



# Multi Channel DataManager Software

USER MANUAL

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# IMPRINT

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# IMPORTANT SAFETY ADVICE

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## WELCOME TO THE MULTI CHANNEL DATAMANAGER

The Multi Channel DataManager is the data conversion software of the Multi Channel Suite package. The Multi Channel Experimenter is for online data acquisition, and the Multi Channel Analyzer is for offline data analysis. The Multi Channel VideoControl is the video acquisition software of the Multi Channel Suite package. Please read the following chapters to understand the general concept of the Multi Channel Suite before starting.

## IMPORTANT SAFETY ADVICE



**Warning:** Make sure to read the following advice prior to installation or use of the device and the software. If you do not fulfill all requirements stated below, this may lead to malfunctions or breakage of connected hardware, or even fatal injuries.



**Warning:** Always obey the rules of local regulations and laws. Only qualified personnel should be allowed to perform laboratory work. Work according to good laboratory practice to obtain best results and to minimize risks.

The product has been built to the state of the art and in accordance with recognized safety engineering rules. The device may only

- be used for its intended purpose;
- be used when in a perfect condition.

Improper use could lead to serious, even fatal injuries to the user or third parties and damage to the device itself or other material damage.



**Warning:** Multi Channel Analyzer software is developed for Multi Channel Systems MCS devices. The software are not intended for medical uses and must not be used on humans. MCS assumes no responsibility in any case of contravention.

Malfunctions which could impair safety should be rectified immediately.

## High Voltage

Electrical cords must be properly laid and installed. The length and quality of the cords must be in accordance with local provisions.

Only qualified technicians may work on the electrical system. It is essential that the accident prevention regulations and those of the employers' liability associations are observed.

- Each time before starting up, make sure that the power supply agrees with the specifications of the product.
- Check the power cord for damage each time the site is changed. Damaged power cords should be replaced immediately and may never be reused.
- Check the leads for damage. Damaged leads should be replaced immediately and may never be reused.
- Do not try to insert anything sharp or metallic into the vents or the case.
- Liquids may cause short circuits or other damage. Always keep the device and the power cords dry. Do not handle it with wet hands.

## Requirements for the Installation

Make sure that the device is not exposed to direct sunlight. Do not place anything on top of the device, and do not place it on top of another heat producing device, so that the air can circulate freely.

# IMPORTANT SAFETY ADVICE

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## Grounding

This product is grounded through the grounding conductor on the power cord. To avoid electric shock, the grounding conductor must be connected to earth.

## Orient the Equipment Properly

Do not orient the equipment so that it is difficult to manage the disconnection device.

## Explanation of the Symbols used



Caution / Warning



DC, direct current

## Guarantee and Liability

The General conditions of sale and delivery of Multi Channel Systems MCS GmbH always apply. The operator will receive these no later than on conclusion of the contract.

Multi Channel Systems MCS GmbH makes no guarantee as to the accuracy of any and all tests and data generated by the use of the device or the software. It is up to the user to use good laboratory practice to establish the validity of his / her findings.

Guarantee and liability claims in the event of injury or material damage are excluded when they are the result of one of the following.

- Improper use of the device.
- Improper installation, commissioning, operation or maintenance of the device.
- Operating the device when the safety and protective devices are defective and/or inoperable.
- Non-observance of the instructions in the manual with regard to transport, storage, installation, commissioning, operation or maintenance of the device.
- Unauthorized structural alterations to the device.
- Unauthorized modifications to the system settings.
- Inadequate monitoring of device components subject to wear.
- Improperly executed and unauthorized repairs.
- Unauthorized opening of the device or its components.
- Catastrophic events due to the effect of foreign bodies or acts of God.

# IMPORTANT SAFETY ADVICE

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## **Operator's Obligations**

The operator is obliged to allow only persons to work on the device, who

- are familiar with the safety at work and accident prevention regulations and have been instructed how to use the device;
- are professionally qualified or have specialist knowledge and training and have received instruction in the use of the device;
- have read and understood the chapter on safety and the warning instructions in this manual and confirmed this with their signature.
- It must be monitored at regular intervals that the operating personnel are working safely.

