

MDA V7.2

Getting Started



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1 Introduction

The Measure Data Analyzer (MDA) program is an offline instrument for displaying and analyzing saved measurement data.

Since MDA V6.2, the MDA program can be purchased in two different product packages:

- **INCA product installation including MDA:**
The INCA product package, which includes the MDA, offers comprehensive measuring, application and analysis functionality.
- **MDA stand-alone product:**
If your task consists of analyzing readily available measurement files, the required functionality can be provided by the MDA stand-alone installation.

Both product packages require a valid license.

1.1 General Description

MDA (Measure Data Analyzer) is used to visualize and analyze measurement data provided in MDF or ETAS internal ASCII format. For these purposes MDA provides five different views:

- **Oscilloscope window (YT and XY oscilloscope):**

The measurement data are displayed

- as a graph with the amplitude of a channel in the y-direction and the time in the x-direction (YT oscilloscope). This type of window is best used for displaying numerical signals, especially periodic signals and signals with a large amplitude. It is also very useful to compare two signals over time.
- as a graph with the amplitude of a channel in the y-direction and the amplitude of another channel in x-direction (XY oscilloscope). It can be used for example to plot one varying voltage versus another.

- **Table window:**

The measurement data are displayed in a table. It is advantageous to use a table window for displaying non-numerical signals, as well as numerical signals with a very small amplitude. It is also very useful for inspecting the exact value of a numerical signal.

- **Statistics window:**

The statistics window displays the statistical properties of numerical signals, such as the average, minimum, maximum, and standard deviation, which can give insight into a signal's character and quality. It is also very useful for comparing multiple signals.

- **MDR window:**

The MDR window (Measurement Data Refiller) is intended to provide a solution to prepare data for post measurement processing. For example, it is able to reduce the number of used rasters to one raster. When different rasters are used, the measurement might contain gaps for individual

timestamps. The user can determine by means of options if and how these gaps are to be filled. This might be of importance for tools that can handle only one raster. The display looks similar to the Table window.

- **GPS map view:**

The GPS map view displays GPS tracks in a map that are constituted of the measure signals latitude, longitude and (optionally) altitude. It is very useful if you want to put geographic data providing street and terrain information in relation to other measured signals. Thus, any abnormal behavior in the engine module under test can be analyzed in a better way if the GPS data like longitude, latitude and altitude are considered during the offline analysis.

The user can customize layout and content of these views. MDA provides many useful functions such as zooming, scrolling, synchronizing different views, or searching for specific events. For special purposes, MDA provides an interface to define, calculate, visualize, and analyze signals, events, and bits.

For documentation and presentation purposes, MDA offers to print out views according to user defined templates and to export measurement data files in MDF or ETAS internal ASCII format.

To be able to display mass measure data quickly, measurement data reduction can be used to enhance the display performance. Of course it is possible to disable the data reduction.

1.2 User Information

1.2.1 What You Need to Know

This manual addresses qualified personnel working in the fields of automobile control unit development and calibration. Specialized knowledge in the areas of measurement and control unit technology is required.

Basic knowledge in operating a PC and using the WINDOWS® operating system is a prerequisite. All users should be able to execute menu commands, to activate push buttons, etc. Users should also be familiar with the WINDOWS file storage system, especially the relationship between files and directories. Users have to know how to use the basic functions of WINDOWS Explorer. Moreover, users should be familiar with the "drag-and-drop" functionality.

1.2.2 How this Manual is Organized

This MDA manual consists of the following chapters:

- **Chapter 1: "Introduction"** (this chapter)
This chapter provides a basic description of the MDA and other general information.
- **Chapter 2: "New Features in MDA V7"**
This chapter contains a summary of the new features and changes.
You should read this section even if you are an experienced MDA user.
- **Chapter 3: "Installation"**
The chapter titled "Installing the Program" is for all users who install, maintain or uninstall MDA on a PC or a network as well as system administrators who provide MDA on a file server so that the program can be

installed via the network. It contains important information on the scope of delivery, hardware and software requirements for stand-alone and network installations and the preparation required for installation. The chapter also describes the procedures used to install and uninstall MDA.

- **Chapter 4: "Getting Started"**

This chapter provides the user with a quick introduction to the program concept of MDA. You will receive an overview of the program functionality and working principles by means of practice-oriented work examples presented as flow diagrams.

- **Chapter 5: "General MDA Operation"**

This chapter provides information on the window structure, control options using the mouse and the keyboard, and the help system.

- **Chapter 6: "Glossary"**

The chapter titled "Glossary" explains all the technical terms used in the manual. The terms are listed in alphabetical order.

- **Chapter 7: "Appendix: Troubleshooting MDA Problems"**

This troubleshooting chapter gives some information of what you can do when problems arise during your work with MDA.

1.2.3 Getting More Information

In the MDA online help, you can find further detailed information on the MDA and its functions. Information on using the online help can be found in Chapter "Help Functions" on page 53.

Subjects which can easily be shown instead of being described in words are presented as video tutorials. The videos are installed locally on your PC if you selected the installation of video tutorials during installation. They are available as mp4 files and can be called up from MDA via the menu item ? → **Videoclips Tutorials**. If you did not install them on your PC, you can either view them in the ETAS channel on YouTube, or you can download them from the ETAS Download Center.

1.2.4 Using this Manual

Presentation of Information

All actions to be performed by the user are presented in a so-called "Use-Case" format. This means that the objective to be reached is first briefly defined in the title, and the steps required to reach the objective are then provided in a list. This presentation appears as follows:

Definition of Objective:

Any preliminary information...

- **Step 1**
Any explanation for Step 1...
- **Step 2**
Any explanation for Step 2...
- **Step 3**
Any explanation for Step 3...

Any concluding remarks...

Specific example:

To create a new file:

When creating a new file, no other file may be open.

- Choose **File** → **New**.
The "Create file" dialog box is displayed.
- Type the name of the new file in the "File name" field.
- Click **OK**.

The new file will be created and saved under the name you specified. You can now work with the file.

Typographic Conventions

The following typographic conventions are applied:

Choose File → Open .	Menu options are printed in bold, blue characters.
Click OK .	Button labels are printed in bold characters.
Press <ENTER>.	Key commands are printed in small capitals enclosed in angle brackets.
The "Open file" dialog box appears.	The names of program windows, dialog boxes, fields, etc. are enclosed in double quotes.
Select the <code>setup.exe</code> file.	Text strings in list boxes, in program code and in path and file names are printed using the <code>Courier</code> font.
A conversion between Logic and Arithmetic data types is <i>not</i> possible.	Emphasized text portions and newly introduced terms are printed in <i>italic</i> font face.

Important notes for the users are presented as follows:

Note

Important note for users.

2 New Features in MDA V7

This section contains a summary of the new features that have been introduced in MDA V7. You should read this section even if you are already an experienced MDA user. The latest changes are listed on top.

2.1 New Features in MDA V7.2

This section contains a summary of the new features that have been introduced with MDA V7.2.

2.1.1 Overview

The following functional extensions and improvements are contained in MDA V7.2:

- New features
 - MSI-Installer for MDA
 - Improve Variable Selection by Support of Wildcards
 - Search for already selected Variables in the Configuration
 - Support for Channel with Multiple Conversion Formula's
 - Create a List of Variables used in the Configuration (*.lab file)
 - Support of Windows®10
 - Measure File Extractor

2.1.2 MSI-Installer for MDA

MDAV7.2 uses a new installation technology, the MSI-Installer. MSI is an installer package file format used by Windows. MSI files are used for installation, storage, and removal of programs. The files are contained in a package, which is used with the program's client-side installer service, an .EXE file, to open and install the program. Of course, you can assume present user settings of a previous MDA version. When you start MDAV7.2 for the first time, an import dialog window opens. If you would like to import the previous user settings later, you need to adapt the file mda.ini (located in ...\\ETASData\\MDA7.2) and set the option "Copy User Settings From Former Versions Of MDA" back to 1.

2.1.3 Improve Variable Selection by Support of Wildcards

To enable an efficient variable selection, the variables column in the variable selections dialog is enhanced by a search field. The following wild-cards are supported, and can be used in combination and multiple times:

- * is a placeholder for 0 to any number of characters including letters or figures.
- ? is a placeholder for exactly one letter or figure.

2.1.4 Search for already selected Variables in the Configuration

If you work with big configurations, you can now search for variables that are already selected in a configuration, and you can see the assignments to instruments or windows. The new "Search Variables" window can be opened from the menu options Edit → Find → Find Variable. Alternatively, use the shortcut Ctrl+F.

2.1.5 Support for Channel with Multiple Conversion Formula's

The combination of different conversion rules for transferring raw measure data into physical values is called "nested conversions". Typically this is used to combine a range of raw data having a conversion into numeric values, and a range for conversion into textual values often status information. MDA V7.2.0 supports variables with such combined computation methods and allows to display the respective signals. With MDA V7.2.1 generation of measurement files supports signals having nested conversions. Further enhancements for using variables with nested conversion as input signal for calculated signals are planned.

2.1.6 Create a List of Variables used in the Configuration (*.lab file)

A list of the variables used in the configuration can be created as label file. The file includes the signal name and the raster information. LAB files can be created for all variables selected in the configuration or just for those which are assigned to a specific instrument. LAB files can be loaded in INCA variable selection to filter the variable to be selected, as well as filter for the desired signals during a measure file extraction (see 2.1.8).

2.1.7 Support of Windows®10

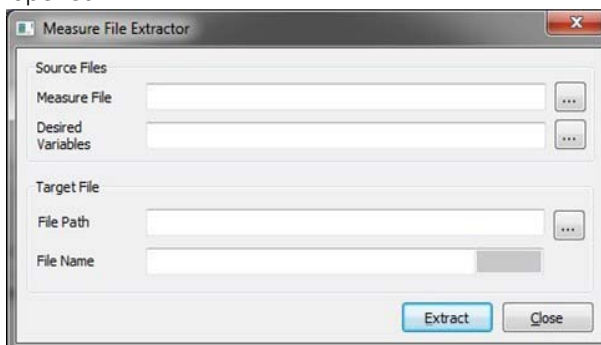
MDA V7.2.1 supports the following variants of the Windows®10 operating system:

- Windows 10 — 32 bit
- Windows 10 — 64 bit in 32 bit compliance mode

2.1.8 Measure File Extractor

If a measure file (only MF3/MF4 files) is added having a number of signals, which exceeds a preset limit, MDA offers the possibility to extract from this file only the desired signals (limit can be set in mda.ini file). Although the extraction process will extend the time of adding and opening the file, this is usually helpful as the extraction procedure has to be done only once, and the performance during analysis will be better with the extracted file.

In case the signal number exceeds the preset limit, the extraction dialog will be opened.



When the extraction dialog is canceled the original measure file will be loaded as usual. Otherwise following settings will be used for the extraction process:

- Measure file: Defines the original file from which data will be extracted.

- **Desired Variables:** Choose a LAB (*.lab) file as a filter list for the required signals to be extracted. LAB files can be created in INCA or MDA with the "Saved Used Variables (LAB format)" function.
- **File path:** Defines the location for the resulting extracted file.
- **File Name:** Name of the result target file. The file format is automatically the same as for the source file and can't be edited.

For extraction, a separate tool is opened in the command-line interface. With MDA V7.2.1 only extraction of scalar signals incl. enumerations is supported. This excludes strings and event signals. At the end of the extraction, a window with a log file is displayed.

2.2 New Features in MDA V7.1

This section contains a summary of the new features that have been introduced with MDA V7.1.

