



scannexus

CU Manual

Version 3.0

Date last modified August 2023

Updating scanning information 7T after 7T Upgrade

Updating phone numbers

Updating link to Scannexus service desk

Version 2.0

Date last modified July 2020

Updated

Chapter 2.5 Wiki information is replaced by Scannexus Service Desk

Chapter 2.6 is added; how to report a technical issue

Chapter 3 GUFU Magnet Safety Training is added

Chapter 7 Some changes in how to act when table movement fails

Chapter 9 SAR limit exceeded changed the order how to act when scanning EPI

Chapter 10 Added the FLEET bug when using geometrical distortion correction. And added a screenshot to show how to invert the RO/PE polarity.

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1 INTRODUCTION

Dear Certified Users,

This manual describes the basic usage of our scanners and equipment. You can find basic information about important phone numbers, safety, screening, preparing your measurement, peripheral equipment, etc..

If you need more information, please contact the Support Staff. Detailed information about equipment, special protocols can be found at our Scannexus self-service portal: <https://scannexus.atlassian.net/servicedesk/>

GENERAL INFORMATION


2 GENERAL INFORMATION

2.1 EMERGENCY PHONE NUMBERS

For medical/fire emergencies/ERO assistance: **1333**
043-387 5566

In case of a quench: **088-2100510** general service number of SIEMENS (24/7)
(Use in consultation with Scannexus Staff only!)

2.2 CONTACT NUMBERS FOR MRI SCANNING FACILITY - OXFORDLAAN 55

Room	Room	Phone	 scannexus
Reception	T0.007	+31 43 3885667	
3T Console	T0.009	+31 43 3885838	
7T Console	T0.027	+31 43 3887421	
9.4T Console	T0.026	+31 43 3887422	

Person	Phone	Mobile	E-mail
Support Team	+31 43 3885667	+31 6 38764939	scanlabs@scannexus.nl
Desmond Tse	+31 88 3887435	xxx	d.tse@scannexus.nl
Job van den Hurk	+31 43 3885837	xxx	j.vandenhurk@scannexus.nl
Esther Steijvers	+31 88 3887424	xxx	e.steijvers@scannexus.nl
Sanne Schins	+31 88 3887426	xxx	s.schins@scannexus.nl
Rick Voncken	+31 43 3881242	xxx	r.voncken@scannexus.nl

Service	Phone	Full number
Service Desk Facilities	+31 43 3882002	
Security/Burglar Alarm	+31 43 3885566	
UM Emergency	1333	+31 43 3875566
Siemens Hotline	+31 88 2100510	

ASSISTANCE INSIDE OFFICE HOURS: Contact Support/ MRI Research Technicians for any problems +31 6 38764939	ASSISTANCE OUTSIDE OFFICE HOURS: Desmond Tse Esther Steijvers Job van den Hurk Sanne Schins Rick Voncken
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2.3 OUT OF OFFICE HOURS

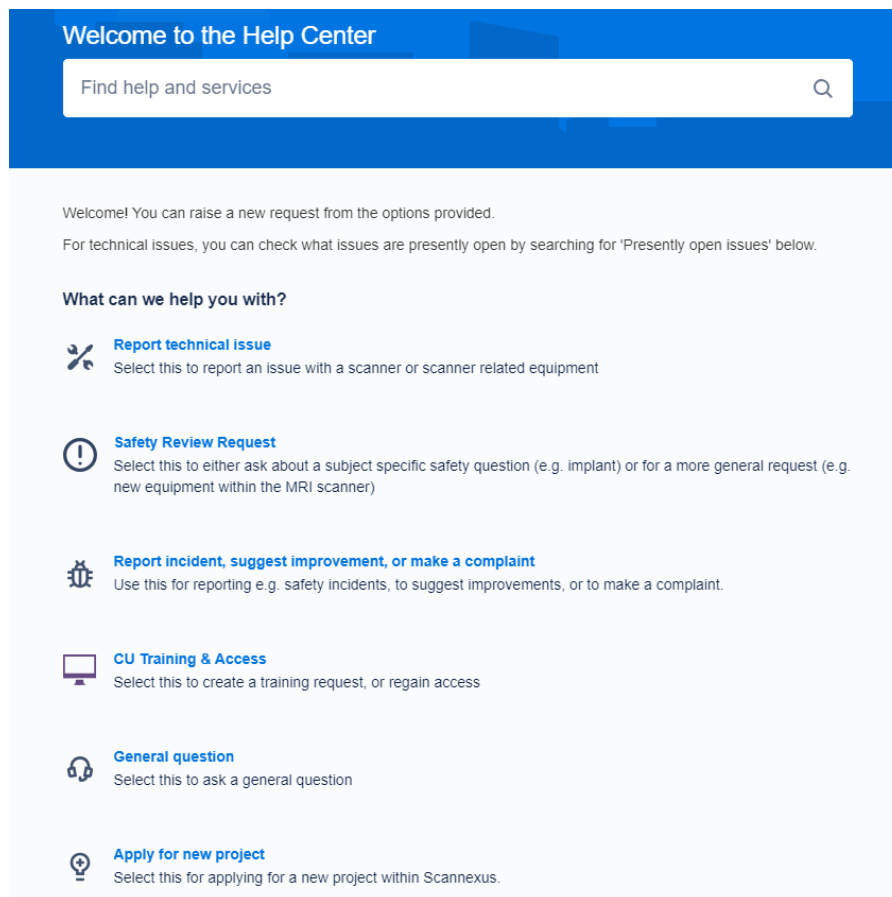
- Office hours (Mon – Fri from **8:30 -17:00**):
 - At least one CU has to be present during the entire time of scanning.
- Out of office hours: Mon – Fri 17:00-08:30h, weekends and collective holidays):
 - One CU **and** one at least Magnet Safety Trained person have to be present. One of them has to be BHV/ERO certified.

2.4 RESERVING SCANNER TIME







- Online bookingsystem Calpendo: <https://scannexus.calpendo.com/>
- Once you completed the Certified User qualification you can request to be a user on the bookingsystem.

2.5 SCANNEXUS SELF-SERVICE PORTAL

Scannexus self-service portal for all kind of requests, information needed (see below): <https://scannexus.atlassian.net/servicedesk/> . Create an account to login.



The screenshot shows the 'Welcome to the Help Center' page. At the top, there is a search bar with the placeholder text 'Find help and services' and a magnifying glass icon. Below the search bar, a welcome message reads: 'Welcome! You can raise a new request from the options provided. For technical issues, you can check what issues are presently open by searching for 'Presently open issues' below.' The main content area is titled 'What can we help you with?' and lists several options with corresponding icons:

-  **Report technical issue**
Select this to report an issue with a scanner or scanner related equipment
-  **Safety Review Request**
Select this to either ask about a subject specific safety question (e.g. implant) or for a more general request (e.g. new equipment within the MRI scanner)
-  **Report incident, suggest improvement, or make a complaint**
Use this for reporting e.g. safety incidents, to suggest improvements, or to make a complaint.
-  **CU Training & Access**
Select this to create a training request, or regain access
-  **General question**
Select this to ask a general question
-  **Apply for new project**
Select this for applying for a new project within Scannexus.

INFORMATION

Detailed information about equipment, troubleshooting, safety, etc. can be found in our Scannexus self-service portal

Other information e.g. CU training, Scannexus guidelines etc., is also found at our website: <https://www.scannexus.nl/information/documentation>

REPORTING A TECHNICAL ISSUE AND REFUND SCANNING HOURS

In case of a technical failure, **report a technical issue** at the Scannexus self-service portal. Possible solutions to the issue might be shown by the self-service portal. When the solution is not shown, please finish the "report technical issue" to notify the Scannexus team about the issue.

Scannexus will decide if a **refund of the hours** is justified after reporting the technical issue in the Scannexus self-service portal.

SAFETY REVIEW REQUEST

Questions about safety, safety review of new device can be applied here. Add all the information you have about the device to the request.

3 CU TRAINING

Contact the Scannexus Support Staff (scanlabs@scannexus.nl) or register within the Scannexus self-service portal <https://scannexus.atlassian.net/servicedesk/> to apply for the CU training.

The CU training is made up of several sessions, depending of the scanner/system you need to be trained for. You have to prepare yourself and read our Scannexus guidelines before the start of the training. Documentation can be found at: <http://www.scannexus.nl/information/documentation>. It is advised to gain some basic MRI knowledge before starting the training.

The **Basic Training** contains the following three sessions:

1. An online GUFU (German Ultrahigh Field Imaging) Magnet Safety Training and a safety tour included with a Siemens safety video and an explanation of the Scannexus safety screening form, which you will fill in during this tour. (Duration of the safety tour is about 0,5 hour)
2. Rules and regulations and an introduction to the scanner user interface. (Duration approximately 3 hours)
3. Practical session at the 3T scanner. (Duration approximately 3,5 hours)

After the basic training:

CU for 3T:

- Your first measurement(s) needs to be accompanied by a member of the Scannexus Support Staff, the so called supervised sessions.

CU for 7T:

- Continue with 7T upgrade training which will last about two-three hours.
- Your first measurement(s) need(s) to be accompanied by a member of the Scannexus Support Staff, the so called supervised sessions.

CU for 9.4T (pTx) training:

- (It is preferred to have expertise as a 7T CU)
- Perform 7T upgrade training
- Continue with a pTx training (description of system architecture, safety tests, pTx shim procedures). This training session will last for at least 4 hours. You will then be trained by your PI, in the specific workflow known by this PI and needed for your experiment.
- Certification will follow, after demonstrating your ability to start up the system, including safety test, and perform the above workflow, without assistance. Both a member of Scannexus and the PI must be present supervisors.

Completion of the training:

The training is completed after successful supervised session(s). With completion of the training you confirm that you know how to operate the scanner, you are aware of the risks and the safety issues related to MRI and the Scannexus specific procedures, by signing the Certified User Agreement. The agreement is signed by a member of

the Scannexus Support Staff as well. In appendix 2 of the Guidelines Scannexus (<https://www.scannexus.nl/information/documentation>) you can find the agreement and an accompanying checklist.

4 ACCESS TO THE SCANNERLAB

The facility is open 24 hours a day, 7 days a week. However between 23:00 and 7:00, a burglar alarm is activated.

4.1 BURGLAR ALARM SYSTEM

For deactivating the alarm, CU's need to pick up a BA (Burglar Alarm) key situated in the key cabinet at Scannexus. Access to the key cabinet and the BA keys, is given after completion of the CU training. Note:

- The CU of the specific scanning session is responsible for obtaining and returning one of the four BA keys.
- CUs should pick up the BA key during office hours, upfront of the scanning session.
- BA keys must be returned within 48 hours of the finish of the scan slot (Tuesday 5pm in the case of weekend work).
- It is not permitted for one CU to pass the key on to another user. The key cabinet registers who possesses which key.



Entrance to the scannerlab building outside of office hours is by the entrance facing Oxfordlaan 55. To open the door, place your UM ID card on the card reader, and wait for the sound of the door unlocking to finish. **Pulling on the handle earlier can cause the door to not unlock.**

The burglar alarm control panel is at the left side near the entrance.

To use the smart BA key alarm system:



- To de-activate the alarm:
 - When you enter the building you will hear a tone indicating the alarm is on.
 - Place the BA key near the display of the burglar alarm control panel until a beep is heard.
 - The delay time will stop and the tone will stop.
- To activate the alarm:
 - Please make sure no other users are in the building!
 - The setting is clearest if you open the cover (see right image above).
 - Place the BA key near the display of the burglar alarm control panel until a beep is heard. It only needs a very short period of time.
 - Repeat this twice.
 - If the system has accepted this, the first indicator at the bottom (circled in the right image above) will light up and a tone will be generated.
 - A time delay allows you to exit the building.

On leaving the facility, the CU is responsible for checking whether other users are in the facility and activating the alarm if they are the last to leave.

SAFETY

5 SAFETY INSTRUCTIONS

Details on safety issues and emergencies can be found in the Guidelines Scannexus, chapter 5 and Magnet Safety Training:

<http://www.scannexus.nl/information/documentation>.

Important safety information is summarized in this document.

- **MRI-safe:** "MR safe" means that an object or device, when used in the MR environment, will present **no additional risk** to the patient but may affect the quality of the diagnostic information.
- **MRI-compatible:** "MR compatible" means that an object or device, when used in the MR environment, is MR safe and **significantly do not affect the quality of the diagnostic information**, nor significantly affect its operation in the MR environment.



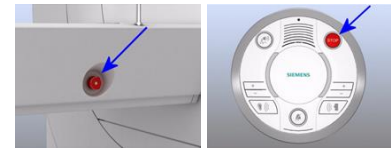
5.1 EMERGENCY BUTTONS

5.1.1 SQUEEZE BALL

- When the squeeze ball is pressed by the subject → Use talk button on the intercom to turn off the alarm. Activating the alarm while scanning will not automatically stop the scanning itself.

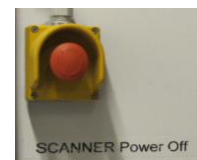
5.1.2 TABLE STOP BUTTON

- One button on each site at the scanner bed. Releasing by turning stop button counter clock wise.
- 3T only: Look at the scanner display for instructions. The intercom device holds a stop button as well.



5.1.3 EMERGENCY ELECTRICAL SHUTDOWN

- Shuts down all electrical systems of the scanner (gradients, RF) but NOT the magnet, which will still remain at field.
- 3 buttons: one in the technical room, one in the magnet room, one in the control room.
- Should be used for any dangerous situation like an electrical incident or fire in the magnet room.
- In case of an electrical shutdown use the handle at the end of the table to pull the tabletop manually out of bore.



5.1.4 MAGNET DISCHARGE

- Demagnetizes the magnet via a process known as a quench.
- Should be used **in life threatening situations only!** Situations of a person being trapped between the scanner and a metallic object or personal injury.
- A large volume of helium gas is discharged during a quench.
- Very cold helium gas will rapidly escape through a vent tube to the roof top. Keep the subject and yourself away from these vents!
- Slight risk of gas venting into the MR room, causing the oxygen level to drop and increasing pressure in room.
- NOTE: Quenching is very expensive and might be dangerous in rare cases, when venting fails!



5.2 KEY SYSTEM

After the CU training access is provided by an UM/MUMC- or guest card to the key cabinet containing the key of the magnet room.

- The key for the magnet room is available in the key cabinet;
 - This cabinet is located in the corridor towards the 7T and 9.4T rooms.
 - Accessible with your UM/MUMC- or guest card.
 - Access is granted to the key of the magnet room of which you are the CU and the BA keys.
 - The cabinet registers who possesses which key.
- Responsibility for safety;
 - The CU that picks up the key is the so called Keyholder!
 - The Keyholder is responsible for safety until the key is returned to the key cabinet.
 - Do not lock the door to the magnet room while scanning!
- Returning the key after scanning;
 - Failing to lock the door to the magnet room after scanning keeps you responsible for safety!
 - Failing to return the key will result in loss of booking privileges.
 - Usage of the key cabinet is registered. This activity log is used as a checkup for usage and scan times. Any misuse will result in a loss of booking privileges for the Keyholder.

5.3 SAFETY CHECKS

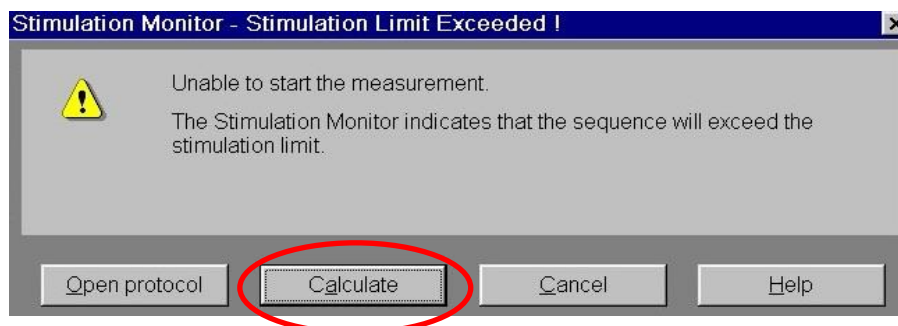
The MR system safety checks are automatically performed according to IEC guidelines. At the 9.4T pTx system, safety checks need to be done manually before scanning a participant.

Always be aware that the correct subject is registered (correct weight, gender, age)!

5.3.1 PERIPHERAL NERVE STIMULATION

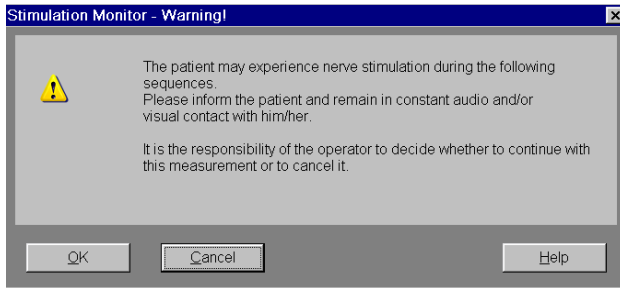
Warn subject about peripheral nerve stimulation. Let the subject know that it is harmless, but to squeeze the alarm ball when it becomes uncomfortable!

Exceeding the stimulation limit, 2 options, see images below:



You cannot proceed without altering your parameters. The system will make a suggestion.

Still inform the subject!



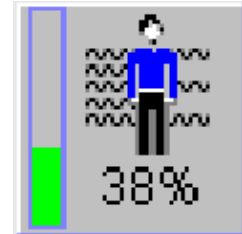
**You can proceed
but **inform the
subject!****

5.3.2 SAR LIMITS

The Specific Absorption Rate (SAR) describes the potential for heating of the subject's tissue due to the application of the RF energy.

The SAR is defined as the RF power absorbed per unit of mass of an object, and is measured in watts per kilogram (W/kg).

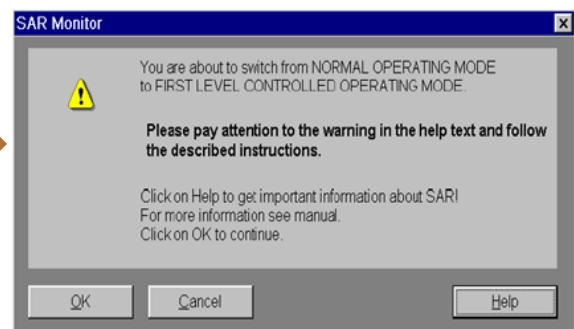
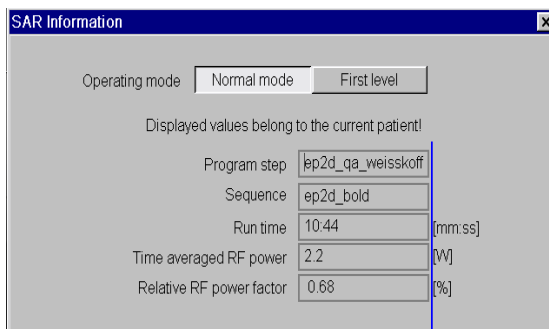
- o Maximum temperature rise of 1°C is allowed.
 - At the end of the sequence you are at 38% of 1°C.
 - This varies per sequence and the sum of sequences and delay time in between.



5.3.3 LEVEL 1 OPERATION MODE

You can proceed but only if the subject has no contraindications for thermoregulation! (See image below.)

- o Peripheral nerve stimulation:
 - About 1% chance in standard operation mode of the scanner.
 - About 50% chance in level 1 operation mode of the scanner.
- o SAR increases in level 1 operation mode of scanner, but is still within legal safety limits.