Personnel still undergoing training may only work on the device under the supervision of an experienced person.

## **Terms of Use for the Program**

You are free to use the program for its intended purpose. You agree that you will not decompile, reverse engineer, or otherwise attempt to discover the source code of the software.

## **Limitation of Liability**

Multi Channel Systems MCS GmbH makes no guarantee as to the accuracy of any and all tests and data generated by the use the Multi Channel DataManager software. It is up to the user to use good laboratory practice to establish the validity of his findings. To the maximum extent permitted by applicable law, in no event shall Multi Channel Systems MCS GmbH or its suppliers be liable for any special, incidental, indirect, or consequential damages whatsoever (including, without limitation, injuries, damages for data loss, loss of business profits, business interruption, loss of business information, or any other pecuniary loss) arising out of the use of or inability to use Multi Channel DataManager or the provision of or failure to provide Support Services, even if Multi Channel Systems MCS GmbH has been advised of the possibility of such damages.

## MULTI CHANNEL DATAMANAGER SOFTWARE

### Installation and Updates

One of the following Microsoft Windows® operating systems is required: Windows 10, 8.1 or Windows 7 (English and German versions supported) with the NT file system (NTFS). Other language versions may lead to software errors. If a computer was acquired from MCS, the Multi Channel Suite will be preinstalled. Updates are available for free download on a regular basis from the [MCS web site](#). It is recommended always to install the latest software version. To install the software, download and start the respective \*.exe file and follow the instructions on the screen.

### Recommended Operating System Settings

The following automatic services of the Windows operating system interfere with the data storage on the hard disk and can lead to severe performance limits in Multi Channel Analyzer. These routines were designed for use on office computers but are not very useful for a data acquisition computer.

- Turn off Screen Saver.
- Turn off Windows Indexing Service. Only important for data hard drive.
- Manual management of automatic Windows Update.
- Power Options: Power scheme: Never turn off monitor, hard disk and system standby.

It is also not recommended to run any applications in the background when using Multi Channel DataManager. Remove all applications from the Autostart folder. Be careful when using a Virus Scanner. If possible, exclude Multi Channel Suite data files (\*.msrd) from being scanned.

### Compatible Data Files

The Multi Channel DataManager is free to download and install on an unlimited number of computers.

The software is a tool to export data recorded with [MC\\_Rack](#), [Cardio2D](#), [Multi Channel Experimenter](#), [CMOS-MEA-Control](#), or [Multiwell-Screen](#).

There are no import options for 3<sup>rd</sup> party data files.

## GENERAL SOFTWARE FEATURES

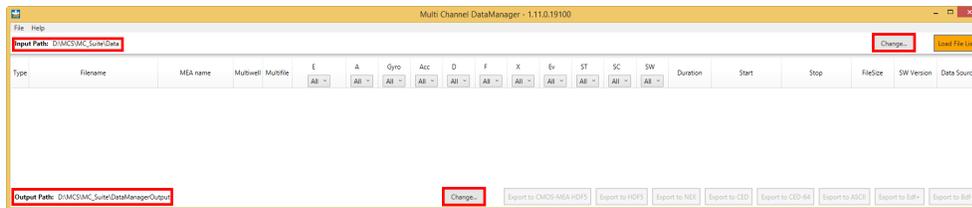
The [Multi Channel Suite](#) consists of four parts: The **Multi Channel Experimenter** for online data acquisition, the **Multi Channel Analyzer** for offline data analysis, the **Multi Channel DataManager** for data conversion, and the **Multi Channel VideoControl** for controlling a video camera. Many features and concepts apply to all parts.

### Description and Purpose

The Multi Channel DataManager is a data conversion tool. The software is **free to download** and install on an unlimited number of computers. It can convert data files from most MCS data acquisition software to a number of different 3<sup>rd</sup> party output formats. Batch conversion of a number of files is possible, as well as exporting just selected data streams from one or more files. There are **no import options** for 3<sup>rd</sup> party data files.

