MDA V8 – Functionality Overview

Summary of Major Features and Usage Concepts

Functionality Scope based on
MDA V8.5.1 and Previous Versions

ETAS

DRIVING EMBEDDED EXCELLENCE

MDA V8 – Functionality Overview

Summary of Major Features and Usage Concepts (Based on MDA V8.5.1)

- **Basics**
  - Docking Windows, Ribbon, Keyboard Support, Meaning of ‘Configuration’, Error Handling, Customization Possibilities, User Settings
- **Measure File Handling**
  - Measure File Handling, Export of Measure Data, Time Offset, Textual File Formats
- **Signal Handling**
  - Variables & Signals, Definition of Display Name, Calculated Signals, Bit Extraction
- **Instruments**
  - Overview of Instruments, Time Navigation & Synchronization, Oscilloscope, Scatter Plot, Table, Event List, Statistical Data, GPS Map View
- **Configuration Handling**
  - Configuration Management, Import of MDA V7 Configurations (*.xda)
- **MDA V8 in Combination with other Applications**
  - INCA & MDA V7, EHANDBOOK-NAVIGATOR, Command Line Tool ‘mdfconvert.exe’

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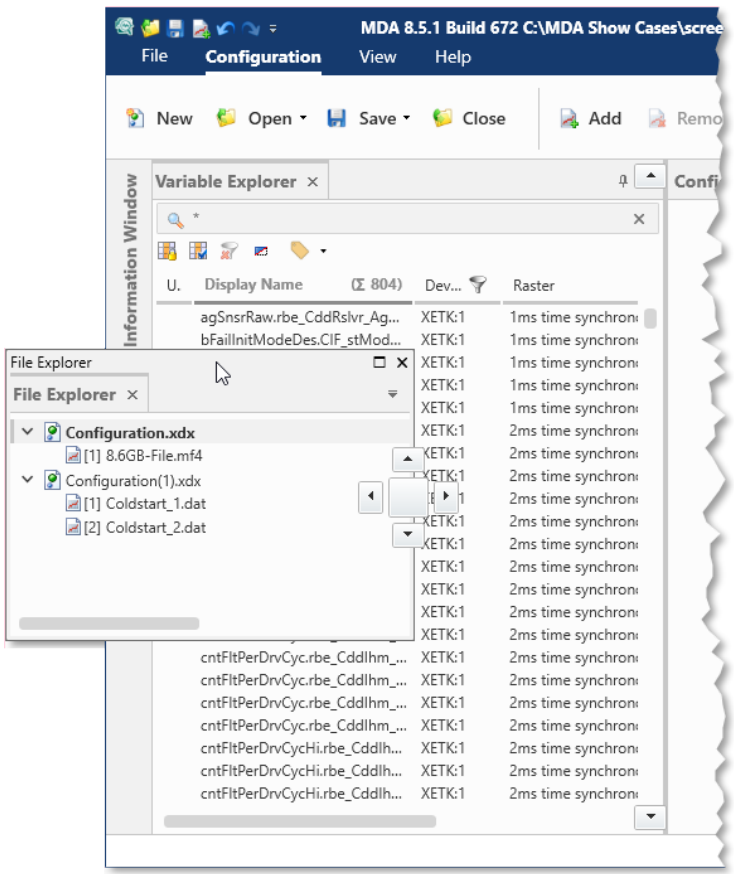
MDA V8 – Functionality Overview

General Notes

– MDA V8.5 is the latest product release of the new generation of ETAS' measure data analysis tool
– It combines high performance (even with 'huge' files), and user-friendly operation concepts
– Installation of MDA V8 includes MCD Core* and DirectX9, and requires 64 bit Windows® 8.1 or 10 operating system*

– Docking Windows Technology
– State-of-the-art technology is used, like Windows ribbon concept, or docking window mechanism, i.e. objects can be positioned at any desired place using drag & drop via the title bar
– Docking windows and other UI elements provide an auto-hide pin

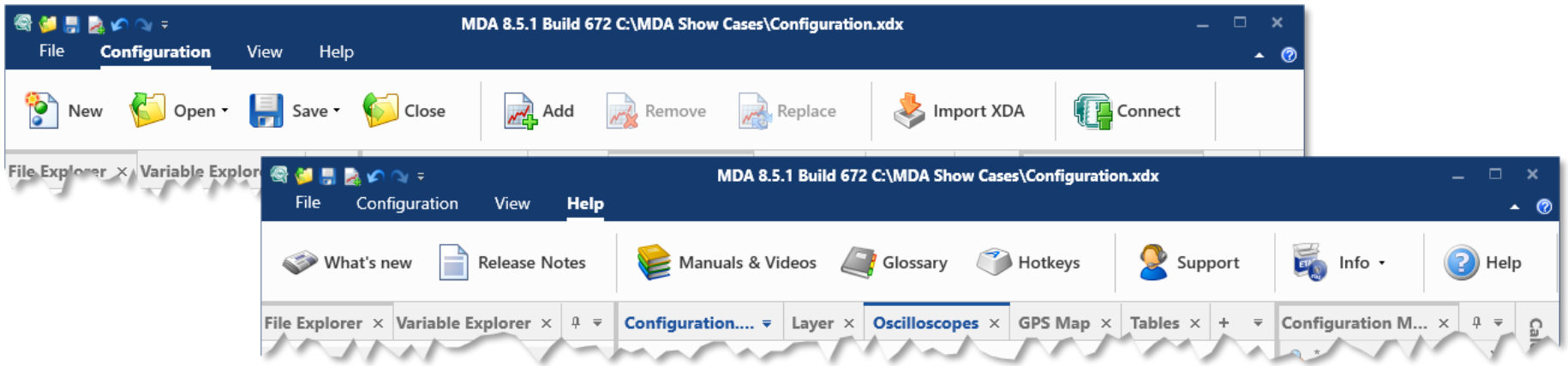


* Notes:
- MCD Core is a base component for ETAS tools used for high performance data handling
- For more details about supported Operating Systems see the latest Release Notes document

MDA V8 – Functionality Overview

Ribbon: Get quickly access to frequently used functionalities

– Functionality is structured in ribbons, namely for Configuration, View and Help
– For an efficient usage of the available space the ribbon can be set to auto-hide *
– A Quick Access Toolbar enables access to main functionality



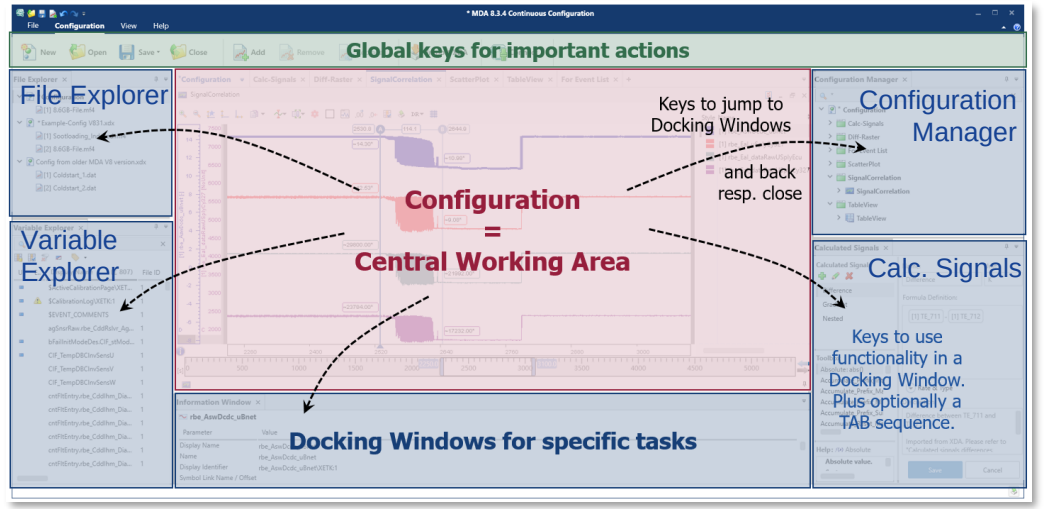
– Within ‘Help’ ribbon ‘Manuals & Videos’ provides access to more information about usage of MDA V8
– Within the ‘View’ ribbon e.g. the start-up language can be set *

* Notes:
- These settings are persisted in ‘settings.user’ file, and applied when MDA V8 application is re-opened
- A brief overview how to use MDA V8 is given in the video #20 “Basic Introduction”

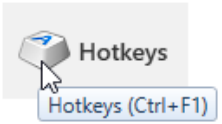
MDA V8 – Functionality Overview

MDA can be operated via mouse and using the keyboard

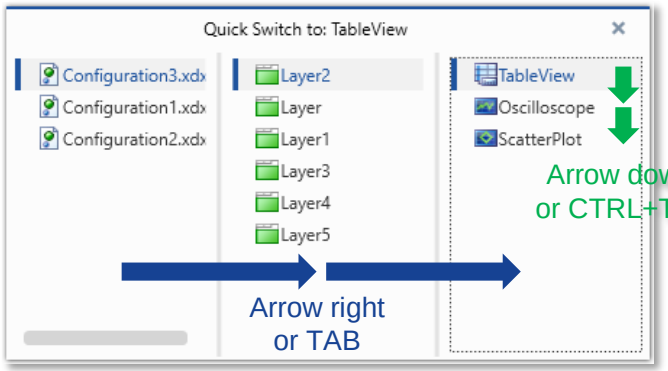
– Important actions can be done via global short-cuts
– Docking windows are opened, and closed (via Shift+ESC) individually
– Clear indication of focused element
– All hotkeys for supported operations are listed in context menus or at the respective icon



– CTRL+F1 provides an overview of all supported keyboard combinations *



– 'Quick Switch' window (opens via CTRL+TAB) enables quick navigation between different instruments, layers or even configurations

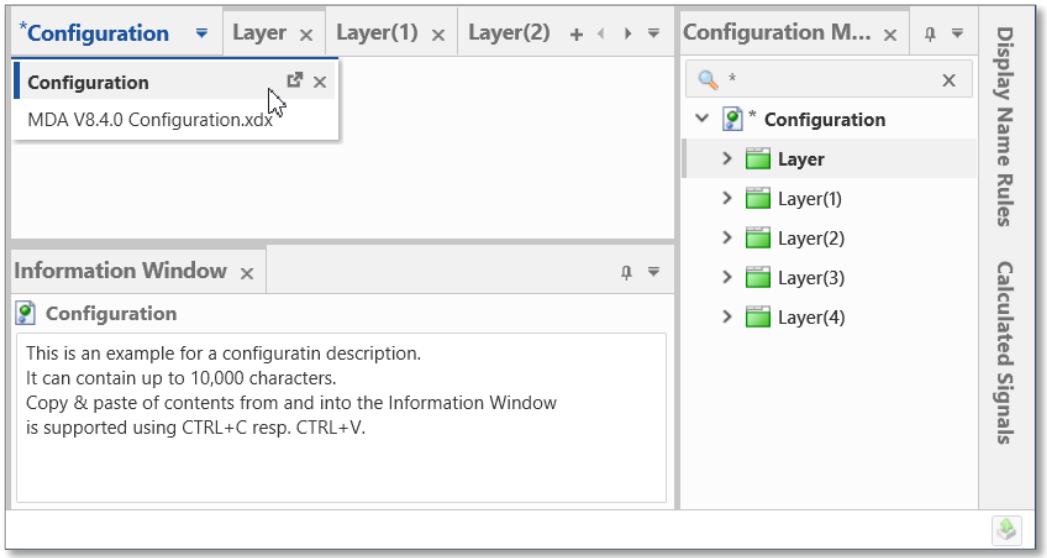


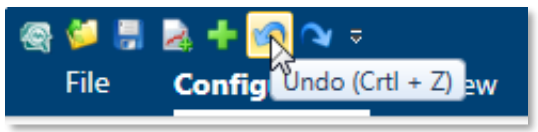
* Note: Pure navigation keys (like arrows down, page up or similar) are not listed

MDA V8 – Functionality Overview

Configuration: Manage even complex display and analysis tasks

– A configuration is the central working place for the display and analysis of measure data
– Layers, instruments and signals assigned to instruments are part of a configuration
– Measure files are linked to configurations
– Within one MDA V8 session several configurations can be opened in parallel
– A configuration description can be given in the Information Window (CTRL+I)
– Unsaved changes to a configuration are indicated by a star
– UNDO (Ctrl+Z) and REDO (Ctrl+Y) are supported for any configuration changes



