Standard Operating Procedures for Philips MRI Acquisition

Accelerating Medicines Partnership® SCHIZOPHRENIA

An observational study examining clinical trajectories and predictors of outcomes in the clinical high risk population.

Version 1.2, 21 SEP 2024

Procedure	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Visit 9	Visit 10	Visit 11	Visit 12	Visit 13	Visit 14	Visit 15	Visit 16	Conversion
Month	-3 to -1	0	1	2	3	4	5	6	7	8	9	10	11	12	18	24	-
Consent Form	✓																
Interview/ Questionnaire	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cognitive Tasks		✓		✓				✓						✓		✓	✓
MRI*		✓		✓													
EEG*		✓		✓													
Blood and Saliva Samples*		✓		✓													
Actigraphy (daily)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Digital Data (daily passive sensing, EMA, audio diary)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
Free Speech Sampling (audio and facial recording)		✓		✓													
PSYCHS (audio recording)		✓	✓	✓	✓			✓						✓	✓	✓	✓

** In-person visit*

AMP SCZ MRI Acquisition – Philips Details (Achieva DDAS)

Standard Operating Procedure (SOP) – COPENHAGEN site

Version 1.4; Effective Date 2024-09-20

I. Scope

This SOP is an adjunct to the general AMP SCZ MRI Acquisition SOP, with specifics related to the Philips Achieva DDAS platform (software version 5.7.1.2). It should only be read after first reading and understanding the general MRI Acquisition SOP. The output of a Philips imaging session will be the scan data and the completion of an online "MRI Run Sheet" (with annotations on the imaging session) in the appropriate network (PRESCIENT or ProNET) database.

II. Responsibilities

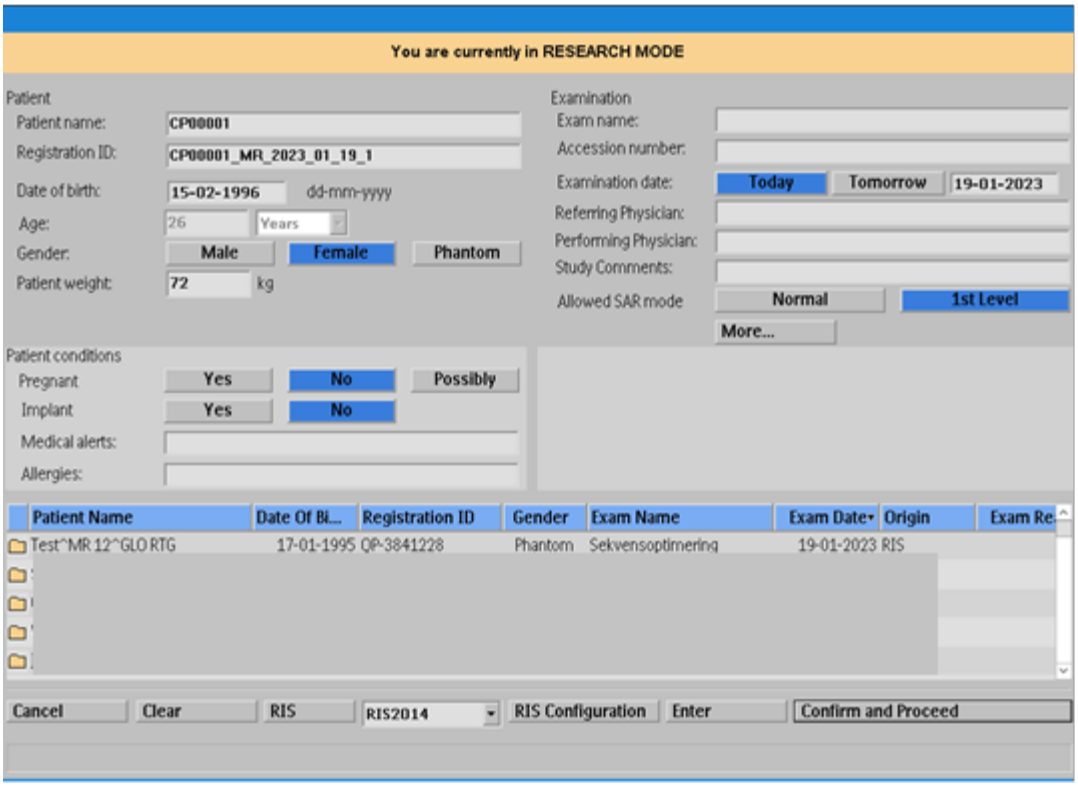
Scans are operated by trained Copenhagen site MRI technologists by the Functional Imaging Unit (FIUNIT). During the scan two study personnel will be present. An MRI technologist will operate the MRI console. The MRI assistant is tasked with maintaining/completing the MRI Run sheet, assuring protocol compliance, and assuring imaging quality control.