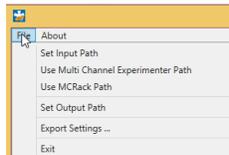
### In- and Output Directory

The Multi Channel DataManager uses default folders for input data files and for storing the exported data files. Both directories can be changed by the user. The Input Path is displayed on the top, and the Output Path at the bottom of the software window.

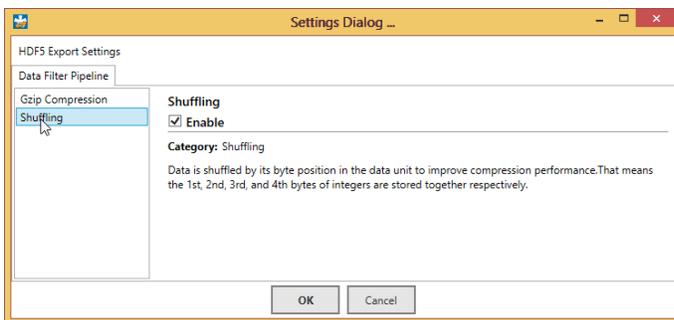
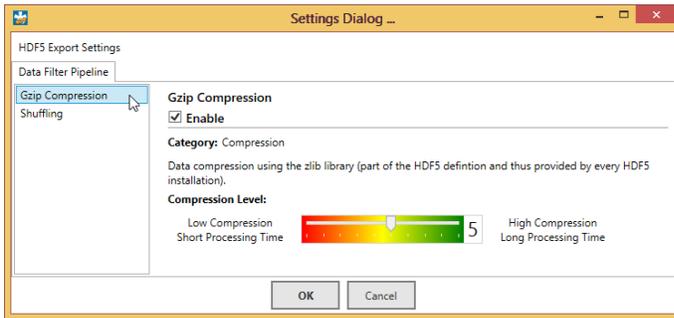


### Main Menu

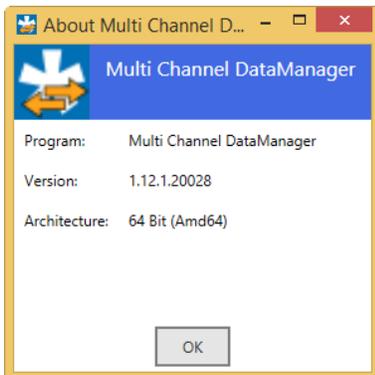
In the File menu, there is the option to set the **input and output directories** from a file browser. The input directory can also be set automatically to the default data path used in Multi Channel Experimenter or MC\_Rack software.



The **Export Settings** apply to **HDF5 export only**. Two options to compress the data during HDF5 export are available, Gzip and Shuffling. For Gzip, the compression level can be changed. A high compression level will increase the time for exporting the data but will decrease the size of the resulting files.

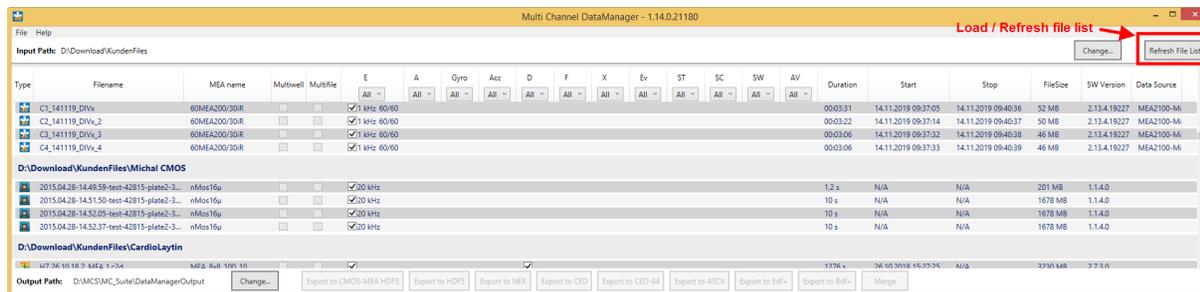


The **About** dialog will show the installed **software version**.