2.2.1 Overview

The following functional extensions and improvements are contained in MDA V7.1:

- **New features**
 - Copy Oscilloscope & Replace Signals (2.2.2)
 - Visualization of GPS Data on a Street Map Within MDA (2.2.3)
 - Information on Devices used for the Measurement (2.2.4)
 - Support of MDF 4.1 — Standard Indexing and Data Compression (2.2.6)
- **Performance improvements**
 - Support of ETAS File Indexing (2.2.5)
 - Performance Improvements for Calculated Signals (2.2.7)
- **Enhanced Usability**
 - Filter Options for Variable Selection (2.2.8)
 - Default Step Size of Analysis Cursor (2.2.9)
 - Customizable Toolbars (2.2.10)
 - Resetting the Display of Warning Messages (2.2.11)
 - Automatically Showing Signal-Related Events (2.2.12)
 - Enhanced Menu Bar and Toolbar for Configure Window (2.2.13)
 - Marking Signals With Invalid Samples (2.2.14)
 - Display of Long Signal Names (2.2.15)
 - Display of Signal Names in Formulas for Calculated Signals (2.2.16)
 - Display of Digital Signal Names in Oscilloscope (2.2.17)
 - Show Axis Index in Signal List (2.2.18)
 - Restoring the Manually Sorted Signal List (2.2.19)
 - Simpler MDF File Selection (2.2.20)
 - Enhanced Generate Measure File Dialog (2.2.21)
- **Others**

- Support of Windows 8 and Windows 8.1 (2.2.22)
- Video Tutorials Explaining the Open and Configure Dialog (2.2.23)
- Direct Access to Manuals and Tutorial (2.2.24)

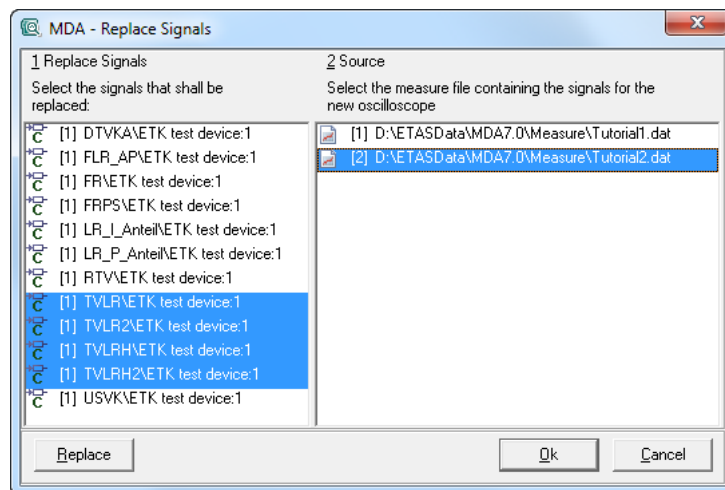
2.2.2 Copy Oscilloscope & Replace Signals

You can copy a complete oscilloscope window and replace the included signals with signals from another measure file which is part of the configuration. This can be useful for example in comparison tasks.

Note

It is only possible to copy oscilloscope windows in YT mode; other oscilloscope modes (i.e. XY oscilloscope mode and DTA mode), other window types (e.g. MDR window, statistics window or table windows) or other items (e.g. variables or axes) can not be copied with this function.

To copy an oscilloscope, select an oscilloscope in the tree view of the window **Configure Windows** and select **Copy View & Replace Signals** from the context menu. A dialog opens, where you can replace the signals used in the original oscilloscope by the corresponding signals from a different measure file.

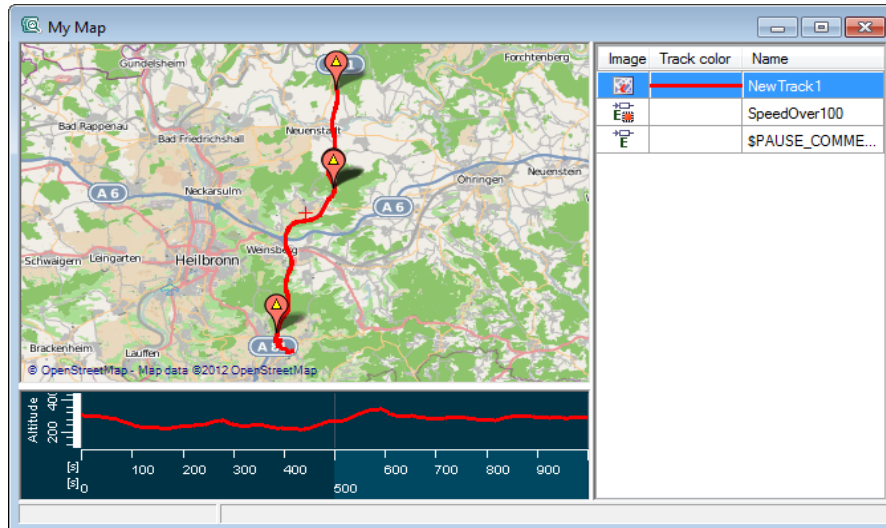


2.2.3 Visualization of GPS Data on a Street Map Within MDA

The GPS map view displays GPS tracks on a street map within MDA. This is advantageous if you want to put geographic data providing street and terrain information in relation to other measured signals. Thus, any abnormal behavior in the engine module under test can be analyzed in a better way if the GPS data can be considered during the offline analysis.

The measured signals representing latitude, longitude and altitude can be automatically mapped to the GPS signals constituting the GPS track. Automatic mapping can be disabled in the global settings under **GPS Automatic Mapping**.

The GPS map view can include several configurable tracks at once. Moreover, it can be synchronized with YT oscilloscopes. If cursors are enabled, the cursors are shown as markers on the maps.



By default, MDA uses a license-free open-source street map. Customer-specific maps may be used as well.

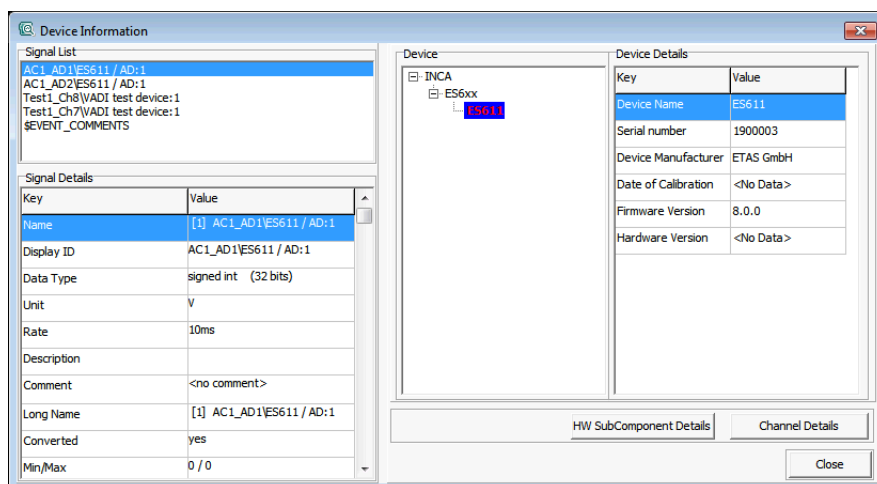
Note

If you are using a different map than the license-free open source map, please check the licensing conditions of your map provider.

2.2.4 Information on Devices used for the Measurement

Upon recording measurements, information on the hardware and software setup that was used for a measurement and calibration experiment are saved in the MDF file along with the measured data.

To view this information in MDA, select **Show device information** from the context menu of a signal, and information on the selected signal and all other signals from the same measurement as well as on the device used for the measurement (e.g. device type, serial number, date of calibration) is displayed.

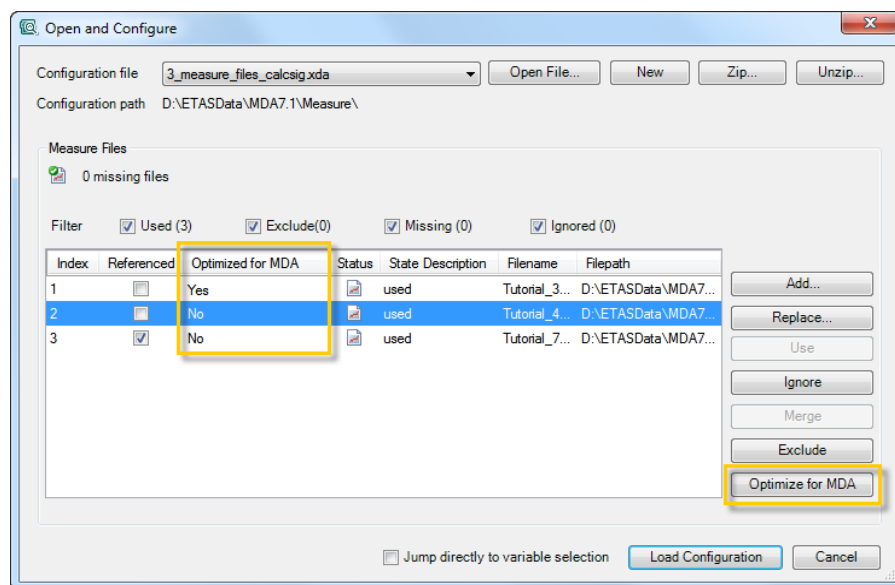


The device information is only available if the measure file was saved in MDF V4 format (*.mf4).

2.2.5 Support of ETAS File Indexing

While reading huge measure files, MDA reduces samples for a given time range and displays the reduced data. By indexing the measure file, it is possible to save this data reduction with the measure file, thus enhancing the performance upon reading the measure file.

If you want to use measure files in MDA that are not yet indexed, you can optimize them by clicking the selecting the measure file in the **Open and Configure** dialog and clicking the **Optimize for MDA** button.



ETAS measure file indexing is supported for measure files in the formats MDF V3 and V4.

For further details, watch the MDA video tutorial (see „Video Tutorials Explaining the Open and Configure Dialog“ on page 21).

2.2.6 Support of MDF 4.1 — Standard Indexing and Data Compression

MDA V7.1 can read and write measure files in the format MDF 4.1. This file format includes the support of standard indexing and data compression:

- Indexing adds information to the measure file which optimizes the performance when reading the file.
If MFD compliant indexing is required, because the measure files will also be used with 3rd party tools, you can use standard indexing. To use stan-

Standard indexing, open the file mda.ini and set the option Use Standard Indexing for Generation of Files to the value 1:
 Use Standard Indexing for Generation of Files=1

Note

*ETAS indexing can be applied to measure files in the formats mdf 3.0 or higher.
 Standard indexing can be applied to measure files in the formats mdf 3.3 or higher.*

- Data compression reduces the amount of data which is written to the file without loss of information.

Note

*Data compression may lead to reduced performance when writing measure data or reading measure data from file.
 Data compression is applicable only for measure files with the format MDF V4.1.
 Measure files with data compression may not be supported by all 3rd party tools.*

2.2.7 Performance Improvements for Calculated Signals

During operation, it might be necessary to compute calculated signals time and again, e.g. when scrolling through an oscilloscope. This leads to unnecessary performance losses. To avoid these performance losses during analysis, calculated signals can be computed in advance and saved in cache files.

Caching calculated signals to gain performance improvements in zooming and scrolling can be enabled or disabled in the global settings under **Use Cache for Calculated Signals**.

2.2.8 Filter Options for Variable Selection

In the **Measured Variables** window, new filter options allow you to select the relevant variables more easily. By using the filter icons, you can display only variables of a specific data type. Additionally, you can filter the variable selection so that only used or unused variables are shown.

2.2.9 Default Step Size of Analysis Cursor

The step size defines the time steps taken when you move the analysis cursor in an oscilloscope by means of the cursor keys (\leftarrow , \rightarrow). You can now set the default step sizes through the following global settings:

- **Cursor Mode**

With this option, you can set the cursor mode which will be used by default for new oscilloscope windows. The following cursor modes are available:



Sample The cursor is moved from timestamp to timestamp.



Time The cursor is moved in discrete steps along the time axis, e.g. in steps of 0.1 s.
The time interval of the steps can be adjusted on the **Window** tab in the Legend window of the oscilloscope.

- **Jump by Samples (Cursor Mode)**

With this option, you can set the default step size for cursor movement if the cursor mode is set to **Sample** mode.

This setting defines that the cursor positions are shifted by the number of samples given in this field. The jump always ends on an actual sample (not between two samples).

- **Jump by Time Interval (Cursor Mode)**

With this option, you can set the default step size in seconds for cursor movement if the cursor mode is set to **Time** mode.

This setting defines that the cursor positions can be shifted only in discrete steps by multiples of this specification. The cursors can be moved to any desired time point and are not limited to the timestamps of actual samples.

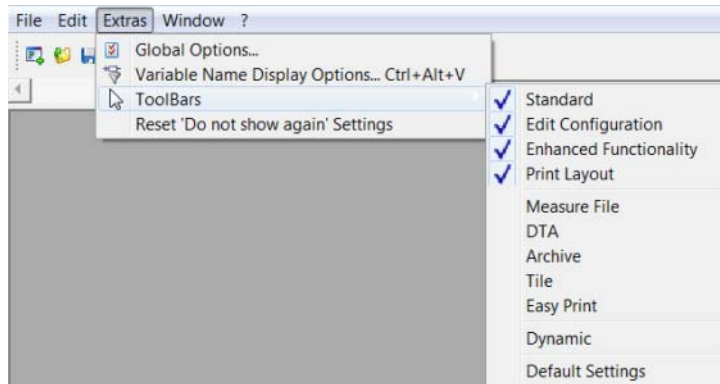
2.2.10 Customizable Toolbars

You can adapt the toolbars in the MDA main window and the Print Layout Editor to your own preferences.