III. Participant Registration in Philips

The ‘Patient Registration’ can be completed in advance, either before the participant is in the scanner room, or by the individual responsible for scanning while the other is setting up the participant. However, **do not click “Confirm” until the head coil is fully connected, the participant is at Isocenter and both study personnel are back in the control room.**

1. Login appropriately.
2. Launch user interface in ‘Research Mode’
3. Register a new patient
4. Complete fields for New Examination.
    a) See general MRI Acquisition SOP (“Participant Registration” section) for instructions and naming conventions.

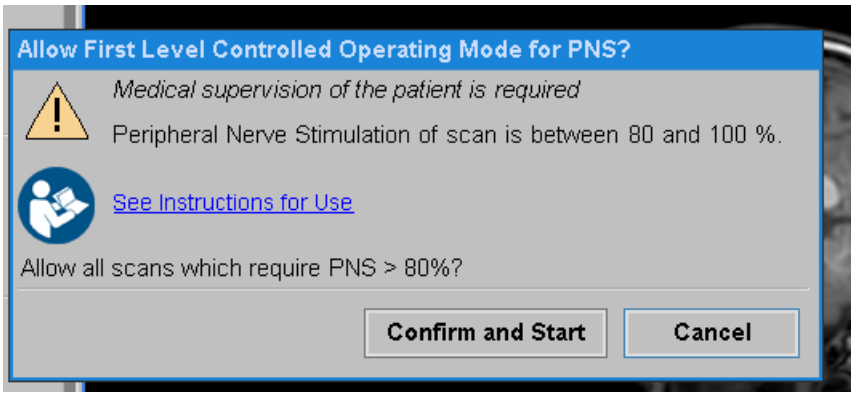
    Here is a visual example from a Philips system:



5. Click “Confirm and Proceed’’.

6. Select the AMP SCZ imaging protocol.
    a) Drag the exam-card over to the sequence interface.
    b) Once loaded, scan queue should look like this:

    c) The SmartBrain scan serves as a localizer, and is used to implement automatic positioning of the field-of-view (FOV). You can proceed to click ‘Start Scan’.
    d) The other scans must be ‘opened’ first by double click and then clicking ‘Accept’, followed by ‘Start Scan’ when ready to proceed.
        i. This gives you an opportunity to view the placement of the FOV for that scan relative to the localizers loaded in the graphic segments at the top of the screen, as a visual check that the auto FOV placement (SmartBrain) returned a reasonable FOV.
    e) The icon with an exclamation mark inside a triangle means that the Peripheral Nerve Stimulation (PNS) will exceed 80%, and a pop-up message will show up for which you need to click ‘Confirm and Start’:



IV. Imaging Protocol – Philips details

Important: See general MRI Acquisition SOP ("Imaging Protocol" section) for the overall structure of the imaging session, and instructions that are applicable across all vendors.

Reminder: Do NOT make any changes to the protocol without first consulting the Imaging Core.

In the absence of movement, the protocol settings (i.e., FOV size) should be sufficient to minimize wrap-around (due to susceptibility distortion) in both the "AP" and "PA" polarity EPI scans. If the participant moves appreciably (either enough to induce wrap-around of brain tissue, or more likely, out of the FOV in the superior/inferior direction), see the **Rescan procedures and unscheduled breaks** section of the general MRI Acquisition SOP, and the **"Delete the queue" procedure** section below**.**

The following details apply to the Philips protocol:

Structural block details:

In the structural block, the size and positioning for the **shim box** for the first `DistortionMap_AP` scan must be reviewed and potentially adjusted.