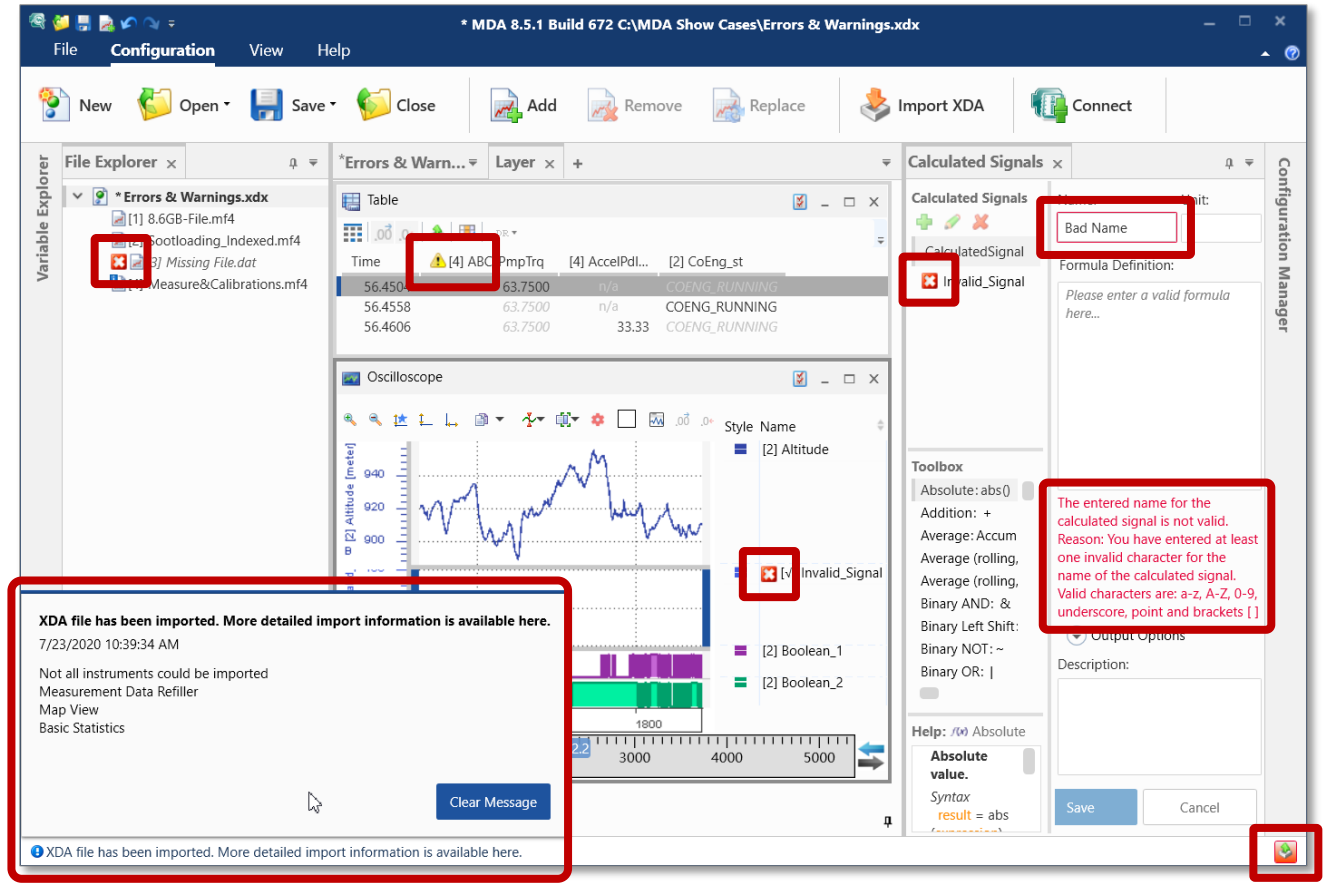


Important Compatibility Limitations:
- MDA V8 configurations (*.xdx) cannot be converted back to and opened in MDA V7.x (*.xda)
- An MDA V8 version can open configurations created with former MDA V8 versions, but not from newer software versions

MDA V8 – Functionality Overview

Unexpected situations: MDA V8 informs you when something unusual happens

- In case an activity could not be done as planned, or an object is causing trouble, MDA V8 informs you
- The information usually happens at the location related to the issue, like
  - a warning or error icon is shown at the respective object (like a not supported signal, a missing file etc.)
  - a red frame around a name field
  - a message in the status bar appears (as case of not imported objects)
- Just hover onto the icon and get more details about the issue

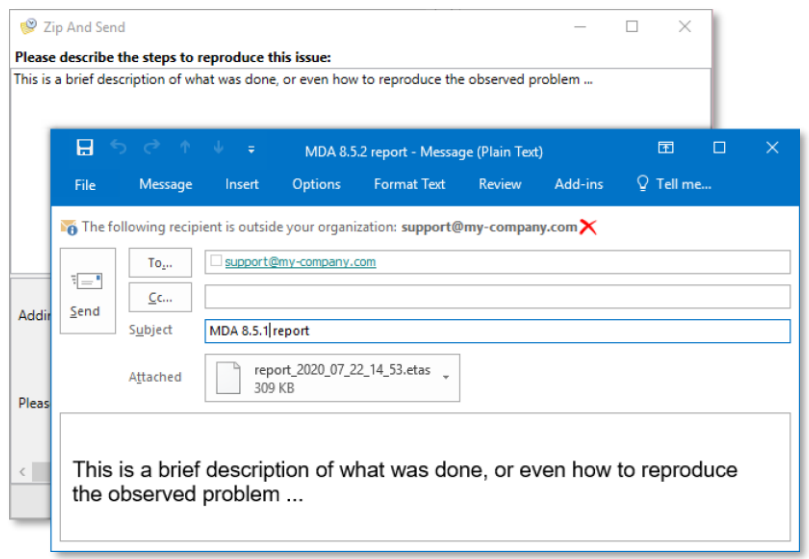


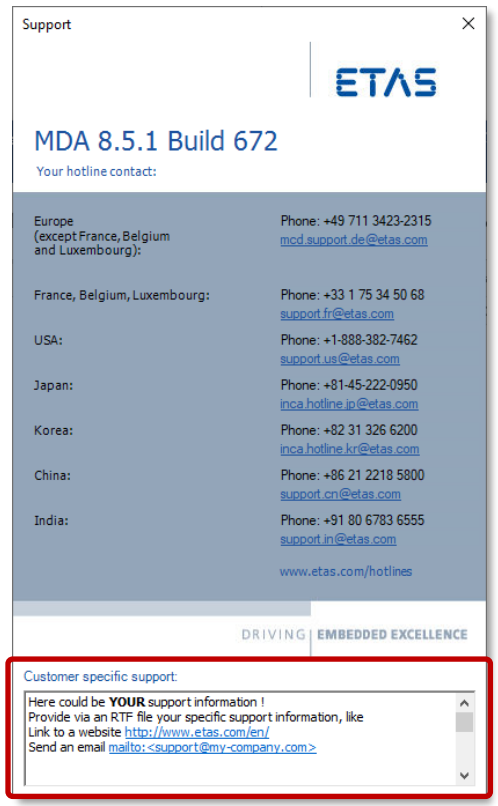
MDA V8 – Functionality Overview

Adapt MDA V8 to your company working environment

– Customer specific support
– Support dialog can include customer specific support information
– MDA support dialog can be extended via ‚CustomerSupport.rtf‘ file
– Contents can be plain text, hyperlinks to websites or email addresses

– Default Zip&Send email address
– The default email address used for Zip&Send operation of MDA reports (MDA V8 log files) can be defined to a customer-specific support address



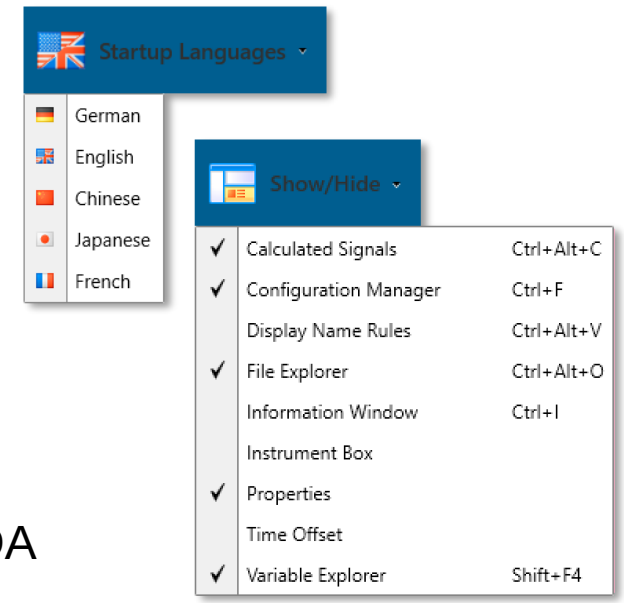


Note: For more details see MDA V8 Manual -> Customizing the Support Information

MDA V8 – Functionality Overview

Spend less time with configuration as MDA V8 persists automatically your settings

- MDA V8 persists automatically many settings done by the user
  - Application: language, status & appearance of docking windows, paths
  - Per Instrument: default appearance, like background color and others
  - For Signals: color, decimals, connection style, marker symbols, etc.
- Settings are stored in the user specific ‘settings.user’ file
- These settings are loaded and re-used, when the application is started
- As a result the effort for configuring the tool layout,
  and signal representation is minimized
- A pre-defined set of settings can be rolled out before the first usage of MDA
- User settings are migrated when a newer version of MDA V8 is used,
  old setting files are kept as fall-back solution in case a downgrade is required



Notes:
- For more details about which settings are persisted, and how to roll these out, see MDA Manual chapter 1.3
- Existing settings.user files **must not** be edited externally, as edited files are rejected by MDA V8

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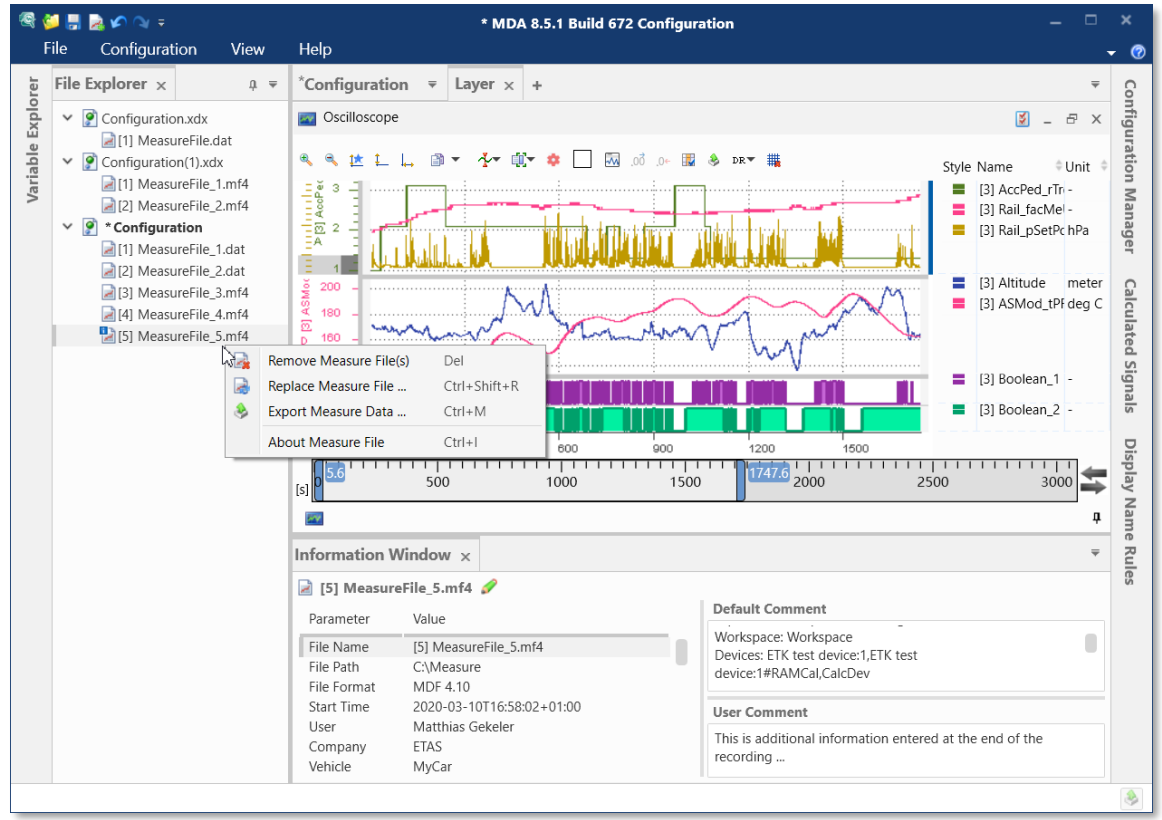
MDA V8 – Functionality Overview