To customize the toolbars shown in the MDA main window, select **Extras → Toolbars**:

- You can select which toolbars shall be displayed by ticking the corresponding entry in the sub-menu.
- The sub-menu option **Default Settings** resets the toolbar display to the original settings, displaying most of the toolbars for the most common tasks: Standard, Edit Configuration, Enhanced Functionality, and Print Layout.

- The sub-menu option **Dynamic** disables or enables the toolbar containing those icons that are specific to the type of analysis window.



The Print Layout Editor always displays all available toolbars.

If you want to change the position of a toolbar, you can drag it by catching it with the mouse at its control, and drop it at the desired location within the toolbar area.

Moreover, you can set the desired icon size in the global settings under **Toolbar Icon Size**.

All these changes are saved in MDA and will still be shown after restarting it.

2.2.11 Resetting the Display of Warning Messages

If you have ticked the checkbox **Do not show again** for a warning message, this warning message is no longer displayed. Now, you can enable all warnings again.

To reset the settings, select **Extras → Reset 'Do not show again' Settings**.

2.2.12 Automatically Showing Signal-Related Events

In MDA, you can show events such as pauses, snapshot events, calibration logs and comments, along with the measured signals. These events can be selected either manually or automatically.

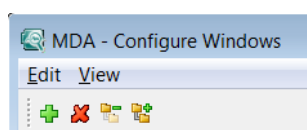
If you want to assign related events automatically along with the measured signal, you have to set the global setting **Automatic selection of related events** to **Yes**. In oscilloscopes, all event signals will be added to the **Events** tab of the signal list, while the **Signals** tab will only show analog and digital signals, without any related events.

2.2.13 Enhanced Menu Bar and Toolbar for Configure Window


In the **Configure Windows** window, new icons are available for the following functionalities:

- Add and remove elements
- Collapse and expand all elements in the tree view

The tree view options can also be selected via the new **View** menu.

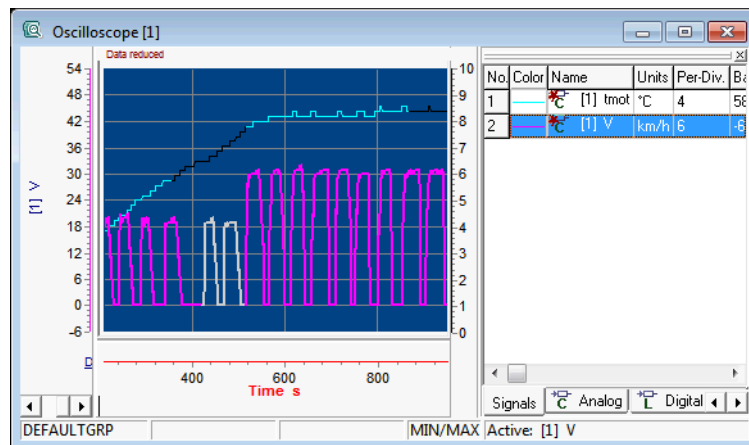


2.2.14 Marking Signals With Invalid Samples

MDA signalizes if a signal contains invalid samples. Generally, this is indicated by showing the signal icon in red: .

The icon can only be shown in red if the invalid range has already been read by MDA or if the measure file is indexed.

In oscilloscopes, the invalid range of the signal is displayed in a different color than the valid parts of the signal.



In tables, the invalid samples in the table as well as the corresponding signal header are displayed in red color.

For calculated signals referring to signals with invalid samples, only the table header is displayed in red color.

Note

Marking signals with invalid samples is only supported for the MDF V4 format.

2.2.15 Display of Long Signal Names

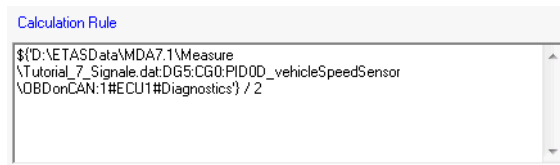
Signals may have long names, which are often not completely visible. MDA now shows the complete path and file name on mouse over of the signal. Additionally, the complete path is shown in the status bar of an instrument.

No.	Col	Name	Units	Per-Div.	Bas
1	C	[1] PIDOC_engineRPMVOB...	1/min	250	-25
2	C	[1] PIDOC_engineRPMVOB...			
3	C	[1] PIDOC_engineRPMVOB...			
4	C	calc_sig		1.5	-1.5

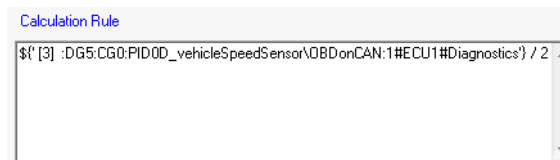
2.2.16 Display of Signal Names in Formulas for Calculated Signals

Formulas for calculated signals now use only an index for file name and path of a signal to make the formula more concise. The full name and path is shown in a tooltip.

Formula in MDA V7.0:



Formula in MDA V7.1 (new):



Note

The index instead of the file name and path is only used if the global setting **Source Identification** is enabled.

2.2.17 Display of Digital Signal Names in Oscilloscope

Digital signal names are only displayed if they can be aligned with the signals in the oscilloscope. To make the digital signal names visible, you can enlarge the digital signal area by dragging the line between time axis and digital signal area.

2.2.18 Show Axis Index in Signal List

You can now show in the signal list to which axes the signals belong. To display the axis assignment, select **Show Axis** from the context menu in the signal list, and a column with the axis name is added.

No.	Color	Axis	Name	Cursor 1	Cursor 2	Diff.	Units	Per-Div.	K
1	B	C	[2] FKD	-	1	-		0.15	-0
2	C	C	[2] HDK	6.66667°	51.7647°	45.098	%	10	1
3	E	C	[2] MMM	14°	310.434°	296.434	Nm	30	60
4	A	C	[2] NAB 32	384°	1472°	1088	U/min	500	40
5	A	C	[2] NMD 32	832°	3529.05°	2697.05	U/min	500	4
6	A	C	[2] NTU 32	864°	3328°	2464	U/min	500	4

2.2.19 Restoring the Manually Sorted Signal List

If you have manually sorted the signals in the signal list and subsequently clicked on one of the column headers, the manually sorted order is no longer visible. Now, you can restore the manually created order by clicking the **Undo automatic sorting** icon.

2.2.20 Simpler MDF File Selection

When adding a configuration in the **Open and Configure** dialog box, the search for a file in MDF format is now simplified. You do not need to know whether the MDF file you want to add is in *.dat, *.mf4 or *.mdf file format. By default, any MDF file is displayed. After you have selected a format "MDF V3.x (*.dat)" or "MDF V4.x (*.mf4)" and opened a file, this file format is stored as default for the next session.

2.2.21 Enhanced Generate Measure File Dialog

When converting from *.mdf to *.mrf file format, the device name had been included in the signal name by default. In the **Generate Measure File** dialog, you can now select the **Suppress device name** checkbox. By that, the signal name is generated without the device name in the measure file. The default for this checkbox can be predefined in the mda.ini file via "Suppress Device Name For Generation Of MRF Files".

2.2.22 Support of Windows 8 and Windows 8.1

MDA V7.1 supports the following variants of the Windows® 8 operating system:

- Windows 8 and Windows 8.1 — 32 bit
- Windows 8 and Windows 8.1 — 64 bit in 32 bit compliance mode

2.2.23 Video Tutorials Explaining the Open and Configure Dialog

MDA now includes videos explaining how to use the Open and Configure Dialog:

- Composing and Managing Measure Files in the Open and Configure Dialog
- Removing Files from a Configuration in the Open and Configure Dialog
- Optimizing Measure Files in the Open and Configure Dialog

The videos can either be accessed through the online help or via the entry **Videoclips Tutorials** in the **?** menu.

2.2.24 Direct Access to Manuals and Tutorial

You can now directly access the manuals and tutorial in PDF format via the entry **Manuals and Tutorial** in the **?** menu.

2.3 New Features in MDA V7.0

This section contains a summary of the new features that have been introduced with MDA V7.0.

2.3.1 Overview

The following functional extensions and improvements are contained in MDA V7.0:

- Support of Windows 7 (2.3.2)
- Enhanced Usability Through New Icons (2.3.3)
- Support of the MDF V4.0 Standard (2.3.4)
- Enhanced Dialog Box for Writing Measure Files (2.3.5)
- New Option for Identification of the Signals' Source Files (2.3.6)
- Making Copies of Complete Oscilloscope Windows (2.3.7)

2.3.2 Support of Windows 7

MDA V7.0 supports the following variants of the Windows®7 operating system:

- Windows 7 — 32 bit
- Windows 7 — 64 bit in 32 bit compliance mode

2.3.3 Enhanced Usability Through New Icons

The usability of MDA V7 has been further enhanced through the introduction of new desktop and tool icons. The new icons

- are Windows compliant,
- provide an improved high recognition value, due to consistency between use case and symbol,
- and they provide a common look&feel with other ETAS solutions for prototyping and test automation (INCA, LABCAR).

MDA can now be started via the following desktop icon:



The following comparisons illustrate the enhancements in the MDA toolbar icons:

Toolbar icons in the MDA Main Window:

MDA V6:



MDA V7:



Toolbar icons in the MDA Print Layout Editor:

MDA V6:



MDA V7:



2.3.4 Support of the MDF V4.0 Standard

MDA V7 and INCA V7 support the new ASAM MDF V4.0 standard.

MDF V4.0 has been defined to resolve limitations of the currently used MDF V3.x industry standard.

The main benefits of the new MDF V4 standard are the following:

- Extension of the maximum file size (by now limited to 4 GByte)
- Support of meta-data information (e.g. the user having created the file, timestamp of the recording, etc.)
- Higher accuracy of the global start time (nano seconds) with additional information on time zone offsets and summer time offsets (UTC)
- Introduction of angle, distance or index for synchronization in addition to time
- Extension of comment length, record length, array size, and number of signals per group.

MDA V7 reads and writes measure files in the formats MDF V3.0, MDF V3.3, MDF V4.0, and ETAS internal ASCII format.

Note

Conversion of measure formats is not supported in MDA V7. Therefore, if your configuration contains signals from source files in different formats (MDF V3, MDF V4, ETAS ASCII), the generation of new measure files is not possible.

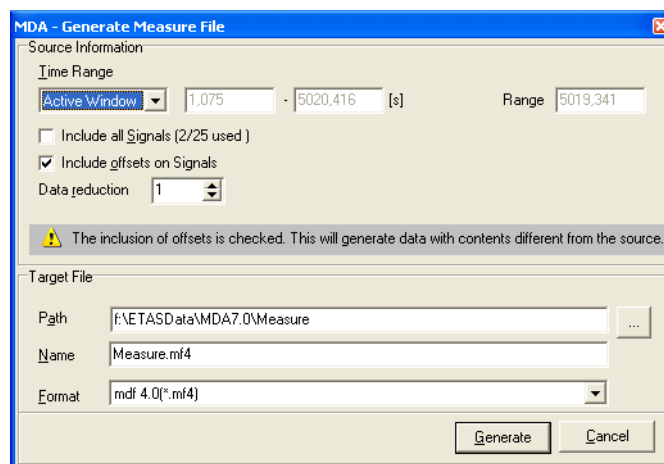
2.3.5 Enhanced Dialog Box for Writing Measure Files

With MDA, you can generate new measure files from the measure data in the current configuration, e.g. in order to save a subset, save data from separate measure files in a common file, or to include derived data such as calculated signals.

This functionality is provided by the **MDA — Generate Measure File** dialog box. In MDA V7.0, this dialog box has been replaced by a new one, which is designed in more user-friendly way.

Moreover, the following functionality has been added:

- With the checkbox **Include all signals**, you can determine whether only the signals from the active analysis window or all signals from all measure files of the configuration will be included in the target measure file.
Calculated signals will only be included if they are added to an analysis window.
The resulting number of signals that will be included in the target measure file is displayed next to the check-box.
- With the checkbox **Include offset on channels**, you can define that signals with an X-offset will not be saved with their original measure values, but with their derived measure values including the defined X-offset.