The shim box (red in image below) should be sized and positioned to cover the whole brain (inclusion of some skull is fine)!

Do not change the size of the FOV (orange in image above), or change its position/orientation unless the positioning returned by SmartBrain is wrong and cutting out brain tissue (which should be a very rare occurrence).

Once the size and positioning of the shim box is set for the first `DistortionMap_AP`, those shim box settings should automatically replicate across the other scans.

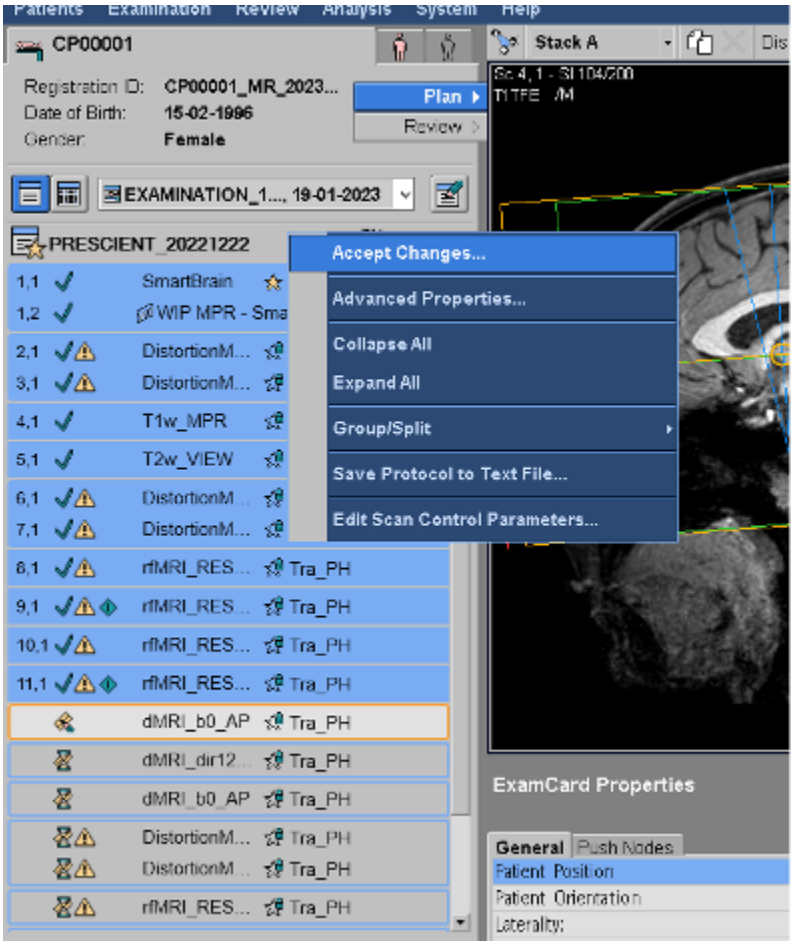
rfMRI scans:

The resting state fMRI scans (rfMRI) should be fully automated. You just open the scan and accept and run the scan. Note that the size and position of the shim box should match what you set previously for the first `DistortionMap_AP` scan. It should look like this:

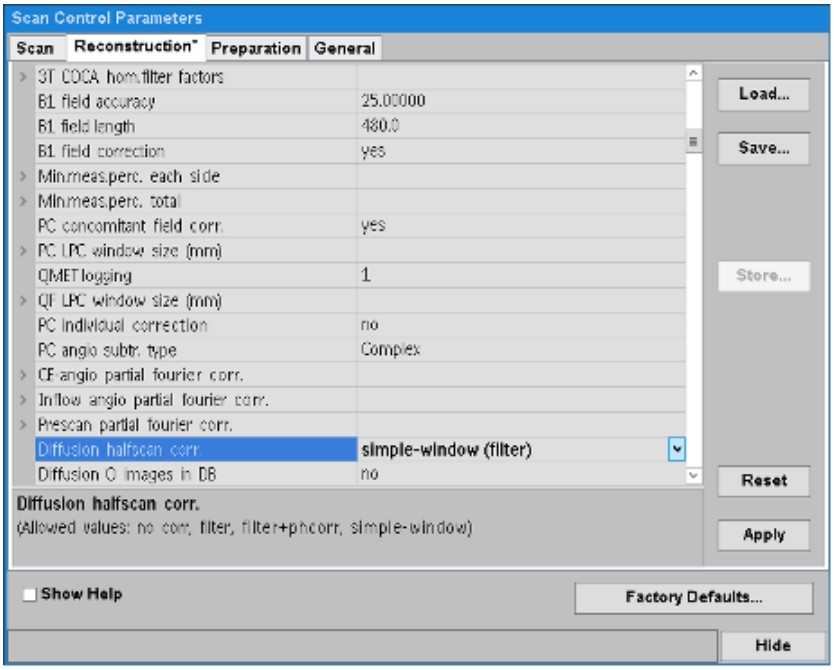
Make sure music/video is turned off and crosshair is projected and approximately centered in their view prior to starting the rfMRI scans.

