IMPORTANT INFORMATION

Limitations in MaxFilter™ 2.0

After the validation of the MaxFilter™ 2.0 software release, we have discovered that certain limitations apply to systems with this software release. Specifically, the software imposes the following limitations:

1. MaxFilter is not able to handle over 1GB files

Description: When the input data are stored in 16-bit format and occupy more than 1GB, the default output data would be over 2GB, which is not possible for current FIFF format.

Workaround: If the size of the 16-bit input file is over 1GB, the output file needs to be stored in 16-bit format or split into two separate files by using the data skip option (Max-Filter 2.0 User Guide Section 2.6 "Output options").

2. MaxFilter may crash with continuous HPI data

Description: If the continuous HPI signal is set on after the start of raw data recording, program MaxFilter crashes if automatic bad channel detection is attempted.

Workaround: Continuous HPI needs to be activated before starting raw data recording. Alternatively, automatic bad channel detection needs to be turned off, and bad channels should be given manually.

3. Head movement estimation may delay MEG responses

Description: MEG channels are delayed by 5–10 ms when head position estimation (option –movecomp, –headpos or –lpfilt) is done with default settings. However, other channels (EEG, STIM, MISC) retain the correct timing. Default automatic bad channel detection

scans the first 30 seconds of raw data, but thereafter a low-pass IIR filter remains active. The implementation of the IIR filter causes time delay on filtered MEG data.

Workaround: Automatic bad channel detection needs to be turned off, and bad channels should be given manually. Then the low-pass filter is not activated at all.

4. The autobad function fails if a stimulus is constantly active

Description: The autobad function selects data sequences where no stimuli are active. However, in some study designs a trigger line may have constantly a non-zero value. In such cases the program may report that all channels are bad.

Workaround: Automatic bad channel detection needs to be turned off, and bad channels should be given manually.

5. Head position estimation problems with an arbitrary sampling frequency

Description: MaxFilter assumes that the intervals of head position calculation go evenly inside one recording block. Normally, this is the case when the sampling frequency is a multiply of 100. However, if the sampling frequency is more 'arbitrary' (e.g. 1054 Hz) the program reports an error when default values are applied.

Workaround: The sampling frequency should be set to a multiply of 100.

6. Head transformation to default head position is poorly defined

Description: The coordinate transformation of the default head position is set improperly if the SSS expansion origin is not given by the user. The resulting target head position becomes too high and causes spurious artifacts in channels on top of the head.

Workaround: The user needs to set a proper expansion origin when selecting the transformation for the default head position. For instance as follows:

```
/neuro/bin/util/maxfilter –f <input.fif> -o <input_trans.fif>
-trans default -origin 0 0 40 –frame head
```

MaxFilter 2.0 User's Guide Section 4.1 gives an incorrect explanation of the default transformation. The corrected text is:

"On command line you can select coordinate transformations with the option –trans *name*, where *name* is the FIFF file defining the coordinate transformation of the reference head position. If *name* = *default*, the coordinate axes directions are identical in the device and head coordinate frames, and the head sphere origin corresponds to the location (0, 0, 0) of the device coordinate frame."

7. Head position transformation removes Isotrak data

Description: When the –trans option is applied to transform data from one head position to another, the program clears all digitized points from the result file.

Workaround: The Isotrak information can be found from the original data file.

8. MaxFilter looses timing information

Description: When the input raw data FIFF file has a non-zero start time (tag firstsamp), the program does not write it correctly and the output file seems to start from time zero.

Workaround: The correct timing is retained in the original data file.

9. The MaxST function may not clean the last block of raw data file

Description: The MaxST function processes raw data files with a fixed buffer length. If the very last block of the input file is shorter than the buffer length, MaxST may not clean artifacts as effectively as from preceding data buffers.

Workaround: Data buffer length should be select long enough so that the very last block has at least 4 seconds of data (MaxFilter 2.0 User Guide Section 3.4 "MaxST settings").

10. MaxFilter may write over an existing file

Description: When the same file is processed twice using the default settings of MaxFilter (version 2.0.21), the application reports the presence of an existing result file as an error. The application refuses to process the data but anyway destroys contents of the existing result file unless it is write-protected.

Workaround: The problem does not affect the original recording file. Thus, the processing can be repeated even if the contents of the existing result file are cleaned.

11. Graphical user interface may show different parameter values than the output log

Description: Graphical User Interface, GUI, is a separate program for collecting input parameters before executing the command line application. The command line application sets the output filename and the origin during execution if they are not given as arguments (MaxFilter 2.0 User Guide Sections 2.6 "Output options" and 3.1 "Expansion origins"). The GUI defaults may show different values than the output log.

12. Graphical user interface may hang up on some HP-UX systems

Description: Some HP-UX 11 workstations may leave the GUI in a hang-up state; the GUI reports that processing is still going while the program has finished and written the output.

Workaround: The problem does not affect Linux nor does it apply to most HP-UX workstations. If the GUI hangs up, the process needs to be killed and restarted.

13. Graphical user interface checks permissions of a wrong directory

Description: When using the GUI one can not save the output to a non-default directory if the default directory is write protected.

Workaround: Run MaxFilter from a command line.

It is our assessment that none of the above limitations affects the safety of the system.

Elekta Neuromag is working on permanent solutions to the above problems and will include the corrections in all future releases of the MaxFilter™ software. In the meanwhile, the user is instructed to manually verify and set the bad channels when continuous HPI was used in the measurement in addition to observing the additional limitations described above.

With any question concerning the above problems, please contact sw-support@neuromag.fi or either of the undersigned.

Miikka Putaala   Matti Kajola
miikka.putaala@elekta.com   matti.kajola@elekta.com