6 SUBJECTS

6.1 PHYSIOLOGICAL EFFECTS ON SUBJECTS

6.1.1 STATIC FIELD

- Attractive Force
- Nausea / Vertigo / Metallic taste

6.1.2 GRADIENT FIELD

- Peripheral nerve stimulation
- Sound pressure, use earplugs
- Avoid loops / Eddy Currents

6.1.3 RF FIELD (SAR)

- Important to register correct length, weight and age of subject.

6.2 SCREENING FORMS

6.2.1 SCANNEXUS SAFETY SCREENING FORM

- **Mandatory!**
- Has to be completed and signed **EVERY TIME on the day of entering the magnet room**, by everybody who enters this room (except CU and MST personnel, they sign this once).
- Printed file, signed by both the subject and CU.
- Printed file has to be handed in at the reception's mailbox.

If you have questions regarding MR compatibility, an explanation form concerning the safety screening questions is available in [Appendix 1](#) of this CU Manual.

6.2.2 TEMPLATE SCREENING FORM

Advised to screen subjects beforehand:

- Service of Scannexus to use the template screening form to screen subjects beforehand. Available at scanlabs@scannexus.nl.
- Content can be adjusted by researcher
- When used: the researcher is responsible for proper usage and storage of this form according to METC approval!
- **FPN researchers have to use the dedicated FPN (template) screening forms!**

The questions on this template screening form should give the researcher an idea if the subject has contra-indications for MR and/or inclusion criteria for the study. Screening in advance prevents last minute cancellation of the reserved scan session. Last minute cancellation (within a week) sessions will not be refunded!

6.3 DATA

- Subjects are not allowed to receive the dicom images.
- CU can decide to hand out screenshots or reconstructions to the subjects
- Screenshots and reconstructions are not meant for clinical purposes.
- In rare cases the images can be shared with the clinic, in agreement with the attending physician, the subject and the researcher only!

6.4 INCIDENTAL FINDINGS

Researchers can arrange their own incidental findings procedure or use the Scannexus incidental findings procedure (see appendix 3 of the Guidelines Scannexus (<https://www.scannexus.nl/information/documentation>)).

The following applies using the Scannexus procedure:

- Subjects who don't want to know about incidental findings **WILL NOT** be scanned at Scannexus.
- Subject must have signed an Incidental Finding Agreement (template for none FPN users available at scanlabs@scannexus.nl.)
- **DO NOT** inform the subject right away in case of an incidental finding.
- Inform your senior staff member or your supervisor immediately about the anomaly found.
- Contact the Scannexus Support Staff for contact information of the qualified medical expert. (neuroradiologist, associated with the Maastricht Brain Imaging Center/Scannexus)
- Scannexus will check if the subject signed an Incidental Finding Agreement.
- Scannexus Support Staff will provide the relevant data to the medical expert.
- Seek contact with the medical expert to provide relevant information.
- Medical expert provides feedback to the researcher and Scannexus. In case of needed follow-up of the finding, a letter for the GP is drafted by the medical expert.
 - Researcher contacts the subject to inform the subject and to hand over the drafted letter for the GP. Within FPN this is done by the ombudsman.

SCANNING

7 SCANNING PROCEDURE GENERAL

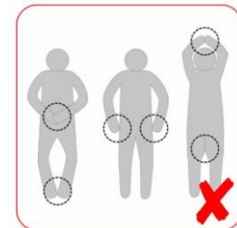
7.1 PREPARATION

Before scanning, make sure that the subject signed the written consent form of the study and a consent form concerning incidental findings (researcher's responsibility). FPN users need to use the forms used within FPN.

- Subject needs to complete the safety screening form.
- CU checks the safety screening form concerning contra-indications.
- Both CU and subject sign the safety screening form.
- Subject and CU need to remove all metal from body.
- Subject (and CU) needs to remove:
 - hair clips / bobby pins and hair ties
 - shirts, sweaters, vests containing metal (e.g. zipper, buttons)
 - piercings and other jewelry
 - belts
 - contents of pockets
 - bra (with metal wire)
 - make-up (especially mascara)
 - glasses (MRI corrective glasses are available)
 - shoes
- Remind subject to go to the toilet prior to scanning.
- Inform subject about noise, peripheral nerve stimulation, local heating, dizziness while entering the bore, not crossing arms and legs.
- Instruct subject about usage of the alarm ball.
- Inform subject about the tasks.
- Prepare experiment.

7.2 POSITIONING OF SUBJECT

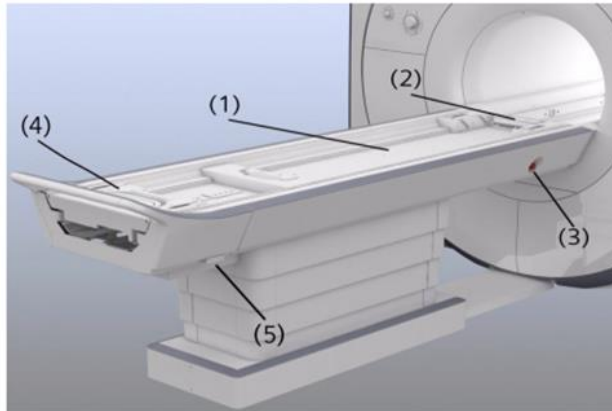
- Give subject earplugs.
- Position body part in dedicated coil.
- Use cushions when needed to avoid motion and/or reduce noise.
- Hand over the alarm ball to the subject, and test the alarm ball.
- Give subject cushion for under the knees.
- Ask whether the subject wants a blanket.
- No loops of hands or legs.
- Position any stimulatory devices or sensors that you need, avoid loops in cables.
- Adjust the mirror on the head coil if necessary.
- Use the laser light localizer (subject needs to close the eyes!).
- Move tabletop to the isocenter.
- Start your measurement and keep in contact with the subject.



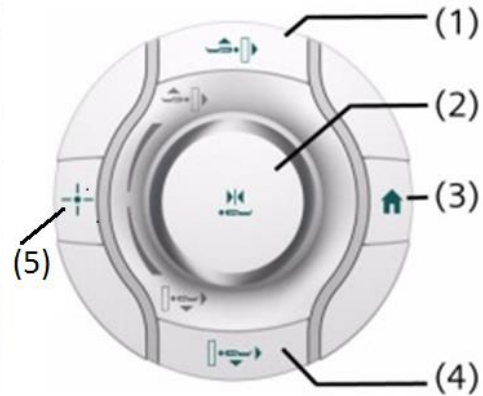
7.3 TABLE OPERATION

7.3.1 3T PRISMA FIT

3T SYSTEM OPERATION



- (1) Tabletop
- (2) Head end
- (3) **Table Stop** button
- (4) Handle to pull out the table top in case of emergency
- (5) Emergency release

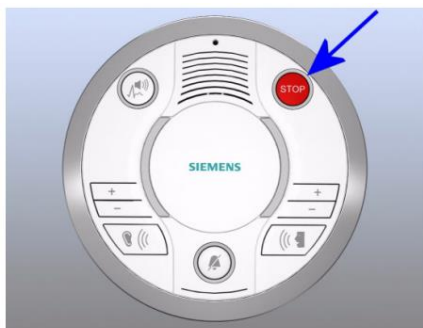


- (1) **Table Up/Inward** button
- (2) Jog wheel, **Center Position** button
- (3) **Home Position** button
- (4) **Table Down/Outward** button
- (5) **Laser** button

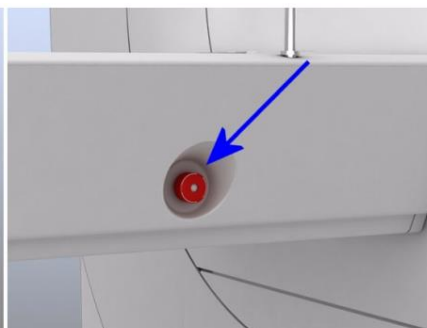
3T TABLE EMERGENCY BUTTONS

The table stop buttons are located on the side of the table and on the intercom system.

The emergency release for manual shifting of the table top is located at the end of the table support.



Intercom



Table

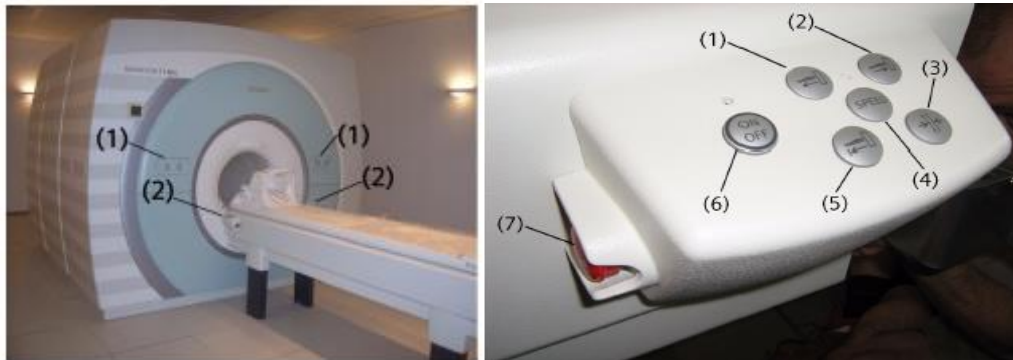


Emergency release

7.3.2 7T PLUS

7T PLUS SYSTEM OPERATION

A list of the scanner/table operation buttons of the 7T is shown below.










- (1) Control units (laser light) on both sides of the magnet bore.
- (2) Control units at the patient bed.

- (1) **Home Direction** button
- (2) **Isocenter Direction** button
- (3) **Isocenter Position** button
- (4) **Speed** button
- (5) **Home Position** button
- (6) **On/Off** button
- (7) **Table stop** button

The table of the 7T system is different from the 3T system. There are three main differences:

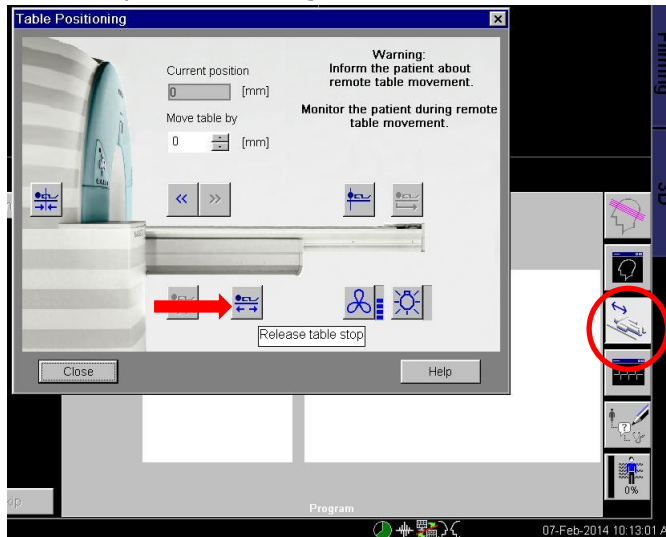
- The table is a separated from the scanner system and can be operated by the buttons on the side only.
- In standard operating mode it varies the speed of the table to reduce the experienced dB/dt in the body/brain which might cause nausea.
- To reduce the risk of RF noise being picked up during scanning, the table should be powered off.

	Table Stop: The tabletop stops immediately.
	Table Inward/Outward: Moving the tabletop in or out the magnet bore. The tabletop moves when button is pushed in.
	Speed: Moving the tabletop at increased speed. <i>Do not use when a subject is being examined. Only for phantoms!</i>
	Isocenter Position: The tabletop moves in to the magnet bore until it reaches the defined isocenter. The tabletop moves automatically. Stop the movement by pressing another move button.
	Home Position: The tabletop moves completely out of the magnet bore. The tabletop moves automatically. Stop the movement by pressing another move button.
	Laser Light Localizer: When pressed a red laser cross is displayed to indicate the isocenter. Deactivate the light to set the position. <i>Always ask subject to close their eyes during operation!!</i>
	On/Off at 7T and 9.4T: Switch the table ON/OFF. A corresponding LED is lighting when ON. It takes about 10s to get out of the sleep mode after switching table on.

POINTS OF INTEREST:

- When powering on the table it can take up to 20 seconds for the electronics to be fully operational.
- Turning on the SPEED feature (which turns on the GREEN LED above this button) disables the special speed regulation of the table. **Do not use this SPEED feature when moving subjects into and out from the scanner bore.** It is allowed for phantom measurements only!
- **No laser:** After a shutdown, the table needs to know its position. See display at scanner. The laser button will not respond when the display shows ---- :
 - Move table little bit towards bore.
 - Then move to home position.
 - Display will show table position again.
 - Positioning with laser light is possible.

- If the table is not responding check the buttons on the table control panel. They tend to get stuck. In this case the buttons will not respond at all. You can just wiggle the button loose again.
- Still no response, switch table power off, wait 30 sec., and switch power on again.
- Still no response, check the emergency stop buttons and emergency release at the end of the table. Someone might have used them but not put back properly.
- Sometimes the system detects a "table stop" event. Clicking on the "release table stop"- button might resolve it.



- A reboot is needed when all of the options mentioned above do not solve the disrupted table response.

7T TABLE EMERGENCY BUTTONS

The table stop buttons are located on the side of the table, **NOT** on the intercom system.

The emergency release for manual shifting of the table top is located at the end of the table support.

7.3.3 9.4T

9.4T SYSTEM OPERATION

On the 9.4T the table operation buttons are the same as the 7T, see 7.3.2.

9.4T TABLE EMERGENCY BUTTONS

The table stop buttons are located on the side of the table, **NOT** on the intercom system.

The emergency release for manual shifting of the table top is located at the end of the table support

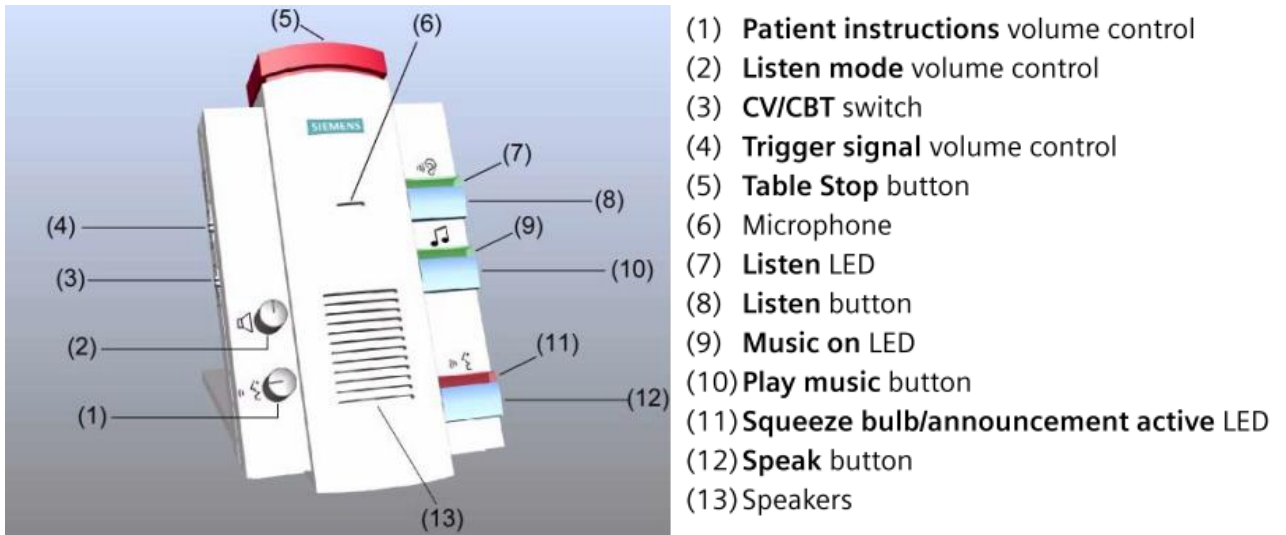
7.3.4 MOVING TABLE OUT QUICKLY

- Small accidents, medical emergencies or inconvenience for the patient and quick removal of the table is needed; the fastest method for moving the tabletop out of the magnet bore is to press the '**Home Position**' button. Use this method whenever the power supply and/or motorized drive are intact.
- In case of power failure and/or defective motorized drive, pull the tabletop manually out of the magnet bore. To disconnect the tabletop from the motor an additional emergency release, which is underneath the end of the table support, needs to be pulled outward.

7.4 INTERCOM

The intercom allows communication between the researcher and subject during the measurement.

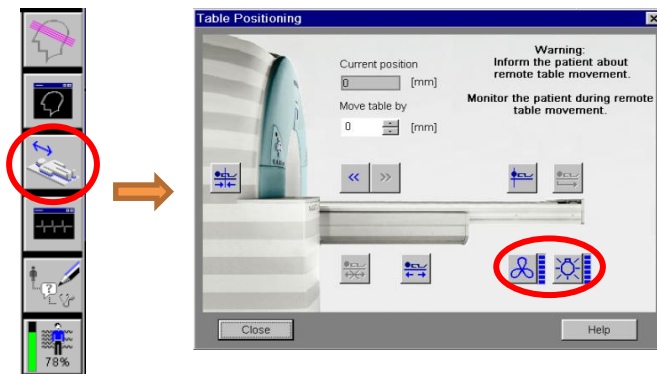
On the 7T and 9.4T system, the red table stop button (5) is not in operation. A picture of the 3T intercom you can find at paragraph 7.3.1, 3T TABLE EMERGENCY BUTTONS.



7.5 MAGNET BORE FAN & LIGHT

Magnet bore fan and light can be adjusted at the panels on the scanners, see displays at the scanners.

At 3T it can also be done remotely:



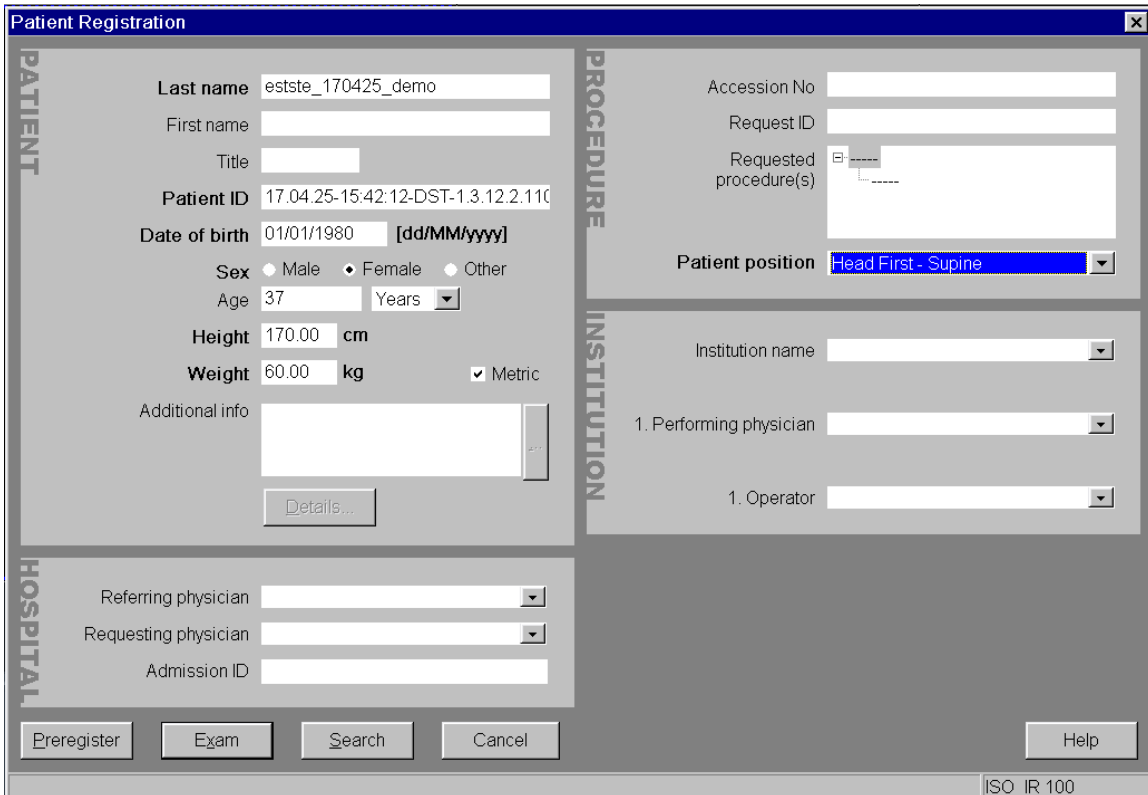
7.6 PATIENT REGISTRATION

The **Bold** fields need to be filled in in order to proceed. These are: Last name, Patient ID, Date of Birth, Sex, Height, Weight, and Patient Position.

