

## MES 7.4 B (18/06/2021)

### New features

- Ribbon numbers at immediate window
- Ribbon numbers at background window
- Export Ribbon numbers to metadata.txt
- Improved performance at protocol loading

## MES 7.4 (12/05/2021)

### New features

- Metaprotocol loop mode
- Metaprotocol Objective arm movements should be specified as delta values
- Focusing panel can be used to select Z levels for Z-stacks when the viewport is horizontal
- Added support for recent Alcor laser modelsPropertyCollect: option to recursively discover folders

### Bugfixes

- Devices outside configured limits are moved into range at startup
- HSFS Record saves background image into the Background Pool
- Flickering in Live mode during Z movements
- Bugfix for Green lamp warning for in vivo-in vitro setups
- Bugfix for deleting channels from a measurement
- FoldedFrame viewer Export video channel selection
- User password creation fixed for Matlab R2018a and higher releases

### Known issues

- Measurements made with MES 7.4 cannot be opened on versions older than 7.2 (but all older measurements can be opened in 7.4)
- Electrophysiology module is not working
- FixWithStage is not working for rotated viewports (warns about it)
- Maximal field of view in the Hi-speed raster scan mode can be achieved with a nontrivial combination of Rotation XY and FastZ values. The Scan optimum number in the Info panel indicates if the parameter combination is optimal (turns to green) and suggests settings for reaching the optimum.
- Matlab R2019a-R2020b is only partially tested
- Compatible with MESSc 4.0.1 (used in HSFS record mode)

## MES 7.3 (06/10/2020)

### New features

- Thermal stabilization
- Cumulative time of thermal stabilization in Help / Setup diagnostic menu point
- Safety for FOV setting
- Warning for green lamp
- Histogram button in Live window
- Undo button on Protocol editor and Protocol channel (Level two) editor

### **Bugfixes**

- Binning ruined the calibration
- Long channel names were not displayed well in protocol editor

### **User experience**

- Simplified mode
  - Hardware state panel does not appear
  - Camera tab: camera and Settings panel does not appear
  - GDD fine tuning does not appear
- Wavelength slider: only integers are accepted
- Unified MES manual
- Users can choose between save options

## **MES 7.2 (06/07/2020)**

### **New features**

- Advanced PhotoStim GUI
  - Several channels can be handled simultaneously
  - Photostimulation and scanning can be performed alternately with the frequency of a fixed pattern
  - Total time can be set (it adjusts Frequency and last value of Time automatically)
  - Settings are saved to Protocol and are loaded when opening GUI
  - Stimulation can be synchronized to the beginning of a frame
  - the value of laser amplitude and time difference in protocol will be automatically adjusted when changing their values (without regeneration of protocol)
- Reset button for protocol channels
- Pattern Copy/Paste buttons in Special scan mode
- Automatic adjustment of PMT gating signal (length of automatic restart can be set in configuration)

### **Bugfixes**

- Image background pool bugfix

- Correction of limits of LUT in case of Capture
- Scan sync signal bugfixes

### Known issues

- Measurements made with MES 7.2 cannot be opened on previous versions (but all older measurements can be opened in 7.2)
- electrophysiology module is not working
- FixWithStage is not working for rotated viewports (warns about it)
- Maximal field of view in the Hi-speed raster scan mode can be achieved with a nontrivial combination of Rotation XY and FastZ values.
- Matlab R2019a-R2020a is only partially tested

## MES 7.1

### New features

- Warning signal when PMT signal level is too high
- Direction of gamma Euler angle is reversed to match the convention used for alpha and beta
- Suggested optimal alpha and FastZ values are displayed in the Info panel
- Special/Line scan patterns can be dragged with Shift + Click
- High-speed AO recording can be used in the MetaProtocol
- Warning when PMT signal is too high
- SocketModule support
- UncageMapping support
- Loading settings of saved measurements improved - Load/Load multiple settings window
- Maximum length of LineMagic line is set to 300  $\mu\text{m}$

### User experience

- Global cursor is displayed on FOV Visualization window as well
- SampleStage button on Focusing panel
- Improved position loading functionality
- Improved TIFF export with metadata.txt
- During measurements GUI elements that have no effect are disabled
- Limits of AO Z is a function of the objective calibration

### Stability

- improved stability with main electric and peripheral electric system (increased stability during HW state setting and MetaProtocol runs)
- improved stability of camera