File Explorer: Manage your files in a clearly arranged way

- In the File Explorer configurations, and the assigned measure files are listed
- A configuration contains a selection of signals and how these are represented; the data for the signals comes from the measure file(s)
- Measure files assigned to a configuration appear underneath the configuration entry
- Each file has a file ID for better identification
- By CTRL+I the file comment and other meta data is shown in the Information Window
- File Explorer provides access for
  - removing, replacing, and
  - exporting or conversion of measure file(s)

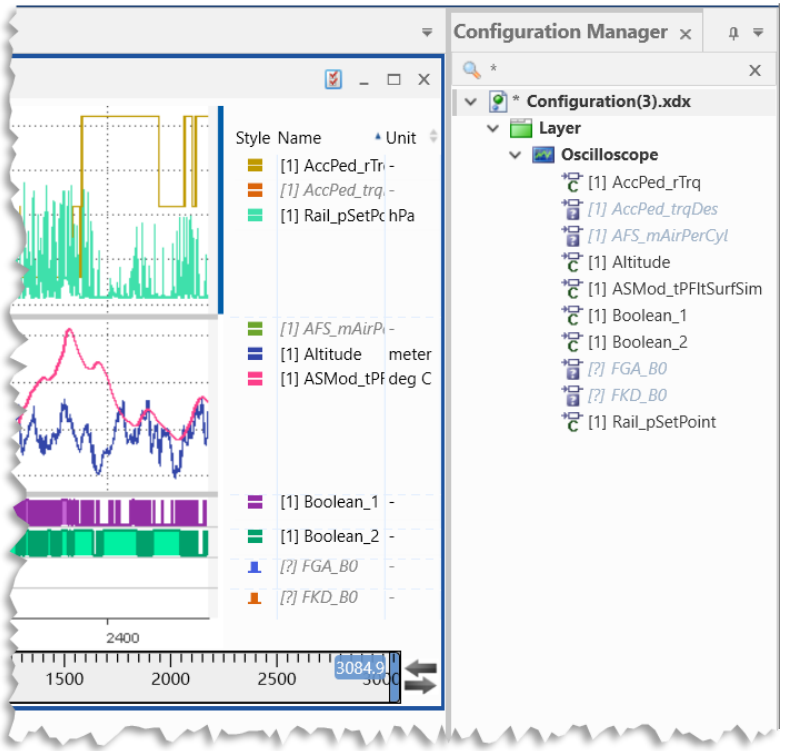


Note: For the basic functionality see video #13 "Files Replace", and video #5 "Files Export"

MDA V8 – Functionality Overview

Improved and consistent handling when input signal is missing

- When removing or replacing a measure file, it might happen that a signal is no longer available
- In MDA V8 missing signals assigned to instruments remain as placeholders until they are available again
- When replacing a measure file an automatic signal mapping is done, based primarily on the signal name and optionally device, and raster
- Any signal(s) which cannot be mapped automatically remain in the configuration, but without data displayed (so-called ‘no-match’ case)
- ‘No-match’ signals are shown by the grey italic font style



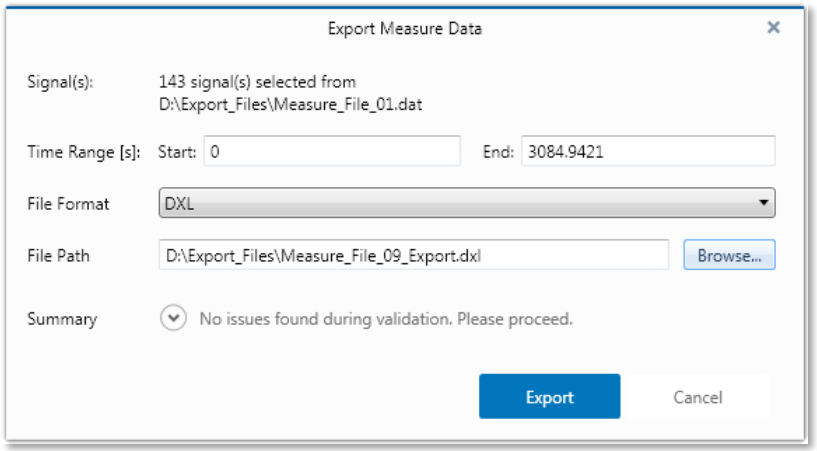
Notes:

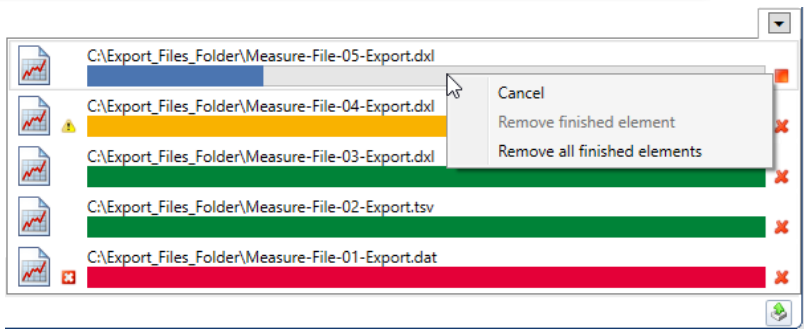
- A no-match situation caused by a missing measure file is indicated by the file ID entry [?]
- Removing a specific no-match signal only is done directly in the instrument or in the Configuration Manager
- To clean-up a configuration from all no-match signals, a context menu entry in the Configuration Manager exists
- If the input signal of a Calculated Signal is in no-match state, it needs to be removed manually

MDA V8 – Functionality Overview

Export Measure Data: Create your own measure file

– Using ‘Export Measure Data’ allows to create a new measure file*, including any MDF file format conversions
– ‘Export Measure Data’ dialog can be opened from
  – the File Explorer context menu by selecting the measure file to be exported resp. converted
  – the Variable Explorer context menu by multi-selecting signals, even from different files, and incl. calc. signals
  – an oscilloscope, scatter plot or table instrument toolbar for the signals in the selected instrument
– A progress view provides information about the export process, and allows to cancel the export



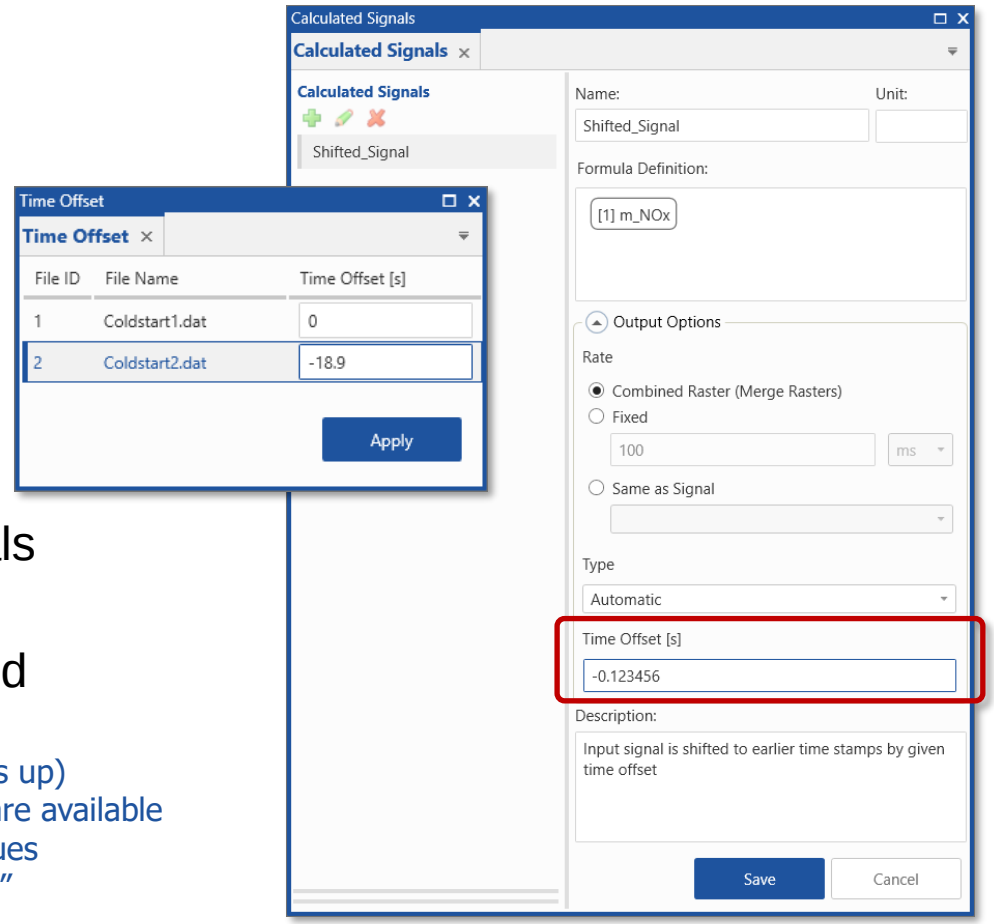


* Notes:
- For a short demo see video #5 “Files Export”
- In case a time offset was applied to a measure file or a signal, the exported signals will have the offset included
- MDA V8.5 supports numeric data and enumerations completely, for mdf V3.x also data type strings

MDA V8 – Functionality Overview

Synchronization of measure data by applying a ‘Time Offset’ on file level and signal level

– To compare measure data, often a time offset needs to be applied to synchronize the recorded data
– MDA V8 enables to apply time offsets
  – for complete measure files, i.e. all signals of the file are shifted accordingly
  – for individual signals, by using Calculated Signals functionality Output Options *
– A time offset for files is applied to the data basis, and effects any ‘consumer’ of the data, e.g. calculated signals are calculated based on the shifted data
– When exporting measure data any time offset is included



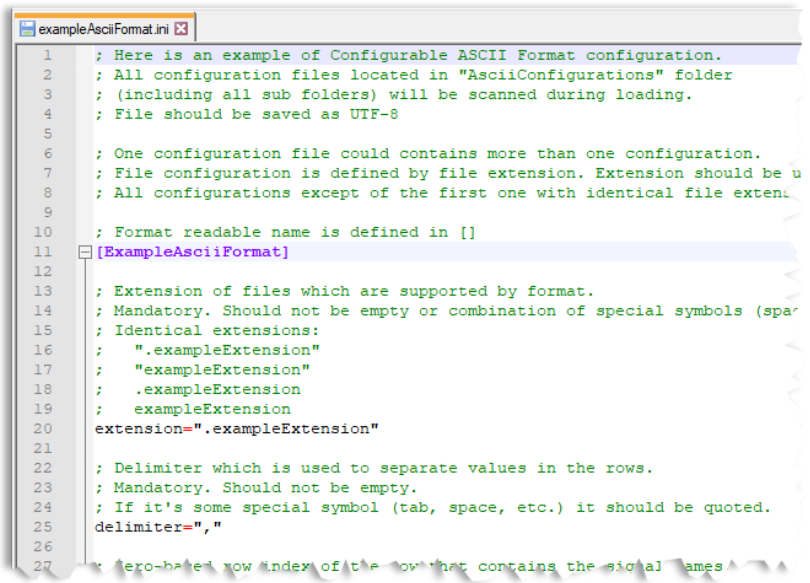
* Notes:
- Time offset for file and individual signal is handled in cumulative manner (i.e. sums up)
- Time stamps of an input signal remain unchanged, i.e. original and shifted signal are available
- Calculated Signals toolbox functionality “Delay_Signal()” supports only positive values
- How to apply a time offset for a file or a signal is shown in video #18 “Time Offset”

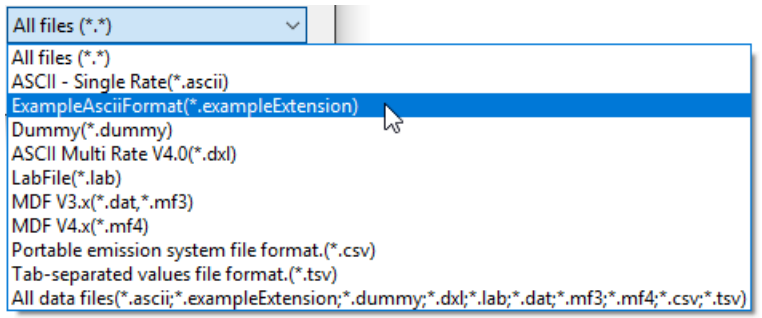
MDA V8 – Functionality Overview

Teach MDA V8 to support your own customer-specific ASCII file formats

– MDA V8 supports additional (ASCII based) measure files formats by an easy-to-create configuration (*.ini) file, which defines how to read & write textual files, like *.csv
– An example incl. a description for such an *.ini file is provided in the folder
%ProgramData%\ETAS\MDA\8.x\CorePlugins\
Etas.TargetAccess.Targets.MeasureFile.Formats.AsciiConfigurable *
  – The measure file extension should be unique
  – A clear structure of header and data blocks is needed
  – All signals must be available in the same raster

– When starting MDA, all available *.ini files are loaded, and respective file formats are supported (Read & Write)





* Note: New folder name introduced in MDA V8.5.1.