Use the following registration guidelines at Scannexus:

The field **Last name** needs to be filled in as follows, separated with an underscore:

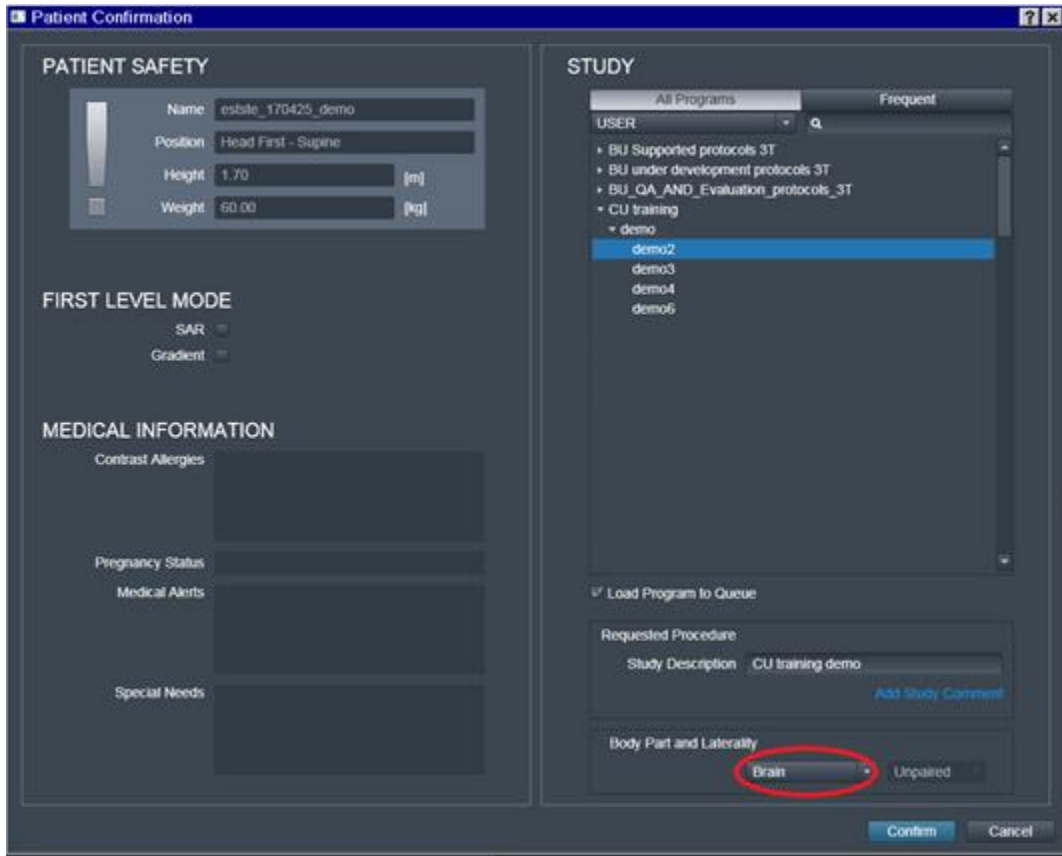
- First 3 letters of **CU's** first name + first 3 letters of **CU's** last name.
- Date of scan (YYMMDD).
- Code (which links with your subject and study).



Patient ID is filled in automatically. If preferred you can copy the input of the **last name** to the patient ID.

Date of birth at least the birth year must be correct to the subject's birth year.

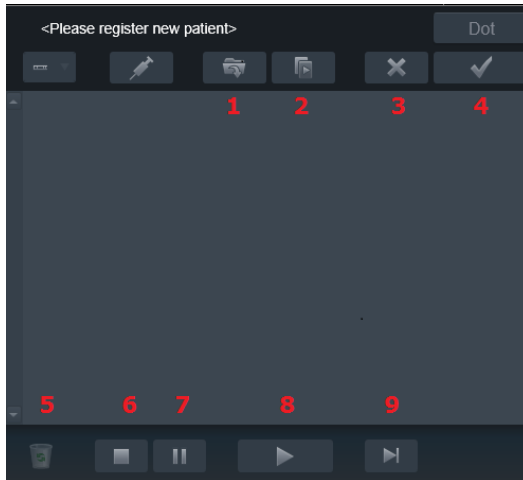
Finally press Exam to select your exam. A second screen will appear at the to select your exam. Select the Body Part examined before confirming the registration.



The user interface at the 9.4T is slightly different, but the procedure is the same.

7.7 SCANNING

Explanation of scanning procedure options:



3T Prisma fit and 7T plus:

- 1 Opens the selected protocol, for positioning the slicebox, change settings.
- 2 Scan: applies and duplicates the selected protocol. Can be useful if several runs need to be scanned in a row in the same way.
- 3 Cancels the changes in protocol and slice/volumebox positioning.
- 4 Applies the position of the boxes and protocol settings.
- 5 Waste bin, deleting protocols.
- 6 Stops scanning.
- 7 Pauses scanning if possible.
- 8 Starts your measurement.
- 9 Skips protocol to move over to the next protocol.



At 9.4T:

The icons are shown as text, like open, apply, cancel, etc..

At the 3T and 7T press the green play button to start acquiring the localizer (nr. 8)

A **“working man”** means you have to open, position and apply your protocol.

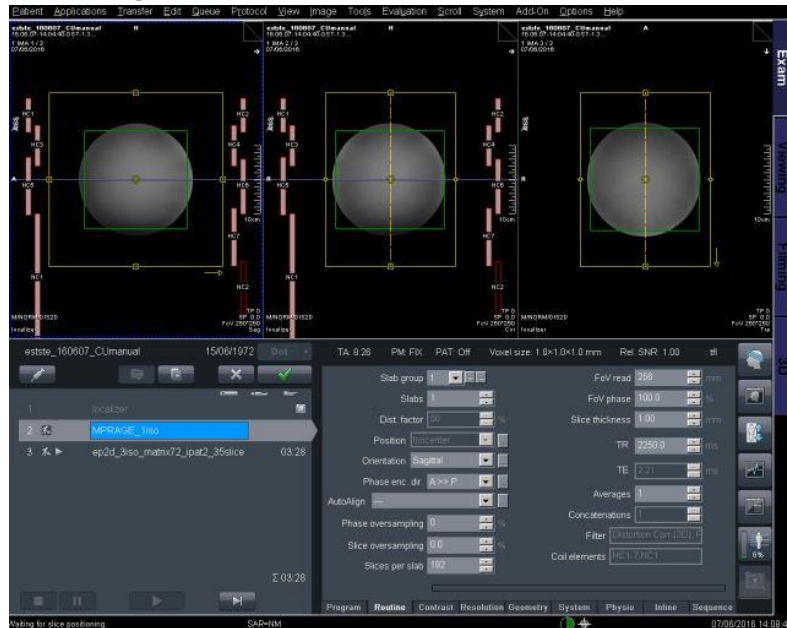
A **pause** in your protocol is created by adding the **play button** into your protocol. This way the scanning is stopped after preparation and a pop up appears to continue the data acquisition.

In fMRI studies this pause provides time to prepare your stimulation script. Click continue to start the data acquisition. At the 9.4T, the play button is shown as a “flag man” in front of your protocol name.

In fMRI studies the triggers from the scanner are received after two-three dummy scans. No data is generated of these dummy scans.

BASIC SCANNING

- Start the measurement with a localizer.
- Plan the following protocols by positioning the yellow volume (slice) box.
- Optimize the shim values by positioning the green adjust volume box in the region of interest.

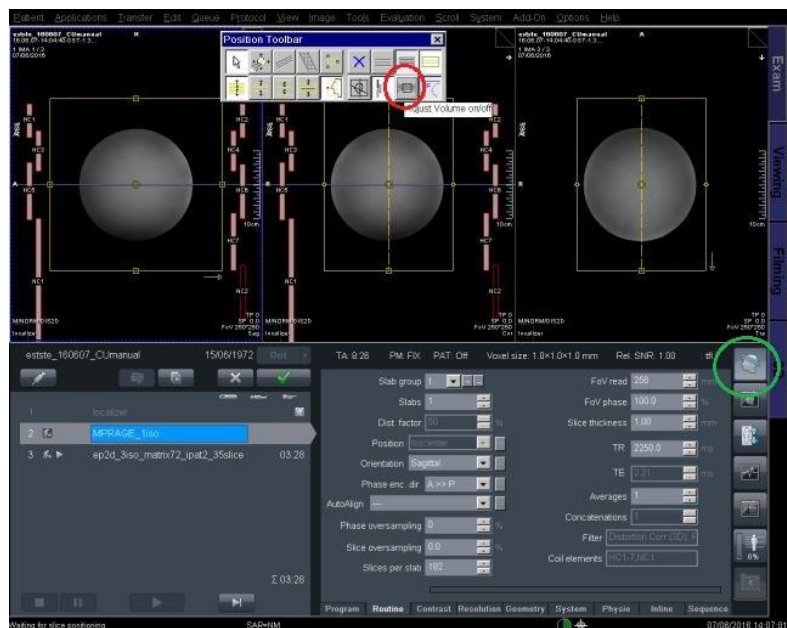


The **yellow** box presents your volume/slice box.

- Position the box over the area of interest.
- Do not change the size of the yellow box. If you do, you might change settings like slice thickness or gap.

The **green** box presents your adjustment volume (B0 shimming).

- Position the box over the body part you are interested in.
- Change size.
- Do not include a lot of air.



If the green box is not visible:

- Select position toolbar (green circle).
- Select adjust volume on/off (red circle).
- Green box is shown and can be planned.

- At 7T plus and 9.4 T extra shim procedures are needed, see chapter 8.
- Click apply (or scan) after positioning of both boxes.
- Data acquisition starts.
- Option: Copy references for following protocols:
 - Open following protocol.

- Click on protocol you want to copy from.
 - Right mouse click.
 - Copy parameters.
 - Copy adjustment volume box.
 - Copy parameters.
 - Copy center of slice groups and saturation regions (use only if same orientation and size of the slice box are needed!).
- Option: AutoAlign (see chapter 11).

7.8 FINISH MEASUREMENT

- Put stimulatory devices and sensors back to their default position.
- Clean mirror and head coil.
- Renew paper cover on scanner bed.
- Place a set of new earplugs on the scanner bed.
- Export your data.
- Close patient in all used tabs of Syngo MR.
- Set projector to standby
- Power off all used PC monitors.
- Lock the magnet room.
- Return magnet room key to the key cabinet!

7.9 EXPORT DICOM DATA

All measured MRI data (dicom) is automatically stored to the hard drive of the Syngo scanner host. Due to its storage limitations, all data acquired more than 1 week ago is deleted on the scanner host!

Make sure to **export your data** immediately to a personal/project folder on <\\BUsrv0001\backedupdata>YourFolder> and check **within one week** whether all data has been successfully exported. Create a **new backup** of the data to individual drives/faculty servers.

When the <\\BUsrv0001\backedupdata> is fully occupied, transfer of the data to this server is not possible anymore. Therefore, **Delete** the data on the <\\BUsrv0001\backedupdata>YourFolder> once you created your personal second backup. Please **clean out** the <\\BUsrv0001\backedupdata>YourFolder> once your project has ended!

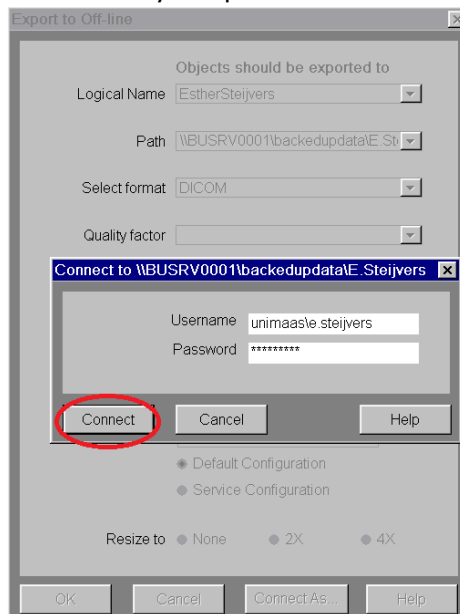
NOTE: Use your personal folder as a transfer for your data and not as a backup!

7.9.1 EXPORT DATA 3T PRISMA FIT AND 7T PLUS

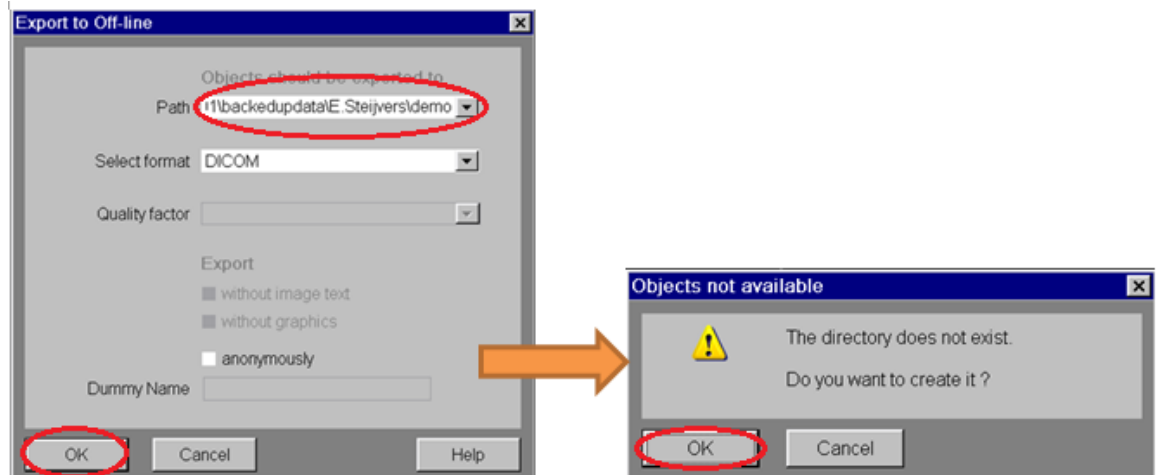
To transfer your data from 3T Prisma Fit and 7T Plus, you need to login to your personal folder on the [\\BUSrv0001\backedupdata\YourFolder](#) with your UNIMAAS credentials.

Before transferring your data: check that all existing transfers from previous user are completed (local job status or ctrl-I)!

- Patient → Browser.
- Select your exam.
- Transfer → Export to offline
- Logical Name → Select your personal folder.
 - Path to your personal folder is created.
 - Create a new subdirectory to the path.
- Click Connect As...
- Add your UNIMAAS credentials:
 - Username: unimaas\your username or P-number.
 - Password: your password.



- Click Connect.
- A pop-up occurs, saying another user is connected: click OK if all existing data transfer of previous user was completed.
- You are now connected to your personal folder.
- Click OK in export to offline
 - The system verifies you are creating a new subdirectory (see figure below).



EXPORT DATA 9.4T

- Patient → Browser.
- Select your exam.
- Transfer → Export to offline:
 - Select the path to your personal folder.
 - Create a new subdirectory to the path, select ok.
 - The system verifies you are creating a new directory.

7.10 DEFAULT COILS

Please, be very careful with the available coils.

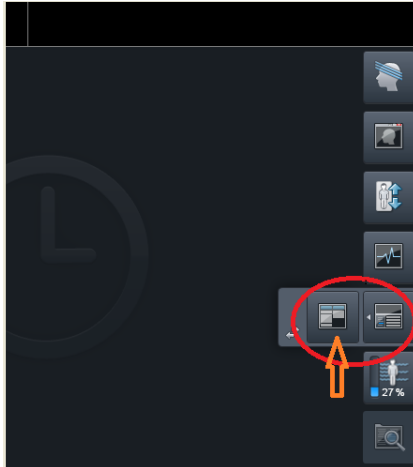
Make sure the default coil is connected, after finishing your measurement.

- For 3T the default coil is the 64 Channel Head/Neck Coil.
 - For 7T the default coil is the NOVA 1Tx/32A Coil.
- Note: This coil has a set of electronics that extends from the head end of the coil. This part of the coil should **NOT** rest on top of the ridge in the bed!

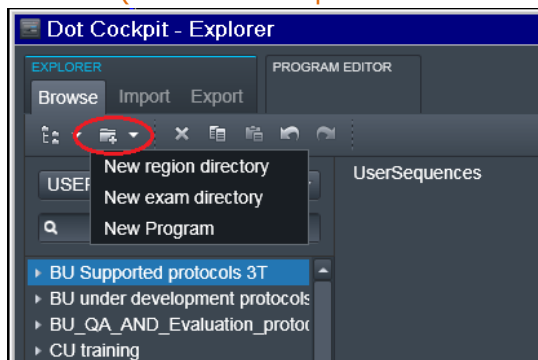
7.11 CREATING AND SAVING PROTOCOL / EXPORT TO PDF

7.11.1 SAVING PROTOCOL AND PDF AT 3T PRISMA FIT AND 7T PLUS

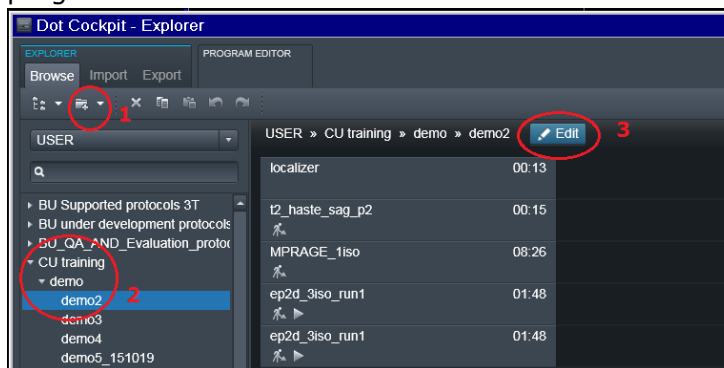
- Click the arrow to the left of the Program card icon in exam tab.
- Click on Dot Cockpit.



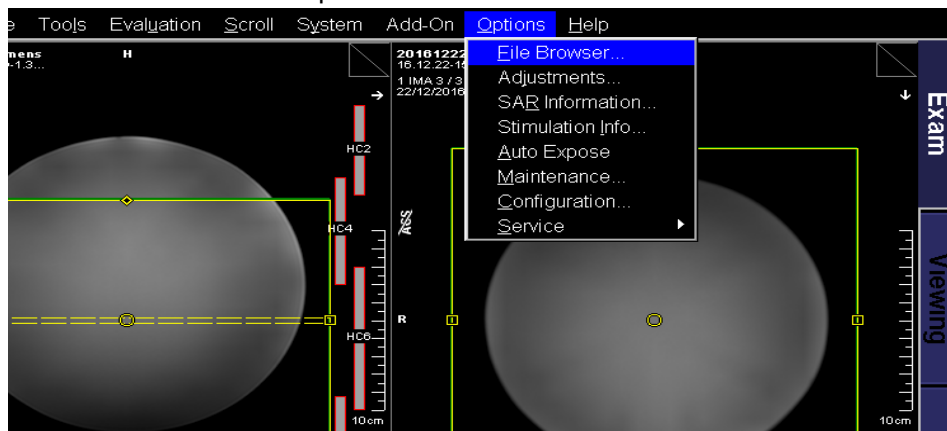
- In Dot Cockpit, create your directory in the correct exam tree. At 3T this is the USER tree. (At 7t use the procedure described below for 7T):



- 1. new region directory (YourName/Project)
- 2. new exam directory (NameProject)
- 3. new Program (NameMeasurement, ..save as)
- Click edit (step 3, figure below) if you want to change an existing program.



