EURESYS™
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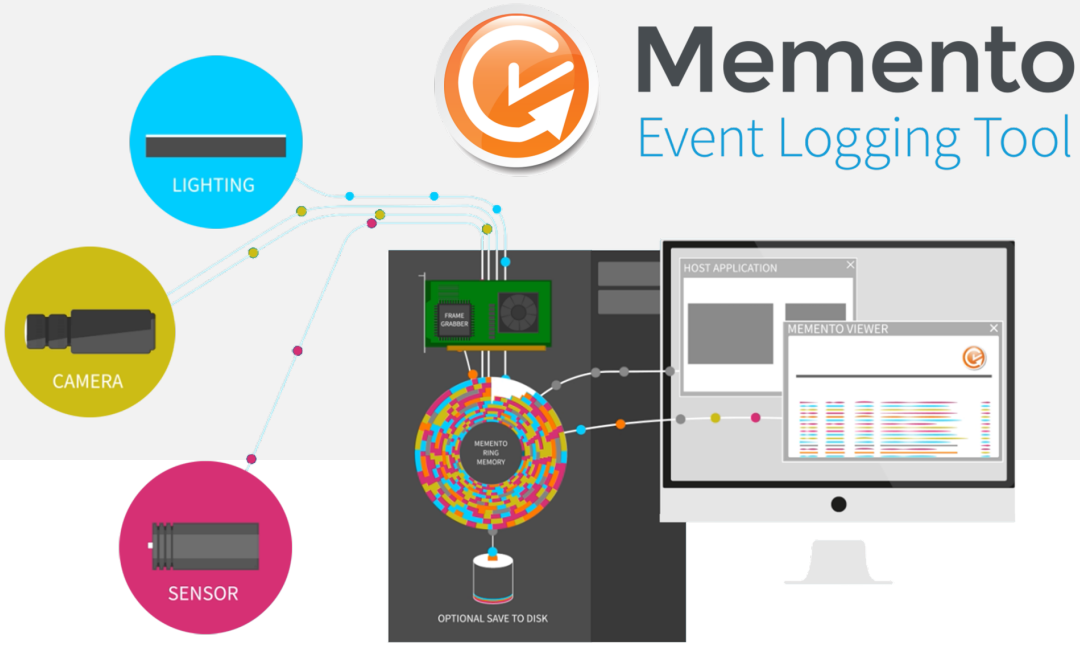
USER GUIDE

Memento

Memento 12.0.0



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This documentation is provided with Memento 12.0.0 (doc build 6019).