## Bugfixes

- Direction of gamma Euler angle is reversed to match the convention used for alpha and beta
- TIFF export bugfixes and significant speedup, export process can be cancelled
- FoldedFrame Export movie bugfix
- Kombiplxer-related timer handling bugfixes - increased stability during HW state setting and MetaProtocol runs
- Background pool bugfixes
- Protocol saving issue with 'image' type channel
- Line scan Rectangle selection bugfix
- SampleStage also prompts for confirmation of large movements
- Z-stack viewer Stack movie bugfix
- Image statistics and histogram bugfixes
- Cell3DFinder subselect feature bugfix
- Special/Line scan pattern selection works only on image area
- Raster scan Record mode bugfixes (record time)
- Opening the PDF manual is not blocking the GUI
- Blinking issue of live window
- LUT is available at the first start of Live imaging in Live window

## Known issues

- Measurements made with MES 7.1 cannot be opened on previous versions (but all older measurements can be opened in 7.1)
- electrophysiology module is not working
- FixWithStage is not working for rotated viewports (warns about it)
- Maximal field of view in the Hi-speed raster scan mode can be achieved with a nontrivial combination of Rotation XY and FastZ values.
- Matlab R2019a-R2020a is only partially tested

## MES 7.0

### New features

- High-speed scanning at 40Hz at a resolution of 510×510 pixels on a FOV of 500×500 μm
- Imaging plane can be rotated with AO technique without any physical constraint according to all three Euler angles
- Scanning plane can be extended to a volume as an alternative of Bessel beam technology
- With special scanning modes the activity of a cell and its dendrites can be followed in 3D (multiline, ribbon, snake, chessboard and cube scanning) fitting the drifting direction according to the actual viewport axes
- Acousto-optical drift scanning with special surface and volume elements can be used for reducing motion artefacts (3D Anti-Motion technology)
- Photostimulation enhancements

- Automatic cell detection
- A set of measurement parameters (e.g. rotation and translation of imaging plane) can be changed during measurement

### User experience

- Improved visualization for Z-stacks and rotated planes in Raster Scan mode
- Display average on High Speed Frame Scan, Volume Scan and Special Scan modes
- Simplified GUI for Z-stacks

### Stability

- Femtonics Log Collection System for preventing and diagnosing issues

### Compatibility

- This software branch supports Femtonics galvo systems no longer

**(MES 6.4 and 6.3 releases support only galvo systems)**

### MES 6.2

#### New features:

- Controlling motorized tilting objective
  - Redesigned Focusing GUI with controls for Femtonics X/Y stage and motorized tilting objective unit
  - A visual guide can be opened from the Focusing panel to help better understand the available handwheel modes
  - New Virtual mode for focusing and navigating with a tilted objective
  - More detailed movement range limiting allowing for a wider tilting range
- Photostimulation
  - Usage of several patterns at AO special scanning modes to perform photostimulation
- The Behaviour importer module now handles velocity data (.vlg files) recorded with Femtonics Gramophone devices
- CurveGenerator window to insert user specified curves to selected channels in protocol window
- Electrophysiology measurement can be performed in camera mode without scanning

#### New analysis features:

- Improved and faster motion correction algorithm for Femto3D AcoustoOptic microscopes' chessboard scanned measurement units
  - With more intuitive parameter set
  - Units can be transformed to the same reference image
  - Motion correction batch process can be called from command line as well

- Offset curves in X and Y direction are saved into .mat files
- See also [Translational Motion correction batch](#)

### User experience:

- 3D visualization and navigation
  - Simplified GUI and new visualization mode for Femto3D AcoustoOptic (AO), and Piezo objective positioner specific 3D scanning features in the cases of Femto2D and FemtoSmart systems
  - Navigation commands (step left/right/up/down/Z-up/Z-down, zoom in, zoom out, fixed and free zoom) work in reference of the actual viewport, even in rotated cases
  - Protocol editor shortcuts for setting the most relevant parameters
  - Rotation controls moved to Navigation panel
  - In case of rotated planes, the (0,0) coordinates are shown at the center of FOV
  - Fast Z-stack gives a warning if the selected values are not reachable with the AO focus or piezo
- Improved features in Folded Frame viewer
  - The borders of Folded Frame fields can be made visible in the viewer window of the measurement unit
  - The borders of user selected ROIs (i.e. which pixels belong to the selection) can now be visualized
  - The recalculation of curves from user selected ROIs can now be turned off with the checkbox above the graph
  - Advanced ROI selection and adjustment in FF viewer (ROIs can now be adjusted on a one-by-one basis)
- Z-stack mode chooser in synchrony with handwheel modes
- Warning 1 week before license expiry
- Line scan: warns when less than 4 pixels are selected (to avoid kpm2 error)
- Redesigned InfoView window
- The 4D scan settings panel cannot be closed when 4D scanning is enabled
- Settings menu items
  - the different settings will no longer be saved with a separate menu item
  - the windows that are closed with Save button will save the settings immediately (or close the application)