## CONVERTING DATA FILES

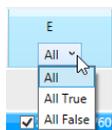
The Multi Channel DataManager will open with an **empty window** when started. Use the **Load File List** command to load the list with all compatible files in the selected Input folder. If new files are moved to the Input folder, the list can be **refreshed**. For each file, all available meta information is shown.



- Type** Software used for recording
- File name**
- MEA name** MEA layout, Wireless HS type, CMOS chip type
- Multiwell / Multifile** Multiple files were generated in this recording (multiple wells / MEA or multiple headstages in Multi Headstage Mode)
- Data streams** **E** Electrode Raw Data, **A** Analog Raw Data, **Gyro** Rotation Data, **Acc** Acceleration Data, **D** Digital Data, **F** Filtered Data, **X** Cross Channel Data, **Ev** Events, **ST** Spike Time Stamps, **SC** Spike Cutouts, **SW** Sweeps; **A** Averaged Sweeps; streams present in the file are marked with a tick box
- Duration** Length of the recording
- Start / Stop** Date and time of beginning and end of the recording
- File size** File size in MB
- SW Version** Version of the data acquisition software which was used during recording
- Data source** Data acquisition hardware which was used for recording

### Filtering the File List

Each data stream has a **filter menu**, with the options "All", "All True" or "All False". The default "All" means the displayed files are not filtered for this stream. "All True" means only files containing this stream will be shown. "All False" means the opposite, only files not containing this stream will be shown. Filter combinations are possible, for example setting X to "All True" and Ev to "All False" will limit the displayed list to files containing Cross Channel Data but no Events.



### Compatible Input Data

The Multi Channel DataManager can convert data generated with the Multi Channel Experimenter (\*.msrd), MC\_Rack (\*.mcd), CMOS MEA Control (\*.ncd), Multiwell Screen (\*.mwd) and with some restrictions Cardio 2D (\*.c2d). It is not possible to convert these formats from one to the other, just any of those input formats to the output formats described below. Not all output formats are compatible with all input data. Please see also the [table](#) on the MCS web site for details.

## Output File Formats

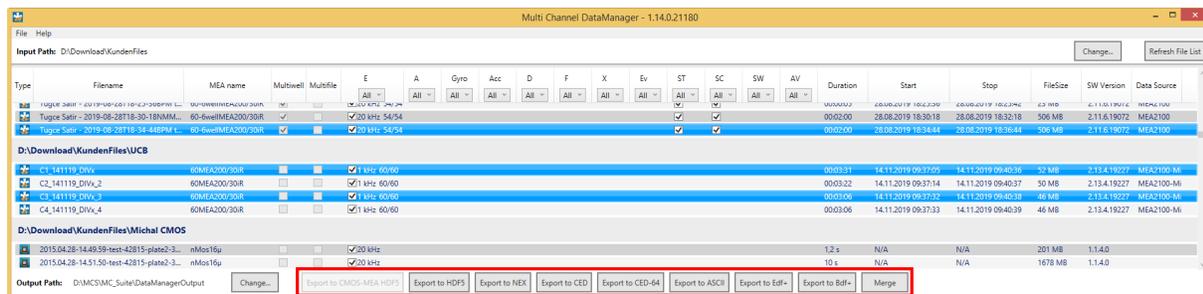
The following output formats are available. For requests concerning other formats, please contact [Support@multichannelsystems.com](mailto:Support@multichannelsystems.com). Generated output files will have the **same file name** as the original input file, with the respective new file ending.