2.3.6 New Option for Identification of the Signals' Source Files

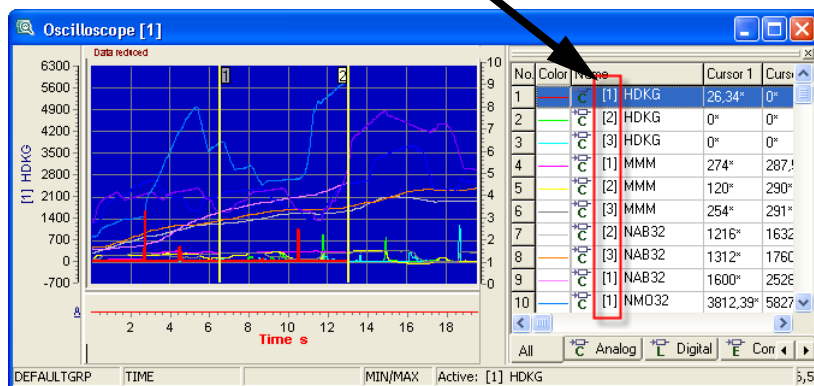
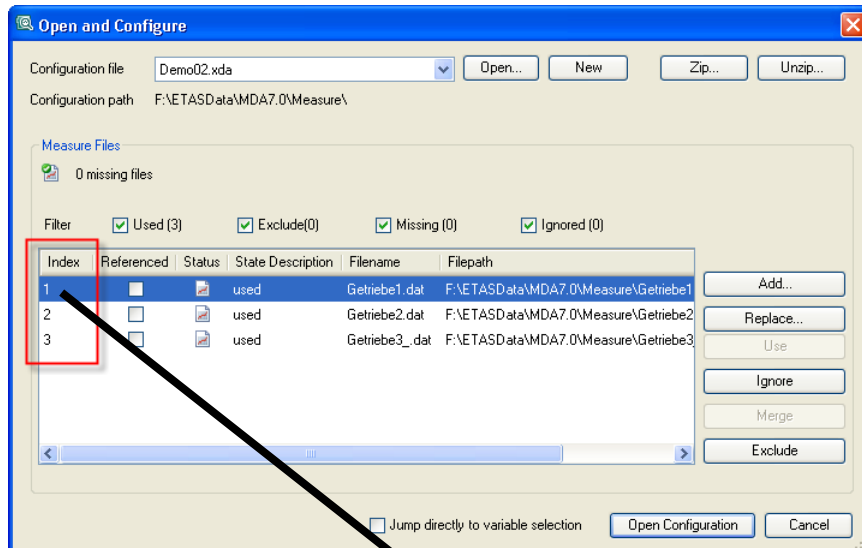
An MDA configuration often contains signals coming from several different measure files. In order to allow you to distinguish the signals' source files at a glance, you can enable the global option **Source Identification**.

The following option settings are available:

- **None**
No prefix for measure file identification will be displayed.

- **Index**

In all MDA windows, MDA displays an index number in front of the signal names. This index number indicates the measure file containing the corresponding signal; it is the index number displayed in the **Open and Configure** dialog box.



Note

If a measure file contains two more signals with the same name, these signals are also indexed.

To distinguish between the index identifying the measure file, and the occurrence of a signal, the source identification index is set before the signal name, while the occurrence is located after the file.


Example: in the string [3] TMot (2), the signal TMot comes from the measure file with the index number 3; it is the second occurrence of a signal with this name within this measure file.

2.3.7 Making Copies of Complete Oscilloscope Windows

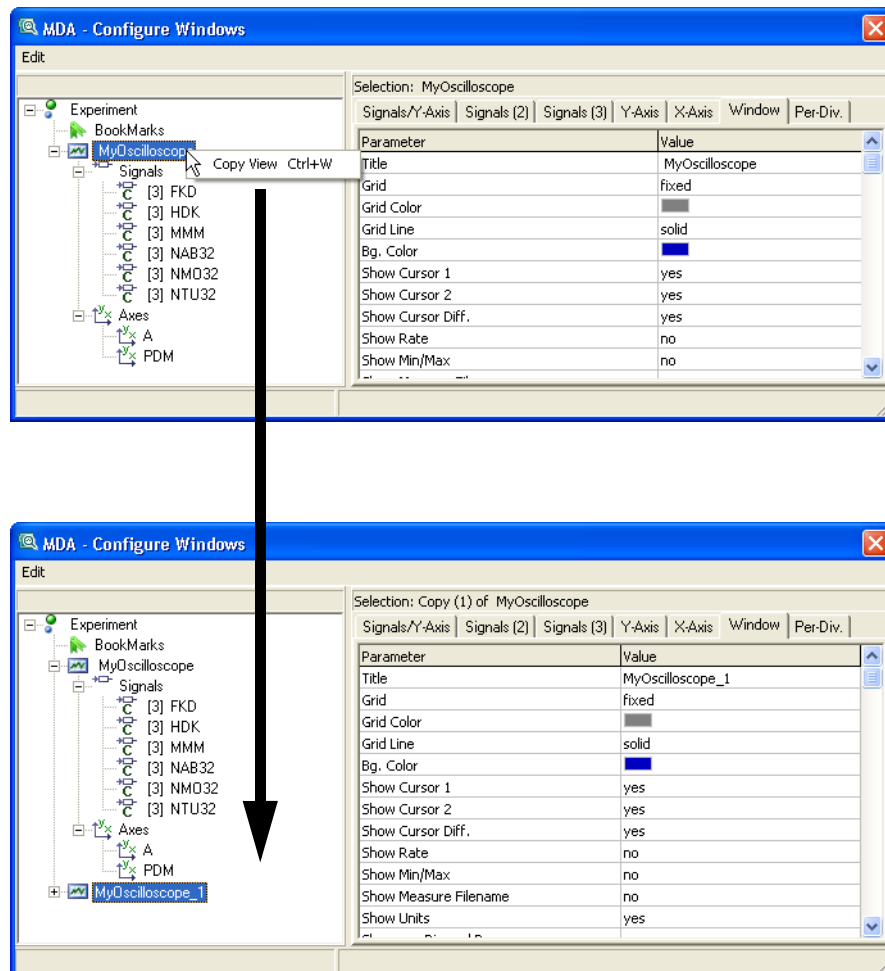
You can copy a complete oscilloscope window with all assigned signals, settings and properties, and paste the copied window into the MDA configuration. This can be useful, for example, in comparison tasks.

Note

It is only possible to copy oscilloscope windows in YT mode; other oscilloscope modes (i.e. XY oscilloscope mode and DTA mode), other window types (e.g. MDR window, statistics window or table windows) or other items (e.g. variables or axes) can not be copied with this function.

The oscilloscope window can be copied in the **MDA — Open Configure Windows** dialog box. The dialog box can be opened by selecting **Edit → Open Configure Windows**, by pressing <F4>, or by clicking  in the toolbar.

In the list on the left, select the oscilloscope window that you want to copy. Then select **Copy View** from the context menu or push <Ctrl> + <W>.



MDA makes an exact copy of the selected oscilloscope window and pastes it into the MDA configuration. The copied oscilloscope window is inserted into the window tree view. It contains the same signals, axes, points of interests, and analysis

cursor positions as the original oscilloscope window, all of them with the same settings as in the original. Moreover, if the original oscilloscope window is part of a synchronization group, the copied window will be part of the same group.

The window name, signal sorting order, bookmarks, zoom states, and docking of legend and signal list will not be copied along with the other items and settings.

After having copied the window, you can configure the original and the copied window separately from each other; the changes will apply only to the selected window.

3 Installation

The chapter titled “Installing the Program” is for all users who install, maintain or uninstall MDA on a PC or a network as well as system administrators who provide MDA on a file server so that the program can be installed via the network. This chapter also contains information on the scope of delivery, hardware and software requirements for stand-alone and network installations and the preparation required for installation. Moreover, the chapter describes the procedures used to install and uninstall MDA.

3.1 Preparing to Install

Check to make sure all the items have been delivered and that your workstation complies with the system requirements. Make sure you have the necessary user privileges for the operating system and the network connection being used. You must have administrator privileges to install MDA.

3.1.1 Package Contents

Essentially the MDA installation media for the MDA stand-alone product has the following contents:

- Program files for MDA
- Online help, MDA-manual in PDF format (Acrobat Reader), and video tutorials (mp4 format)

3.1.2 MDA License

You require a valid license for the use of MDA.

Note

As MDA is also provided together with INCA, either an MDA or an INCA license is required for the use of MDA.

You can obtain the license file required for licensing either from your system administrator or through a self service portal on the ETAS Internet Site under <http://www.etas.com/support/licensing>. To request the license file you have to enter the activation number which you received from ETAS during the ordering process.

In the Windows Start menu, select **Programs → ETAS → License Management → ETAS License Manager**.

Follow the instructions given in the dialog. For further information about, for example, the ETAS license models and borrowing a license, press **F1** in the ETAS License Manager.

3.1.3 System Requirements

Note

Please see the Readme file for the latest information on the MDA system requirements.

System Requirements: Minimum PC Requirements:

- Required hardware:

- 2 GHz processor
- 4 GB RAM
- DVD-ROM drive for installation
- VGA graphics card with a resolution of at least 1024 x 768 and 16 bit colors
- Required operating system:
 - WINDOWS® 7 SP1 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode) or higher
 - WINDOWS® 8 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode)
 - WINDOWS® 8.1 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode) or higher
 - WINDOWS® 10 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode)

Note

English, French, Japanese, Chinese and German OS versions are supported.

- Required free disk space:
 - 500 MB

System Requirements: Recommended PC Requirements:

- Hardware:
 - 3 GHz quad core processor or equivalent
 - 8 GB RAM
 - DVD-ROM drive for installation
 - XGA graphics card with a resolution of at least 1024 x 768, 16 bit color and DirectX 7
- Operating system:
 - WINDOWS® Vista SP1 (32 Bit) or higher
 - WINDOWS® 7 SP1 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode) or higher
 - WINDOWS® 8 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode) or higher
 - WINDOWS® 10 (32 or 64 bit. On a 64 bit operating system MDA uses the 32 bit compatibility mode)

Note

English, French, Japanese, Chinese and German OS versions are supported.

- Free disk space:
 - > 10 GB

The minimum requirements for the MDA PC ensure that MDA will run smoothly with smaller measure files, and the recommended PC configuration means that it will operate very efficiently.

Added performance boost depends on the hard disk's average access time and the power-saving modes that have been enabled for the computer components (processor, hard disk, etc.).

3.1.4 User Privileges Required for Installation and Operation

User Privileges Required for Installation:

In order to install MDA on a PC, administrator authorization access is necessary. Please contact your system administrator, if necessary.

User Privileges Required for side-by-side installations of different MDA versions:

Operating different MDA versions on the same PC requires administrator authorization access for COM registration. Please contact your system administrator, if necessary.

User Privileges Required for Operation:

In order to work with MDA, each user must obtain the following rights from the administrator:

- Read and write access to the registry folder `HKEY_LOCAL_MACHINE\Software\ETAS` and all subfolders
- Read and write access to the `TEMP` directory used by MDA.
- Read and write access to the MDA installation directory (e.g. `c:\ETAS\MDA7.2`)
- Read and write access to shared components in `ETASShared12` (e.g. `c:\ETAS\ETASShared12`).
- Read and write access to the directory for the MDA data (e.g. `c:\ETASData`) and all subdirectories

Unlimited access is required for all mentioned directories.

3.2 Installing the Program

The dialog boxes for installing from the CD and installing from the network drive are identical.

3.2.1 Initial Installation

To install MDA:

- Close all open ETAS programs.
- Depending on your company-specific regulations, the installation files are provided on DVD or on a network drive.

By using the DVD, the installation routine starts automatically. If this is not the case, execute the **Autostart.exe** file on the DVD manually.

If you install the program from a network drive, execute the **Setup.exe** file.
- Select your preferred setup language.
- Click **Next**.
- Read and accept the terms in the license agreement to continue installation.
- Follow the instructions displayed on the screen and confirm each screen by clicking **Next**.

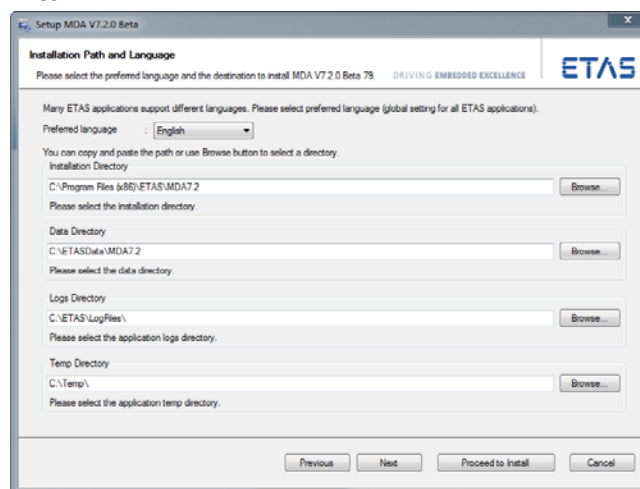
Note

After finishing installation, the computer must be restarted before MDA can be opened.

