MES detailed release notes

MES 8.5

New features

- Tile Z Scanning GUI
- Option to undock measurement control panels in separate windows
- Option to align Special scan patterns to the plane of the viewport or the absolute horizontal plane
- Dichro dependent coordinate tuning and AO intensity compensation option
- 3D-RTMC (former FocusPinner)
    - Correction can be enabled/disabled during measurement
    - The reference point can be modified during measurement
    - Enable/disable correction in Z dimension

Updates

- Tile Scan and Tile ZScan improvements
    - Storable settings
    - Integration in Metaprotocol
    - Automatic postprocess tiled images using Fiji tool (external)

Main bugfixes

- 'Select whole viewport' now handles Volume scan measurements (creates Snake scan pattern)
- Special scan analysis fixes
- 3D-RTMC
    - Dichro compensation fix
    - Save correction curves and reference data during Z-stacks
- Pixel timestamps in case of 2D Special scan measurements

Stability

- Recorded analog/digital input data is continuously streamed to the disk

- Free disk space is monitored during measurements, measurements stops before disk gets full
- FemtoAPI documentation available at GitHub https://femtonics.github.io/FemtoAPI/

Coming soon

- Protocol editor redesign
- Closed-loop photostilmulation
- Start measurement via external trigger

MES 8.4 update 2

New features

- Tile XY Scanning GUI

MES 8.4 - MESc 4.6.13643 (10/06/2024)

New features

- Automatic dendrite detection (Imaris integration)
- Automatic cell detection in volume (Imaris integration)
- Bessel beam
- Advanced intensity compensation for large field of view
- Measurement can be stopped at trigger signal

MES 8.3 - MESc 4.5.13237 (21/03/2024) "Triggered Action" Edition

New features

- Triggered Action for Imaging and PhotoStimulation with Continuous Real Time Motion Correction

Stability

- Transmission noise of FocusPinner has been eliminated

MES 8.3 - MESc 4.5.13237 (13/12/2023)

New features

- FocusPinner for ZStacks

- Increased number of patterns (configured parameter)
- Break view at Live imaging for special scanning measurements
- Special scan browser show the pixel timestamp (total time counted from the beginning of the measurement) (+)
- New feature for loading multiple points (without overwriting measuring parameters)
- FocusPinner for large FastZ (extra development from rev.14541)

Stability

- Elimination or rare MATLAB crashing (at Camera start)
- Feasibility for automatic AO card reset (final fix on 13/12/2023)

Coming soon

- Advanced intensity compensation (+)
- Volume display for FocusPinner reference volume
- Volume display for any volumetric measurement

MES 8.2 (15/09/2023) - MESc 4.5.12979

New features

- Line-by-line switching between lightpaths and patterns (+)
    - combination with FocusPinner (+)
- Image overlay functionality with MESc 4.6 for chronic imaging (+)
- Optimized precalculation (shorter precalculation time)
- MultiPulse generator adjusts the number of repetitions as a function of protocol length time
- 100 kHz per points (SW solution needs optical adjustment) (+)
- Common post hoc motion correction for all channels (offset calculated on the user selected channel and applied on channel with potentially weaker SNR)
- Sequence numbers at MES ROIs
- Camera and 2p images are matched with haircross
- Automatized adjusting of ROIs after reselecting reference point
- Analysis ROIs
    - Sequence numbers
    - Automatic coloring of new ROIs for better visibility
- FocusPinner

- Automatic adjustment of ROIs after reselecting reference point
- Stores dichro state at reference selection, used stored state during reference measurements
- Reference drift insertion is taken into account when using Frame/Line Sync signals
- Frame Sync signal
- Warning is displayed if Z-stack laser intensity is significantly higher than current settings
- Tiled Imaging functionality
- Tiled ZStack functionality
- Support for Basler acA5472-17um camera
- Supporting [Suite2p](#) and [FIOLA](#) packages for cell and Ca signal extraction
- Win11 compatibility

Bugfixes

- Interrupted ZStack can be loaded into image backgound pool
- Image statistic bug fix
- FocusPinner bugfix at extreme large AO cycles
- Bugfix at PropertyCollector

Coming soon

- Extension of Raster Scan with Protocol

MES 8.15 (14/03/2023)

New features

- loading layers of VolumeScan to background pool is feasible
- Widgets to input sizes of FOV
- Script for unfolding FrameSync data → Github
- Script for transforming points back to microscope coordinate system from finding specified points on image - > Github

Bugfixes

- FocusPinner at Raster Scan Records bug
- Point Loading to MES from MESc

Coming soon

- Automatized adjusting of ROIs after reselecting reference point
- Extension of Raster Scan with Protocol

MES 8.1

New features

- FPGA-based Real Time Motion Correction ('FocusPinner'): detecting and correcting motion by using a fix number of AO cycles for reference scanning and shifting the target of scanning by compensating in X-Y-Z direction during the scanning of a specific pattern.
    - It makes feasible to
        - scan ribbons, chessboards, points, lines and full field of view with motion correction
        - compensate motion based on intensity of reference drifts (without appearing in measurements)
        - automatic parameter adjusting
        - scan reference drifts with task-specified AO amplitude (i.e. with larger amplitude for the better SNR compared to amplitude in case of imaging)
- Measurement control
    - Point-scan measurement with 1 point, reaching 33 kHz sampling rate (previously at least 4 points should have been selected)
    - Square pixels at all scanning modes
    - Long ('unlimited' duration) recording for all scanning modes including Special scans
    - Line scan tab is removed, Line scans can be performed in Line scan mode under the Special scan tab
    - Traditional and High Speed Raster scan tabs are merged