Contents

Documentation Updates

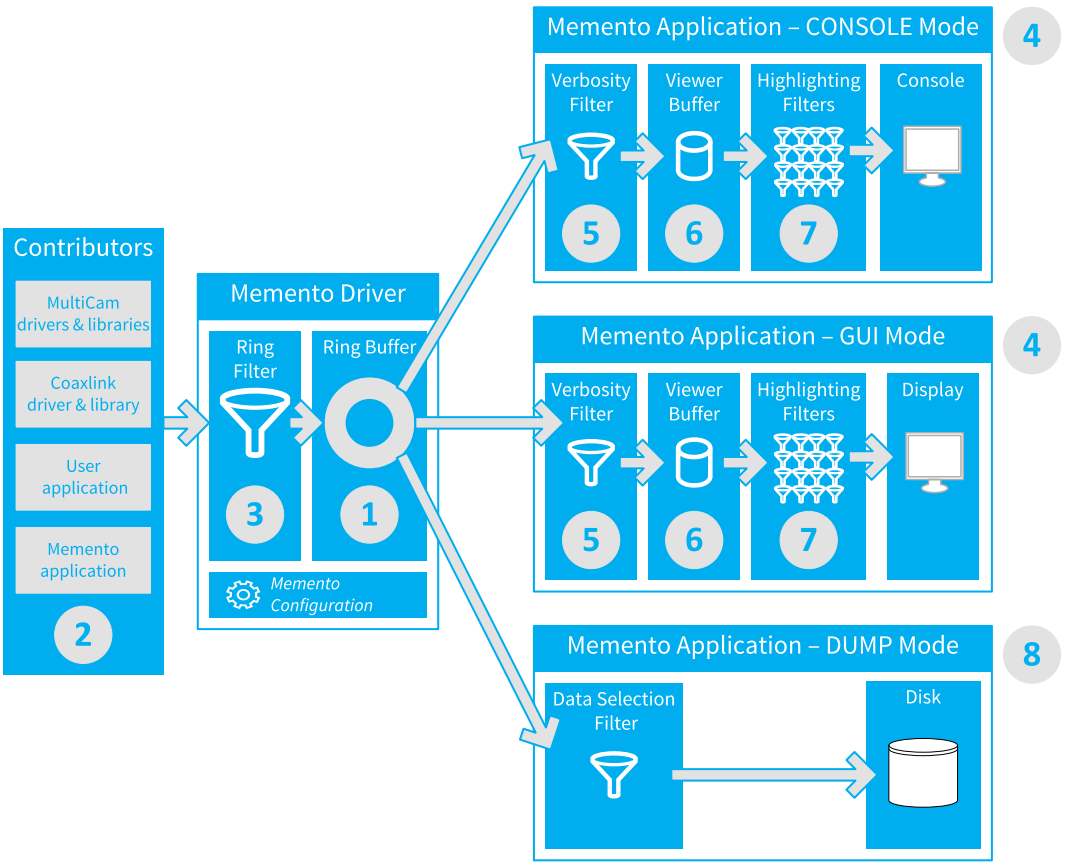
The documentation updates for Memento 12.0.0 are detailed in the table below.

Update description	See section
New option: In the Go Back feature, you can use a filter as a condition to pause the trace extraction.	"Monitoring Earlier Stored Activity" on page 21
Changed behavior: The traces are no longer cleared after a Go Back action.	"Monitoring Earlier Stored Activity" on page 21

1. Memento Presentation

Memento is an advanced system for logging event messages. It greatly facilitates the debugging of machine vision applications using Euresys frame grabbers. It is non-intrusive as the required CPU load is extremely low.

The Memento system is made up of three main components: the Memento driver, the Memento application and the Memento contributor(s).



Memento Function Blocks and Data Flow

The Memento system works as described below and shown on the above schema:

1. The Memento **Ring Buffer** is a common memory space that the Memento driver reserves on the computer and makes it known to the frame grabber drivers and libraries, as well as the user space applications.
2. The Memento **Contributors**, that means the frame grabber drivers and libraries, the user space applications and the Memento application itself, inject event messages - the Memento **Traces** - into the ring buffer.

   They time-stamp the Memento traces using a common time scale – the Memento **Time Scale**.
3. The **Ring Filter**, applied upstream of the ring buffer, allows you to filter the traces written in the ring buffer.
4. The Memento application you can access in **Console Mode or GUI Mode** allows you to view recent and past traces.
5. The **Verbosity Filter**, applied upstream of the Memento application, makes it possible to filter the traces loaded into the Memento **Viewer Buffer**.
6. The Memento **Viewer Buffer** stores the traces that are made available in the Memento application.
7. The *Highlighting Filters*, applied in the Memento application, make it possible to highlight or hide the traces in the Memento application.
8. You can also dump the traces from the ring buffer using the Memento **Dump Mode**. This dump mode is available from the Console or GUI interfaces.

2. Starting Memento

NOTE You will find detailed information on how to set up Memento and perform the initial configuration in the Getting Started guide (D602).

Start adding data to the ring buffer

When the PC hosting the Memento driver is running, the traces start being added to the ring buffer as soon as one of the contributors sends Memento traces to the ring buffer.

As long as past activity is still available in the ring buffer, you will be able to view past traces in the Memento application (GUI or Console mode) even if it was closed when the traces were added.