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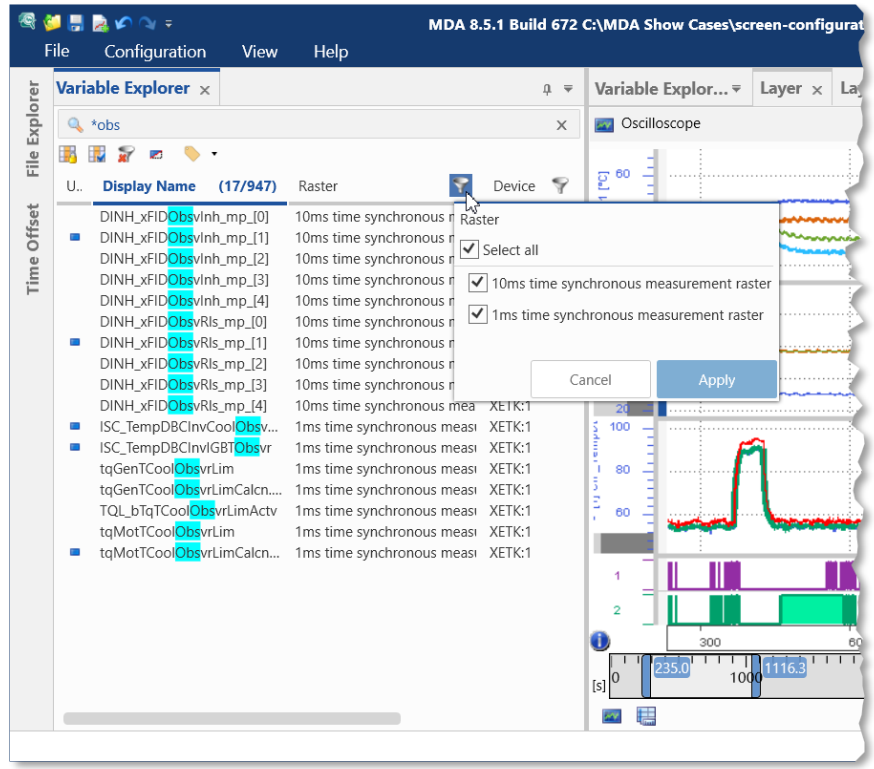
MDA V8 – Functionality Overview

Variable Explorer: Experience the new performance

- The Variable Explorer is a tabular view for selection of signals showing signal name and meta data
- To shrink the entries in the list to the relevant ones, filtering is done via:
  - Search field for variable name
  - Funnel icons in the column header (e.g. Raster 
  - Icon to filter used and not used entries 
- Columns to be shown is customizable  , and columns can be reordered *
- Columns at left can be excluded from scrolling (‘Freeze’ )*
- Signals are assigned to an instrument via drag & drop onto a layer tab, or into an existing instrument

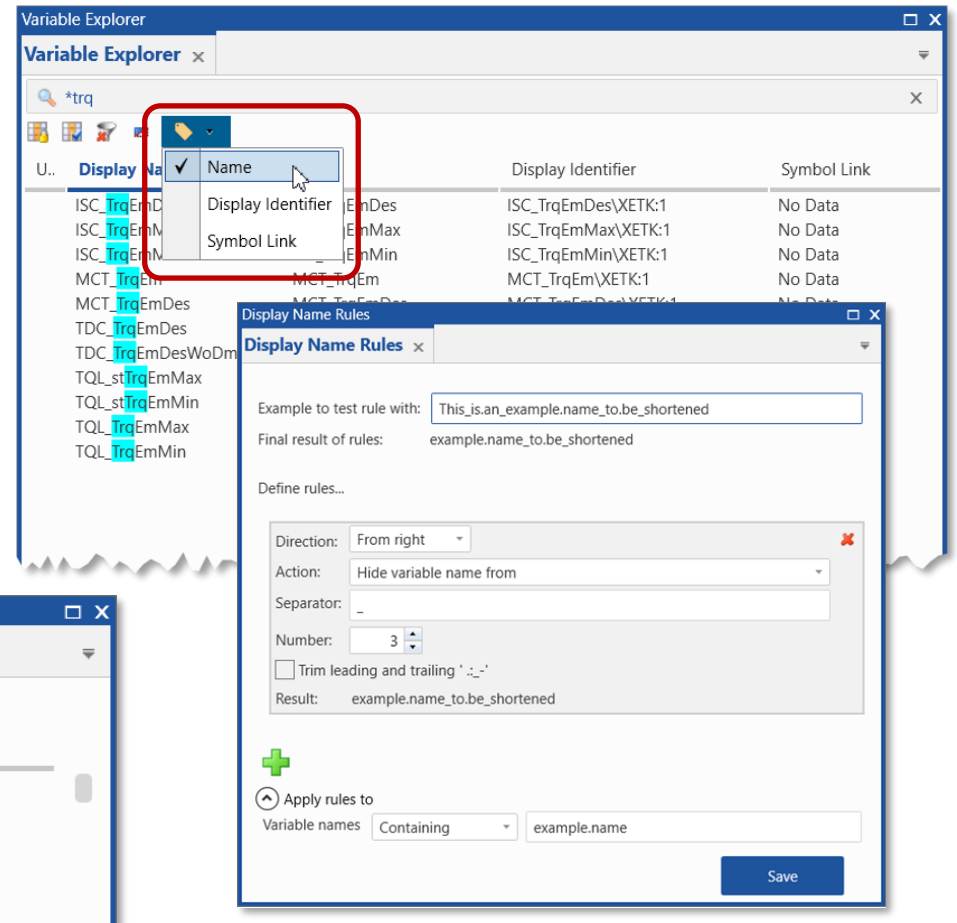


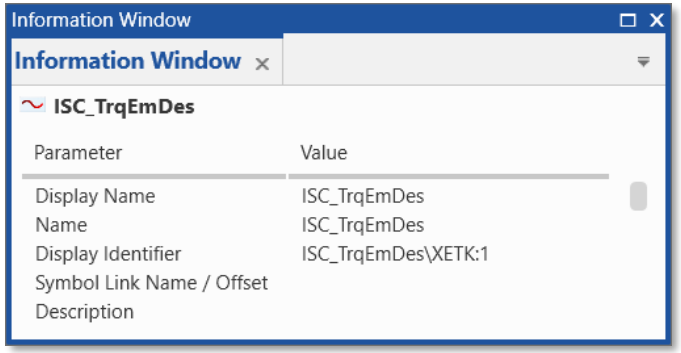
* Notes:
- For a basic introduction see video #2 “Signals Selection”
- These settings are persisted in ‘settings.user’ file, and used when Variable Explorer is opened

MDA V8 – Functionality Overview

Define how a variable's or signal's name shall be displayed

- In an MDF file alternative variable names can be given, like Display Identifier or Symbol Link
- The name type to be used in MDA UI can be defined in Variable Explorer
- Additionally MDA V8 allows to shrink the display name to the relevant part to be shown e.g. in instruments
  - An arbitrary number of rules can be combined
  - The target group of variables for which the rules shall be applied is definable
- Information Window shows all kinds of available names for a variable / signal

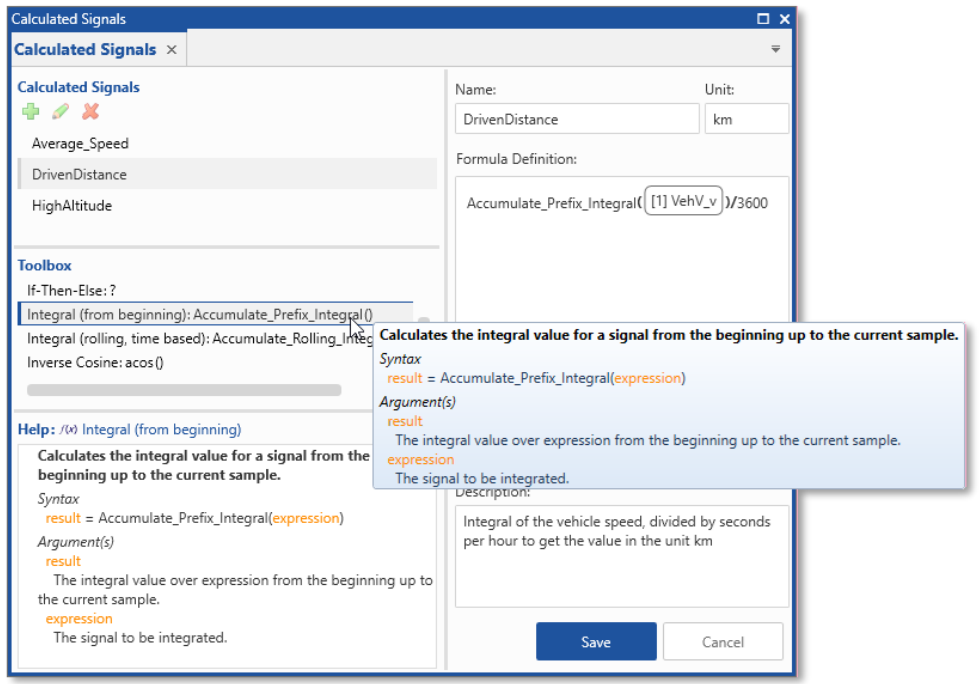




MDA V8 – Functionality Overview

Easy-to-use Calculated Signals management

– Calculated signals enable to derive information which is not accessible directly in the recorded measure data
– A new user-friendly Calculated Signals editor supports easy-to-read and -to-understand formulas
– Within very few steps a new calculated signal is defined, and ready to use instantly
– High-performance of the underlying calculation engine
– Duplicate, edit or rename an existing calculated signal within the same configuration
– Copy & paste calculated signals across configurations
– For toolbox operators a Tooltip and the Help window show at least a brief description of the arguments
– Display, export etc. can be done as for recorded signals

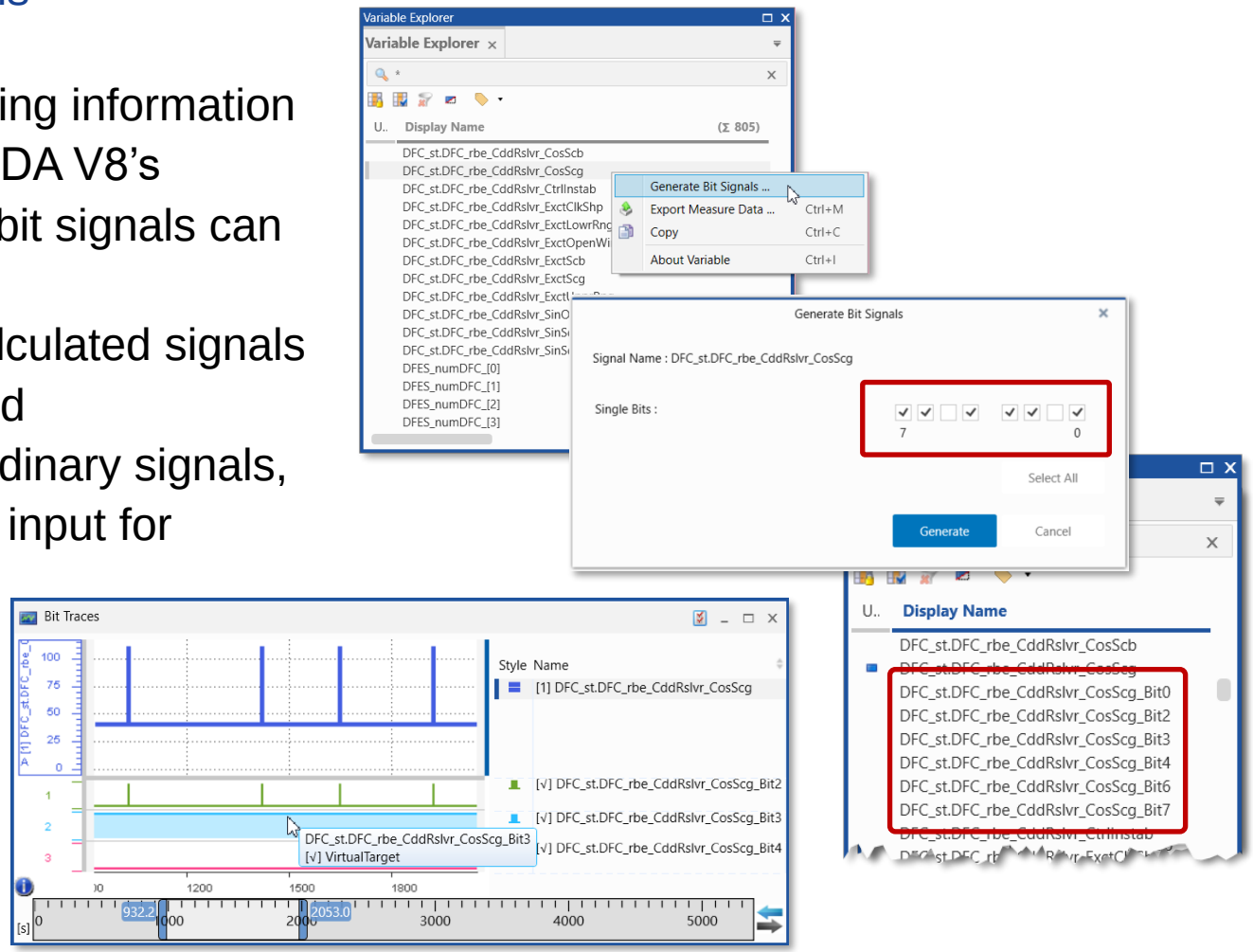


Note: For basic usage see video #4 "Calculated Signals", more details and examples are given in the Online Help and MDA V8 manual