- Copy or drag protocols from Siemens tree/User tree (after researcher's approval only!) or your measurements from the exam tab into the program folder.
- Save protocol.
- Export to PDF: In Dot Cockpit – Explorer
 - Select protocol.
 - Right mouse click.
 - Print.
 - Check the checkmarks.
 - Create pdf file name.
 - Filename has to be stored in C:\Temp
 - Connect to your folder in [\\BUsrv0001\backedupdata\YourFolder](#) (Z:) (see 7.9.) if not connected yet.
 - Go to File Browser in Options.



- Select PDF created in C:\temp\PDFfilename.pdf
- Copy PDF file to your personal folder.
- Delete created pdf file in C:\temp.

EXAM TREES AT 7T

At 7T we use a different procedure to save the protocols in the dot cockpit. Please use this procedure.

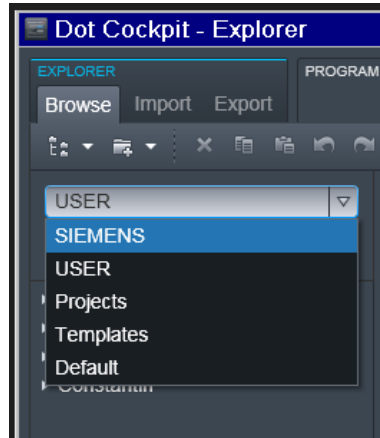
Trees available at 7T: **Siemens, USER, Projects, Templates and Default** tree.

- **Siemens** tree contains default Siemens exams.
- **USER** tree, in case of developing new imaging methods, development exams safe as "CU's name".
- **Projects** tree, in case of a dedicated project workflow, exam protocols safe as "projectnumber and name".
- **Templates** tree contains default protocols which can be used and copied to your personal project exam. Adjust them to your needs in your personal exam.
- **Default** tree contains the basic sequences are listed.

The Projects tree will be backed up on a regular basis by Scannexus. The USER tree will not be backed up by Scannexus.

Example procedure saving exams in the Dot Cockpit at 7T Plus:

Select the correct **tree**:

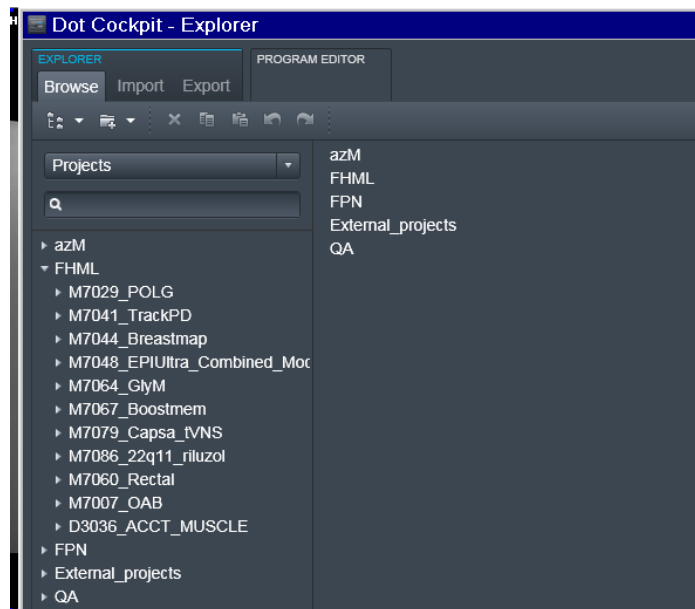


Select **region directory** in projects:

- azM
- FHML
- FPN
- External_projects
- QA

Create **exam directory**:
Projectnumber_Projectname

Create **program**:
Create the protocol tree
Safe as → Name measurement



7.11.2 SAVING PROTOCOL AND PDF AT 9.4T

On 9.4T:

- Click on Exam Explorer (button on the right side)
 - Create new subdirectory in own directory:
YourName\NameProject\NameMeasurement
 - Copy protocols in this subdirectory or,
- Exam tab
 - Select all sequences of your measurement.
 - Drag and drop the sequences in the new folder of the Exam Explorer. (or right mouse click :save as program)
 - Click on the Save icon in the Exam Explorer.
 - Protocol is saved in Exam Explorer.
 - Patient → Close Patient
- Export to PDF
 - Exam Explorer
 - Select protocol
 - Go to Object, Print
 - Print to: Adobe PDF.
 - Check the "protocols" checkmark.
 - File Name: T:\YourName\name.pdf
 - Click on "OK".
 - CTRL+ESC → Windows Explorer
 - Programs → Advanced user → PW: meduser1.
 - CTRL+ESC → Windows Explorer.
 - Go to T:\YourName\name.pdf
 - Transfer PDF file to personal folder on BUserver:
<\\BUsrv0001\backedupdata\YourFolder> (Z:)
 - Delete created PDF file T:\YourName\name.pdf.



8 7T COMBINED - PTX

Extra B0 shimming is needed at the 7T and 9.4T UHF systems. The B1, RF pulse, needs optimization at UHF. A default workflow for 7T is described in this chapter for combined mode and pTx mode.

7T Plus allows for two modes to collect your data, the **combined mode** and the **pTx mode**.

Combined mode; 1 transmit RF pulse coil, e.g. for brain imaging this is the NOVA 1Tx/32A coil.

pTx mode; 8 transmit RF pulse coil, the NOVA 8pTx/32A.

When to use which mode:

1. Combined mode: Continuation of old studies and good results.
2. pTx mode, CP (circular polarized mode): In case of big risk of high SAR, not interested in temporal lobe or cerebellum.
3. pTx mode, UP (Universal Pulses): 3D structural imaging with good signal in temporal lobe and cerebellum.
4. pTx mode RF shim (advanced): Very high resolution and optimizing of RF amplitude or homogenizing RF distribution in small region needed.

8.1 SWITCHING MODES

SWITCHING FROM COMBINED (1TX) TO PTX (8TX) MODE

1. Disconnect any coils
2. Switch on pTx at the switch box



3. In 7T technical room, set the RFPA from the combined mode (COM) to pTx mode (8FBR)



4. Switch off, wait few seconds and switch on the RFPA
5. Wait until the scanner is ready for measurement on the pTx host

SWITCHING FROM PTX (8TX) TO COMBINED (1TX) MODE

1. Connect any combined coil
2. Switch off pTx at the switch box



3. In 7T technical room, set the RFPA from the pTx mode (8FBR) to combined mode (COM)



4. Switch off, wait a few seconds and switch on the RFPA
5. Wait until the scanner is ready for measurement on the combined host

8.2 WORKFLOW SHIM COMBINED MODE

1. Localizer
 - a. run localizer, one 3D shim is automatically acquired in the localizer
2. B1 Map
 - a. position slice box and adjustment volume box
 - b. open options, manual adjustments
 - c. run frequency go, until yes
 - d. measure 3D shim (e.g. brain GRE (=advised for brain imaging)), calculate apply
 - e. run frequency go, until yes
 - f. repeat steps d, and e until
 - i. frequency is small and single peaked
 - ii. images in 3D tab show homogeneous blue/green in brain area
or use **snxbsh** to select best shim of choice
 - g. close adjustments window
 - h. apply B1 map
3. Data acquisition scans/protocol
 - a. position slice box and adjustment volume box
 - b. power optimization B1
 - i. use refV measured in step 2 (B1 map) for whole brain
 - ii. option for smaller ROI, recalculate refV by:
 - *divide mean value ROI in B1map by 10 (= Mean)*
 - *90/(Mean) times refV shown in B1map*
 - c. open options, manual adjustments
 - d. run frequency go, until yes
 - e. measure 3D shim (e.g. brain GRE), calculate apply
 - f. run frequency go, until yes
 - g. repeat steps d, and e until
 - i. frequency is small and single peaked
 - ii. images in 3D tab show homogeneous blue/green in brain area
or use **snxbsh** to select best shim of choice
 - h. in case of high resolution; optional step interactive shim
 - i. interactive shim in manual adjustments, measure
 - ii. x, y, z up and down until FWHM frequency below 40 Hz and T2*
in range of 16-20
 - iii. stop, apply (best) shim
 - i. close adjustments window
 - j. apply data acquisition

8.3 WORKFLOW SHIM PTX MODE

In **CP** mode: same workflow as combined mode

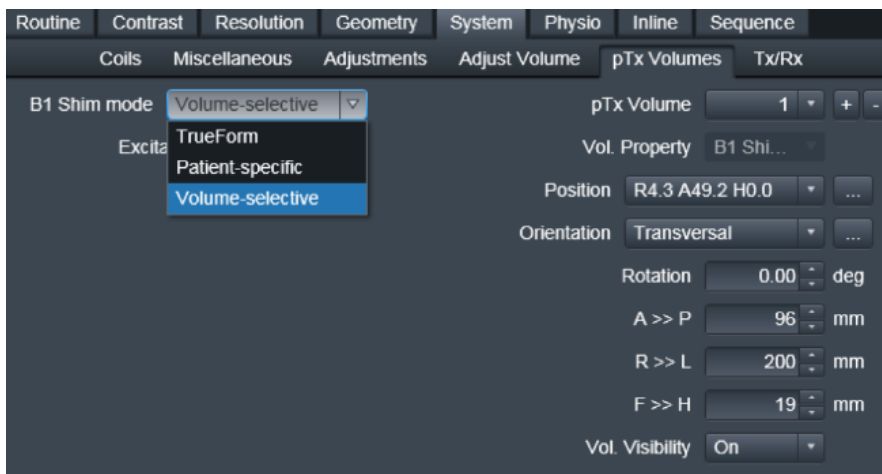
1. B1 shim mode, select **TrueForm**; is virtual 1Tx channel mode
2. Good B0 shim is important

Using **UP**: same workflow as combined mode

1. Good B0 shim is important

Static **B1 shim (no default workflow → project specific):**

1. B1 shim mode, **Patient-specific**; static B1 shimming at the whole slice box volume
2. B1 shim mode, **Volume-selective**; static B1 shimming on a specified volume



9 SAR LIMIT EXCEEDED

9.1.1 EPI

Possible solutions when SAR limits are exceeded in EPI (fMRI) or clipping of RF pulse appears:

- Decrease fat suppression pulse voltage.
- Decrease flip angle/transmitter voltage.
- Increase pulse length (max. ~6500) MB and ME only.
- Decrease number of slices.

9.1.2 DWI (DTI)

Possible solution when SAR limits are exceeded in DWI (DTI)

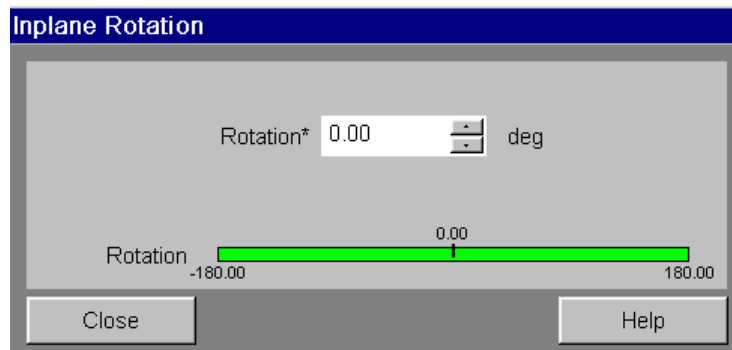
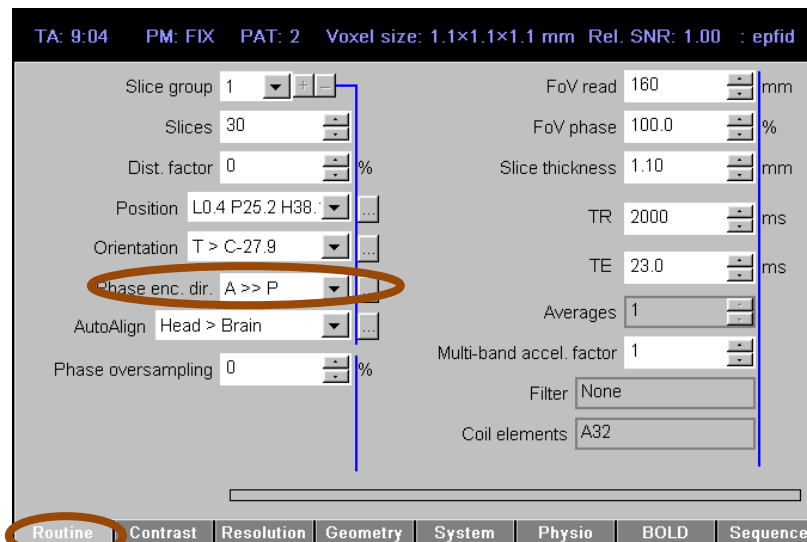
- Increase TR
- Note: TR must be exactly the same in all following shells of your DWI protocol!

Do not change the flipangle/transmitter voltage when SAR limits are exceeded. DWI already has a low signal to noise. By lowering the flip angle/transmitter voltage, this low signal to noise will even further decrease.

10 GEOMETRICAL DISTORTION CORRECTION

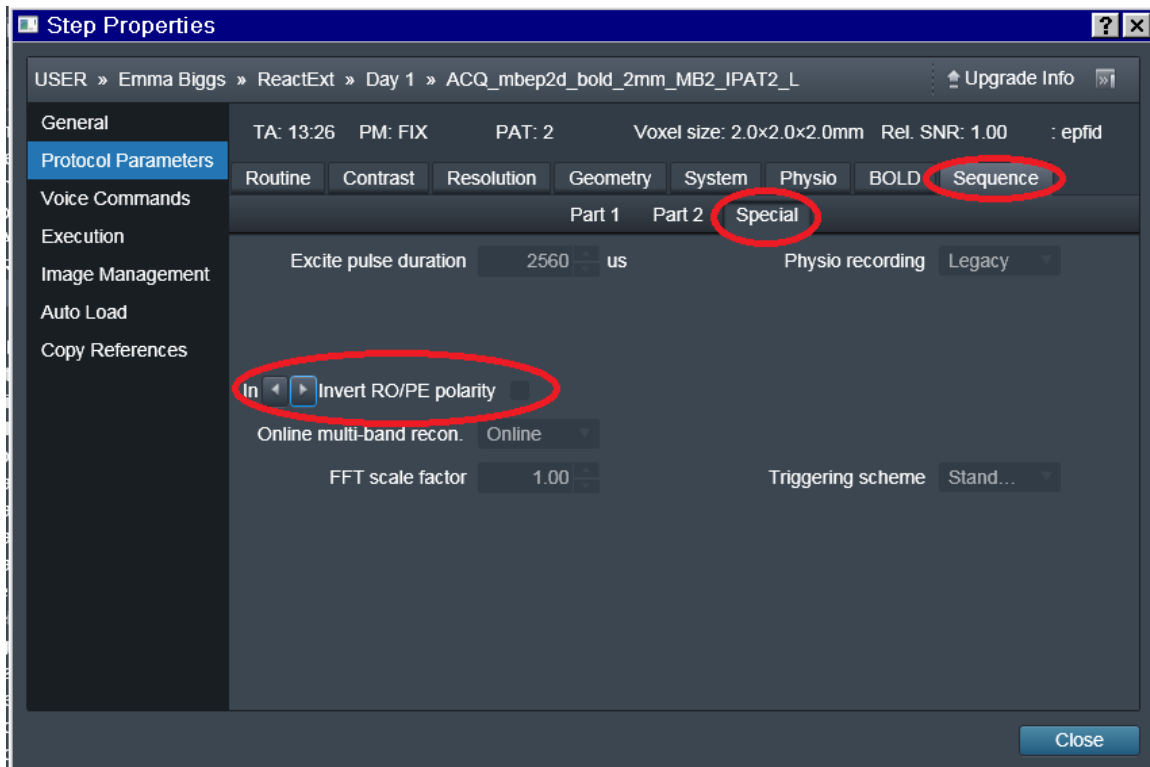
To correct for geometrical distortion in EPI images you need to run about 5 extra volumes of you EPI protocol.

Run your normal EPI experiment with the original phase encoding direction. Repeat this EPI run, but change the measurements in the parameters BOLD card to 5. Rotate the phase encoding direction 180 degrees to the EPI experiment (Routine card), by adding or subtracting 180 (thus AP becomes PA, RL becomes LR etc.).



In **MB sequences from CMRR** rotation is set in a different manner. Select "Invert RO/PE polarity" in protocol card, Sequence, Special tab. NOTE: in this case use the GRE as a reference mode, when GRAPPA acceleration mode is selected. GRE will allow you to use the "Invert PE/RO polarity" option in the special card (see image below). This is currently not possible when using the FLEET reference mode. A bug will stop the scanning in case the FLEET reference mode in combination with "Invert PE/RO polarity" is selected. When FLEET reference mode is the choice of preference perform manual rotation of the phase encoding in the routine tab instead of the "Invert RO/PE polarity."

Screenshot of Invert RO/PE polarity in the MB sequence of CMRR:



11 AUTO ALIGN

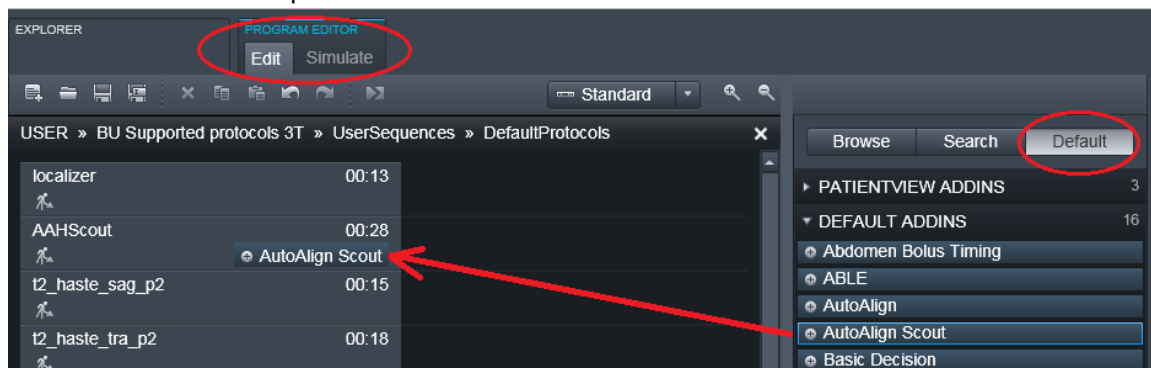
AutoAlign is the method for automatic positioning and alignment of slices for an MR examination. AutoAlign assists the user in positioning the slices in a robust and reliable way regarding positioning standards and arbitrary patient positions, different patient ages, pathologies and interventions.

The specific AutoAlign Head scout scans a sagittal, T1-weighted 3D volume in the isocenter and computes the AutoAlign Head references. The resulting MPR localizer images are automatically loaded into the graphic segments of the Exam task card.

NOTE: The AutoAlign Head scout needs an add-in to compute the MPR localizer images.



In the Siemens and Supported protocols the AutoAlign Scout add-in is included in the AAHScout. If not, the add-in needs to be added by drag and drop in the program editor in the dot cockpit.