* 5-step slider for controlling the number of drifts in one line of a Raster scan

    - Drift length setting for Line and Longitudinal ribbon patterns
    - Effective bit depth is adjusted automatically (16 bit transfer is used on low resolutions, 8 bit transfer on high resolutions)
    - New options for Point --> Pattern transformation: XYZ cross and Chessboard

- MESc-based data storage for all measurement modes leading to improved data saving times at Special scans
- Averaged images per Z-stack layers
- Raster scan with Protocol can be performes by the 'Select whole viewport' option on the Special scan tab
- MetaProtocol delta time edit boxes
- Special scan patterns are displayed in the Focus plane visualization window
- Analysis
  - Line-scan batch analysis is redesigned and extended for 3D Special scan measurements (i.e. Chessboard and Ribbon measurements)
  - Post hoc Motion correction can be saved to new measurement units in case of chessboard, ribbon scanning
  - Batch processing of post hoc motion correction
  - Improved File panel

* Tree view similar to MESc * Opening multiple files are supported

  - Improved data storage based on MESc

* Data is being streamed to .mesc (HDF5-based) files making it feasible to get and analyse data during measurements (via FemtoAPI) * Data is losslessly compressed, 4 compression methods are supported * Description of new file structure: MES8-A-2410250298 * Sample codes for accessing attributes on GitHub:

  - Redesigned measurement viewers
    - MultiCube and Snake measurements are treated as volume scans
      - Additional slider for navigation in Z
      - ROI evaluation takes into account the volumetric nature of data
    - Measurement ROIs are always shown in a user-friendly arrangement (according to former Break view)
    - Multiple analysis ROI selection after clicking the New... buttons
    - Analysis ROIs can be moved and adjusted easily, their color can be changed
    - Pixel values and coordinates are shown below the corresponding image while moving the cursor
    - Inverse coordinate matching is implemented

- - A cursor indicates the corresponding position on the frame image while moving the cursor on the Background image
  - Overlapping ROIs are supported
  - Points can be selected both on the frame and on the Background image
  - Improved zooming functions on images and axes
  - Points

* Point group 0 (with fixed colors) is removed * Points can be colored arbitrarily, point groups have an adjustable default color * Context menu on images for adding new Points

- TIFF export became compliant with OME-TIFF
- MES starts MESc on startup
- Matlab R2020b and R2021a are supported

Bugfixes

- Fixed black image when stopping the camera
- Improved alignment of scanning drifts with the guideline in Longitudinal ribbon and Line scanning
- Number of pixels during one AO cycle is now variable in Special scans
- Vertical artefact during HSAFS is removed
- Only completed frames are saved at the end of the measurements (without fragmentary data)
- Electrophysiology recording fixed in case of downsampling
- Optimized protocol calculations (fixing the slow response of Protocol editor windows in case of long measurements)
- Better resizing of measurement viewers
- Turning on the dF/F visualization in measurement viewers doesn't hide the physical channels
- Histogram and Image statistics windows ignore the empty areas of Special scan images
- Store button on the Live camera window always stores the current image
- Prevent twisting of Z directional ribbons

Known issues

- File format change:
  - .mes files made with MES 7 or lower cannot be opened in MES 8 (only .mesc files can be opened, .mes files cannot be converted into the new format)

- .mesc files made with MES 7 HSAFS mode can be opened in MES 8
- Compatible with MESc 4.5.1 (recommended) and 4.5.0 (update mandatory from 4.0.1 or earlier versions)
- Compatible (via MESc) with FemtoAPI 2.0.0
- Special scan measurements can be viewed and analyzed in MES, full frame measurements in MESc
- MES measurement viewers open slowly
- Command line access changed due to extensive refactoring of the backend
- MES supports .mescroi files in JSON format (old .mescroi files in XML format can be converted to the new format in MESc)
- Metaprotocol files (.Mprot) made with MES 6 or lower cannot be opened in MES 8
- Protocol editor: Crop beginning is hidden (fixed at 0)
- 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.

Coming soon

- Multilayer

MES 8.0 (25/09/2022)

New features

- Measurement control
    - Square pixels at all scanning modes
    - Long ('unlimited' duration) recording for all scanning modes including Special scans
    - Line scan tab is removed, Line scans can be performed in Line scan mode under the Special scan tab
    - Traditional and High Speed Raster scan tabs are merged
        - 5-step slider for controlling the number of drifts in one line of a Raster scan
    - Drift length setting for Line and Longitudinal ribbon patterns

- Effective bit depth is adjusted automatically (16 bit transfer is used on low resolutions, 8 bit transfer on high resolutions)
- New options for Point --> Pattern transformation: XYZ cross and Chessboard
- MESc-based data storage for all measurement modes leading to improved data saving times at Special scans
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  - Improved File panel
    - Tree view similar to MESc
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    - Data is being streamed to .mesc (HDF5-based) files making it feasible to get and analyse data during measurements (via FemtoAPI)
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