Start the Memento application

To start the Memento application (graphical user interface), do one of the following actions:

- Click the Memento icon on the desktop.
- Select the application from the **Windows Start Menu > Euresys Memento > Memento**.
- Use the following command line from the Memento console: `memento gui --hide-console`.

Options from the Windows Start menu

From the **Windows Start Menu > Euresys Memento**, you have a quick access to some options to quickly perform a ring buffer configuration or save traces to a dump file:

Command	Description
Record Memento and XPerf traces	This generates a .zip file including the memento dump with all the data currently stored in the ring buffer, as well as the data collected by the Windows Performance Monitoring tools. This option is only relevant on Windows.
Reset Memento to Default Verbosity Level	This resets the ring buffer configuration to the **Default** profile. See Setting up the Driver in the Getting Started guide (D602).

Command	Description
Set Memento to Highest Verbosity Level	This sets the ring buffer configuration to the **Verbose** profile. See Setting up the Driver in the Getting Started guide (D602).
Start Memento Logging	This creates a dump file where all new data added to the ring buffer are stored. See the section Saving Traces (GUI) in the User Guide (D603) and (Console) in the Reference Manual (D604) if you want to define additional parameters for your dump file.

3. Touring the Interface

This section provides an overview on the user interface mode of the **Memento** application.

The Memento application helps you among others to:

- filter traces to display and highlight the most relevant events in your processes.
- search for traces based on their content or their time stamp.
- rapidly spot errors or critical traces on a plot showing the recent activity and on a plot displaying the number of events according to their criticality.
- investigate an issue by analyzing process-related events and state changes displayed as waveforms.
- save traces from the current process to a dump file for further investigation.

3.1. Overview of Memento User Interface

Layout of the Memento user interface

Memento application – GUI mode – Main window

1. **Control Bar**: a set of buttons, check-boxes, text and slider controls.
2. **Activity Plot**: an area showing a graphical representation of the recent activity.
3. **Message Plot**: an area showing a graphical representation of a set of message traces.
4. **Analyzer Plot**: an area showing a graphical representation of process-related waveforms. This area is only displayed when the Analyzer is enabled and open.
5. **Tooltip Area**: a text area showing the message corresponding to the position of the mouse pointer, possibly completed with tooltip data.
6. **Message List**: a table showing a time-ordered list of messages with their attributes.
7. **Status Bar**: statistical and status information.

3.2. Control Bar

Starting from the left side, the Control bar contains the following controls:

Message search controls

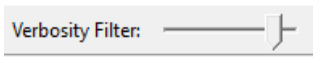
Use this control to search for messages according to the search criteria entered in the **Search** field. The search is applied to the information available in the **Trace** column.

Select the **Aa** check-box for case-sensitive searches.

Select the **RE** check-box for searches based on Perl-like regular expressions.

See the section "Searching for and Finding back Traces" on page 30.

Verbosity slider



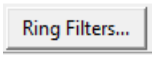
Use this slider to change the verbosity level of the messages to display in Memento. The filter applies to the messages displayed after defining the filtering criteria.

Moving the slider to the right increases the verbosity: more messages are displayed (less critical messages are included).

Moving the slider to the left decreases the verbosity: less messages are displayed (focus on more critical messages).

See the section "Filtering Traces for the Viewer Buffer" on page 49 for detailed information.

Ring filters button

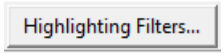


Use this control to view or refine the configuration settings for adding messages into the ring buffer.

The messages that do not meet the filtering criteria will not be added to the ring buffer. In other words, such messages will never appear in the Memento application.

See the section "Filtering Traces in the Ring Buffer" on page 46 for detailed information.

Highlighting filters button

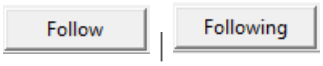


Use this control to modify how traces are displayed in the Memento application (highlighting traces, changing the message font color, hiding traces).