AutoAlign Head references:

- Head > Basis (sagittal and coronal orientation)
- Head > Brain (transversal orientation)
- Head > Inner ear
- Head > Orbits
- Head > Optic nerves
- Head > Temporal lobe

11.1 SETUP AUTOALIGN FIRST SUBJECT

Start the measurement

- Scan a default localizer if preferred.
- Scan the AutoAlign scout.
- Open your first protocol:
 - Reset AutoAlign reference to none (--);
 - Predefine the main orientation and reset the position to Isocenter;
 - Set the required AutoAlign matrix in the field AutoAlign of the Routine parameter card;
 - Position the slice box as required;
 - If required, define an offset for position and rotation;
- For all the following protocols in the same orientation:

- Open the protocol;
- Make sure the AutoAlign reference is set to none (--);
- Right click on the first protocol of the same orientation;
- Use "Copy references", center of slice group;
- The slices will automatically align to the set position;
- Apply.

After finishing the first measurement:

Save the measured protocols into the Exam Explorer as a new program.

- o For all the protocols in the same orientation as the first protocol:
 - Set "Copy reference" from the first protocol

Do not use the autoalign matrix (autoalign reference must be (---)) in the following protocols of your exam when you want the same alignment. Use copy references instead. This way you will have the same offsets for each protocol in your exam, because autoalign will always overrule.

11.2 FOLLOWING SUBJECTS / MEASUREMENTS

Use the protocol of your first subject, which you saved in the Exam Explorer. The position of the slices in the following subjects is generated automatically and should be the same as set in your first subject.

- o In the protocol you can (de)activate the AutoAlign option at any time.
- o If you do not agree with the auto-aligned slices, you can reposition the slices manually. See orange comments in paragraph 11.1.

12 MOCK SCANNER

The Mock scanner is a fake scanner to train your subject prior to a scanning session. A head motion training as a preparation tool can be performed. This is recommended for young children (8-12 years) and subjects with cognitive impairment. The head motion training is a very useful tool that allows tracking head motion of the child/subject and giving visual feedback of the fact that they moved excessively. The child/subject sees a movie that stops every time they exceed a certain threshold. The use of the Mock scanner will decrease dropouts and increase data quality.

12.1.1 MOTION TRAINING

At first check if the power of the dummy scanner is on. The switch to turn on the power is located on the right side of the desk. There's a sticker with Dummy Scanner on/off above it. If the power is on, the little orange light on the switch will be glowing. Next you can turn on the stimulus pc and the radio named "Algemeen". After logging into the stim PC start Datalogger and Movieplayer.

Datalogger:

- Press 'Get Temp'
- Press 'Set Offset'
- Press 'Select or Create File' button. A new window opens to let you create the database table that will contain all the data of the movements. Check that it opens in the folder of your choice and name with the coding you give the subject.
- Press 'Get Data'. A window appears asking if you are ready to start. **Do not press anything yet.**

Before you select the movieplayer, please first adjust screensettings: Extend displays. Do **not** adjust the resolution.

Check:

- Check whether the screen behind the mock scanner is on.
- The switchbox in the stimulus rack needs to be set to switch 3.
- The sensor for movement is inside the pink headband.
- If you have problems with showing the video on the screen behind the mock scanner you can check the settings of the screens with Nvidia (control panel on the pc).

Movieplayer:

- Press "Select and Open DB". When the window appears load the file you **created in Datalogger.**
- Check the 'Control' section and if necessary change the parameters (everything on 7 first and gradually decrease later in video).
- Press 'Select File' and choose the video. There's an animation movie located under D:\Dummy Scanner\Media.
- 'Get Data' → movieplayer.

Now you can press OK on the window that previously appeared on Datalogger.
(Optional: you might have to click on Switch Mode if the video does not start on the Stimulus PC after pressing 'Get Data').

After the motion training, ask if the child is fine and whether they perceived the movement that the device detected. **Give the child feedback!** Make the child aware that moving too much causes the scan to fail. If necessary, repeat the movie.

PERIPHERAL EQUIPMENT

13 EQUIPMENT RACK

13.1 AUDIO AMPLIFIER

Must be set on Aux2 and must be **on** for all audio. The volume of amplifier has to be between 15-17, to keep the noise level in your audio to be low.

13.2 MIXER

The mixer controls all audio of the subject. The inner (pop-out) knobs adjust volume. The outer (ring) knobs control left and right balance.

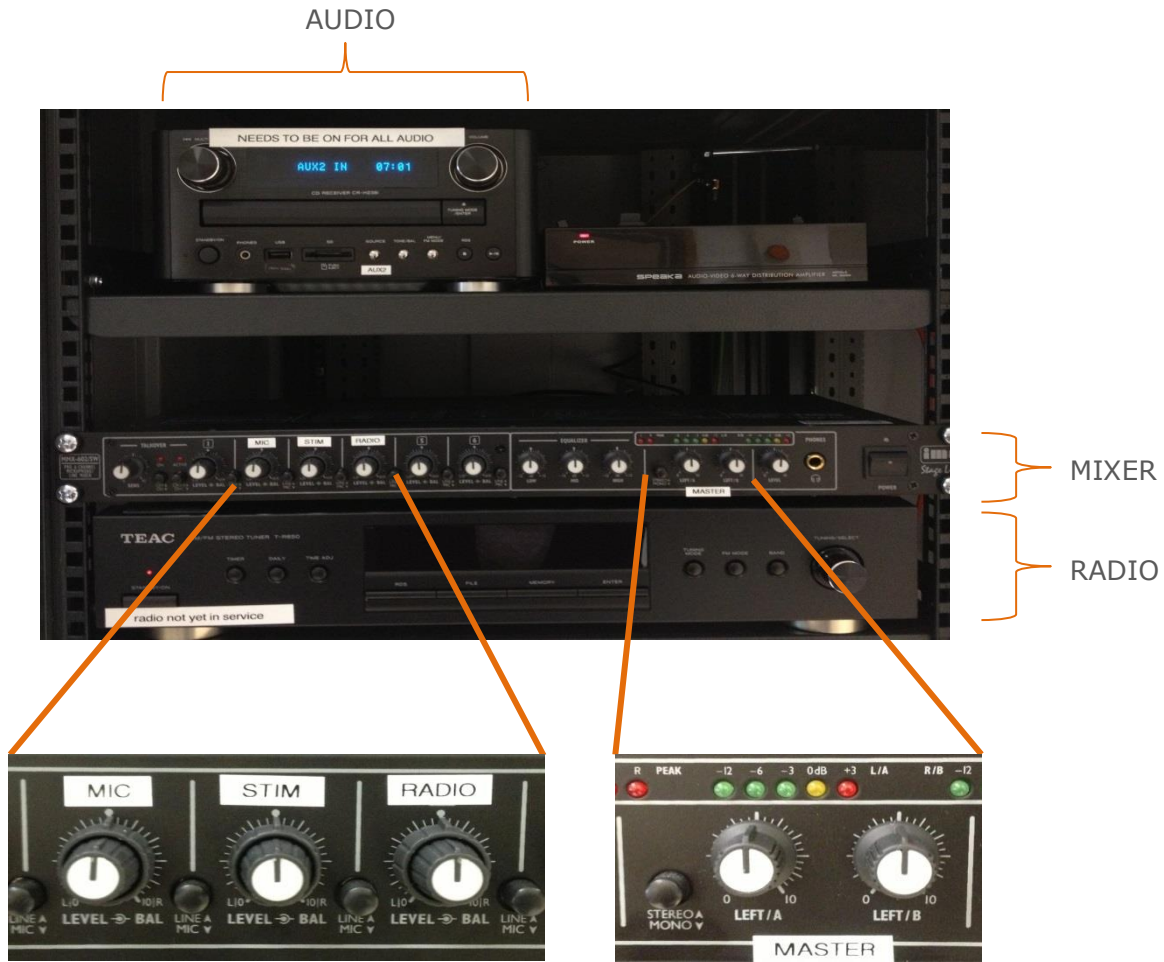
For your audio measurement the following is important:

STIM PC

- Sound level output of PC max 80%.
- Disable all soundcard enhancements (playback devices → properties → enhancements → disable all enhancements).
- Equal balancing output (playback devices → properties → levels → balance).

MIXER

- The MIC knob controls the microphone settings.
- Small button on the right-hand side of knob must be pushed in.
- Talk through microphone on desk: returns automatically to off.
- The STIM knob controls input of stimuli from the stimulus PC. The inner (pop-out) knob adjusts volume. Set this volume so that no clipping appears. (see red lights of left and right peak indicators above Master) The outer (ring) knob controls left and right balance.
- Small button on the right-hand side of knob must not be pushed in.
- The Master volume controls the output of the mixer to the amplifier.
- Small button on the left must be pushed in for mono
- Using stereo you can adjust the volume per left/right individually.
- Optimize volume by checking indicator lights. Orange light of 0dB must be blinking, but not the red light (then clipping appears). The volume of the audio amplifier can stay low.
- The Radio is not working.
- ***The standard settings are shown the picture below.***



Return the equipment to the standard after finishing your measurement!

13.3 SPEAKER

Allows researchers to hear what the subject is hearing (speaker output is left-channel only). The volume of the audio can be adjusted within the console room without affecting the subject's parameters.

13.4 INTERFACE BUTTONBOX AND JOYSTICK

This interface or response box controls how the data of the button box are being stored. Researchers can switch between parallel mode and USB mode on the device besides the interface. USB mode is recommended. A power reset must be done in order for the change in mode to take place.

BUTTON BOX

Changing settings response box using the button box:

- push knob
- change mode, yes
- manual config
- select setting (turn knob)
- default mode HHSC-2x4_c, USB, HID key 12345
- reset power

The interface auto connects to the button box in the scanner room. Every button on the button box corresponds to a given number.



JOYSTICK

Change the settings of the response/interface box when using the joystick in combination with the trigger of the scanner:

- connect the joystick in the MR room and make sure the joystick is standing flat on the floor and is not tilted!
- push knob of response box
- change mode, yes
- manual config
- select setting (turn knob)
- Thethyx, USB, **HID JOY COMP** (make sure to select hid joy comp otherwise you will not receive the trigger from the scanner!)
- reset power



13.5 SWITCH BOXES

The switchboxes allow researchers to switch input for the projector video, TBV monitor and secondary stimulus monitor. Also to switch between the EEG and Eye tracker monitor. On the 7T you can switch for video input to the goggles. The **orange light** indicates the current setting.



SWITCH BOXES

14 STIMULI AND RESPONSE EQUIPMENT MR ROOM

14.1 BUTTON RESPONSE BOXES

Button response boxes can be found next to the scanner.

- Left and right hand button boxes
- Four buttons each



14.2 SENSIMETRIC EARPLUGS (+CANAL TIPS)

Inside the magnet room you find the in-ear system for auditory stimuli.

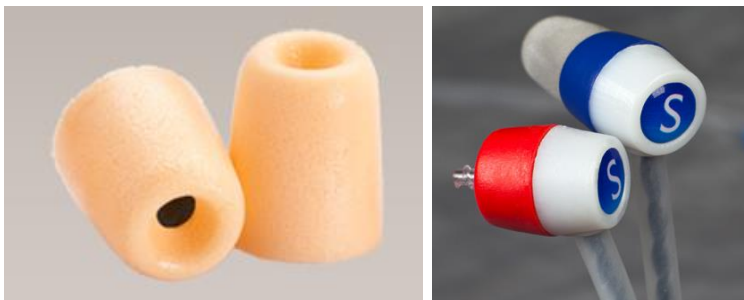
The ear buds come in different sizes:

- Slim (small)
 - Standard length
 - Short length
- Standard (medium)
 - Standard length
 - Short length
- Large

They are stored in the supply box in the console room.

When applying the foam ear buds, handle with care. Do not squeeze tip when applying it on earplug!

When screwed on: gently expose a bit of the black top by pulling down the foam. Shape tip to the ear.

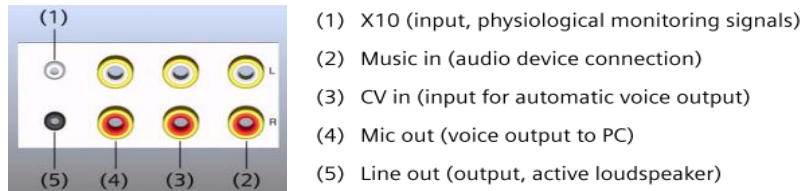


Very expensive ear buds! Reusable for the same subject!

To fixate the head, use the black circular cushions that have an open space in the middle to make room for the earplugs.

14.3 MUSIC

Connections for audio equipment are located at the central unit of the intercom in back of Syngo Acquisition Workplace.



15 PHYSIOLOGIC SENSORS

15.1 CHARGING STATION

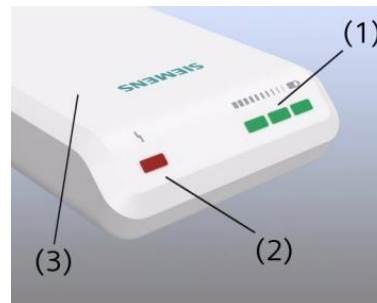
The physiologic sensors are located in the console room in the charge unit (B).

Respiratory belt, ECG electrodes and pulse sensor are available in the magnet room. Application tools (gel, wipes) are available in the supply box in the console room.

The green LEDs flash when positioned correctly.

Always place sensor back into charging station!

- (1) 3 Green LEDs (battery status)
- (2) 1 Red LED (fault)
- (3) Transmitter unit

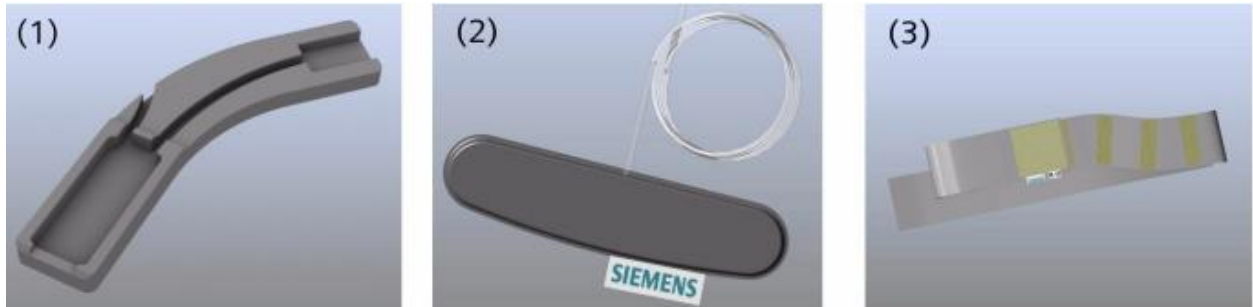


3 Green LEDs flash	Fully or nearly fully (2/3) charged accumulator
2 Green LEDs flash	1/3 to 2/3 fully charged accumulator
1 Green LED flashes	Nearly discharged accumulator; remaining operating duration is 1 hour
Red LED flashes (as regular as the green LEDs)	Transmit function deactivated, unit is positioned outside the static magnetic field; no electrode/application fault detected
Red LED is off	Transmit function activated; unit is positioned on the patient table in the static magnetic field; no electrode/application fault detected
Red LED flashes rapidly	PERU: electrode fault - one or more ECG electrodes are not applied correctly or fell off PPU: application fault - pulse sensor is not applied correctly at the finger

15.2 RESPIRATORY SENSOR

The unit can acquire the ECG channel as well as the respiratory channel of the subject. The ECG electrodes and respiratory cushion (attached with respiratory belt) are attached to the unit.

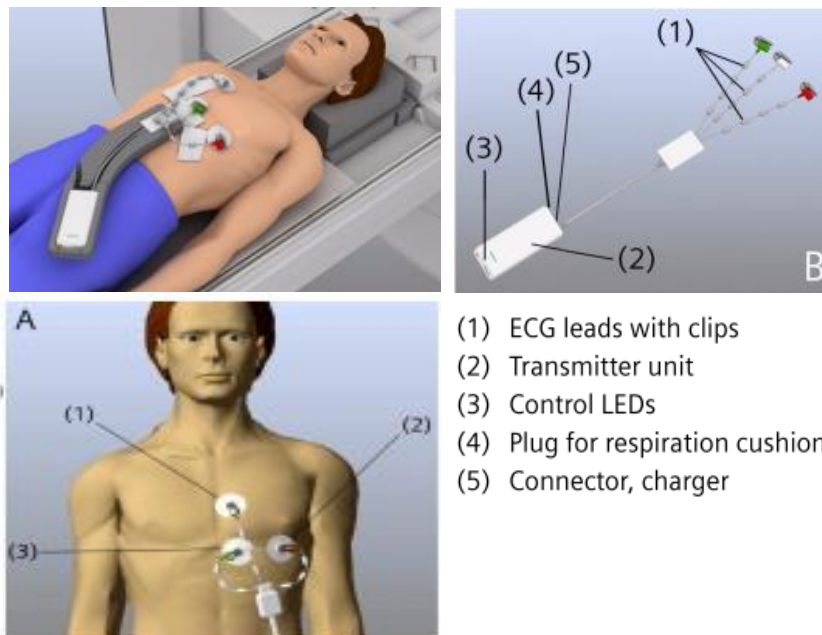
Unit has to be placed in the application cushion to prevent skin irritation during examination.



- (1) Application cushion
- (2) Respiratory cushion with pressure hose
- (3) Respiratory belt

15.3 ECG SENSOR

Unit has to be placed in the application cushion to prevent skin irritation during examination.

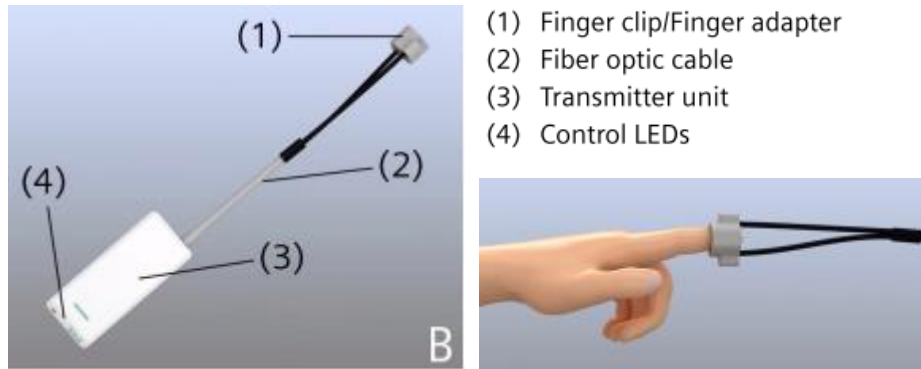


- (1) ECG leads with clips
- (2) Transmitter unit
- (3) Control LEDs
- (4) Plug for respiration cushion
- (5) Connector, charger

- (1) AVF – (white)
- (2) I + (red)
- (3) I -, AVF + (green)

15.4 WIRELESS PULSE SENSOR

The unit acquires the subject's peripheral pulse. The finger clips are available in three sizes (cupboard scanner room).



15.5 7T ACOUSTIC CARDIAC TRIGGERING

The ECG signal is disturbed in UHF MR systems. As a replacement, an acoustic system is available to detect the heartbeat.