Most of the screens are completely self-explanatory. The following sections explain only those parts of the installation procedure where additional information might be helpful.

Setting the Installation Path and Language

In the following screen, you specify destination directories for program and data files:



The program **files**, program **data**, **Log** files and **Temp** files are stored in different directories. If you uninstall or update the program later, only the program files will be deleted or overwritten. The program data will continue to be available to you.



WARNING!

Selecting the Program Files directory for MDA data files may lead to problems in MDA as the access to the program folder depends on the Windows user rights.

Do not save MDA data files in the Program Files directory. Select a folder in a data area where all users have read and write access rights.

Filling in the User Information Form

In the following screen, you can enter your user informations

Note

You do not need to fill in the fields of the form. The MDA reuses the entered information for further use cases.

3.3 Customizing the Network Installation

To provide the users with the installation files, you can copy the data from the DVD to a network drive. A network installation has the advantage of allowing you to adjust the installation files even before actually installing the program on the computer. This allows you to set company-specific defaults.

You can change certain default settings before conducting the network installation. This is done by adjusting the configuration file **InstallationDefaultSettings.xml**. This file is in the installation directory.

Customizing installation dialog

In the file **InstallationDefaultSettings.xml**, you can define different settings of the MDA installation.

You can define the following custom parameters or variables:

- **PRODINSTDIR**
Defines the installation path for MDA.
- **LIMA-INIFILE**
Defines the installation path for the licensing.ini file. The licensing.ini file contains your license informations.
- **PRODDATAINSTDIRALL**
Defines the path of the working files (e.g configuration files, databases)
- **ETAS_TEMPPATH**
Defines the path of the temporary files.
- **ETAS_LOGPATH**
Defines the path of the Log files.
- **CREATE_UNINSTALLATION_SHORTCUT**
Automatically creates an uninstallation shortcut on your desktop.
- Following variables includes personal and company information. Set any default values to automatically insert them into the form within the installation:
FirstName, LastName, Company, Department, AreaCode, Phone, Language, EMail, Street, ZIPCode, City, Country

Logging the Installation Information

When installing from a network drive, the information entered in the registration dialog is saved in a file (`MDA.usr`). It is used for polling the license data back to ETAS or for your own reference. By default, the file is stored on the installation drive from which the installation was started, under a dedicated directory named `User` (e.g., `F:\User\MDA.usr`).

As already mentioned during the registration for network installation, you can change the storage location specified in **InstallationDefaultSettings.xml**. However, you *cannot* disable the log function for the network installation.

Note

Make sure that all users have write-access to the log directory, i.e., the installation directory or the directory you specified in `install.ini` (see below).

Setting the licensing behavior

In the `Licensing.ini` file, you can define the way in which MDA and other ETAS software programs access the required licenses.

To define the access to the required licenses:

- Open the **Licensing.ini** file with a text editor.
- Modify the settings as desired. The parameters that can be included in this section and their settings are described below.
- Save your changes.

The following parameters may be used:

- `LicenseFileName`
Defines the absolute path to the location of the license file which is to be added.
- `LicensesToBorrow`
You can use this setting if licenses can be borrowed from a license server. To enable the borrow mechanism, you must enter the name of the product or features license (e.g. MDA). If you enter more than one license, the license names must be separated by blanks.
- `BorrowExpiryMode`
Defines the way in which the expiration of the borrow status is given. Possible values are:
 - `Date`
If the `BorrowExpiryMode` is set to `Date`, the borrow period will expire at a certain date which is specified under `BorrowExpiryDate`.
 - `Interval`
If the `BorrowExpiryMode` is set to `Interval`, the borrow period will expire after a certain number of days which is specified under `BorrowExpiryInterval`.
- `BorrowExpiryDate`
If the `BorrowExpiryMode` is set to `Date`, this parameter specifies the date when the borrow period expires. The format is `yyyy-mm-dd`.
- `BorrowExpiryInterval`
If the `BorrowExpiryMode` is set to `Interval`, this parameter specifies the length of the borrow period in days.
- `ExecuteBorrowAutomaticExtensionInterval`
Defines at what point of time the borrow period will be automatically extended. This parameter specifies the number of days before the expiration of the current borrow period. When this time is reached, the borrow period is automatically extended to the interval specified under `BorrowAutomaticExtensionInterval`.
- `BorrowAutomaticExtensionInterval`
This parameter specifies the borrow interval in days that is applied when an automatic extension of the borrow period is executed (as defined under `ExecuteBorrowAutomaticExtensionInterval`).
- `CustomLicenseFolder`
Due to the fact that the default location for added license files, i.e. `C:\Documents and Settings\All Users\Application Data\ETAS\FlexNet`, is only writeable for users with admin rights, a different path for the license file folder may be specified with this parameter.

3.4 Using Command Line Parameters

Setup.exe /? and **Setup.exe /help**

Displays the available command line parameter. The full description of the command line parameter and also of the error codes which can occur during an installation are described within the setup.pdf provided in the installation root directory.

Silent Mode

/Silent: Executes the installation silent. This means, you don't see any dialog window of the installation routine. All commands are hidden. For example, you can use this option to install INCA on a computer, without interrupting the users work.

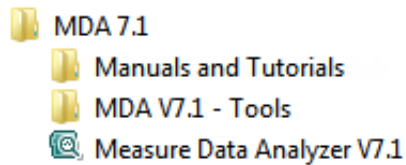
No Restart Mode

/NoRestart: Specify this argument in combination with /silent to omit a restart that might be necessary at the end of installation. If restart is omitted, a log message states this. If /silent parameter is specified either this or /AllowRestart parameter must be specified.

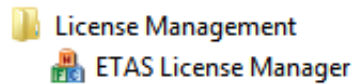
3.5 MDA V7.2 Program Group / Apps

After having installed MDA and restarted your PC, you will find an entry for your MDA installation:

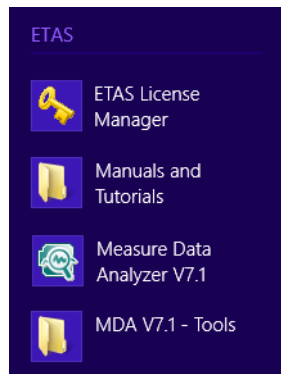
- Windows XP and Windows 7:
A folder for MDA V7.2 has been created under ETAS in the Start menu.



Moreover, the program group License Management has been added to the Start menu under ETAS:



- Windows 8:
A tile for MDA V7.2 has been created. Moreover, the following apps have been added:



The Start menu items or respective apps provide the following access:

- **ETAS License Manager**
Starts the ETAS License Manager, where you can view and manage licenses for your ETAS software products (e.g. adding licenses or borrowing and returning licenses).
- **Manuals and Tutorials**
If you have installed the PDF user documentation, you can open the folder and view the desired documentation.
- **MDA V7.2 - Tools**
Opens a folder with the following entry:
 - **ReadMe**
Gives you the latest information on MDA V7.2.
- **Measure Data Analyzer V7.2**
Starts the MDA program.

4 Getting Started

This chapter is aimed at new users of MDA helping them to get started with MDA V7.2. You will receive an overview of the program functionality and working principles by means of practice-oriented work examples presented as flow diagrams.

The following sections give a brief overview of the individual working steps:

- "Selecting Measurement Files and Measured Signals for the Analysis" on page 38
- "Configuring the Display of Measure Data" on page 39
- "Analyzing Measure Data" on page 40
- "Printing Measure Data" on page 41

4.1 Introduction

The MDA works in display mode or in analysis mode. Display mode is used for preparing the analysis. It provides a wide range of options for configuring the analysis window and displaying the measured signals.

The actual analysis takes place in analysis mode. Here too there are many options for displaying areas to be analyzed so that the analysis can be performed optimally.

You perform a measure data analysis as follows:

1. First you create an analysis configuration by selecting the measure files and the recorded signals for the analysis, distribute the signals to analysis windows and define the appearance of the windows and the display of the signals.

You then save this configuration in a configuration file (*.xda). You can save a selection of variables as a new measure file (*.dat, *.mf4, or ascii).

2. In display mode, you can optimize or change the original configuration (for example, if you want to generate a new analysis variant). The end result is saved and can be started again in this form later. In this way, you can create entire libraries of analysis variants.
3. In analysis mode, you can analyze the individual signals and analyze the values at the measurement points. You can link measure signals and/or calculated signals with each other or analyze the recorded calibration activities in the form of comment signals. You can also define and edit measurement comments in the measure files.

4.2 Selecting Measurement Files and Measured Signals for the Analysis

When you start the MDA for the first time, you must select one or more measurement files for the analysis and assign the information contained in the files to an analysis window. You can then save this configuration to a file (*.xda).

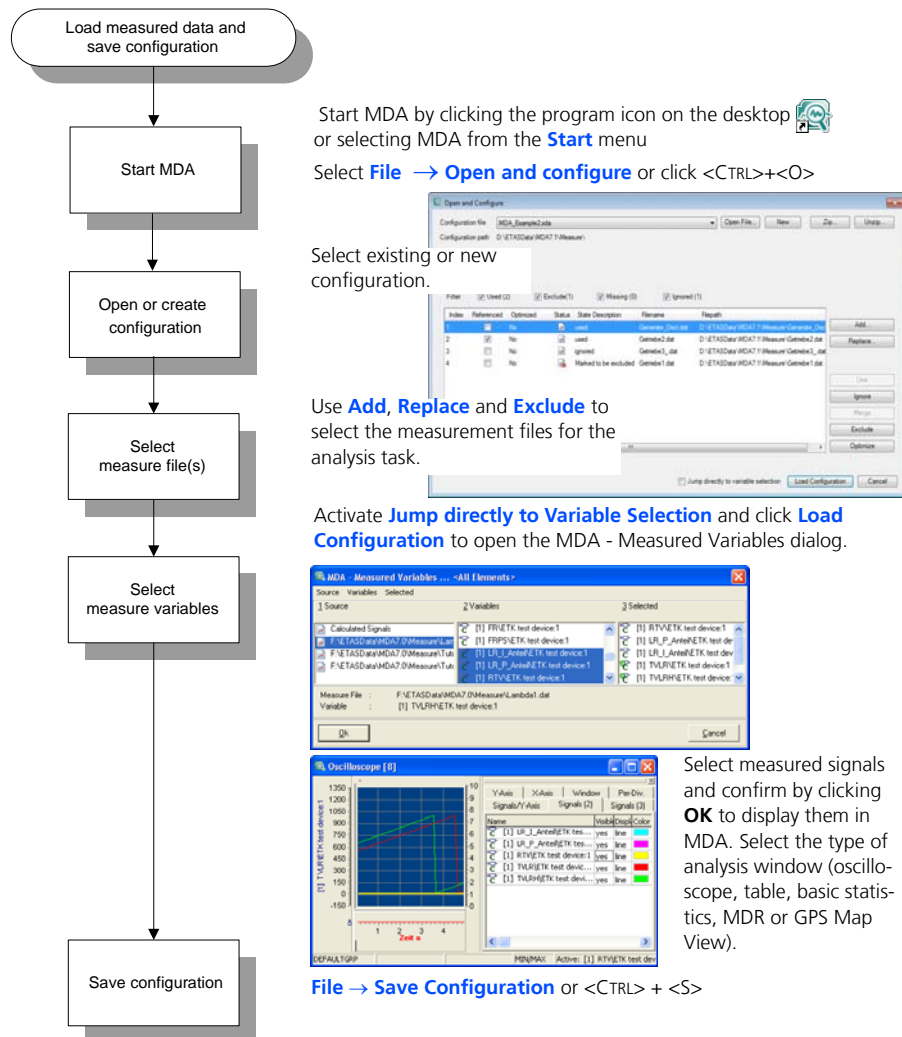


Fig. 4-1 Preparing the measure data analysis

4.3 Configuring the Display of Measure Data

Measure data can be displayed in an oscilloscope, a table window, a basis statistics window, or, if different rasters are used, in an MDR window (Measure Data Refill). Displaying GPS data in a map view is also possible.

The most widely used window is the oscilloscope window. The measured numerical values are graphically displayed in the signal pane of the oscilloscope display. To the left you can see the Y-axes that are being used. Additional dockable child windows can be added to the analysis window. For example, you can view a list of measured signals on the right and open a configuration window in the lower section to facilitate modifications to the display settings.