By default, filters 1 to 10 are disabled and filters 11 to 16 are enabled and implement the default highlighting scheme.

See the section "Customizing Trace Display" on page 50 for detailed information.

Follow | Following button



Use this toggle button to control whether the message list is automatically scrolled down.

This function makes it possible to constantly display the most recent messages in the list or not.

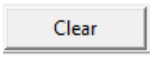
See the section "Monitoring the Activity in Real Time" on page 20 for detailed information.

Run | Pause button

Use this toggle button to control whether the most recent messages are extracted from the ring buffer to fill in the viewer buffer, and consequently whether the Memento application is fed with these new messages from the viewer buffer.

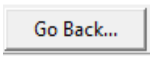
See the section "Monitoring the Activity in Real Time" on page 20 for detailed information.

Clear button



Use this button to clear all messages in the Memento application. This corresponds to clearing the viewer buffer.

Go back button



Use this button to go back in time and display older messages in the Memento application. Going back automatically clears the viewer buffer before reloading it with old messages still available in the ring buffer.

See the section "Monitoring the Activity in Real Time" on page 20 for detailed information.

Menu button

Click this button to access the following functions:

- **Clear search history** to clear the history of the search strings in the **Search** field.
- **Clear all user preferences** to clear the history of all user preferences (verbosity filter, layout preferences, etc.). The ring filter and highlighting filters are not reset with this control.
- **Clear Analyzer preferences** to clear the Analyzer configuration.
- **Clear history before bookmark** to clear the message list before the selected bookmark.

  See also "Administration Tools" on page 68 for more information on the four functions above-mentioned.
- **Dump Memento data to file...** to dump the content of the ring buffer to a file.
- **Dump Memento section between bookmarks** to dump the content of the ring buffer between the time stamps of the selected bookmarks.
- **Dump Memento selection to file** to dump the content of the ring buffer between the time stamps of the first and last selected messages.

  See "Saving Traces" on page 60 for more information on the three functions above-mentioned.
- **Inject current time trace** to inject a UTC time trace into the ring buffer.

  See "Using Time Information" on page 66.

- **Reload Trace Definition** to reload the trace dictionary used for mapping the trace references stored in the ring buffer with the actual trace description displayed in the Memento application.

  See "Administration Tools" on page 68.

- **Enable analyzer** to extract the Analyzer traces to the viewer buffer and give access to the Analyzer controls in the Memento application.
- **Open analyzer** to open the Analyzer Configurator and Analyzer Plot area. Only displayed when the **Enable Analyzer** option is selected.
- **Show analyzer traces** to add Analyzer traces in the message list that correspond to the events displayed in the Analyzer plot area.

  See "Activating the Analyzer" on page 35 and "Configuring Traces for Analysis" on page 38 for more information on the Analyzer module.

- **About** to view the version number of Memento.

3.3. Activity Plot

The **Activity Plot** area of the Memento application shows the recent message logging activity as a graph:

Horizontal axis

The horizontal axis of the activity plot represents the time. The axis has a **fixed scale** and subdivided with major divisions of 1 minute and minor divisions of 2.5 seconds.

The major divisions are labeled with the Memento time value. The time value represents the time elapsed since you have started the Memento application.

The activity plot shows the activity in the last seven minutes. The rightmost end of the time scale is the current time.

Vertical axis

The vertical axis of the activity plot represents the number of messages per second that are effectively logged into the Memento ring buffer.

The axis is a logarithmic scale covering five decades:

- The first horizontal grid line is at 10 events per second
- The second horizontal grid line is at 100 events per second
- …

Plot display

The plot display is composed of trace dots or lines. The dot or line color reflects the severity level of the logged messages:

- The green color represents logged messages that are less critical than **Notice**.
- The yellow color represents **Notice** messages.
- The orange color represents **Warning** messages.
- The red color represents logged messages that are more critical than **Warning**.