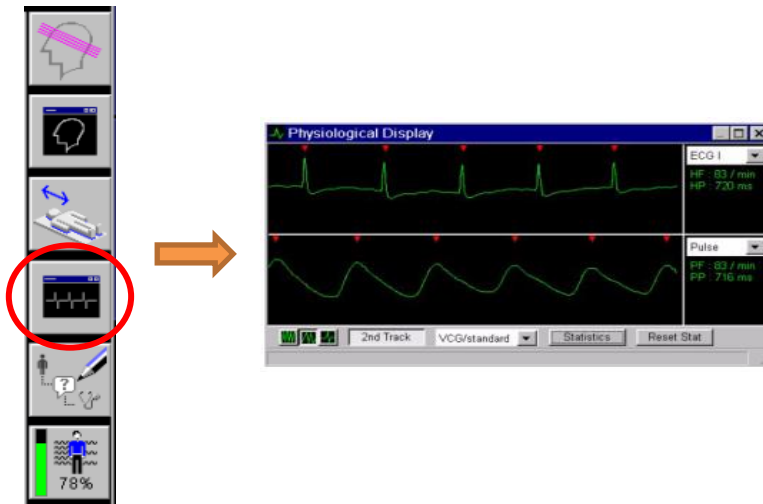
The manual of the acoustic system can be found via the documentation folder of the BU server Z:\~Documentation\Manuals\Manuals Peripheral Equipment\Easy act triggering or via the Scannexus self-service portal

<https://scannexus.atlassian.net/servicedesk/> by filling in '7T cardiac triggering' in the 'search box'.



15.6 MEASURED DATA

Measured data can be viewed at Physiological Display within Syngo MR.



15.7 PHYSIOLOGICAL LOGGING

Automatic logging of physiological data can be done within the fMRI MB sequence of CMRR.

At **Prisma fit** and **7T plus** the logging can be recorded as a dicom file. Select DICOM in Sequence/Special tab, Physio Recording.

At 9.4T, select physiological recording in the special card of the sequence. The physiology data are saved to: C:\medcom\log\physio.

Other sequences need a cmd tool to be able to log the data. See Scannexus self-service portal <https://scannexus.atlassian.net/servicedesk/> and use the search box to find the how-to-articles related to the physiological logging.

16 STIMULUS PC

Stimulus PC can be used to present your stimuli to the subject. Different programs are available (the most recent software versions are documented in our Scannexus self-service portal: <https://scannexus.atlassian.net/servicedesk/>, like Matlab, PsychoPy, Presentation or E-prime to present your stimuli. The latter two will be explained in further hardware related details in this CU manual. Make sure the switch boxes are correctly set (orange indicator) to present your stimuli correctly and to



receive the scanner trigger.

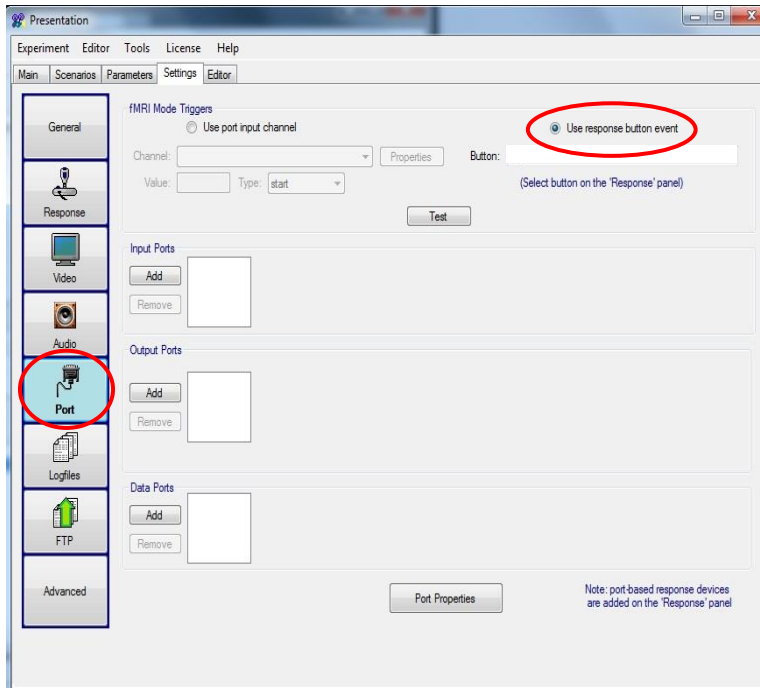
It is also possible to use your laptop instead of the stimulus PC. Connections available to your laptop are video, audio, USB and LPT port. Make sure you selected the right PC on the following switch to be able to receive the scanner trigger.



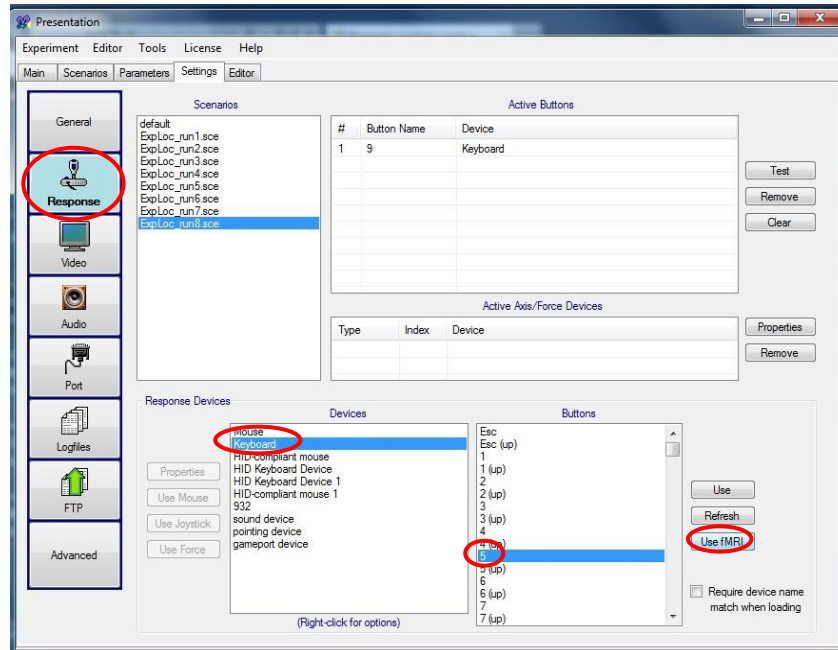
16.1 PRESENTATION

16.1.1 USB MODE

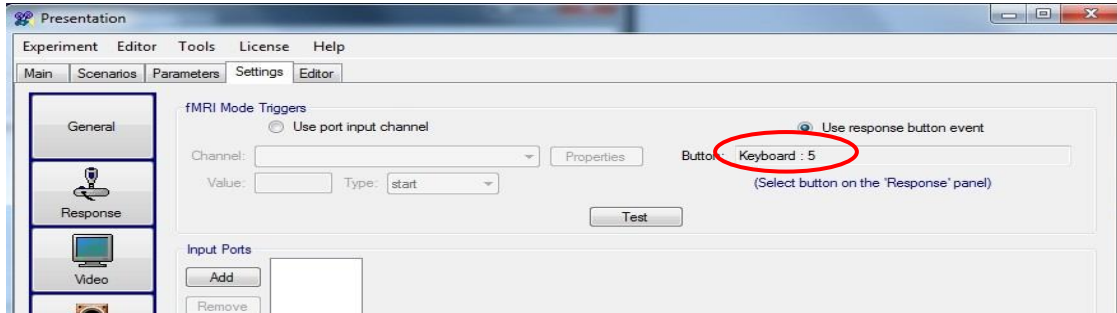
For USB trigger mode: check the “use response button event” box on the *Port panel* and return to the *Response panel*.



On the Response panel select: *Keyboard, 5*, and choose *Use fMRI*



On the port panel “Keyboard: 5” will appear.



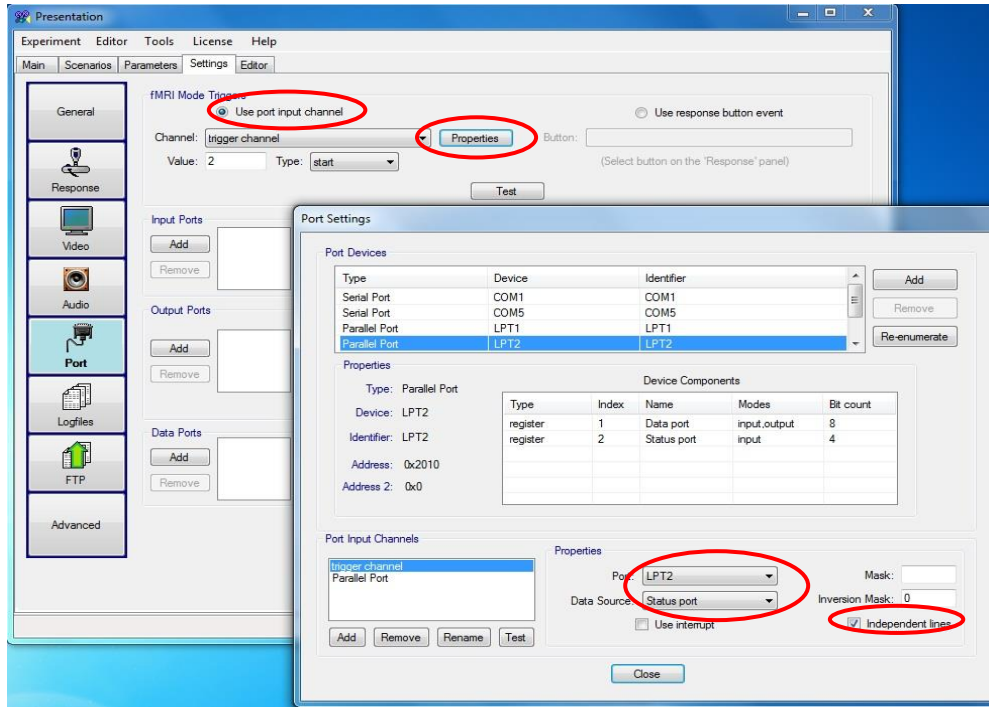
On the response panel you can choose the other buttons you need. Select *Keyboard*, the right buttons (1-4, 6-9) and *Use*. The corresponding buttons and fingers in default mode are:

- 9 - L Pinky (red)
- 8 - L Ring (green)
- 7 - L Middle (yellow)
- 6 - L Index (blue)
- 1 - R Index (blue)
- 2 - R Middle (yellow)
- 3 - R Ring (green)
- 4 - R Pinky (red)

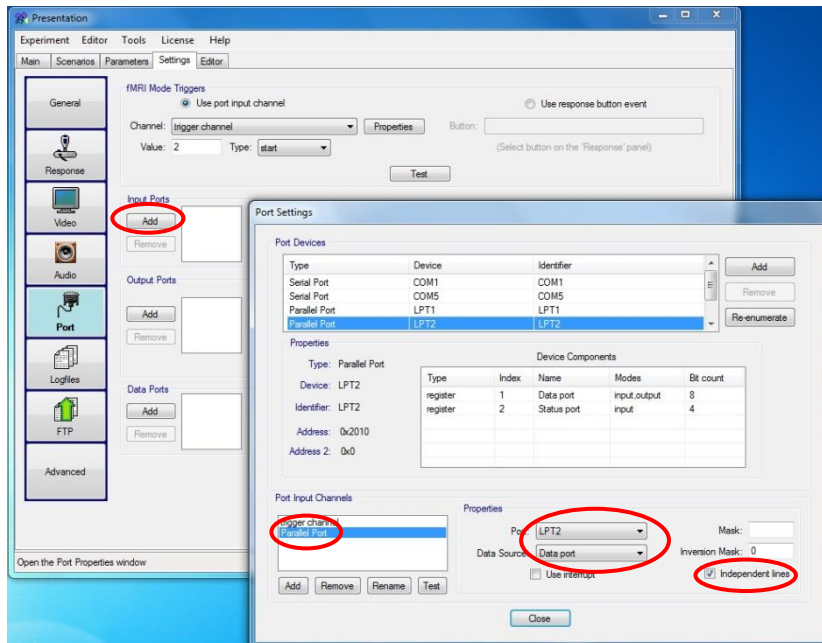
The USB mode is recommended. During programming and preparing you can use the 5 of your keyboard to simulate the trigger of the scanner. After copying your files to the stimulation pc you are ready for scanning without changing your settings.

16.1.2 PARALLEL PORT

However, it is possible to use the parallel port. On the *Port panel* check the “use port input channel” box. Select properties. Select LPT2, status port, check independent lines.

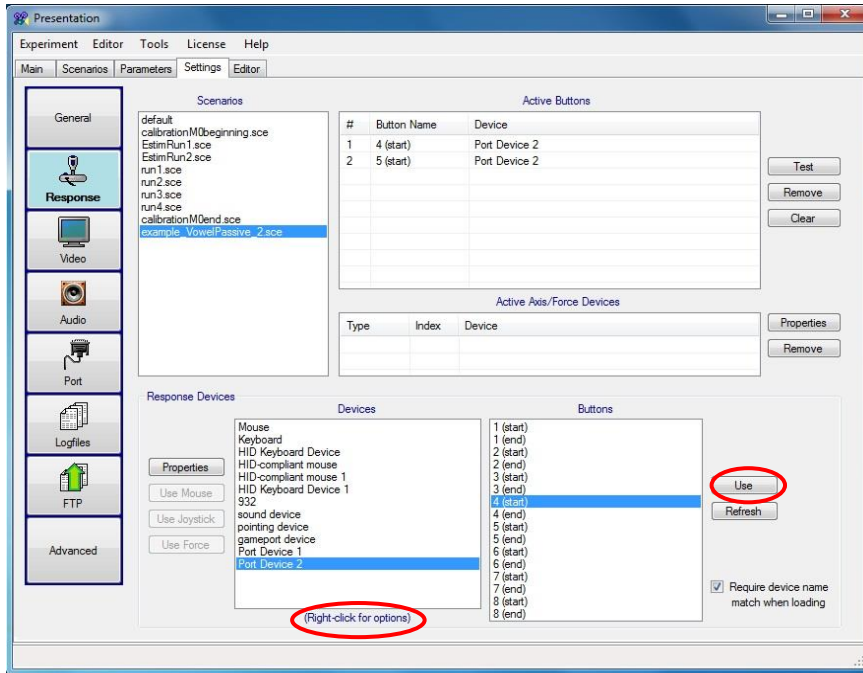


For the use of the button box: Click on Add below Input Ports. Select LPT2, data port, check independent lines.



On the response panel add your port device by clicking with your right mouse button on the "device field". Select your port device and add the buttons you need. The corresponding buttons and fingers in default mode are:

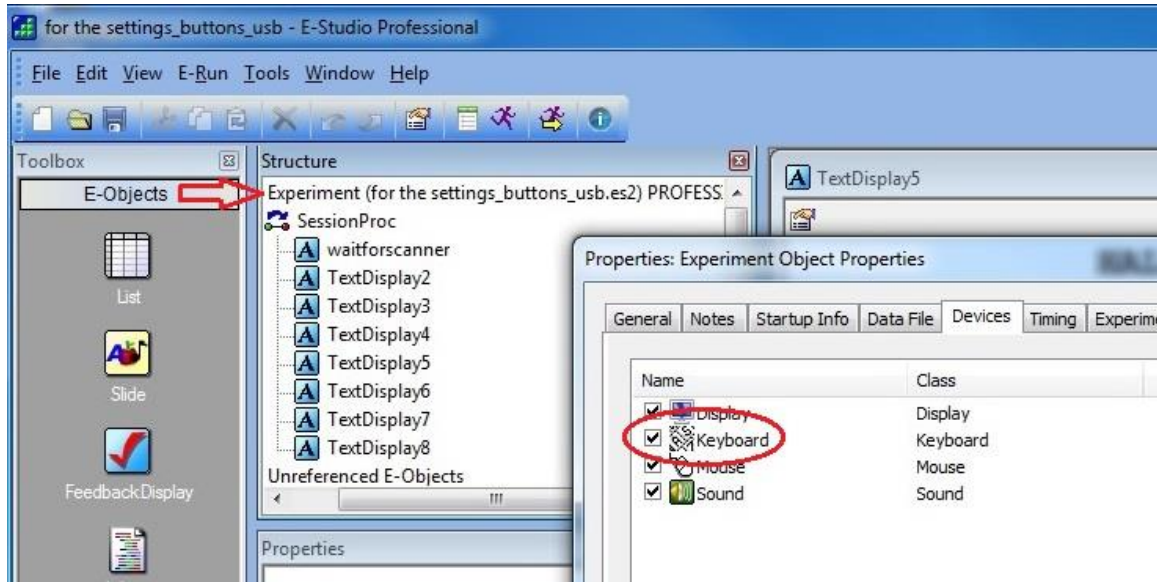
- 1 - L Pinky (red)
- 2 - L Ring (green)
- 3 - L Middle (yellow)
- 4 - L Index (blue)
- 5 - R Index (blue)
- 6 - R Middle (yellow)
- 7 - R Ring (green)
- 8 - R Pinky (red)



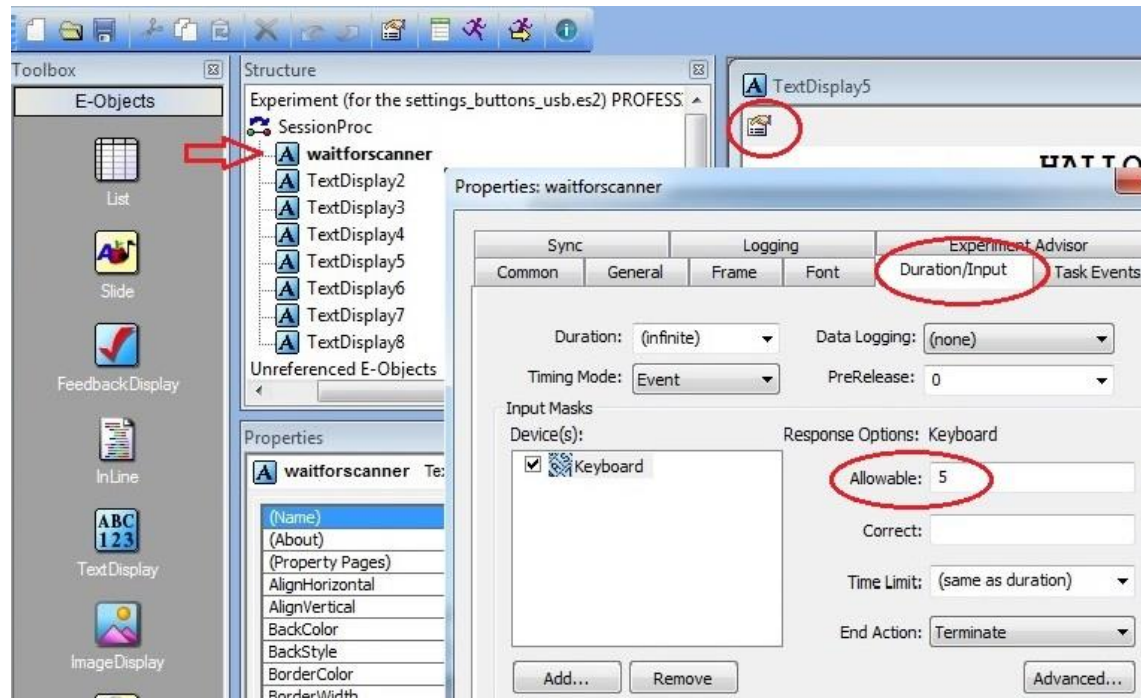
16.2 E-PRIME

16.2.1 USB-MODE

For USB trigger mode: you need the keyboard to be selected. Double-click on “Experiment” to check this.



Open a slide that should wait for a scanner trigger by double-clicking on it, double-click on the properties icon, open the Duration/Input tab, add the keyboard. Under the response options: enter 5 for the allowable.