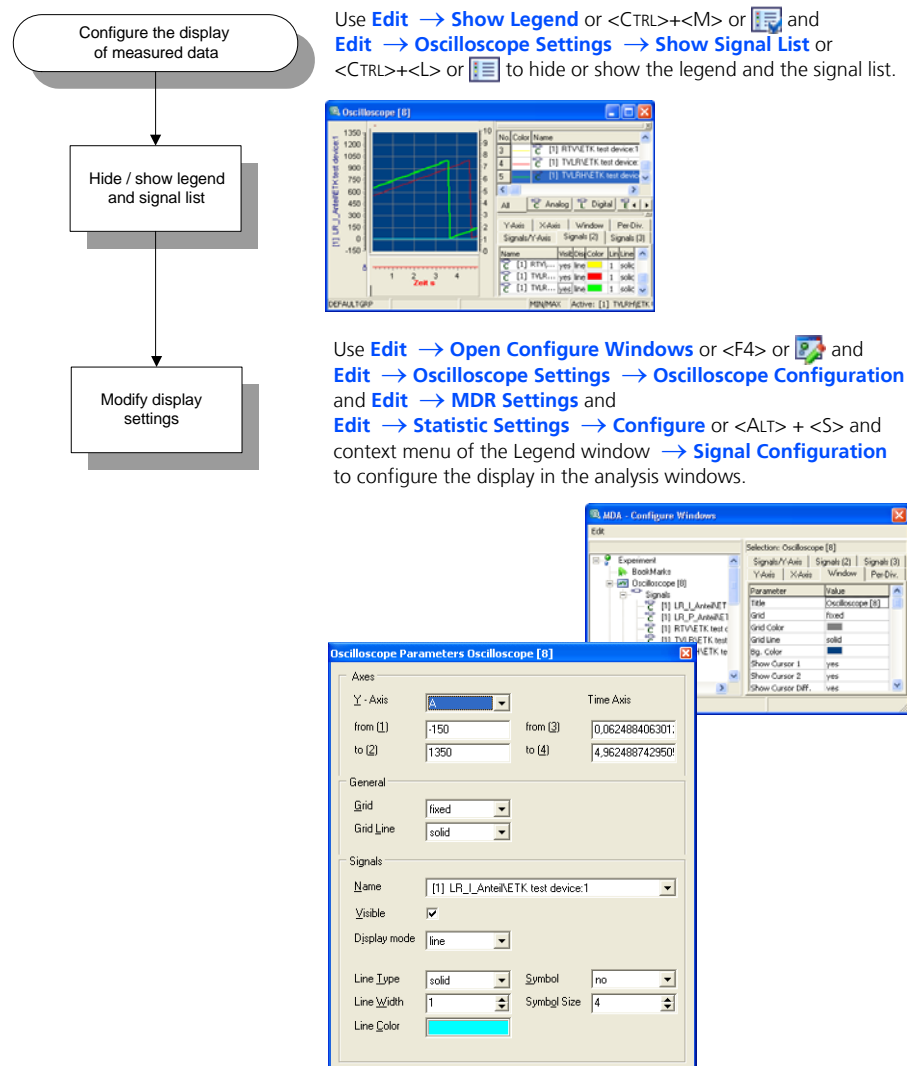
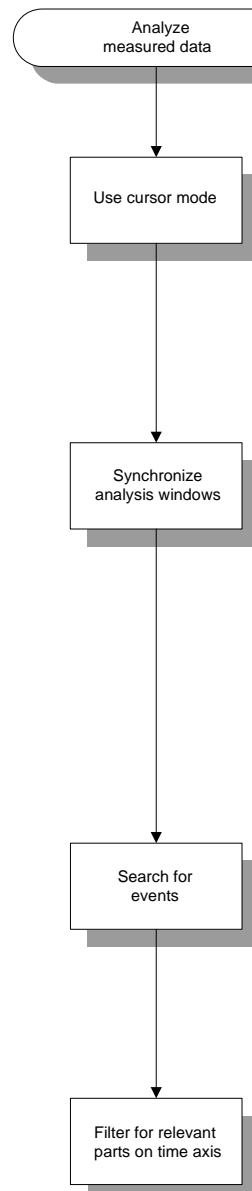


Fig. 4-2 Configuring the display of measure data

4.4 Analyzing Measure Data

Using the MDA's user-friendly zoom, scroll and synchronize functions, you can move quickly from the overview of the graphical signal display to detailed sections containing signal traces of interest to you.



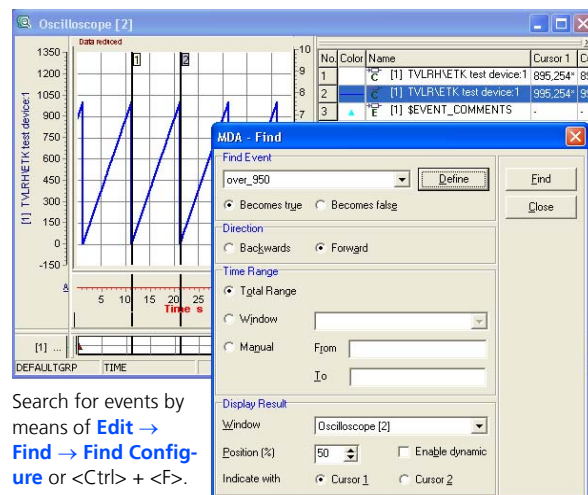
Select the desired section (e.g., using the magnifier tool, XY-zoom, entering a time range)

Display analysis cursors via **Edit → Activate Cursor** or **<Ctrl> + <R>** or and select the desired cursor mode via **Edit → Cursor Mode** or Time .



Synchronize different analysis window via **Edit → Show Align Views Window** or **<CTRL> + <ALT> + <A>** or .

Enable and disable alignment and synchronized scrolling via **Edit → Synchronize the Views** or **<CTRL> + <ALT> + <S>** or .



Search for events by means of **Edit → Find → Find Configuration** or **<Ctrl> + <F>**.

Hide irrelevant parts of a measurement and display all interesting parts next to each other on a discontinuous time axis via **Edit → DTA → Create and edit trigger** or **<CTRL> + <T>**

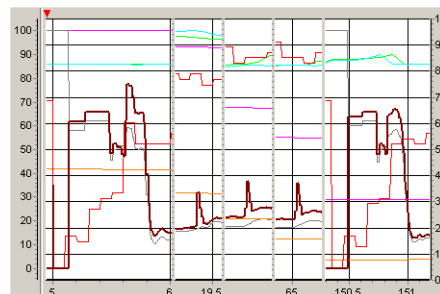
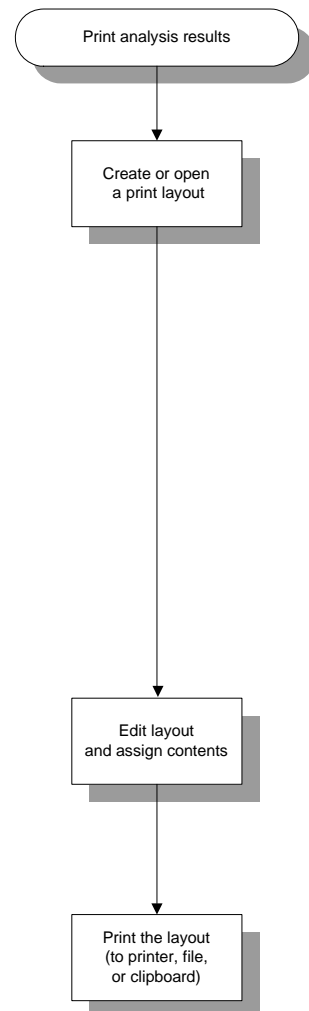


Fig. 4-3 Analyzing the measure data

4.5 Printing Measure Data


You can use the Print options to document the results of your analysis, or to optimize the print output in cases where you have a lot of data displayed on the screen.

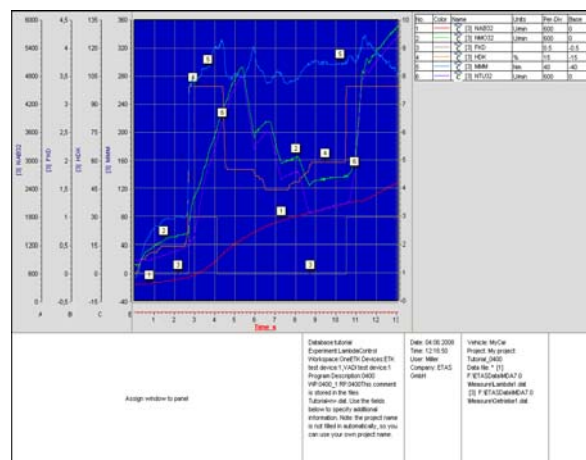


File → **Print** or <CTRL> + <ALT> + <P>

In the **MDA — Print Layout Editor**:

Doubleclick an existing layout or

Layout → **New** or <CTRL> + <N> or  to create a new layout




To add sections:

context menu **Split horizontally** / **Split vertically** or  / 

To assign contents:

context menu **Assign** or drag & drop from list of available windows

To adjust sizes of sections: drag separator bars

Layout → **Print** or <CTRL> + <P> or 

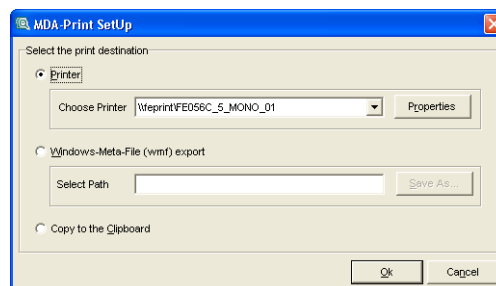


Fig. 4-4 Printing the analysed measure data

5 General MDA Operation

This chapter provides information on the window structure, control options using the mouse and the keyboard, and the help system.

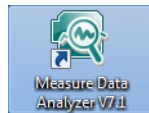
Be sure to read this chapter since some operational procedures are described only in this section. Although the presented techniques are standard Windows operations, they may not be familiar to the less experienced Windows user. They are therefore described here as a central summary.

5.1 Starting the Program

MDA can be started in one of several ways:

- **Via the desktop icon:**

By default, the MDA installation program places a shortcut icon on your desktop.



You can start the program by double-clicking on this icon.

- **Via the program group:**

You can start the MDA by selecting **ETAS** → **MDA V7.2** → **Measure Data Analyzer V7.1** from the Windows **Start** menu.

- **By double-clicking a configuration or measure file:**

If you associate MDA with the file extension `.xda` in Windows Explorer and double-click the file from Windows Explorer, MDA starts and immediately loads the configuration and its associated measurement file. You can also achieve this on the command line with the command

```
MDA.exe -f<file path+name>.xda
```

If you associate MDA with the file extension `.dat` in Windows Explorer and double-click the file from Windows Explorer while MDA is already running, MDA loads the measurement data in the file into the running MDA window. In the global options you can specify MDA to either replace the previous measurement file, replace the entire configuration, or start a new instance of MDA. You can also

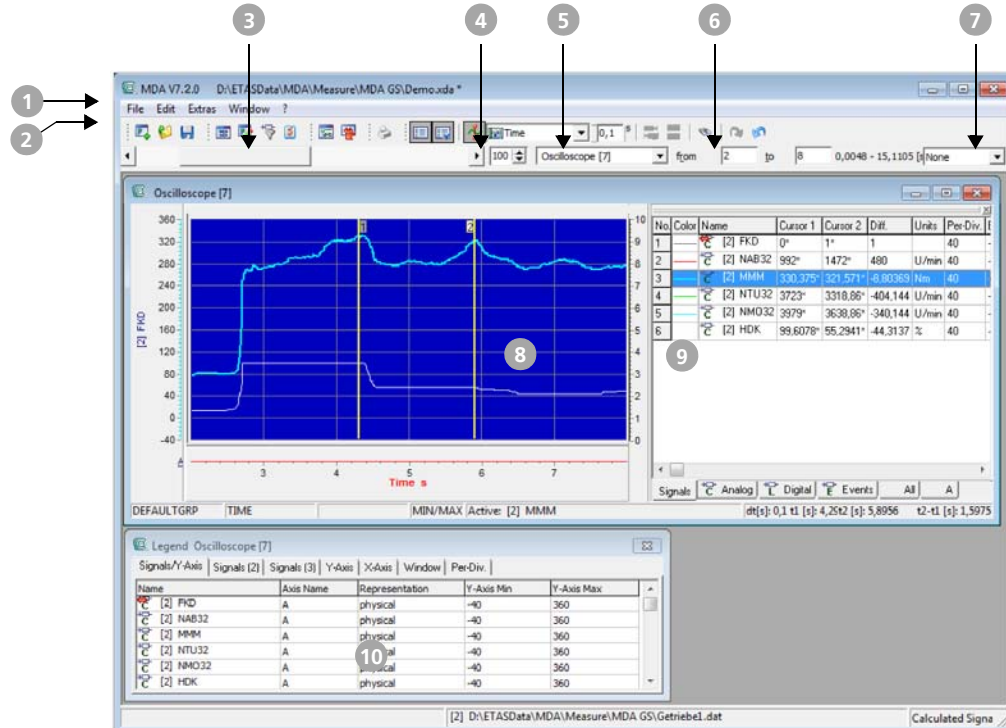
achieve this on the command line with the command
`MDA.exe -r<file path+name>.dat`

Note

*If INCA is being installed on your PC, you can also start MDA directly from within INCA. In this case you must specify in the INCA user options the location of the MDA installation to be used. Then you have several options to call MDA from within INCA, e.g. via the **Tools** menu or a toolbar icon. For further information please see the INCA user documentation.*

5.2 Window Structure

The MDA window contains the following elements:



- Menu bar (1)
- Toolbar (2)
- Scrollbar for time axis (3)
- Step size for the scroll bar in % (4)
- Selection of active window (5)
- Input fields for time range (6)
- Selection of bookmarks (7)
- Signal pane of an oscilloscope window (8)
- Signal list of the oscilloscope window (9)
- Legend of the oscilloscope window (10)

5.3 Controls

5.3.1 Toolbars

The most common commands are also available as buttons in a toolbar. In this way, a command can be executed simply with a click of the mouse.