You can click the activity plot to plot messages close to that point in time in the message plot. This allows you to investigate errors appearing in red in the activity plot area.

Activity monitoring mode

The activity plot has two operation modes available by right-clicking the activity plot area:

- **Accurate Activity Monitoring Mode** (Default mode)

  This mode takes into account the verbosity level of messages to generate the activity plot. Consequently the notice, warning and more critical messages are represented respectively by yellow, orange or red dots in the plot.

- **Fast Activity Monitoring mode**

  This mode does not analyze the verbosity level of messages to generate the activity plot. Consequently the plot is only represented as a green line, no matter how critical they are. This mode can be useful if you need to alleviate the CPU workload.

3.4. Message Plot

The **Message Plot** area of the Memento GUI gives a time plot representing a set of message traces.

Horizontal Axis

The horizontal axis of the message plot represents the time. The axis has a variable scale with adaptive major and minor divisions.

Vertical Axis

The vertical axis of the message plot represents the verbosity level: the messages are represented according to their verbosity level on the various horizontal lines displayed in the message plot.

- Messages with the highest verbosity level (Verbose) - the least critical - are represented on the first level from the bottom.
- Messages with the lowest verbosity level (Critical) - the most critical - are represented on the seventh level from the bottom.

Message Symbols

A message is represented by the symbol **=**. The symbol color matches the background color settings defined in the **Highlighting Filters**.

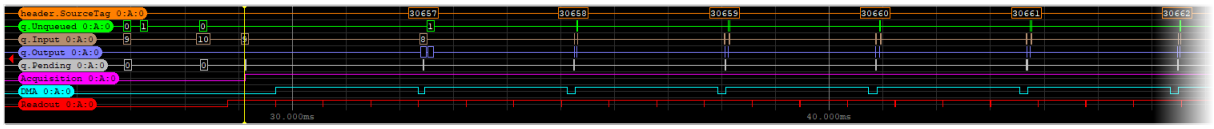
The portion of the message plot represented below shows:

- First several **Debug** messages (2nd level from bottom) and **Info** messages (3rd level from bottom) have been issued at the same time as an **Error** message in red (6th level from bottom).
- Straight after these messages, a **Debug** and **Info** messages were issued at the same time as a **Warning** message in orange (5th level from the bottom).

3.5. Analyzer Plot

The **Analyzer Plot** area of the Memento application displays waveforms corresponding to specific types of events you want to analyze.

Once you have selected these types of events in the Analyzer configuration, the corresponding waveforms are displayed in the Analyzer plot.



Horizontal axis

The horizontal axis of the Analyzer plot represents the time. The axis has a **variable scale** with adaptive major and minor divisions.

Vertical Axis

The vertical axis of the Analyzer plot shows the waveforms selected in the Analyzer configuration.