MDA V8 – Functionality Overview

Quick and simple way to extract bits signals

– When for a block of bit signals the masking information is not given in the measure file, within MDA V8's Variable Explorer the needed individual bit signals can be extracted easily and quickly
– In the background the corresponding calculated signals are created. If desired, it can be renamed
– Generated bit signals can be used as ordinary signals, i.e. assigned to any instrument, used as input for calculated signals, and exported into new measure files



Notes:
- Generation of Bit Signals is **not** supported for signals with verbal computation method ("Enumerations")
- An example is shown in video #16 "Extracting Bits"

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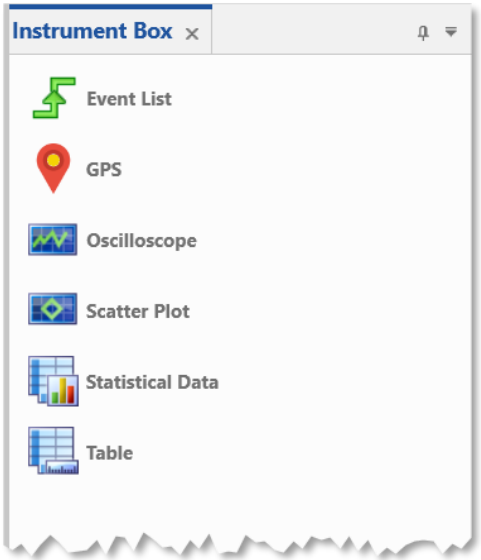
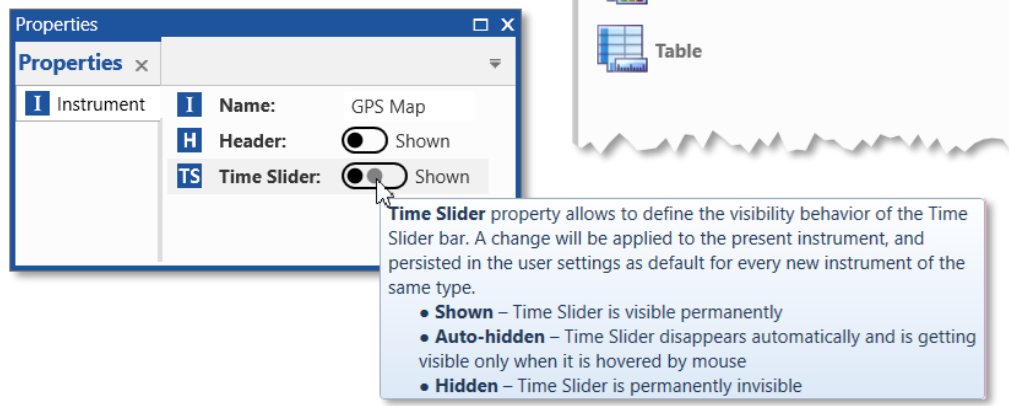
Instrument Box: Get an overview of all possible instruments

– MDA V8 provides six different instruments i.e. data views, namely an oscilloscope (comparable to INCA V7), a scatter plot (x-y representation), a table, an event list, a statistics instrument, and a GPS map
– To use the screen more efficiently, instruments specific properties enable e.g. to show or hide instrument header, Time Slider and more
– Changes are applied to the active instrument immediately
– Several Properties for instruments and signals are persisted automatically in the file* ‘settings.user’ and are re-used when creating a new instance of the instrument or signal (like e.g. oscilloscope background color, signal curve color, decimals for values, and several others)



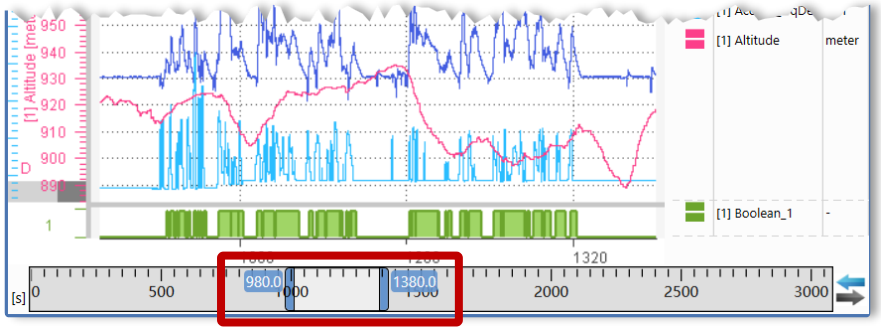


* Notes:
- Properties with default character are listed in the MDA V8 Manual Chapter 1.3 ‘User Settings’.
- File ‘settings.user’ is stored here: C:\Users*username* \AppData\Local\ETAS\MDA*8.x* \

MDA V8 – Functionality Overview

Instrument and Time Slider: Display relevant information quickly

– At the bottom of an oscilloscope a Time Slider is shown for an overview of the complete time range of all measure files assigned to the present configuration



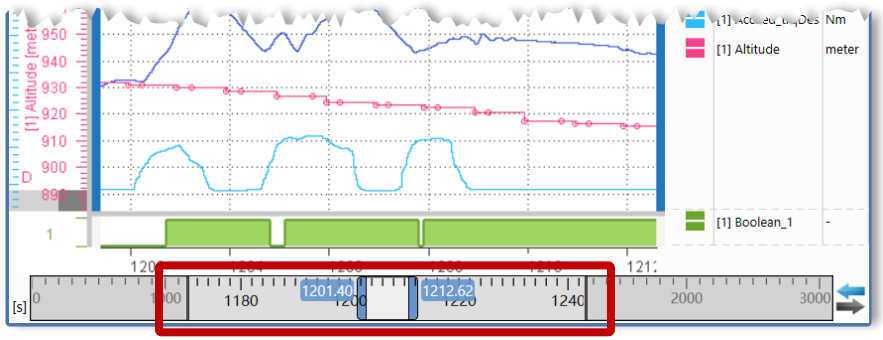
– Time Slider allows quick navigation through measure data and time range

– Scrolling, zooming* and synchronization of instinstruments can be done from here

– In case of deep zooming the mode switches automatically into Magnifier mode, i.e. the visual range is represented on a magnified scale for better orientation

– For quick navigation in magnifier mode, scrolling of the magnified scale is enabled

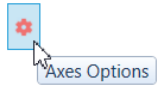
– Show/Hide behavior of Time Slider can be defined within the Properties window of each instrument



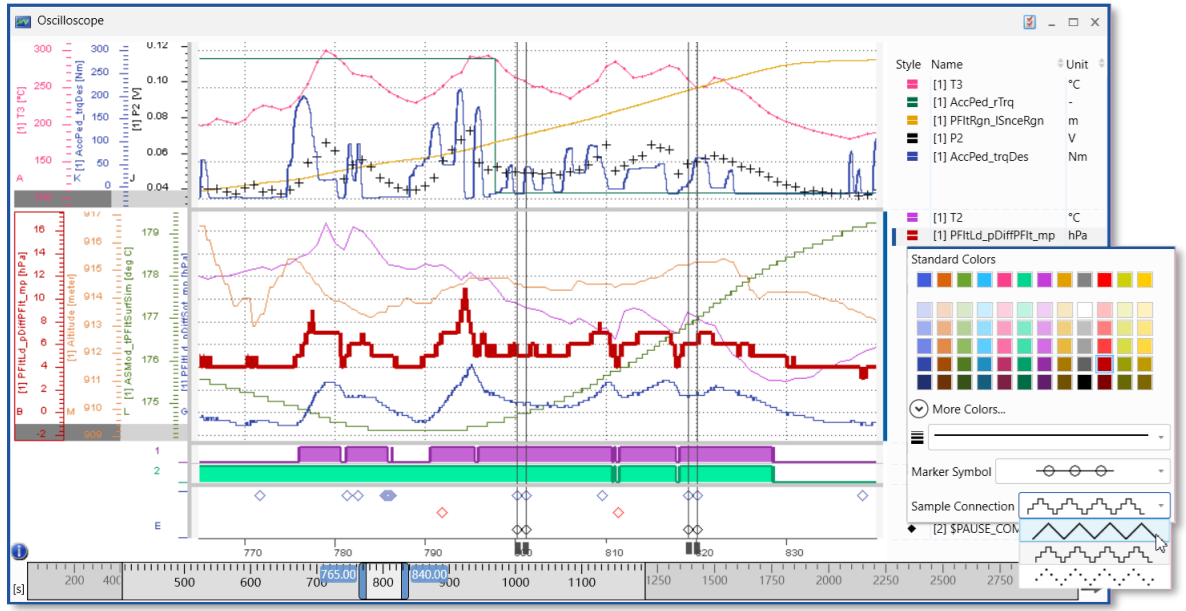
* Notes:
- For a brief demo see video #3 "Instruments Zoom & Synchronization"
- For symmetric zooming use the left mouse button plus CTRL key

MDA V8 – Functionality Overview

Oscilloscope: One instrument for several views

– The oscilloscope of MDA V8.4 offers:
  – Strips for analog or boolean signals
  – One ‘Event Strip’ for event signals
  – Analog signals can share the same axis
  – Axis range adaptations are done directly via mouse or via axes options 

  – The color icon allows to set for each signal several settings for display (like color, markers, kind of connection) *
– The icon bar supports frequently used actions e.g. zoom-to-fit, cursors, taking screenshots, or export data

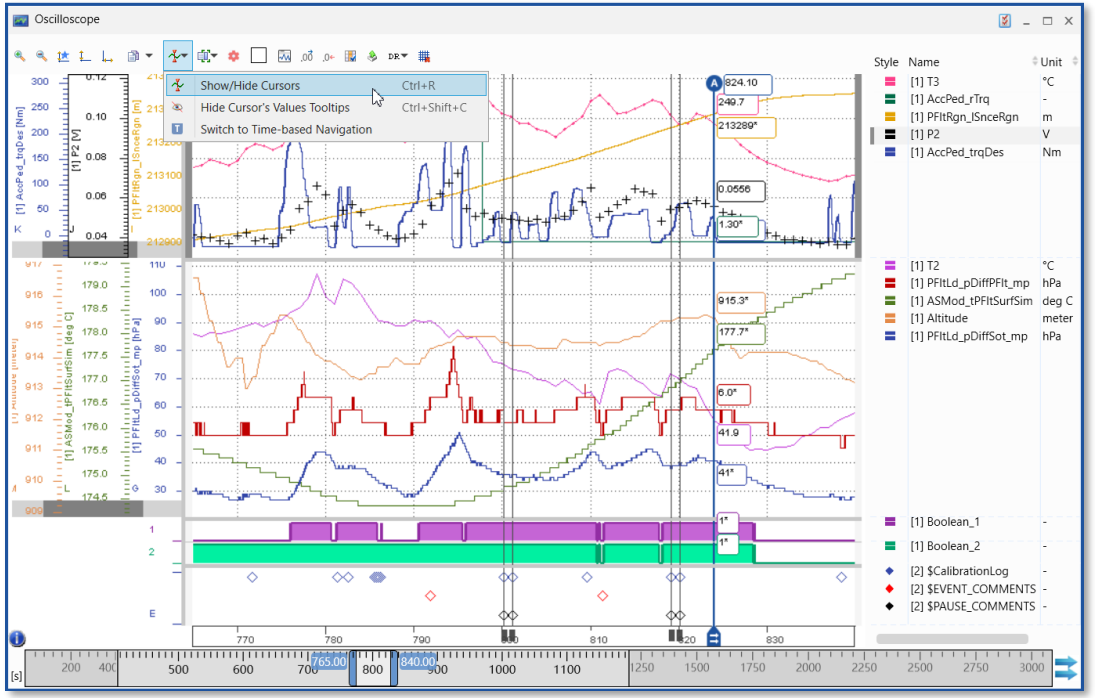


* Notes:
- For scrolling of value axes or the time axis use the left mouse button, plus CTRL key for zooming or right mouse button
- See the different videos about the oscilloscope instrument to learn more about its possibilities (#8 “Strips”, #9 “Axes”, #10 “Cursors”)
- Most of these settings are persisted in ‘settings.user’ file, and used when the signal is re-selected for an oscilloscope