Note

All commands that can be issued by clicking the specific buttons are also available in the corresponding menus.

All buttons located on the toolbars are mouse-sensitive. If you place the mouse cursor on a button and hold it for one second, a tooltip box is displayed right next to the selected button which displays the button function as well as the associated keyboard shortcut.



Under **Extras** → **Toolbars**, you can select which of the available toolbars shall be displayed and which ones shall be hidden.

- You can check the toolbars individually.
- The menu option **Dynamic** disables or enables the toolbar containing those icons that are specific to the type of analysis window.
- The menu option **Default Settings** resets the toolbar display to the original settings, displaying the toolbars Standard, Edit Configuration, Enhanced Functionality, and Print Layout.

Depending on which toolbars you have selected, the MDA main window can contain the following toolbars and icons:

- **Standard**



Opens the **MDA - Open and Configure** dialog box for loading and changing a saved analysis configuration or generating a new analysis configuration.



Opens the **MDA - Open configuration / MDA - Zip File** dialog box, in which you can select a saved analysis configuration for loading.



Saves the active analysis configuration.
If the analysis configuration is new and you have not yet saved it, a file selection dialog box opens. You can select an existing file for saving the active analysis configuration or create a new file.

- **Edit Configuration**



Opens the **MDA - Measured Variables <All Elements>** dialog box for adding variables to the active analysis configuration and configuring them.



Opens the **MDA - Configure Windows** dialog box for configuring the display of the analysis windows.



Opens the **MDA - Display name settings** dialog box in which you can define the display of the variable names and the filters used.



Opens the **MDA - Global Options** dialog box for changing basic settings of the Measure Data Analyzer

- **Enhanced Functionality**



Opens the **Manage Calculated Signals** dialog box for defining calculated signals from other values.



Resets all signals which were moved along the X-axis to their original values (reset X-offset).

- **Print Layout**



Opens the **Print Layout Editor**.

- **Measure File**



Opens the **MDA - Generate Measure File** dialog box for generating a new measure file from the active analysis configuration.



Opens the **MDA - Measure File Comment** dialog box for defining the comment for the measure files in the active analysis configuration

- **DTA**



Opens the **Trigger properties** dialog box for the DTA functionality. Here you can determine which start and stop triggers should be used for hiding irrelevant parts of a measurement and displaying all interesting parts next to each other on a discontinuous time axis.



Shows the time ranges selected in the trigger conditions.

- **Archive**



Opens the **MDA - Zip Utility** dialog box in which you can make the settings necessary for creating a compressed file (*.zda).



Opens the **MDA Unzip Utility** dialog box in which you can select the compressed file to open the files contained therein in the MDA.

- **Tile**



Cascades (overlaps) the open analysis windows.



Arranges open analysis windows under each other.



Arranges open analysis windows side by side.

- **Easy Print**



Directly prints the active analysis window.

- **Dynamic**

This toolbar is only shown if the configuration contains any signals and analysis windows. Depending on the analysis window which is currently active, some toolbar icons might not be visible.



Shows or hides the **Signal List** window, which is used for displaying the signals of the active analysis window.



Shows or hides the **Legend** window, which is used for configuring the active analysis window and the signals it contains.



Enables or disables the display of cursors.



Lets you select the cursor mode. The following modes are available:

- Time mode, i.e. the cursor is moved in discrete steps along the time axis, e.g. in steps of 0.1 s.
- Sample mode, i.e. the cursor is moved from timestamp to timestamp.
- Fix distance mode, i.e. the two cursors are always moved synchronously and keep a fix distance, i.e. when you move the active cursor, the other cursor moves exactly the same distance.(time, sample, or fix distance).



According to the selected cursor mode, this field provides the following information:

- **Time** mode: Step size in seconds.
- **Sample** mode: Step size in number of samples.
- **FixDistance** mode: Distance in seconds between the two cursors.



Opens the **Align Views** dialog box. Here you can define the way in which the analysis windows are aligned and synchronized.



Enables or disables alignment and synchronized scrolling of analysis windows.

This function is only available if the active window is an oscilloscope and if the oscilloscope belongs to a synchronization group. The alignment behavior is set in the **Align Views** dialog box.



Opens the **MDA - Find** dialog box in which you can define events for which measure files are searched in the analysis configuration.



Restores undone zoom actions stepwise.



Undoes the last zooming step (Y-axis or time/X-axis) in the active analysis window stepwise.

5.3.2 Additional Controls

Below the toolbar, you find the following additional controls:

- **Time Axis** scrollbar



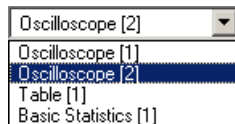
Allows you to scroll through sections of the measured range or to move the measured range on the X-axis.

- **Percentage** field



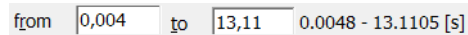
Enables you to set the step size for the scroll bar. A step size of 50% means that when you use the page up / page down key for scrolling or click in the time axis scrollbar on the left or on the right side of the slider, the visible part is moved by 50%.

- **Windows** combo-box



Determines which window becomes the active window and is affected by scrolling along the time axis or the entry in the "from" and "to" fields.

- **Time Range** entry fields



Allows you to enter a fixed time range (**from** - **to**) for the display on the X-axis. The total size of the current measurement file is shown to the right of the entry field. Depending on the selected entry in the Windows list box, the change affects either all or only the currently selected window.

- **Bookmarks** combo-box

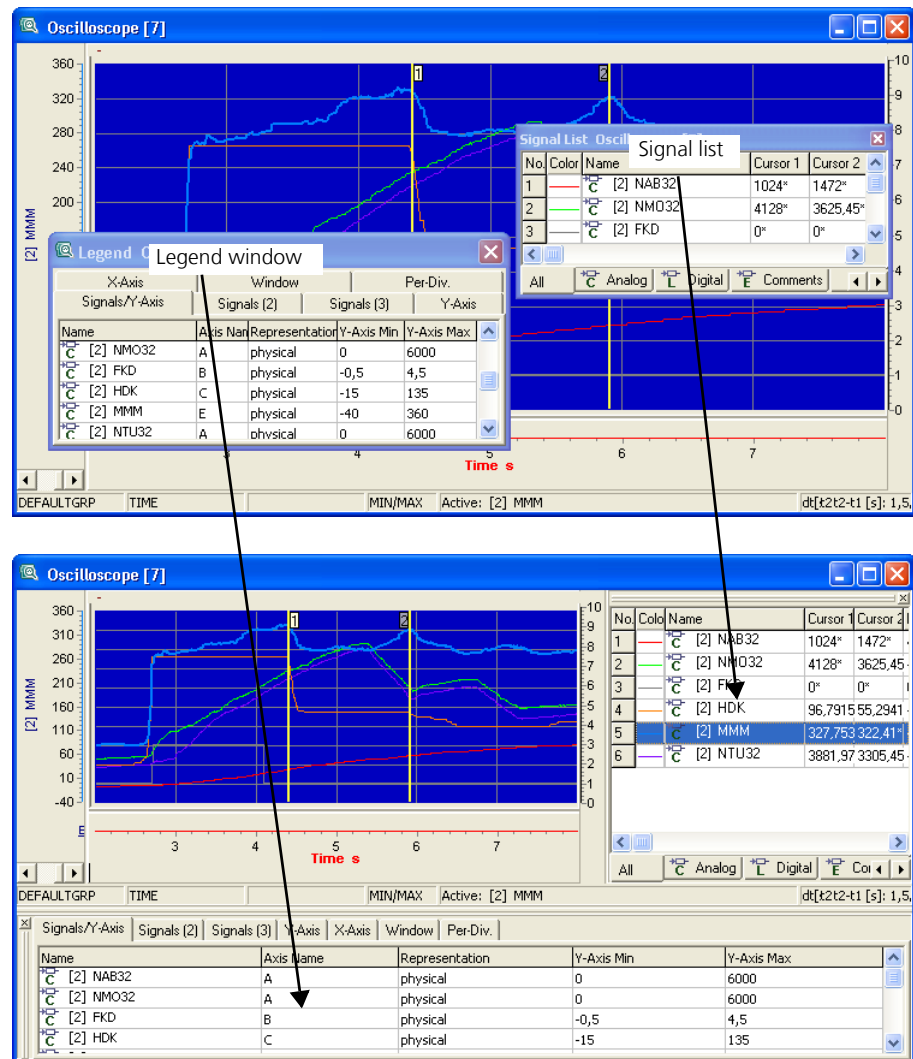


If you have defined bookmarks for interesting points in your measurement, you can select a bookmark from the list and jump directly to the corresponding point on the time axis of the oscilloscope windows. The oscilloscopes scroll in such a way that the bookmark is displayed in the middle of the visible area of the time axis.

5.4 Tips and Tricks for Operation

5.4.1 Docker Windows

The docking of windows is a feature allowing an effective use of the available space on the screen. You can, for example, integrate certain dialog boxes in another display window.





The MDA provides two dockable window types:

- Legend window
- Signal list

As a rule, the windows can only be docked on the right side or at the bottom of the screen.

To dock and undock a window:

To dock a window, you must first open it.

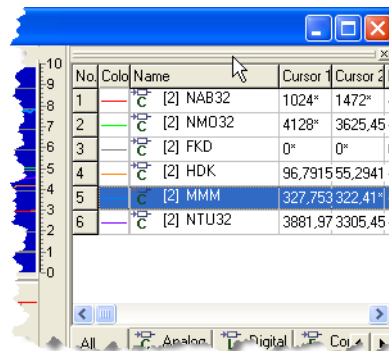
- Open the desired legend window with <CTRL> + <M> or by clicking  in the toolbar.
- If necessary, open the signal list (only oscilloscope display) with <CTRL> + <L> or by clicking  in the toolbar.
- Click with the left mouse-button on the title of the window to be docked and hold it.
- While keeping the mouse-button depressed, drag the window preferably into the bottom right area of the evaluation window.

When you pass over the border of the analysis window, a frame appears at the appropriate places indicating the subsequent position of the docked window.

- Release the mouse button when you are satisfied with the position of the configuration window or the signal list.

The corresponding window is inserted in the evaluation window.

- To undock the window, click on its frame (double line) and hold the mouse button while moving the window.



- To remove the docked window, click the **Close** icon in the top right.

5.4.2 Window Arrangement and Display Options

There are several ways to arrange the individual windows:

- Move the windows manually and adjust the window sizes.
- Use the **Window → Cascade** command; the windows will overlap and have the same size.
- Use the **Window → Tile horizontally** command; the windows will be distributed to the entire desktop and displayed horizontally in the same size.
- Use the **Window → Tile vertically** command; the windows will be distributed to the entire desktop and displayed vertically in the same size.
- Use the **Window → Minimize all** command; all windows will be minimized and placed along the bottom of the screen.
- Use the **Window → Arrange all** command; all minimized windows will be arranged sequentially along the bottom of the screen.
- Use the **Window → Close active window** command; the active window will be removed.
- Use the **Window → Close all windows** command; all windows will be closed.

5.5 Operation Using the Keyboard

MDA can be operated both with the mouse and with the keyboard.

5.5.1 Hotkey Assignment in MDA

To ease keyboard operation, a number of hotkeys have been assigned for the most important actions. You can display a complete overview of the hotkey assignment at any time by pressing <SHIFT> + <F1>.