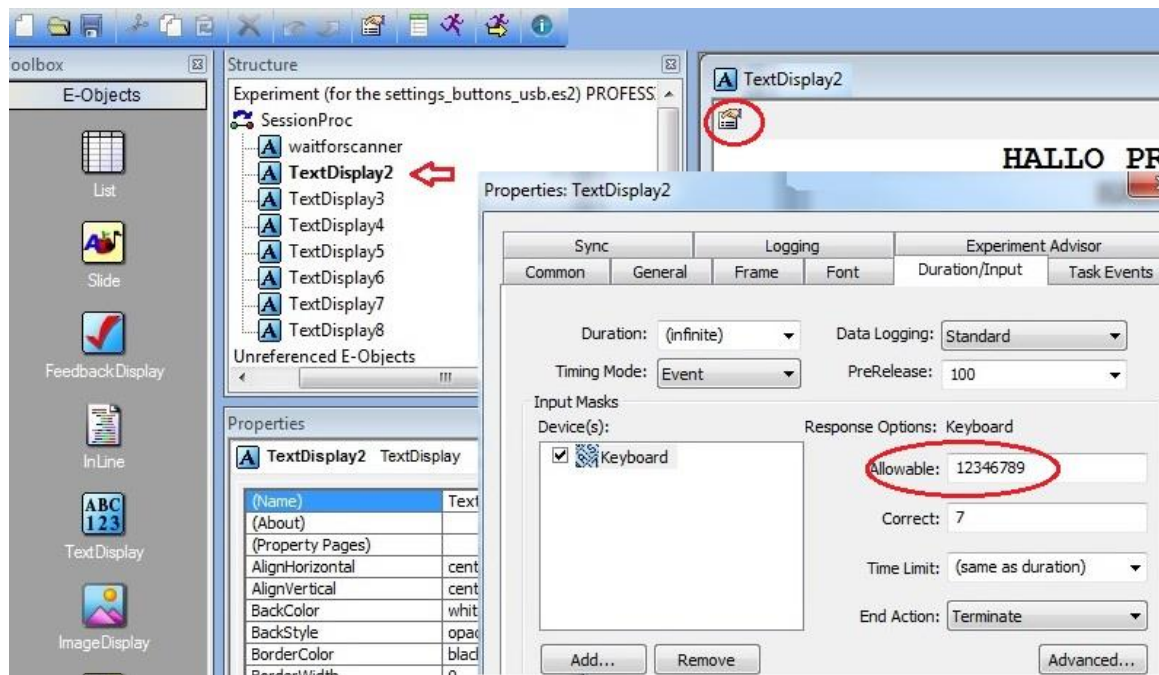


The USB mode is recommended. During programming and preparing you can use the 5 of your keyboard to simulate the trigger of the scanner. After copying your files to the stimulation pc you are ready for scanning without changing your settings.

Open a slide that should wait for input from the button boxes by double-clicking on the slide, double-click on the properties icon, open the Duration/Input tab, add the keyboard. Under response options: enter the buttons you need. (You cannot enter {ANY}, because the trigger of the scanner shows up as 5)

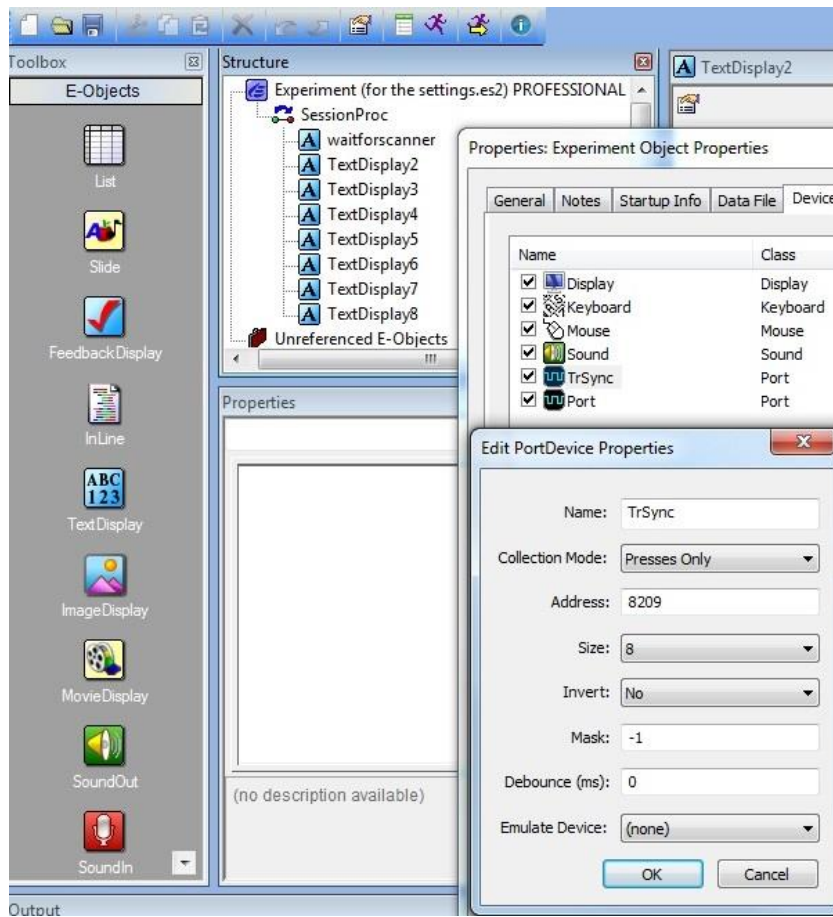
The corresponding buttons and fingers are:

- 9 - L Pinky (red)
- 8 - L Ring (green)
- 7 - L Middle (yellow)
- 6 - L Index (blue)
- 1 - R Index (blue)
- 2 - R Middle (yellow)
- 3 - R Ring (green)
- 4 - R Pinky (red)



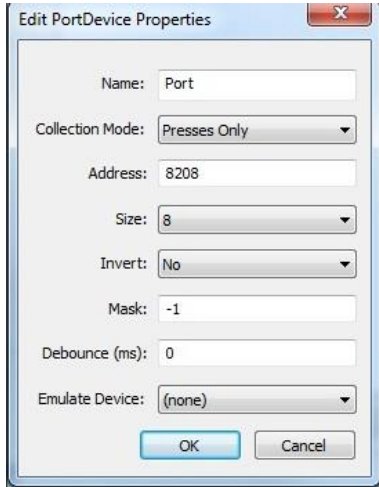
16.2.2 PARALLEL PORT MODE

The USB mode is recommended, but it is possible to use the parallel port. Double-click on "Experiment" and add Port, change the name in TrSync, change the addresses in 8209.



Open a slide that should wait for a scanner trigger by double-clicking on it, double-click on the properties icon, open the Duration/Input tab, add the TRsync. Under the response options: enter {ANY} for the allowable.

If you want to use the button boxes you need to add another port. Double-click on “Experiment” and add Port, change the addresses in 8208.



Open a slide that should wait for a button press by double-clicking on it, double-click on the properties icon, open the Duration/Input tab, add the Port. Under the response options: enter {ANY} for the allowable.

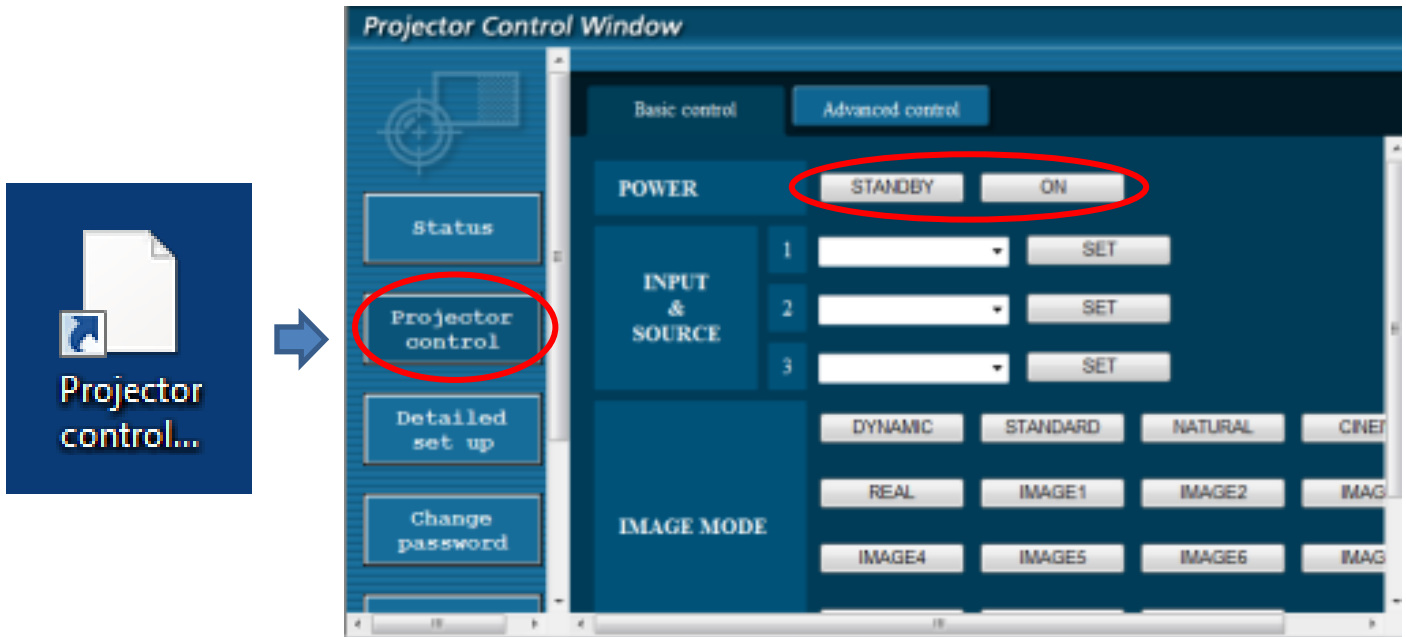
The corresponding buttons and fingers are:

- 1 - L Pinky (red)
- 2 - L Ring (green)
- 3 - L Middle (yellow)
- 4 - L Index (blue)
- 5 - R Index (blue)
- 6 - R Middle (yellow)
- 7 - R Ring (green)
- 8 - R Pinky (red)

16.3 PROJECTOR CONTROL

To turn the projector on or to standby:

- Open the program "Projector Control" on the desktop.
- Hit the button "Projector Control".
- Choose either "Standby" or "ON".

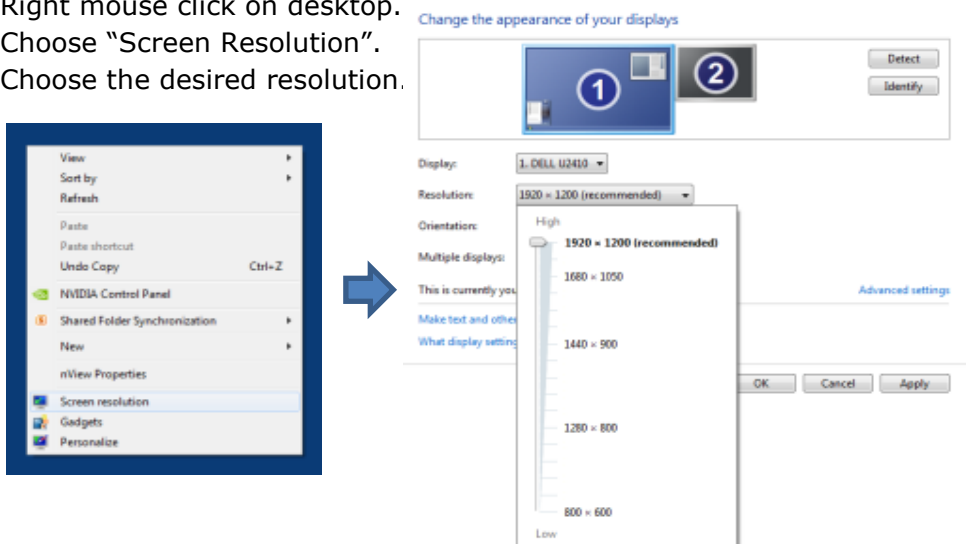


Make sure to use (Stim) PC screen only. Using a second screen might present a black screen instead of your Stim PC screen. In this case:

- Press "windows key" + P
- Select computer only

The resolution of the screen is recommended to be **1920*1200**. If not, you can change this by:

- Right mouse click on desktop.
- Choose "Screen Resolution".
- Choose the desired resolution.



16.4 3T PROJECTOR SETTINGS

When using the 64 channel head/neck coil, make sure the subject is placed in the center of the coil.

If the subject has a small head, an extra cushion underneath the head might be necessary in order to have a view of the whole projection on the screen. This will elevate the head a little, the movement of the mirror is very restricted.

64 CHANNEL HEAD/NECK COIL

- Distance from eye to mirror is about 15 cm, mirror to screen is 60 cm
- Image width: 40 cm
- Image height: 24.5 cm
- Image diagonal: 47 cm

16.5 7T PROJECTOR SETTINGS

The 7T has a variety of different head coils. To use the projector with the different head coils (volume/visual) the distance to the projector screen varies. Also the position of the projector screen on the table can vary. Therefore the user has to choose the right setting on the lens of the projector. The projector is located in the technical room next to the magnet room.



Two screens are available to be mounted in two positions behind the coils

- position 1, back
- position 2, front

The screens as well as their respective positions are labeled. Please make sure that the labels face you when putting the screens in! Make sure that the screens are securely tightened using the mounting screws! If you touch the screens, clean them afterwards!

NOVA 32 CHANNEL COIL

- Use screen position 1 only, due to cable routing
- Adjust the focus on the projector to NOVA COIL POS1 → center
 - Distance from eye to screen: 99 cm
 - Image width: 28 cm
 - Image height: 17.5 cm
 - Image diagonal: 33 cm

VISUAL ARC COIL

- Both screen positions can be utilized using the visual coil
- The distance from eye to screen can slightly vary depending on how you bend the mirror
- Please contact support for correct positioning of the projector, some extra steps are needed!

- **Screen position 2**

This setup gives the user the biggest visual field available. Note in this case, small parts of the lower right and left visual field are covered by the mirror holder.

Adjust the focus on the projector to position VIS COIL SCREEN → center

- **Screen position 1**

Adjust the focus on the projector to position. This position is not labeled

Always set the projector to standby and standard settings when your measurement is finished!

17 EYE TRACKER AND GOGGLES

17.1 NANO EYE TRACKER 7T (NOVA COIL)

This eye tracker system can be used in combination with the Nova coil.

17.1.1 HARDWARE SETUP NANO EYETRACKER

- Projector switchbox to stim or eye, depending on input PC for the projector.
- Switch on tracker interface 2
- Adjust IR level, initial setting of one-third



- Set eye tracker video switch for the small video monitors to 2 for channel 1 and channel 2.



- Put the video monitors in the console room in front of the window to the MR room, so the eyes can visualized inside the MR room for proper positioning of the camera's.

17.1.2 PARTICIPANT PREPERATION NANO EYE TRACKER

The Nano eye tracker is located in a black suitcase located on a consolidation cart in the magnet room. Please be careful, because this is a delicate system.



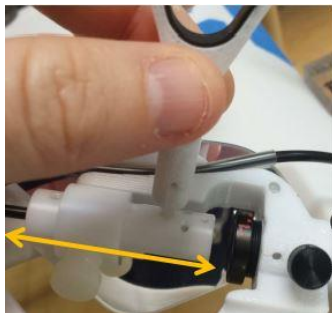
- Remove mirror from NOVA coil.
- **NOTE: use only MR compatible equipment! Ask support staff.**
- Attach the mirror of the Nano eye tracker to the NOVA coil with the thumbscrew.



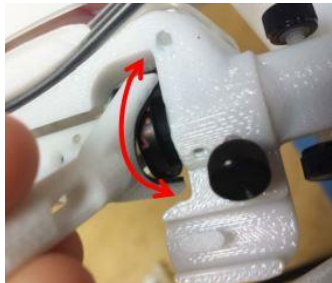
- Secure Image Guide in its clamps.
- Snap the IR fiber couple into the gasket lined grooves.



- Slide the receive coil back carefully and ask your subject to lie down on the MR table. Be careful with the Image Guide and IR fiber!
- Position receive coil over the subjects head.
- Make sure the subject is able to see the whole projection screen.
- Adjust the Nano eye tracker and check with the video monitors if the pupils are presented in the center of the monitor.
 - Loosen the Imaging Head thumbscrew.
 - Slide and rotate the Imaging Head with the Nano Adjustment Tool, until the subject's eye is visible in the video monitor. Tighten Imaging Head thumbscrew.



- Adjust focus by rotating the lens with the tool



17.2 GOGGLES AND EYE TRACKER 7T (VISUAL COIL)


The binocular goggle system of the 7T incorporates eye tracking. This system can only be used in combination with the Visual Arc Coil. Presenting the visual stimuli is done by the goggles for the Arc Visual Coil, not by the projection screen when eyetracking is needed.


The visual stimuli can be presented biocular (same image to each eye) and binocular (different images to each eye). The video interface is located in the equipment rack.

Detailed information is presented in the Scannexus self-service portal <https://scannexus.atlassian.net/servicedesk/>. Fill in 'eyetracker' in the 'search' box

- Change screen resolution of stimulus PC to 1024x768/60 Hz! This resolution is less than the normal projector. **Set resolution back in default settings (1920x1200) after your scan session!**
- Switchboxes in right setting:
 - Switch box of TBV to stim.
 - Switch box of goggle 1 and 2 to stim1, 2 or eye tracking, depending of which PC the goggle input will be.
- Set second screen of stimulus PC to extended or duplicate, depending on presenting different or the same stimuli to the left and right goggle.
- Use TBV screen for second screen (resolution 1024x768!).
- Power on the visual system by power switch of the video interface, see below:



- Check diagnostic indicators
 -  Orange and flashing lights indicate something is wrong: Check cable connections, cooling system.
 - No light of the alarm: System is ok, otherwise the alarm light is orange blinking.

-  Red/Off: Check output settings on source computer (1024x768/60 Hz)

17.2.1 HARDWARE SETUP GOGGLE EYETRACKING

- Change the screen resolution of the eye tracking PC and stimulus PC to (1024x768) when doing the calibration. **Set resolution back in default settings (1920x1200) after your scan session!**
- Switch box of goggle 1 and 2 to stim1, 2 or eye tracking, depending of input PC to the goggles.
- Eye tracker video switch for the video monitors to 1 for channel 1 and channel 2.



- Switch on tracker interface 1, see below.



- Adjust IR level, initial level to one-third.
- Put the video monitors in the console room in front of the window to the MR room, so the eyes can visualized inside the MR room for proper positioning of the camera's.

17.2.2 PARTICIPANT PREPERATION GOGGLE EYE TRACKING

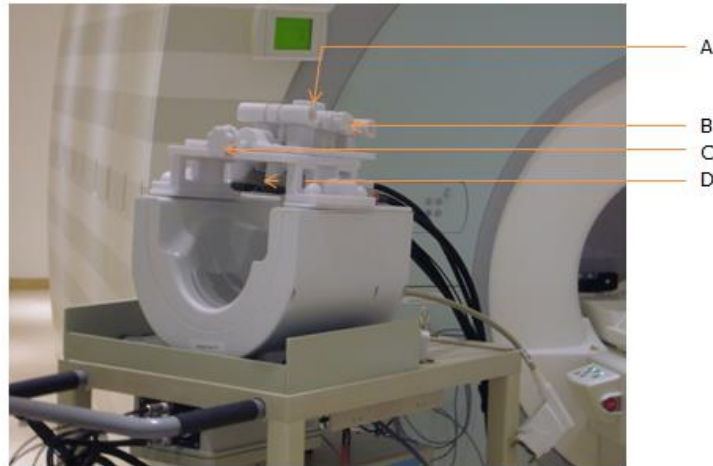
The goggles and the projector of the goggles are located on a consolidation cart in the magnet room.

- Mount and adjust glasses



- Place the head coil mount (picture) on the coil over the subjects head. Be careful to not touch the face when locking the goggles onto the coil.