MDA V8 – Functionality Overview

Oscilloscope cursors: Several modes for efficient analysis

- Cursors are created easily using CTRL+R
- Cursor behavior can be defined by settings *
  - Cursor movement along time or samples
  - Show or hide signal values *
  - ‘Anchoring’ the cursor to keep it in the visible range
- When instruments are synchronized, an anchored synchronization cursor indicates the time stamp which is used to align all instruments
- In synchronization mode cursors are created, and moved as done in the master instrument

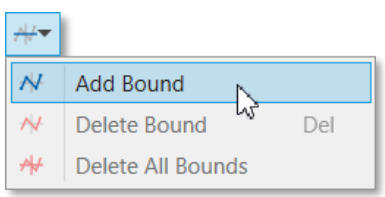


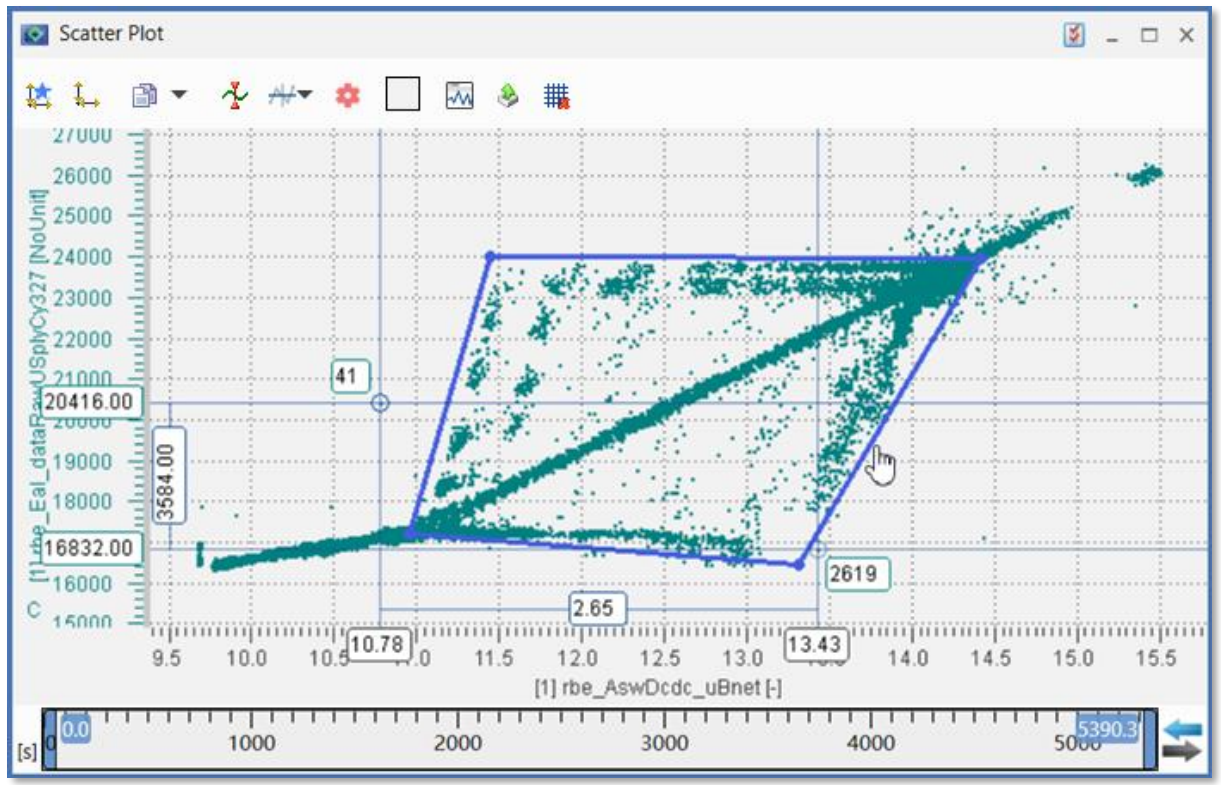
* Notes:
- These settings are persisted in ‘settings.user’ file, and applied when a new cursor is created
- Especially for indexed files, the value shown for a signal is first an indexed value, indicated by ~, as soon as the accurate value is available, the indicator disappears automatically

MDA V8 – Functionality Overview

Scatter Plot: Fast analysis of sample distribution and signal relation

– To focus on time-independent sample distribution or on signal relation the instrument ‘Scatter Plot’ is provided
– Per strip one signal is drawn across another signal on the x axis
– Cross-hair cursors are supported
– Scatter plot can be time-synchronized with other instruments via Time Slider *
– Border lines can be created graphically



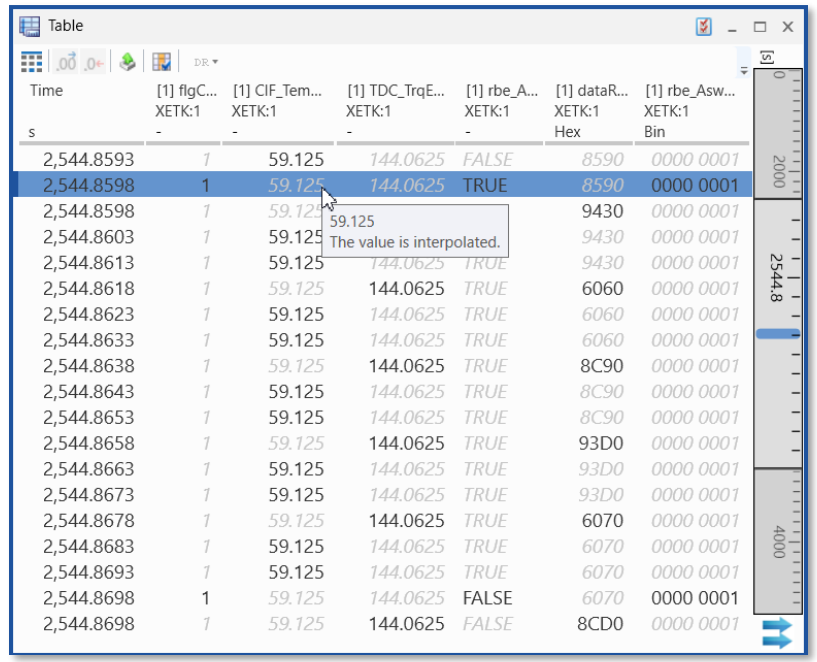


* Note:
- For a basic introduction see video #12 “Scatter Plot”
- Scatter Plot does not support synchronization of cursors and configuration of signal settings so far

MDA V8 – Functionality Overview

Table: User friendly instrument for detailed analysis

- Table instrument of MDA V8 shows accurate data for samples, and it combines functionality of MDA V7 table and measure data refiller (MDR) view
- Enumerations and Events are displayed as strings
- By a simple click onto the ‘Fill empty cells’ button ( ), data is interpolated step-wise to fill cells for which no recorded values are available *
- Columns (except time) can be re-ordered via drag&drop
- Decimals for time stamps and signal values can be set *
- Synchronization with other instruments is supported, and synchronization time is indicated by a blue line
- Data can be exported to e.g. *.tsv (tab separated values) file format for a fast reuse in Excel®

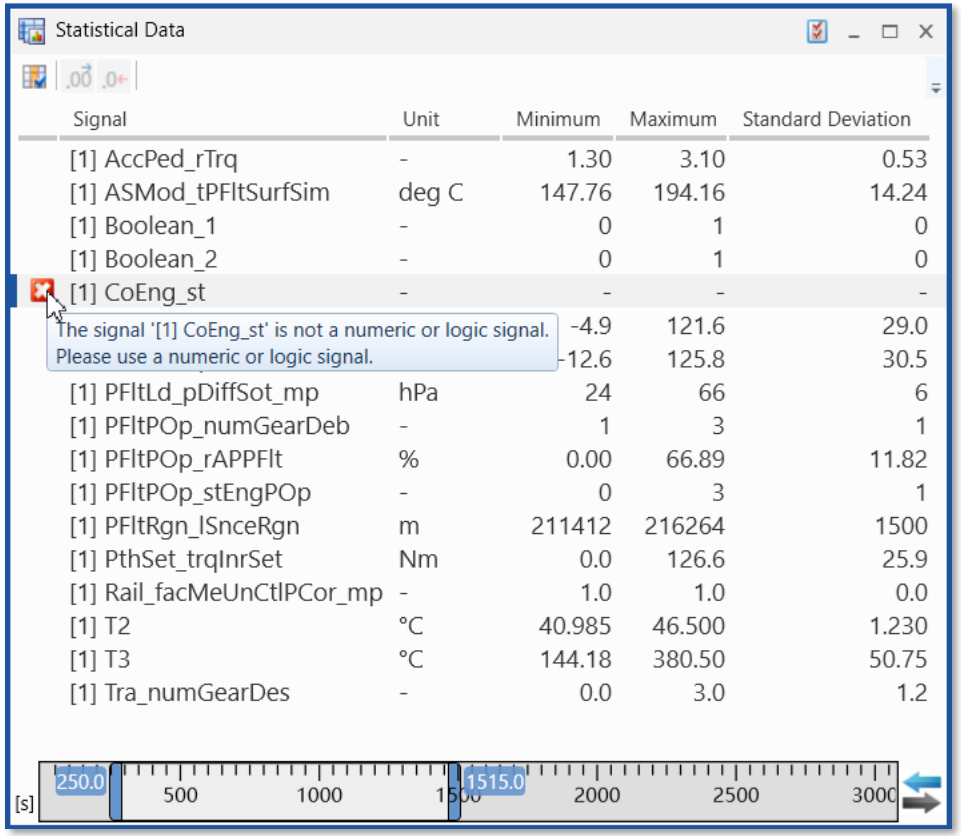


* Notes:
- These settings are persisted in ‘settings.user’ file, and applied when a new table instrument is created
- For a brief introduction see video #11 “Table Basics”

MDA V8 – Functionality Overview

Statistics: Quick access to statistical data even in synchronized mode

– For numeric signals, recorded or calculated ones, basic statistical data can be displayed
– Columns to be displayed can be selected via icon *
– Columns' order can be set using drag & drop *
– Statistical data is based on the time range defined by the Time Slider
– In synchronization mode update of data happens based on the time range set in the synchronization master instrument, e.g. an oscilloscope
– Copy (CTRL+C) includes all columns of selected rows and column header



* Note: These settings are persisted in 'settings.user' file, and applied when a new statistics instrument is created

MDA V8 – Functionality Overview

Event List: Get quickly a complete list of status changes for Boolean signals

– The Event List instrument is provided to navigate quickly between events and value changes of signals
– Any signal can be used, either a recorded one, or a calculated signal