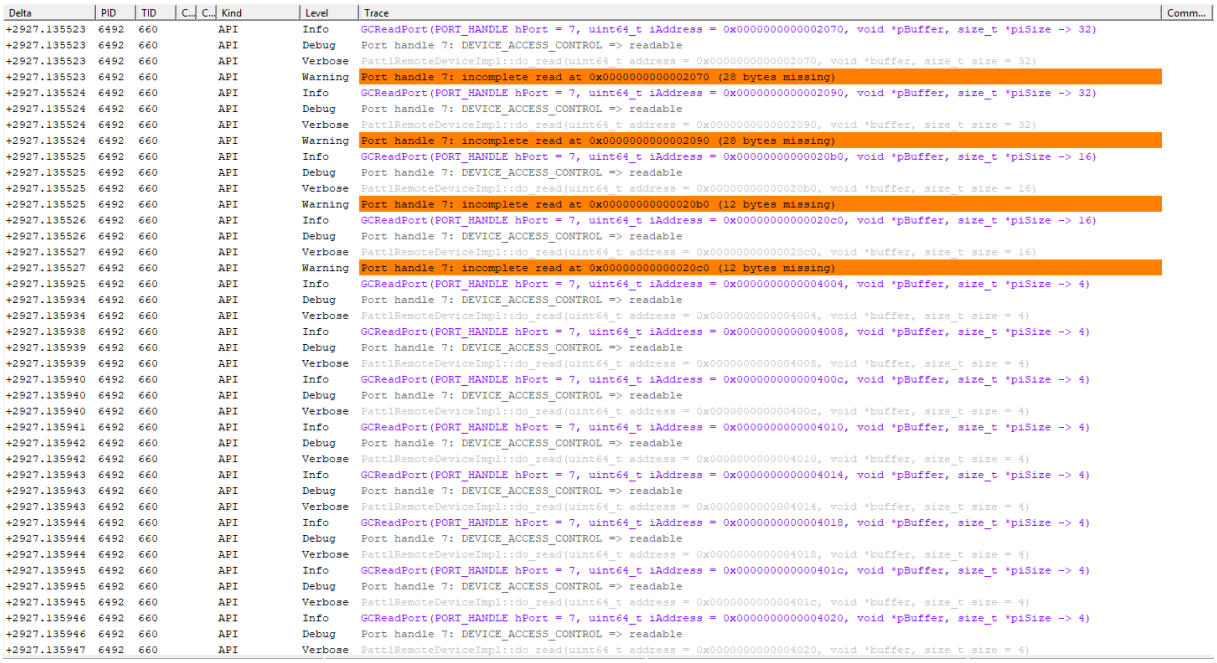
For the waveforms selected in the Analyzer configuration, the following information is displayed:

- the name of the waveforms on the left, and the reference to the related frame grabber card, connector and possibly stream.
- the waveform displaying the occurred events (Analyzer traces). These events can belong to one of the following types:
  - Process start (level up)
  - Process reset (level down)
  - Counter (calculated value)

3.6. Message List

The **Message List** area of the Memento GUI displays a time-ordered list of messages.

The message list is represented as a table with one row per message, and several columns including the message-related data fields.



Delta	PID	TID	C...	C...	Kind	Level	Trace	Comm...
+2927.135523	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000002070, void *pBuffer, size_t *piSize -> 32)	
+2927.135523	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135523	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000002070, void *buffer, size_t size = 32)	
+2927.135523	6492	660			API	Warning	Port handle 7: incomplete read at 0x0000000000002070 (28 bytes missing)	
+2927.135524	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000002090, void *pBuffer, size_t *piSize -> 32)	
+2927.135524	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135524	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000002090, void *buffer, size_t size = 32)	
+2927.135524	6492	660			API	Warning	Port handle 7: incomplete read at 0x0000000000002090 (28 bytes missing)	
+2927.135525	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x00000000000020b0, void *pBuffer, size_t *piSize -> 16)	
+2927.135525	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135525	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x00000000000020b0, void *buffer, size_t size = 16)	
+2927.135525	6492	660			API	Warning	Port handle 7: incomplete read at 0x00000000000020b0 (12 bytes missing)	
+2927.135526	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x00000000000020c0, void *pBuffer, size_t *piSize -> 16)	
+2927.135526	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135527	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x00000000000020c0, void *buffer, size_t size = 16)	
+2927.135527	6492	660			API	Warning	Port handle 7: incomplete read at 0x00000000000020c0 (12 bytes missing)	
+2927.135925	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004004, void *pBuffer, size_t *piSize -> 4)	
+2927.135934	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135934	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004004, void *buffer, size_t size = 4)	
+2927.135938	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004008, void *pBuffer, size_t *piSize -> 4)	
+2927.135939	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135939	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004008, void *buffer, size_t size = 4)	
+2927.135940	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x000000000000400c, void *pBuffer, size_t *piSize -> 4)	
+2927.135940	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135940	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x000000000000400c, void *buffer, size_t size = 4)	
+2927.135941	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004010, void *pBuffer, size_t *piSize -> 4)	
+2927.135942	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135942	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004010, void *buffer, size_t size = 4)	
+2927.135943	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004014, void *pBuffer, size_t *piSize -> 4)	
+2927.135943	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135943	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004014, void *buffer, size_t size = 4)	
+2927.135944	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004018, void *pBuffer, size_t *piSize -> 4)	
+2927.135944	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135944	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004018, void *buffer, size_t size = 4)	
+2927.135945	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x000000000000401c, void *pBuffer, size_t *piSize -> 4)	
+2927.135945	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135945	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x000000000000401c, void *buffer, size_t size = 4)	
+2927.135946	6492	660			API	Info	GCReadPort(PORT_HANDLE hPort = 7, uint64_t iAddress = 0x0000000000004020, void *pBuffer, size_t *piSize -> 4)	
+2927.135946	6492	660			API	Debug	Port handle 7: DEVICE_ACCESS_CONTROL => readable	
+2927.135947	6492	660			API	Verbose	PattlRemoteDeviceImpl::do_read(uint64_t address = 0x0000000000004020, void *buffer, size_t size = 4)	