Export to ...	File type	Description
HDF5	*.h5	A format native to Matlab and Python. The CMOS system also uses HDF5 as data format but requires specific headers.
NEX	*.nex	Native file format of <a href="#">NeuroExplorer</a> . Also compatible with <a href="#">Plexon Offline Sorter</a> .
CED CED-64	*.smr, *.smrx	Native file format of Spike 2 from <a href="#">CED</a> . Available in the older 32 bit and the later 64 bit format.
ASCII	*.csv	General purpose binary file format.
EDF+ BDF+	*.edf *.bdf	<a href="#">European Data Format</a> , often used in EEG recordings and sleep research; BDF is the 24 bit version of EDF.

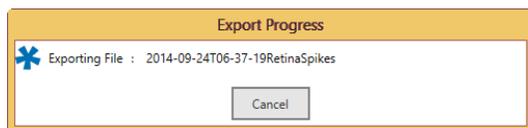
The CMOS-MEA-System uses **HDF5 with the extension \*.cmcr** instead of the proprietary format \*.ncd from CMOS-MEA-Control software version 2.0 onward. The export option “**Export to CMOS MEA HDF5**” is available only to convert older \*.ncd files to the new CMOS-MEA format, to be able to use them in the new version of the CMOS-MEA-Tools.

## Selecting Files to Convert

To select a file for conversion, simply highlight it on the list. For **batch conversion** of several files, you can mark them as in any Windows file explorer with Shift+Click or CTRL+Click. Then select the output format and click the corresponding button. A dialog will come up while conversion is in progress, and after it is completed. Export formats **incompatible** with the data input format are disabled.

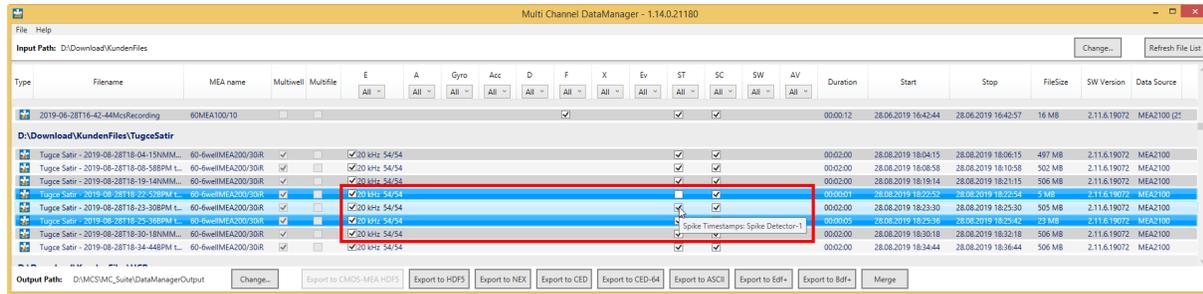


If incompatibilities between the input file(s) and the selected output format occur, an **error message** will appear.



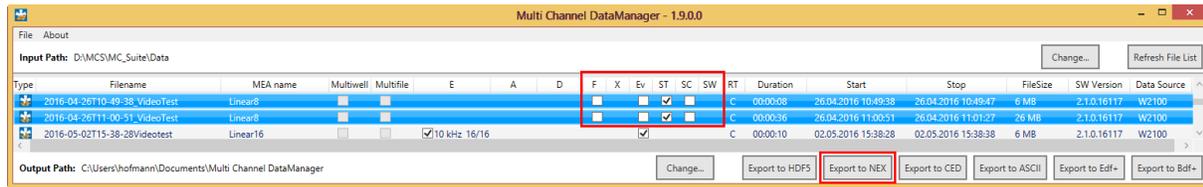
## Exporting Only Selected Data Streams

Each file may contain several different data streams, like Raw Data, Filtered Data, Spike Cutouts and so on (see chapter 5, Converting Data Files). Each of those streams can be selected or deselected for conversion with a tick box.



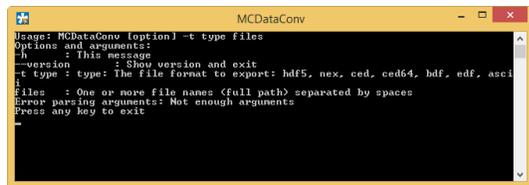
Example: Batch-Convert Only Time Stamps from Two Files to NEX Format

Open the Multi Channel DataManager and load the file list. Highlight the two files with Shift Click and deselect all streams other than the Spike Time Stamps (ST). Click the **Export to NEX** button. Two files will be generated, with the same file name as the original input files, and the ending \*.nex.