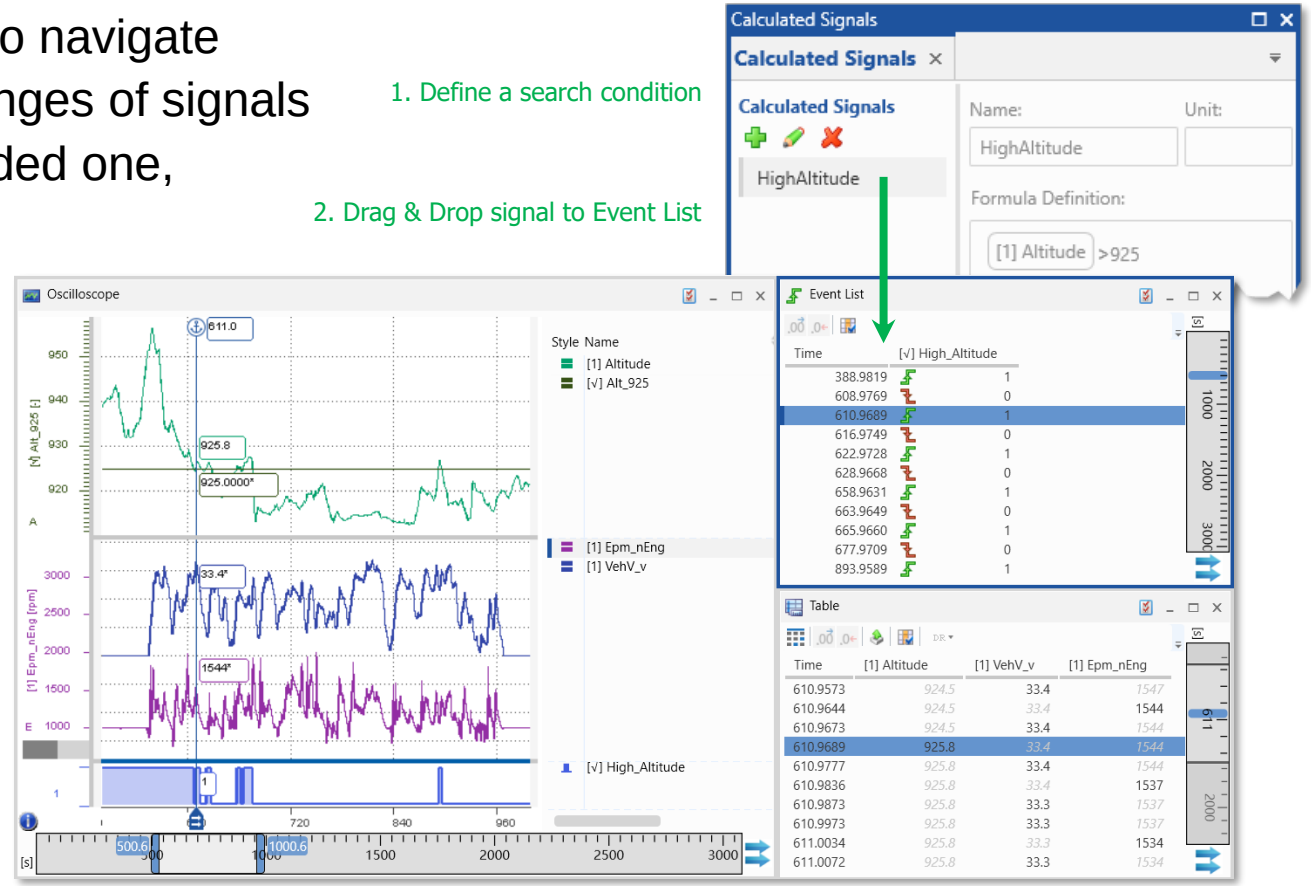
– After adding the event / signal to the event list, only time stamps having a status change are listed

– Synchronization with other instruments is supported, just double-click the next entry in the Event List view

Note: See example in video #15 "Event Navigation"

1. Define a search condition

2. Drag & Drop signal to Event List

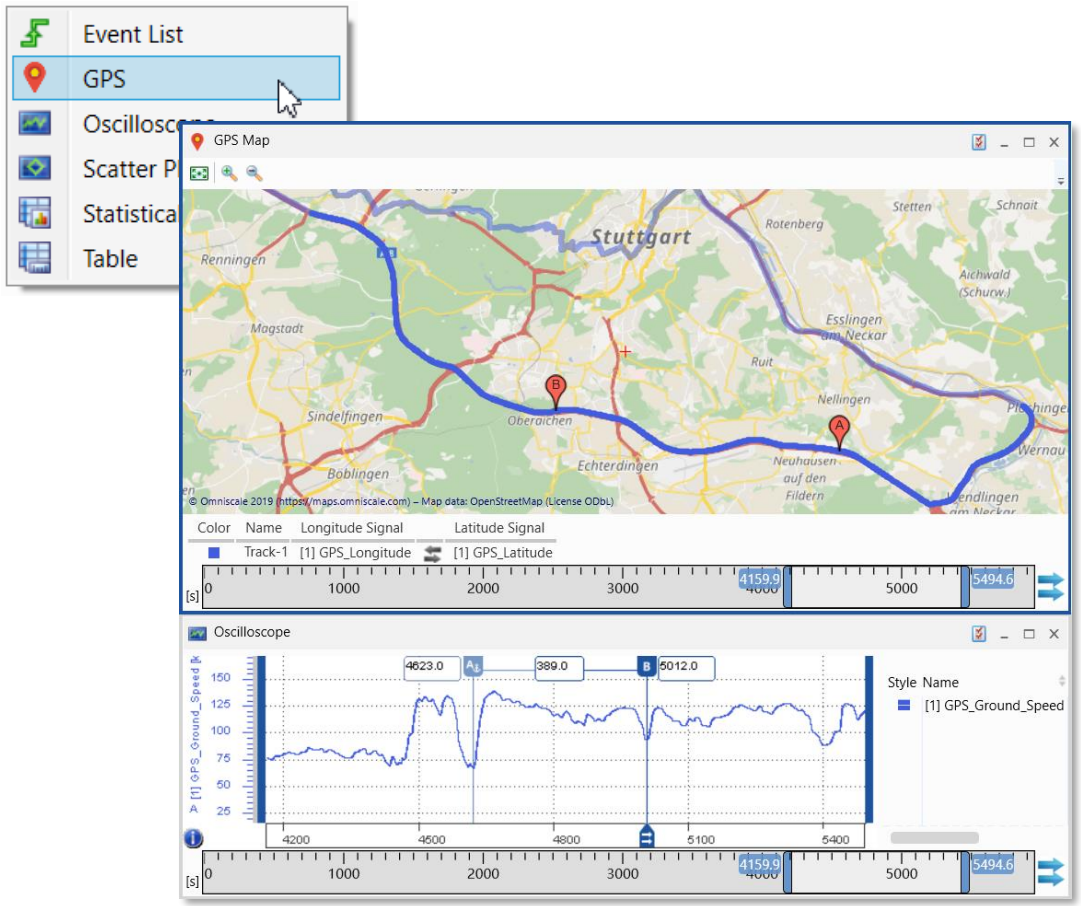


(Oscilloscope and table for visualization of synchronization only)

MDA V8 – Functionality Overview

GPS view: Visualize directly the track of your test drive

– When longitude and latitude information is available in a measure file, a track can be displayed in a map
– Automatically the GPS map instrument identifies longitude and latitude based on signal names, alternatively a manual assignment is possible
– Zooming and scrolling the map is supported
– Time range can be defined using the time slider
– In synchronized mode cursors are shown and moved corresponding to the master instrument



Note: For a basic introduction see video #17 "GPS Map"

MDA V8 – Functionality Overview

Summary of Major Features and Usage Concepts (Based on MDA V8.5.1)

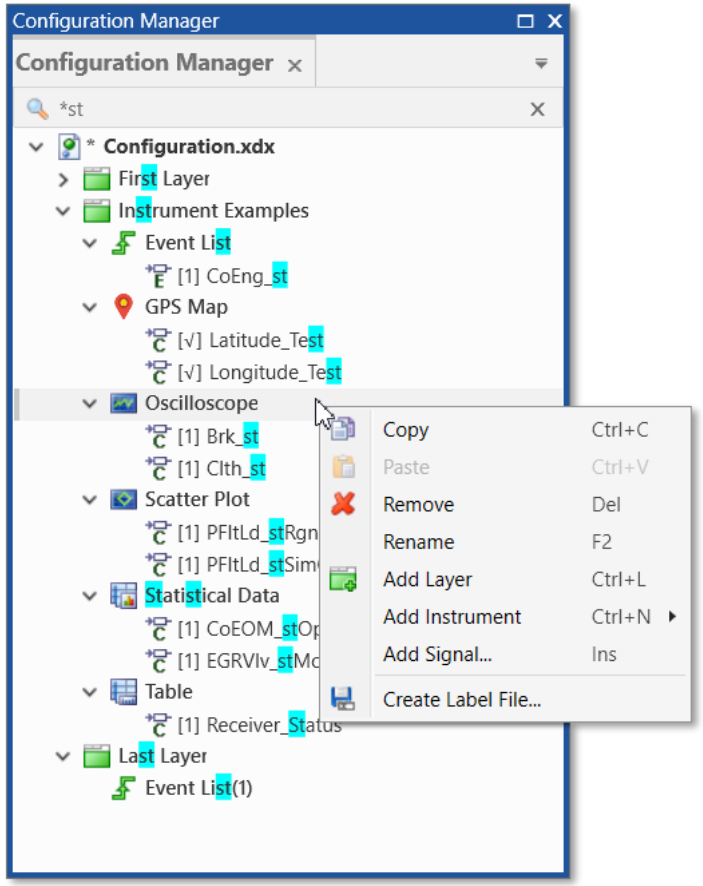
- **Basics**
  - Docking Windows, Ribbon, Keyboard Support, Meaning of ‘Configuration’, Error Handling, Customization Possibilities, User Settings
- **Measure File Handling**
  - Measure File Handling, Export of Measure Data, Time Offset, Textual File Formats
- **Signal Handling**
  - Variables & Signals, Definition of Display Name, Calculated Signals, Bit Extraction
- **Instruments**
  - Overview of Instruments, Time Navigation & Synchronization, Oscilloscope, Scatter Plot, Table, Event List, Statistical Data, GPS Map View
- **Configuration Handling**
  - Configuration Management, Import of MDA V7 Configurations (*.xda)
- **MDA V8 in Combination with other Applications**
  - INCA & MDA V7, EHANDBOOK-NAVIGATOR, Command Line Tool ‘mdfconvert.exe’

MDA V8 – Functionality Overview

Configuration Manager: Get quickly an overview of your configuration

– The Configuration Manager shows a hierarchical representation of the configuration, i.e. layers, instruments, and signals
– Search functionality (CTRL+F) for all kind of objects

– Within one configuration drag & drop of signals (move or copy), or instruments (move only) is supported
– Copy & Paste of layers, instruments, and signals even across configurations within one MDA V8 session
– Renaming and removing of layer and instruments
– Adding of layers and instruments
– Clean-up from configuration node for no-match signals
– Creation of label files (*.lab) for reuse in e.g. INCA

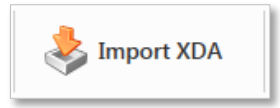


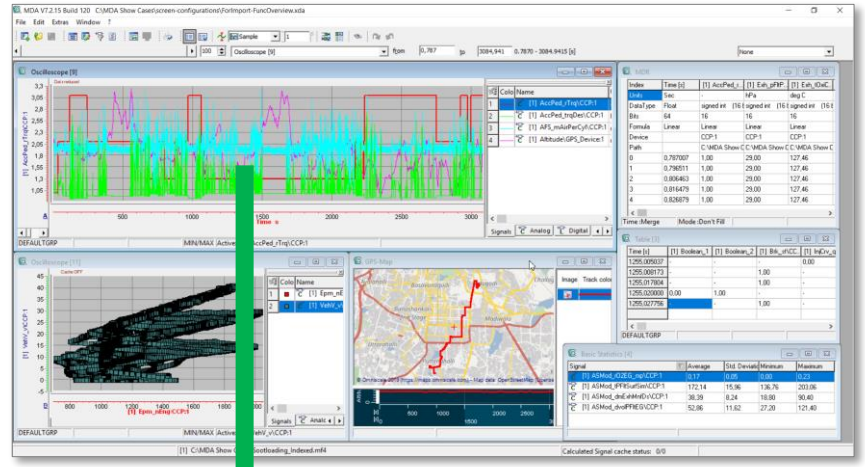
Note: Some basic aspects are presented in video #6 "Configuration Management"

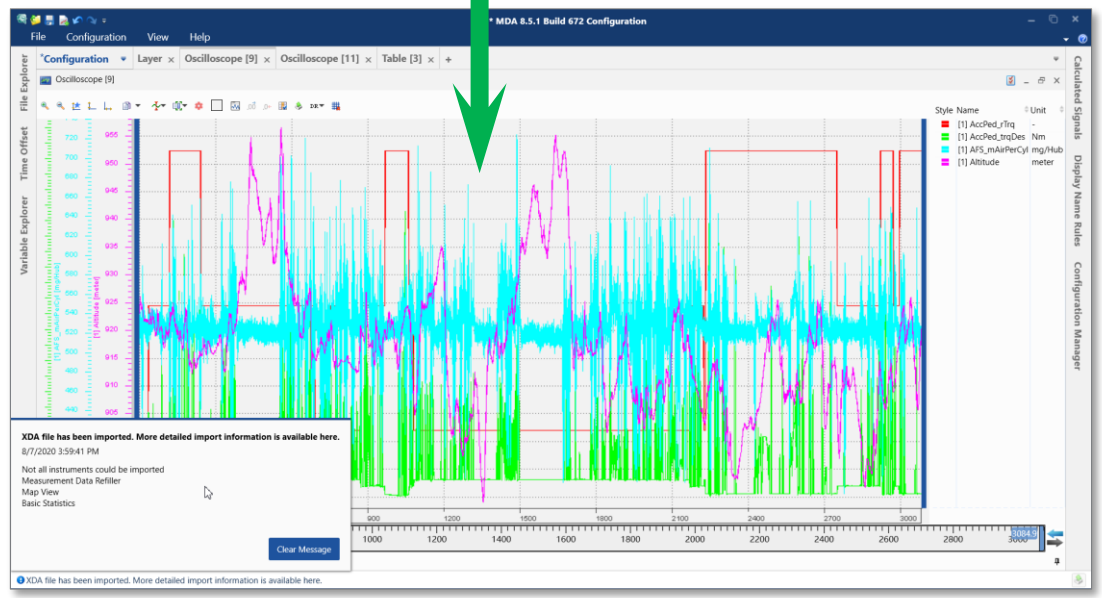
MDA V8 – Functionality Overview

Configuration: Reuse configurations created with MDA V7.x

– Configurations from INCA and MDA V7.x (*.xda files) can be imported into an MDA V8 configuration
– Oscilloscopes, scatter plots and tables are recreated with its signals, and settings
– When importing an *.xda file from MDA V7.x each instrument is maximized on its individual layer using the instrument's name as layer name
– Import of an INCA *.xda file results in one layer
– Calculated Signals are imported (from *.xda and *.xcs files) except e.g. not supported functions
– A message for not imported objects is shown in the status bar of MDA V8