dMRI Block:

Prior to starting the dMRI block, you **need to modify a filter setting**.
Select the sequence dMRI_b0_AP,and right click and select 'Edit Scan Control Parameters' as shown here:

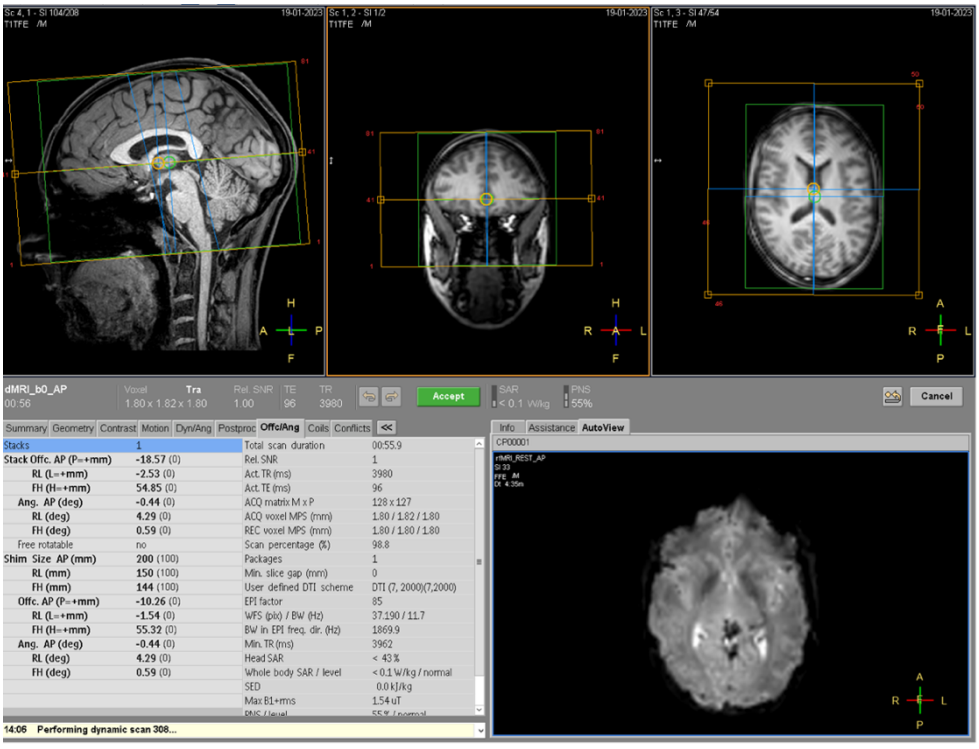


Then select **‘Reconstruction’** tab, scroll down to the ‘**Diffusion halfscan corr**.’ parameter, and set it to **‘simple-window’** instead of ‘filter’. Click ‘**Apply’**:



Note that this change will automatically also be applied to the following two dMRI scans.

Again, the size and position of the shim box should match what you set previously for the first `DistortionMap_AP` scan. It should look like this:



"Delete the queue" procedure

To ensure that the SmartBrain localizer gets applied correctly, use the following procedure if there is an unscheduled break, or if the participant's brain moves out of the scanning FOV and needs to be re-localized:

a) Delete all scans that haven't yet been run from the scan queue.

b) Import and run a fresh SmartBrain scan.