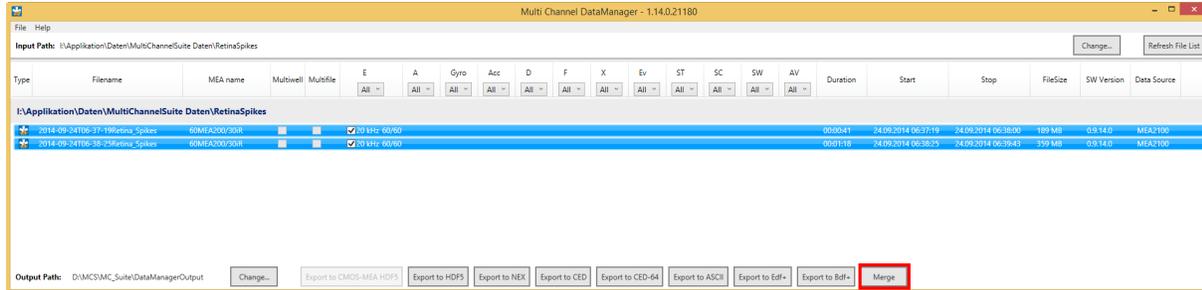
## Exporting Files via Command Line

It's also possible to use a command line interface for data conversion. The **Data Manager Command Line Converter (MCDDataConv)** is available for download at the [Data Manager page](#) on the MCS web site. It provides the same functionality as the Multi Channel DataManager but can be used in automated scripts.



## Merging Data Files

Multiple files with the **same format** (sampling rate, number of channels, ...) can be merged to a single file. This can for example be useful to analyze a number of files in one step with the same analysis parameters. The Merge function works only for files with **Electrode Raw Data**. The resulting merged file will only contain the Raw Data stream, all other data streams are ignored. The timeline of the merged file will be continuous, as if the data would have been generated in one continuous recording.



To merge files, **mark the files** to be merged in the file list, and click **Merge**. Merging files can take some time. The merged file will be generated in the Output Path folder with the name "**Merge\_[Name of first original file].msrd**".



**Attention: The Merge function is only available for files recorded with the Multi Channel Experimenter.**

# TROUBLESHOOTING

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## SUPPORT AND TROUBLESHOOTING

The Multi Channel Suite is a software under development, so bugs may occur more frequently than usual. Also, new software versions are released in short intervals. The software development team of Multi Channel Systems is very grateful for all reported bugs. Due to the modular nature of the software, it is impossible to test all possible configurations for each new release, and any customer feedback is much appreciated to find all problems.

Please report all bugs, feature requests or other issues to [Support@multichannelsystems.com](mailto:Support@multichannelsystems.com). We can only fix things we know about.

In case of problems, please check first whether your **software version** is up to date. The latest release can always be found in the [Downloads](#) section of the MCS web site. Maybe the problem has already been solved. If not, reboot the software and power cycle the recording device.

Sometimes bugs are caused by corrupted experiment (\*.msa) files, so the next step is to try building a new, identical experiment setup, instead of using an existing one.

If the problem persists, report it together with the **experiment file** (\*.msa) which has been used, and possibly a **data file** (\*.msrd and respective \*.msrs files are needed) to the support e-mail address. An upload option for the files will be provided if need be.

# CONTACT INFORMATION

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## CONTACT INFORMATION

### Local retailer

Please see the list of official MCS distributors on the [MCS web site](#).

### Mailing list

If you have subscribed to the [newsletter](#), you will be automatically informed about new software releases, upcoming events, and other news on the product line. You can subscribe to the list on the MCS web site.

[www.multichannelsystems.com](http://www.multichannelsystems.com)