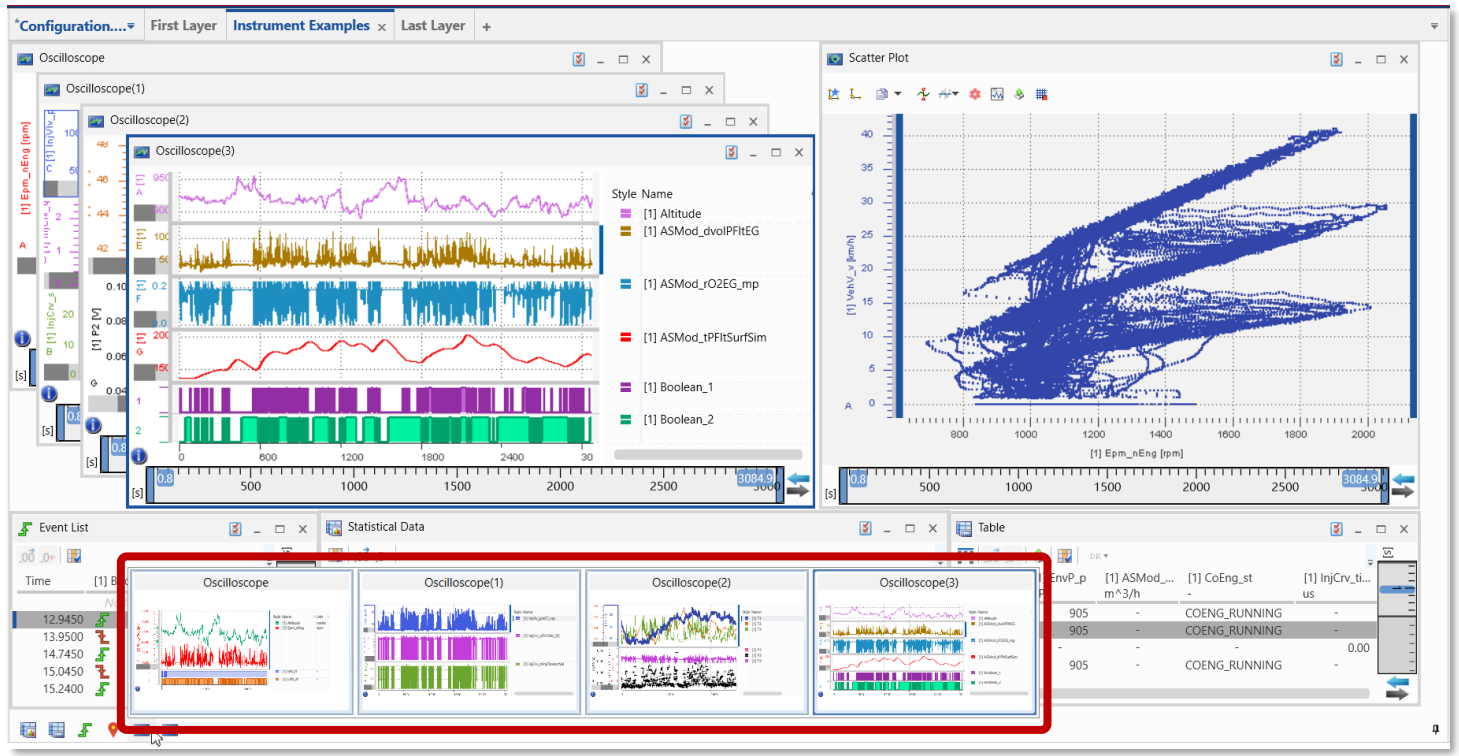


Notes:
- For a brief demo see video #6 "Configuration Management"
- MDA V8 configurations (*.xdx) can not be converted back to *.xda
- Time Offsets defined in MDA V7 can not be imported

MDA V8 – Functionality Overview

Layer Preview: Navigate quickly between different instruments

– On each layer in the task bar instrument type symbols are shown
– A preview allows to identify and to navigate quickly between diverse instruments
– The currently active instrument is highlighted by a blue frame
– Clicking onto an instrument preview brings it to the front and into the visible area
– To navigate quickly via keyboard between instruments, layers, or configurations use CTRL+TAB



MDA V8 – Functionality Overview

Summary of Major Features and Usage Concepts (Based on MDA V8.5.1)

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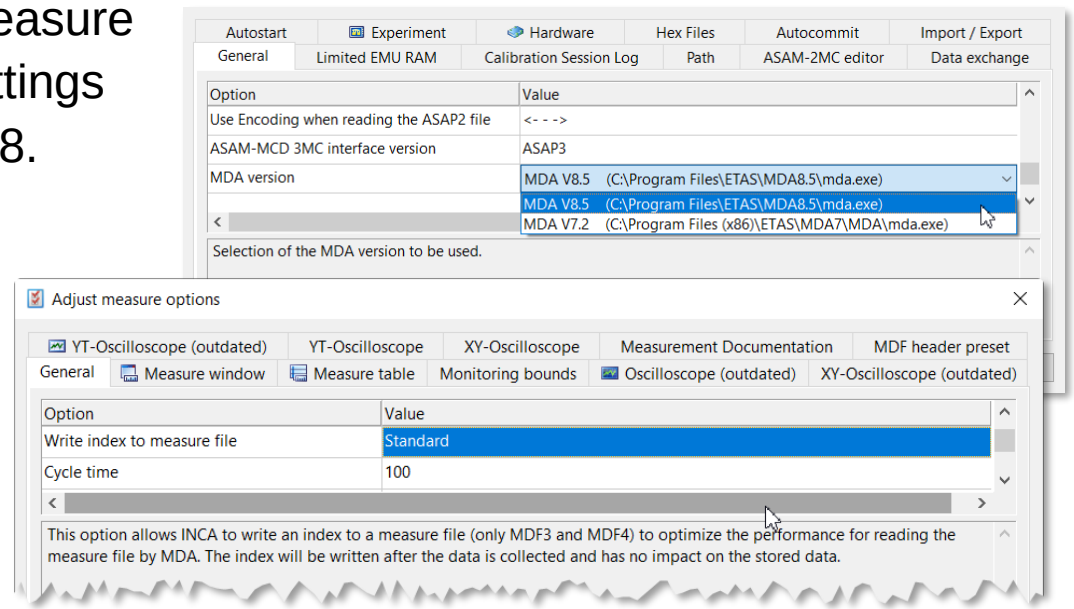
MDA V8 – Functionality Overview

Handling in combination with INCA V7.x and MDA V7.x

- Usage of MDA V8 requires a valid license, which is covered by a INCA V7.2 or MDA V7.2 license
- MDA V8.x and MDA V7.x can be installed and used in parallel without any negative effects
- INCA V7.x has a user option for the MDA version to be opened (User Options -> General)
  - MDA V8.x will be opened, and the just recorded measure file will be loaded. Depending on the INCA user settings an *.xda file is generated and imported into MDA V8. If MDA V8 is already open, the measure file of the active configuration will be replaced.
- When using MDA V8 in combination with INCA V7, for performance reasons it is recommended to use 'Standard' indexing (User Options → Experiment → Measure → General)

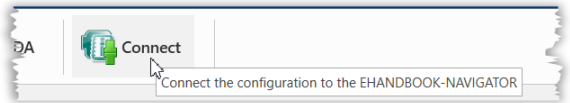


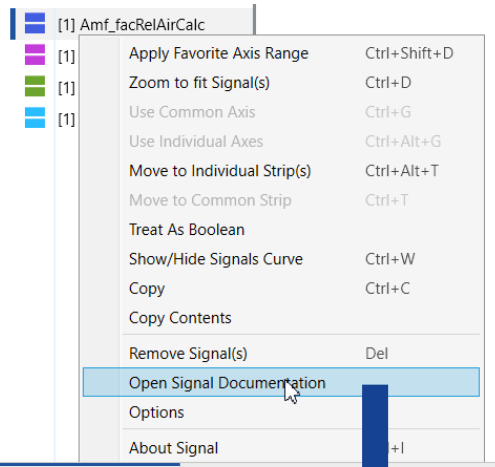
Note: Snapshot Recording requires a combination of MDA V8.4.1 and INCA V7.3.0 (or higher), and recording in MDF V4.x file format

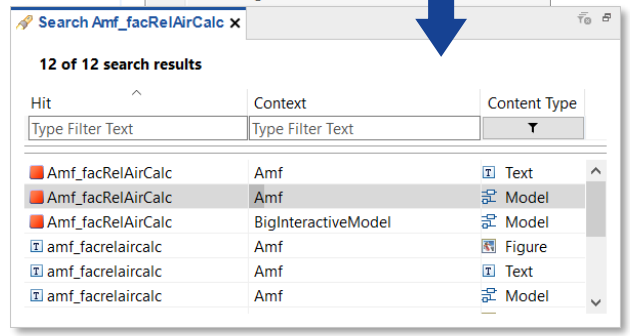
MDA V8 – Functionality Overview

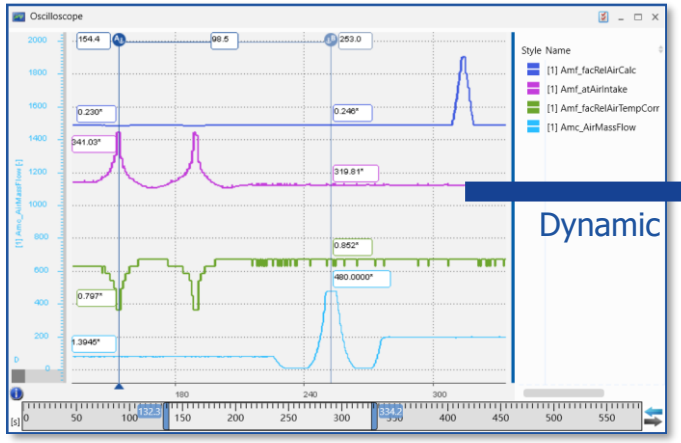
Combined usage of MDA V8 and EHANDBOOK-NAVIGATOR

- Ribbon entry to connect MDA V8 with interactive documentation tool EHANDBOOK-NAVIGATOR (V7.x required, V8.x preferred)
- In connection mode with a documentation container (*.ehb)
  - A search for a signal can be triggered from MDA
  - Measure data can be displayed in interactive models and function overviews shown in EHANDBOOK-NAVIGATOR
  - A cursor movement in MDA updates automatically values in EHB-NAV

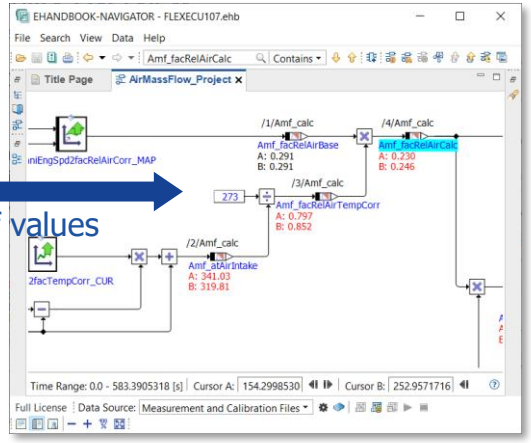








Dynamic update of values



MDA V8 – Functionality Overview

Command Line Tool for Data Conversion and Extraction

– Together with MDA V8 ‘mdfconvert.exe’ tool is installed, which can be used independently from MDA V8 for format conversion and extraction of subsets of signals and time
– ‘mdfconvert.exe’ can be integrated easily into scripting solutions

– Supported file formats are:
  – any *.mdf format version
  – textual format *.dxl (ASCII Multi Rate V4.0, i.e. channel groups are listed separately)
  – tab separated value format (*.tsv, for numeric signals only, one combined time line and completely filled value columns)

Notes:
- Numeric data and enumerations are supported completely, for mdf V3.x also data type strings
- For mf4 signals of data type EVENT an option enables to post-add the events to the newly generated file

Thank you
for using MDA V8

ETAS

DRIVING EMBEDDED EXCELLENCE