### Stability:

- Improved stability for camera handling
- KGOLE object ungrouping image quality loss fixed

### MES 6.1

#### New features:

- Sine pattern generator for the protocol editor window (open source)

#### User experience:

- Resolved flickering bug during Live scan

#### **Stability:**

- Reduced distortions in full field scanning
- Bugfix at protocol input synchrony field
- Support for recent PES firmware version

#### **MES 6.0**

##### **New features:**

- Improved translational motion correction
- Batch process for translational & non-rigid motion correction module
- Binning option in camera control
- Configurable PMT warm-up time
- Improved 4D scan window in rollercoaster module
- Simplified control for 3D anti-motion scanning modes
- Speed mode button for AO raster scan and Z-stack
- Application for automatic sender of log and setting files (troubleshooting)
- Improved Look Up Table GUI with support of full numeric pad shortcuts and display names of colormap
- The last edited LUT channel is saved and next time it is automatically selected
- Auto button also sets the middle slider on LUT window
- GUI: separate views for simplified and full functionality
- Orthoslicer module functionality is integrated into the standard MES release

##### **User experience:**

- New 'Simplified view' switch affecting raster scan, Z-stack, Line scan and AO line scan
- Vertical PMT voltage sliders, PMT voltage sliders of unused PMTs are hidden
- Arbitrary names for Laser and PMT voltage sliders can be set in Service Tools
- Progress bar for longer calculations at curve analysis
- Optimized handwheel smoothness
- Save image (a.k.a. „Photo“) button now moved to the Immediate window top left corner

#### **Stability:**

- Curve analysis window at partial filter
- Curve analysis window FWHM for negative peaks and spectrogram
- Importing .abf files
- Various bugfixes
- Support for MATLAB 2017b

#### **MES 5.0**

### **New features:**

- Electrophysiology importer supports Intan RHD format
- Electrophysiology importer supports CNT format

### **User experience:**

- Auto LUT for camera
- Improved protocol structure and GUI
- Multi ROI broken view for FoldedFrame measurements

### **Stability:**

- New camera driver and interface
- Automatic packaging and sending debug data to Femtonics if requested
- Support for MATLAB 2015b

## **MES 4.6**

### **New features:**

- 4D scanning with rollercoaster
- DoCallback module: endless possibilities
- dGpR module: new R compensated dG/G calculation mode
- AO scanning: support for v5 AO driver cards
- Improvements to Cell3DFinder module: finding cells with nuclear exclusion
- Load arbitrary curves into protocol and use them for output generation during line scans
- Metaprotocol handles devices and can capture images and z-stacks at multiple positions
- Support to Sutter MP285 stages
- New module: bpodimporter imports signals from the BPOD behavioral control device.
- Support for tilting objective
- Intrinsic imaging and VisStim (visual stimulation) support
- Support for holographic stimulation
- Support for PClamp 10.6., ABF 2.03 and Windows 10 for Electrophysiology importer
- New module MCTeleClient performing MultiClamp700B telegraphing.

### **User experience:**

- Global cursor helps identifying same locations on different images.
- FoldedFrame can draw more flexible regions: transverse direction is calculated per ROI.
- Improvement for software-controlled beam coupling adjustment (uncage upgrade - laserintapt module)
- AutoROI function on FoldedFrame (XYT) viewer window
- Point to line setting dialog: it is possible to configure multiple patterns to replicate



- Multiple Immediate windows supported: real time parallel display of multiple channels

### **Stability:**

- Bidirectional scanning correction on the main GUI
- New device drivers for PES, LuigsNeumann and APT- increased stability

### **MES 4.5**

#### **New features:**

- Support to export data to large HDF5 files
- Spectrogram calculation in curve analysis
- Form XYT measurement unit from time lapse images captured by metaprotocol
- Motion artefact correction function for galvo XY or XYZ images.
- Improved point management GUI: multiple separate point groups
- Improvements to PipetteManipulation module: supports hardware other than LuigsNeumann

#### **User experience**

- Curve analysis display preferences
- Bulk XYZ and XYT export to multiTIFF
- Adjuster GUI helps fine positioning selections in 3D
- Image statistics calculates histogram
- Convenient PMT enable button