5.5.2 Keyboard Operation Compliant With WINDOWS® Conventions

The general operation of MDA, such as navigating in menus or activating a certain windows, complies with the WINDOWS® conventions.

Pressing the underlined letter in a menu while holding down the <ALT> key activates the corresponding command. You can activate a subordinate menu command by pressing the underlined letter together with the <SHIFT> key.

For example, to open the **Edit** menu with a keyboard command, press the <ALT> + <E> key combination.

To switch to the next window or list box within the working windows, press the <TAB> key (in the order from top left to bottom right). You can use the underlined letter of the field or list label, while holding down the <Alt> key, to switch to the corresponding field or list box.

The arrow keys allow you to skip to the next item in list boxes. You can select multiple items by making your selection while pressing the <SHIFT> key.

Switching between the individual analysis windows is done—pursuant to the Windows convention—by pressing the <Ctrl> + <TAB> key combination.

General Windows compliant behavior

Key	Function
<Shift> + <F10>	Open shortcut menu for selected item (right mouse button)
<Alt>	Activates the main menu.
<Alt> + <F4>	Closes active display window; if the MDA main window is active, MDA exits.
<Alt> + <Space>	Open system menu of MDA window
<Alt> + <Tab>	Switch between open applications
<Alt> + <->	Open system menu of current window
<Ctrl> + <a>	Select all items (e.g., in a list)
<Ctrl> + <c>	Copy to clipboard
<Ctrl> + <v>	Paste from clipboard
<Ctrl> + <x>	Cut and put on clipboard
<Enter>	Confirm input and quit input mode
	Delete selected item
<Esc>	Cancel input, discard changes

Key	Function
<Space>	Select table or list item or deselect active selection
<Tab>	Move focus to next item (option) in a window (<Shift> + <Tab> moves focus in opposite direction)
<Shift>	Enable range selection, i.e., pressing the arrow keys while holding <Shift> key down allows selecting a table cell range.

5.6 Operation Using the Mouse

You can use the mouse to operate MDA in a user-friendly way. The use of the mouse corresponds to WINDOWS conventions.

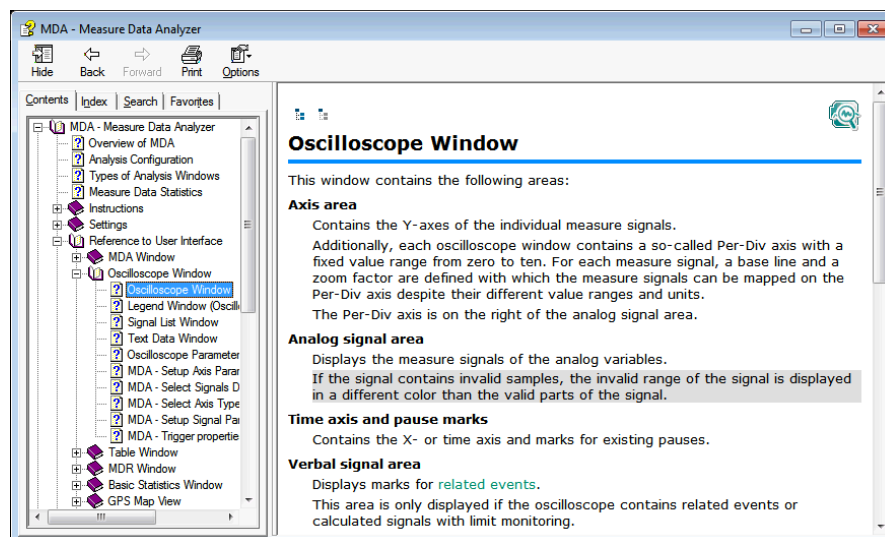
You can select multiple items by making your selection while pressing the <SHIFT> or <CTRL> key.

Right-clicking on the window elements opens context-sensitive pop-up (short-cut) menus.

5.7 Help Functions

5.7.1 MDA Online Help – Quick Guide

Choose **? → Help** to invoke the general help function. The <F1> key allows you to call context-sensitive help pertaining to the currently active window.



The tabs of the help window provide you with the following options:

- The “Contents” tab allows you to browse the help topics by categories.
- The “Index” tab lists all index entries. Browse the entire list, or enter a search term to limit the scope of listing.
- The “Search” tab allows you to search for individual words or terms included in a help topic. Type a search string and let the help function list the entries it has found related to this term.

- In the "Favorites" tab you can add your favorite topics in order to retrieve them more easily.

5.7.2 Manual

The complete MDA manual is available in digital version and can be opened on the screen at any time.

Using the index, full text search, and hypertext links, you can find references fast and conveniently.

You can open the MDA manual via the menu item [? → Manuals and Tutorial..](#)

5.7.3 Video Tutorials

Subjects which can easily be shown instead of being described in words are presented as video tutorials. The videos are installed locally on your PC if you selected the installation of video tutorials during installation. They are available as mp4 files and can be called up from MDA via the menu item [? → Videoclips Tutorials](#). If you did not install them on your PC, you can either view them in the ETAS channel on YouTube, or you can download them from the ETAS Download Center.

6 Glossary

The chapter titled "Glossary" explains all technical terms used in the manual. The terms are listed in alphabetic order.

Analysis configuration	The total set of data files and window settings used to analyze a certain set of data. The measure files used, the measure signals to be analyzed, and the individual analysis windows with their settings are saved in the configuration file (*.xda). The configuration file can be loaded, edited, and saved under different names at any time.
ASAM indexing	See File indexing.
Bookmark	Bookmarks can be set for points of time on the time axis. They can only be created in an oscilloscope window, but they are applied globally in the configuration. They can be used for directly jumping to bookmarked points of time.
Calculated signal	A signal that was not measured directly from any device, but is made up from several other signals by combining using a certain calculation that can be defined in MDA. Example: The difference of two signals, calculated by subtracting the values of the signals at each sampling time.
Compression	Data compression reduces the amount of data which is written to the measure file without loss of information. Data compression is applicable only for measure files with the format MDF V4.1.
Cursor Mode	The following cursor modes are available: time mode (i.e. the cursor is moved in discrete steps along the time axis, e.g. in steps of 0.1 s), Sample mode (i.e. the cursor is moved from timestamp to timestamp), and Fix distance mode (i.e. the two cursors are always moved synchronously and keep a fix distance, i.e. when you move the active cursor, the other cursor moves exactly the same distance).
Device	A hardware device serving as a data source.
DTA	Discontinuous Time Axis; MDA allows you to define and use trigger conditions that can be used for classifying parts of the measurement as relevant or irrelevant. Irrelevant parts are hidden, and only the relevant parts are shown. This results in a discontinuous time axis, i.e. a time axis where certain sections are not shown in the display.
ETAS indexing	See File indexing.
Event	The time at which a certain set of conditions evaluates to true.

File indexing	While reading huge measure files, MDA reduces samples for a given time range and displays the reduced data. By indexing the measure file, it is possible to save this data reduction with the measure file, thus optimizing the performance when opening the file, zooming or scrolling. ETAS indexing, which is used only by ETAS tools, is supported for mdf 3.0 and higher; standard indexing which can also be used by 3rd party tools, is supported for mdf 3.3 and higher.
GPS Map View	A type on window in MDA used to display GPS data (i.e. GPS tracks constituted of the signals latitude, longitude and altitude) in a map.
Global options	General settings which are used as default. Those settings which apply to window layout definitions are automatically applied to new windows, but can be overruled for the individual windows afterwards.
Indexing	See File indexing.
Legend	A window summarizing all settings, as well as contained signals and their settings, of an analysis window.
MDA	See Measure Data Analyzer.
MDR	See Measurement Data Refiller.
MDR Window	The MDR window is intended to provide a solution to prepare data for post measurement processing. For example, it is able to reduce the number of used rasters to one raster. When different rasters are used, the measurement might contain gaps for individual timestamps. The user can determine by means of options if and how these gaps are to be filled. This might be of importance for tools that can handle only one raster. The display looks similar to the Table window.
MDF	Measurement Data Format; MDF is a binary file format used for storing measured data from sensors, ECU and bus monitoring for post measurement processing. In addition to the plain measurement data, MDF also contains descriptive and customizable meta data within the same file. The format is organized in loosely coupled binary blocks to ensure high performance reading and writing. The measurement data is stored channel oriented and uses master channels for synchronization which can be time, angle, distance or simply index related. In contrast to other measure data formats, MDF supports none-equidistant and multiple sample rates per file, as used in the automotive area.

Measure Data Analyzer	The Measure Data Analyzer (MDA) program is an offline instrument for displaying and analyzing recorded measurement data. It runs in its own program window and works in display mode or in analysis mode. Online measurement is not possible in MDA.
Measure data	Term used for the data recorded during a measurement.
Measurement Data Refiller	This method is applied when variables with different rasters are to be displayed together. When different rasters are used, the measurement might contain gaps for individual timestamps. The user can determine by means of options if and how these gaps are to be filled.
Measure file	A data file containing data acquired from one or more devices during a measurement. It is also possible to include virtual signals (e.g. calculated signals) in the measure file if these are included in the experiment during measurement. MDF display identifiers are saved in the measure file together with the name of the measure signal so that you can decide in MDA whether you would like to use the measure signal name or the display identifier.
Measure range	A certain interval in time, defining a measurement of interest.
Measure variable	A variable to be measured.
Oscilloscope window	A type of window in MDA used to display data representing signals that vary in time as a curve very much like the curves you would see on an oscilloscope.
PDM axis	See Per-Div Axis.
Per-Div axis	PDM-Axis. This axis type is a relative scale from value 0 to 10 (without unit), which allows to be used for several signals in parallel, even having different physical units. For each signal axis the minimum value which corresponds to the per-division value 0, is given as "base" on the per-division axis. Additionally a factor "per-div" indicates the slope of the signal axis. It is feasible to select for the slope a multiple to 10 (like 1, 100, 0.1) to have a simple relation. The use of the per-div axis is similar to a real oscilloscope. There the display is usually divided in 10 divisions. The user defines for every signal a base value (lower limit of the display) and a factor (slope from one division to the next).
POI	Point Of Interest.

Point of Interest	In time mode, you can mark individual interesting points of a measurement, e.g. a spike, as a Point of Interest. This Point of Interest is displayed as a pink vertical bar indexed with a P . You can only mark one Point of Interest at a time per oscilloscope. The Point of Interest can later on be used to synchronize different oscilloscopes in relation to this marker.
Posttrigger time	When defining the end trigger for a measurement, set the posttrigger time to the time interval worth of data you would like to see added after the end trigger occurs.
Pretrigger time	When defining the start trigger for a measurement range, set the pretrigger time to the time interval worth of data you would like to see added before the start trigger occurs.
Standard indexing	See File indexing.
Trigger	A trigger is a certain condition which can be defined using Calculated Signals and which is used in MDA for finding and filtering certain information or for segmentation of data streams.

7 **Appendix: Troubleshooting MDA Problems**

This chapter gives some information of what you can do when problems arise during your work with MDA.

7.1 **General problems while working with MDA**

7.1.1 **MDA reacts only after substantial delays**

Cause: Virus scanner settings slow down data access

Modifications in measure files can make your virus scanner program scan the differences in the files. As a result, operation with MDA is subject to substantial delays. There is no possibility to stop this, apart from excluding all MDA data files from virus scanning.

Cause: data files are stored on a network drive

If the data files are stored on a network drive, operation with MDA can be slow due to low network performance (e.g. caused by high network traffic or technical problems on the network). It is recommended that you always store the data files that you use in MDA on a local disk drive.

Cause: the oscilloscope window contain too many signals

Oscilloscope windows with a great number of signals cause very high data processing effort. To limit the required capacity, make sure that you do not use more than 100 signals in the same oscilloscope.

7.2 Problems with Calculated Signals

- 7.2.1 While trying to select calculated signals, the error message appears: "Perl Interface: DllGetEtasDataPath() failed"
-

Cause: No write permission for the required registry folder

Calculated signals can be imported and exported by means of exchange files with the *.xcs extension. The perl interface is used for this purpose.

In order to use the perl interface correctly, you require read and write access to the HKEY_LOCAL_MACHINE\Software\ETAS registry folder.

8 ETAS Contact Addresses

ETAS HQ

ETAS GmbH

Borsigstraße 24

70469 Stuttgart

Germany

Phone: +49 711 3423-0

Fax: +49 711 3423-2106

WWW: www.etas.com

ETAS Subsidiaries and Technical Support

For details of your local sales office as well as your local technical support team and product hotlines, take a look at the ETAS website:

ETAS subsidiaries WWW: www.etas.com/en/contact.php

ETAS technical support WWW: www.etas.com/en/hotlines.php