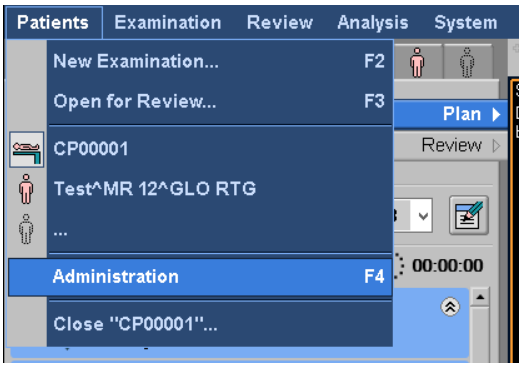
c) Import the scan blocks that still need to be run.
Note that when importing replacement T1w_MPR, T2w_VIEW, and rfMRI_REST scans, they should be accompanied (preceded) by a fresh pair of DistortionMap scans as well (i.e., consistent with the "block" structure of the protocol outlined in the general MRI Acquisition SOP, consider the DistortionMap scans as 'ancillary' scans that are part of the T1w_MPR, T2w_VIEW, and rfMRI_REST acquisitions).

d) Proceed to acquire the remaining scans that need to be acquired.

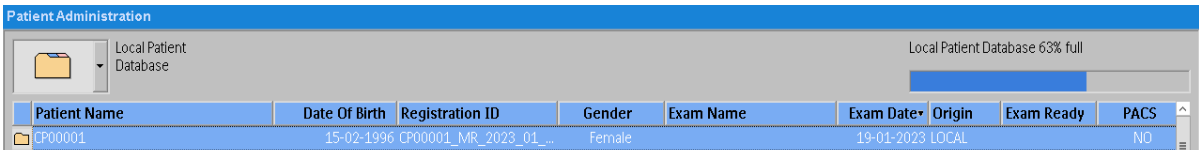
V. Data transfer

Data must be saved as classic 'DICOMS' files. Following steps:

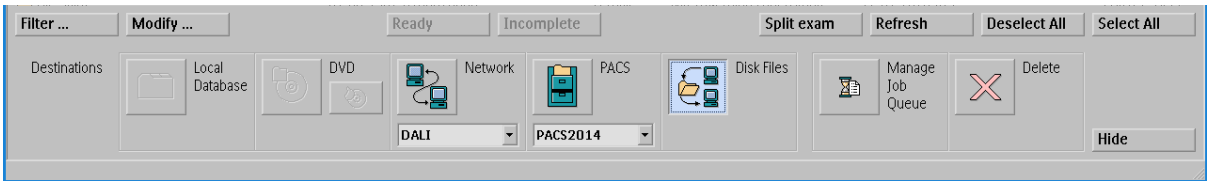
1. Patients → select 'Administration':



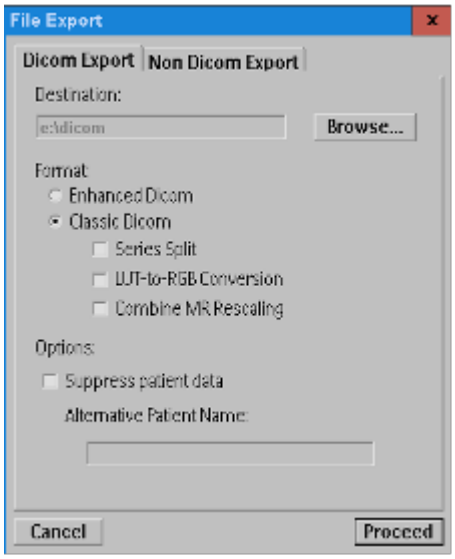
2. Mark the subject folder:



3. Select 'Disk Files':



4. Choose 'Dicom Export' → "Classic Dicom" and click 'Proceed'.
   Make sure that there are no other files in e:\dicom beforehand.



5. Upload a zipped version of the DICOMs to the network database.

VI. Document Control

This SOP has been modified, starting from its Siemens analog, with edits by Daban K. A. Sulaiman (Research Assistant, Copenhagen) and Michael Harms

This SOP has been approved by: Dr. Michael Harms

VII. Change Log

Version	Date	Summary of Changes
1.4	2024.09.20	- First version for public release.