- Goggles system cables face into the bore of the magnet! On the visual coil guiding's are attached for the cables.
- The Silent Vision Glasses have adjustments for refractive correction (focus) on the side of each eyepiece. To adjust the focus move the focus slide until there is a clear image in each eye.
- The glasses can be positioned above the eyes by the 3-Axis mount.



- A. Position goggles in vertical direction
- B. Position goggles in left right direction
- C. Position goggles in feet head direction
- D. Refractive correction
- Adjust the goggles so that they are presented above each eye, check by asking subject to close the eyes. A small dot of light is presented on each eyelid.
- Adjust the positioning of the goggles by looking at the camera pictures.
 - Pupils in center of eye openings in the camera pictures.
 - Adjust distance eye and goggles. The two IR illumination beams on the left and right side of the eye should overlap, so a uniform illumination area is projected over the pupil.
 - Adjust level of IR illumination if necessary (tracker interface)

PLEASE BE CAREFULL WITH CABLES AND DO NOT TIGHTEN SCREWS TOO TIGHT!!!!

17.3 EYE TRACKER 3T

17.3.1 SETUP EYE TRACKER 3T

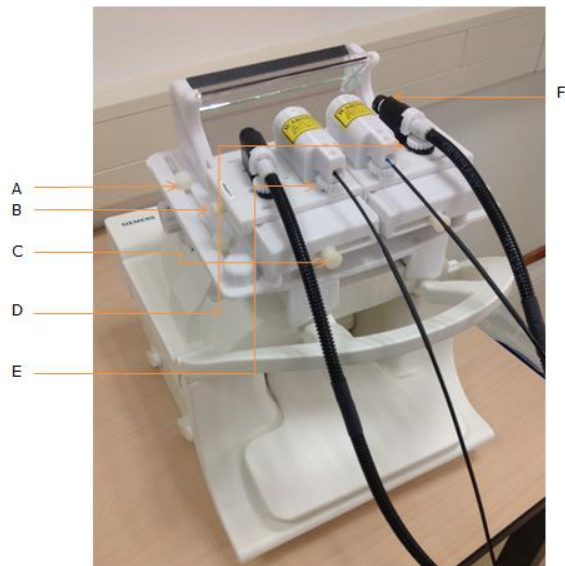
The mounting with the eye tracker is located in the console room of the Prisma fit.

- Mount the eye tracker support on the 64 channel head neck coil. **Note: the screws that tighten the tracker on the coil both rotate in the same direction for tightening and loosening, even though they are positioned on opposite sides of the apparatus. For example, to tighten the screws, you need to rotate both the left and right screw towards you.**
- Turn on tracker interface.
- Adjust illumination level, initial setting of one-third.
- Set projector video switch to eye.
If complete projected screen should be seen by the subject, including lower part, change the position of the projector screen. Change position to position eye tracker. The projector settings are:
 - Distance from eye to screen: 84 cm
 - Image width: 23.5 cm
 - Image height: 38.5 cm
 - Image diagonal: 45 cm

Change setting on the lens of the projector in the technical room to eye tracker position.

Always set the projector to standby and standard settings when your measurement is finished! Put projector screen back to default position!

- Adjust the eye tracker to position the eye in the camera, see picture below:



- A position of mirror to center the projection screen image to the subject's field of view, you can slide back and forward.

- B center the eye image in the video monitor, you can slide back and forward
- C center the eye image in the video monitor, you can slide left and right.

Tighten all directional lock screws.

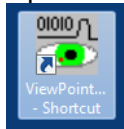
- D+E positioning if the lenses and illumination housings, tighten using thumb wheels.
- F focus the eye image by rotating the lens

PLEASE BE CAREFULL WITH CABLES AND DO NOT TURN SCREWS TOO TIGHT!!!!

17.4 VIEWPOINT SOFTWARE SETUP

This next section details how to get started with the software setup. The original manual for the Viewpoint software of the eye tracker can be found on the BU server: <Z:\~Documentation\Manuals\Manuals Peripheral Equipment\Avotec eye tracker and goggles\ViewPoint 2.8.6.21\Documentation> (ViewPointUserGuide, chapter 5 and 6)

- o Open ViewPoint on the eye tracker PC:

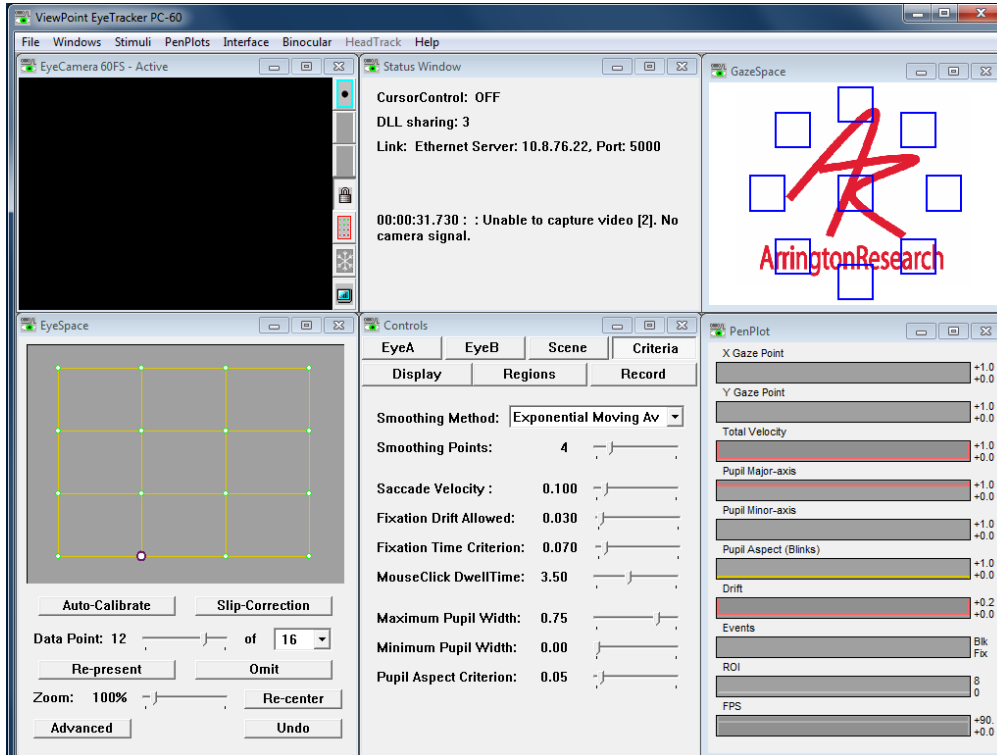


- o Set up communication between Stim PC and eye tracker PC by clicking on the ViewPoint shortcut on the Stim PC.



- o Use the DLL interface in your stimulus program.

Explanation Viewpoint screen:



EyeCamera window: Image of the eye. Adjustment of parameters that make the pupils easier to track.

EyeSpace window: Calibration, shows plot of calibration points before and after calibration.

Status window: Gives useful information recording data, can be changed to EyeCamera window by using binocular viewing mode.

Controls: Control of various different parameters.

GazeSpace window: Trace of where the subject is looking at all times. Blinking yellow square shows the mean gazing point.

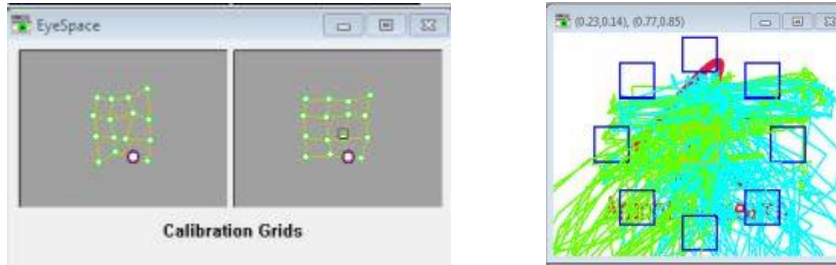
PenPlot window: Monitoring of the eye movements.

Quick start calibration setup:

- Distinguish pupil search area (EyeCamera window). Make sure this area is covering the eye, including the eyelid, to get a range of grey values. Do not include the black surrounding.
- Use standard pupil location with the ellipsoid pupil detection method. (EyeA and EyeB tab in GazeSpace window, select feature method)
- Disable AutoImage function in EyeA and EyeB tab.
- Disable the Positive-Lock Threshold-Tracking for both eyes and click Autotreshold a couple of times.
- Make calibration grid smaller than usual, as the goggle system has a limited field of view. Click regions in Controls window, select Calibration Region. Draw this new calibration region with the mouse in the GazeSpace window,

- approximately around the four diagonal ROIs (values e.g. (0.23, 0.14), (0.77, 0.86)).
- Start calibration with **Auto-Calibrate** and redo dots that are too distorted, simply by selecting the calibration point you want to redo.

Example of good calibration:



It is not necessary to adjust the size of the calibration grid for 3T and Goggles at 7T.

18 CONTRAST INJECTOR

One contrast injector (Acist, Bracco) is available. The injector can be switched from one scanner to the other. Please let Scannexus staff know when usage of the injector is wanted and on what system.

A placard attached to the injector shows the procedure in using the injector.

To administer intravenous contrast to the subject a special guidelines are in place! Please contact Scannexus Staff about these guidelines. Scannexus staff will instruct the CU about the guidelines. It is not allowed for a CU to administer i.v. contrast, this must be done under supervision of a dedicated Scannexus staff member!

More information can be found here:

Scannexus self-service portal <https://scannexus.atlassian.net/servicedesk/>. Fill in 'contrast injector' in the 'search box' injector'

19 EEG 256 CHANNELS

The EGI_EEG system contains 256 channels with sponge cap. It is suitable for 3T and 7T. Instead of gel an electrolyte solution on sponges in pedestals is used. Scanning for 45 minutes is possible. After this the sponges will be dehydrated. At the moment we are trying to optimize the application of the net and hydration time of the sponge cap. **This system is not supported by Scannexus.**

Detailed information can be found at the Scannexus self-service portal

<https://scannexus.atlassian.net/servicedesk/>. Fill in 'EEG' in the 'search box'.

Basic setup information describes a workflow of the application of this EEG system.

Official user manual and instruction application manual can be found in the

~Documentation folder on the BUserv0001:

<Z:\~Documentation\Manuals\Manuals Peripheral Equipment\MR compatible EEG-EGI>

Placards containing instructions application of the net are available.

DEFAULT AND TROUBLE SHOOT

20 DEFAULT SETTINGS 3T

20.1 MAGNET ROOM

- MRI table → Clean paper / Alarm ball / Earplugs
- 64 Head/Neck coil
- White Siemens cushions on MRI table top

20.2 STIMULUS EQUIPMENT

EQUIPMENT

- Stimulus devices stored in cupboard or on dedicated hooks at scanner
- Physiological sensors in charge unit (charge lights must blink)

TRIGGER

- Interface box:
 - Settings for Button boxes:
 - USB HHSC-2X4-C
 - HID KEY 12345
- Switch box for trigger input: USB

VISUAL

- Projector screen position: against 2nd wheel
- Projector filter: 0.3
- Screen resolution Stim PC: 1920x1200
- Switch box1: STIM
- Switch box2: VGA2STIM
- Switch box3: EYE

AUDIO

- Audio Amplifier Aux2
- Mixer :
 - MIC small button in
 - STIM small button out
 - MASTER small button out
 - All adjustment knobs centered (also outer ring)

PIEZO

- Switch box (top): Normal Mode
- Switch box (bottom): Piezo Normal Mode

20.3 CONSOLE ROOM

- Close Patient (in all windows)
- Door Magnet room locked
- Magnet room key in key cabinet
- Turn projector off (standby)
- Power off monitor of scanner host and stim PC

21 TROUBLESHOOTING 3T

21.1 TRIGGER / BUTTONBOX / JOYSTICK

Stimulation program does not receive trigger from scanner:

- Check default settings
- Check if trigger is received at interface box:
 - Circled light should flash every TR
- Now check if trigger is received at STIM PC:
 - Open notepad/word/wordpad/etc...
 - 5 should appear every TR (in USB mode)
- Still no response in your Stimulus?
 - Check your stimulus script



21.2 PC/PROJECTOR SCREEN

Projector screen stays blue:

- Check switch boxes in equipment rack

Projection not focused/blurred

- Check screen position

Projector screen stays black

- Check (Stim) PC → screen only

21.3 AUDITORY SYSTEM

Subject does not hear/balanced L/R stimulus:

- Check if ear buds are correctly used, do not block the tip-opening
- Check if the right size of ear buds are used
- Check default settings of mixer and Audio Amplifier in equipment rack
- Check the volume settings on the STIM PC

21.4 SCANNER

Scanner does not scan:

- Click echo sign (below) when red or yellow stripe
 - Follow instructions (do not call Siemens Service, notify support staff)



21.5 DATA

Inhomogeneous intensity distribution:

- Check if all receive coil elements are selected
- Check if anterior part of coil is recognized

Artifacts:

- Check if door is closed
- Check if subject moves too much
- Check if hairpins/etc. are not removed

22 DEFAULT SETTINGS 7T

22.1 MAGNET ROOM

- MRI table → Clean paper / Alarm ball / Earplugs
- 1Tx/32a channel Nova coil
- Table in home position

22.2 STIMULUS EQUIPMENT

EQUIPMENT

- Stimulus devices stored in cupboard or on dedicated hooks at scanner
- Physiological sensors in charge unit (charge lights must blink)

TRIGGER

- Interface box:
 - Settings for Button boxes:
 - USB HHSC-2X4-C
 - HID KEY 12345
- Switch box for Trigger: USB

VISUAL

- Projector screen position: Back position
- Projector focus: POS 1 > ... < POS 1
- Projector filter: 0.9
- Screen resolution Stim PC: 1920x1200
- Switch box1: STIM
- Switch box2: VGA2STIM

AUDIO

- Audio Amplifier Aux2
- Mixer :
 - MIC small button in
 - STIM small button out
 - MASTER small button out
 - All adjustment knobs centered (also outer ring)

PIEZO

- Switch box (top): Normal Mode
- Switch box (bottom): Piezo Normal Mode

22.3 CONSOLE ROOM

- Close Patient (in all windows)
- Door Magnet room locked
- Magnet room key in key cabinet
- Turn projector off (standby)
- Power off monitor of Scanner host and Stim PC

23 TROUBLESHOOTING 7T

23.1 TABLE/LASER LIGHT DOES NOT RESPOND

- If laser does not respond, move table little bit into bore, go to home position.
- No response of table movement:
 - Check buttons in control panel, might be stuck
 - Turn table off and on again
 - Deactivate table stop alarm (on console)
 - Check table stop buttons / manual movement handle
 - Always move table back to home when problem is solved (recalibration)
 - If nothing works, shutdown system

23.2 TRIGGER / BUTTONBOX / JOYSTICK

Stimulation program does not receive trigger from scanner:

- Check default settings
- Check if trigger is received at interface box:
 - Circled light should flash every TR
- Now check if trigger is received at STIM PC:
 - Open notepad/word/wordpad/etc...
 - 5 should appear every TR (in USB mode)
- Still no response in your Stimulus?
 - Check your stimulus script



23.3 PC/PROJECTOR SCREEN

Projector screen stays blue:

- Check switch boxes in equipment rack

Projection not focused/blurred

- Check focus on projector (technical room)

Projector screen stays black

- Check (Stim) PC → screen only

23.4 AUDITORY SYSTEM

Subject does not hear stimulus:

- Check if ear buds are correctly used, do not squeeze tip
- Check if the right size of ear buds are used
- Check default settings of mixer and Audio Amplifier in equipment rack
- Check the volume settings on the STIM PC

23.5 SCANNER

Scanner does not scan:

- Click echo sign (below) when red or yellow stripe
- Follow instructions (do not call Siemens Service, notify support staff)



23.6 DATA

Inhomogeneous intensity distribution:

- Check if all coils are selected

Artifacts:

- Check if door is closed
- Check if subject moves too much
- Check if hairpins etc. are not removed

APPENDIX

APPENDIX 1 EXPLANATION SAFETY SCREENING FORM



Safety screening form
Version 2.1

This document describes how to use the safety screening form when scanning a research project with human subjects at the MRI scanners or when accompanying persons enter the Magnet Room at Scannexus. This document does not cover all questions about safety/contra-indications. If you have any questions you can contact the Support Team. You can also have a look at www.mrisafety.com .

Keep in mind that the CU has always the final responsibility in screening and safety of the subject!

I have understood the following questions and answered honestly:

- Do you have an active implant? Yes No
(pacemaker, neurostimulator, insulin pump, ossicle prosthesis, or residual leads)

Contra-indication: Subject is not allowed to go into the Magnet Room

- Do you have any other foreign objects in your body, except dental fillings or crowns? Yes No
(e. g. clips on blood vessels, metal splinters in the eye or body as consequence of shooting/accident/metal worker, orthopedic implants, braces, metal wire behind the teeth, mechanical contraception spiral)

If yes, what kind of metal implant?

Contra-indication: Clips in blood vessels, metal splinters in the eye or body, braces, magnetic tooth prosthesis.

Relative contra-indication:

- o *Orthopedic implants, only with evidence of material on paper, type number and has been proven as safe in MRI safety.com. Implants should not be located in the RF field (7T and 9.4T). Do not scan if you are not sure!*
- o *Metal wire behind teeth is only allowed on 3T and 7T.*
- o *Mirena spiral and Copper spirals are allowed, others not need to be evaluated first!*

- Have you had surgery to your brain, head? Yes No

Contra-indication if aneurysm clips or other implants are implanted.

Surgery might affect a neurological experiment.

- Do you suffer from epilepsy? Yes No

Subject can be scanned, but keep in contact with the subject during scan sessions.

Stop scanning if seizure occurs!

Can be a contra-indication for a neurological study!

- Do you suffer from any known heart rhythm disorder? Yes No

*Scanning is possible. Do not exceed threshold of nerve stimulation.
Check subject regularly if he/she feels ok.*

- Do you have circulatory problems? Yes No

*Scanning is possible. Do not scan in level 1SAR mode! Subject might have bad thermo regulation.
Check subject regularly if he/she feels ok.*

- Are you diabetic? Yes No

*Scanning is possible. Do not scan in level 1SAR mode! Subject might have bad thermo regulation.
Check subject regularly if he/she feels ok.*

- Do you suffer from claustrophobia? Yes No

Check if scanning might be possible in consultation with subject. No force! Can cost scan time!

- Are you pregnant or do think that you might be? Yes No

Contra-indication for scanning, not for entering the Magnet Room.

- Do you wear jewelry/piercings that cannot be taken of? Yes No

Contra-indication might heat up or be attracted.

- Do you have tattoos or permanent eye make-up? Yes No

Tattoo is relative contra indication. If tattoo is not in RF field (7T en 9.4T) and is older than 3 weeks it is allowed to scan. Warn subject about possibility of heating. If so, subject has to squeeze the alarm ball immediately and scanning has to be stopped.

Permanent eye make-up is contra indication, contains higher level of iron oxide!

- Are you using drug delivery patches (e.g. nicotine) that cannot be taken of? Yes No

Contra-indication if plasters cannot/are not allowed to be taken of.

I have been informed to satisfaction concerning the MRI safety. I had the possibility to ask questions concerning MRI safety. All my questions are answered to my satisfaction.

I agree with being scanned:

Last name:

Today's date:

First name:

Date of birth:

Middle name (if any):

Height (cm):

Weight (kg):

Signature:

To be filled out by the researcher

Name:

MR System:

Project number:

I declare that the person mentioned above has been informed orally and in writing about the MRI scan and has given their informed consent about the project mentioned above. I also declare that premature termination of participation by the person mentioned above will be of no influence on the care he or she will receive.

Function:

Signature:

Date and time of scan: