Panel Interface	LVDS 48 bit from GCON or DPP Ethernet 10/100 Base T Tx
Cooling System	Natural Convection
Size	19" rack cabinet x 2U height x 460mm depth
Weight	8kg
Power requirements	100 - 240VAC ±10%, single phase 50-60Hz Bruker part number W1522072 Consumption max. 69VA (0,300A @ 230VAC)

Table 7.1. GRASI Unit Specifications

7.1

Ouputs	±10 VDC on set value for channel B0 ±10 VDC on set value for channel X ±10 VDC on set value for channel Y ±10 VDC on set value for channel Z
Inputs	±10 VDC for I monitoring on channel X ±10 VDC for U monitoring on channel X ±10 VDC for I monitoring on channel Y ±10 VDC for U monitoring on channel Y ±10 VDC for I monitoring on channel Z ±10 VDC for U monitoring on channel Z
Open or Closed Contacts	Interlock to GPSCU (on 2 pin BINDER Interlock Connector) A0 to A6 for Coil Code (on SUB-D 37 Coil Code Connector from Gradient Set and 6 pin BINDER Coil Code Connector to GPSCU)

Table 7.2.	GRASI unit In	puts / Outputs	specifications
10010 1.L.		palo / Galpalo	opoonioaliono

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End of Document

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info@bruker-biospin.com www.bruker-biospin.com