Data Fields

The following data fields can be displayed in the message list:

- **Seq**: the sequential number assigned by Memento when a message is entering the Memento ring buffer
- **Time**: the time attribute value assigned by the message contributor and expressed in seconds with 6 decimals
- **Delta**: the time offset relative to the user-defined time reference; the value is expressed in seconds with 6 decimals

- **PID**: the Process ID attribute value optionally assigned by the message contributor
- **TID**: the Thread ID attribute value optionally assigned by the message contributor
- **Card**: the Card ID attribute value optionally assigned by the message contributor
- **Connector**: the Connector ID attribute value optionally assigned by the message contributor
- **Stream**: the Stream ID value optionally assigned by the message contributor
- **Level**: the Level attribute value assigned by the message contributor
- **Kind**: the Kind attribute value assigned by the message contributor
- **Trace**: the text of the message body
- **Comment**: a user-editable data field

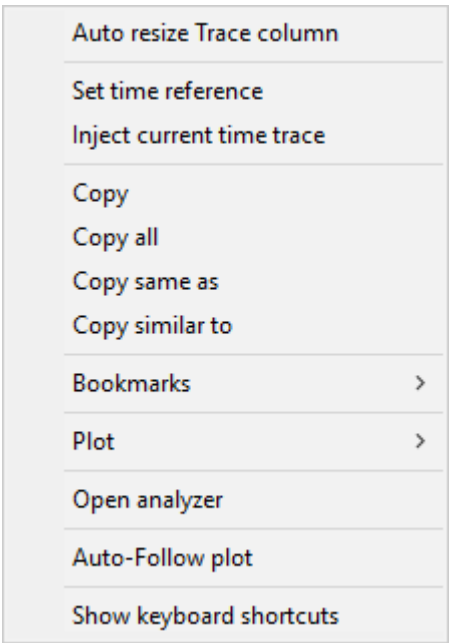
Display or hide a column

- To display a field, right-click the column headers and select the field you want to display.
- To hide a field, right-click the column headers and deselect the field you want to hide.

You cannot modify the column order.

Context menu

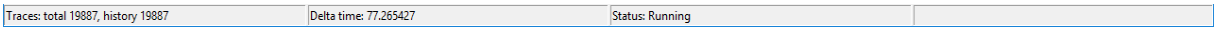
The following context menu appears when right-clicking in the message list:



- **Auto resize Trace column**: resizes automatically the **Trace** column to best fit the content. Select to enable the option: a check mark is displayed in front of the menu option.
- **Set time reference**: sets the time reference +0:000000 on the current message in the **Delta** field. See "Using Time Information" on page 66.

- **Inject current time trace**: injects a message containing the UTC time and date in the ring buffer. See "Using Time Information" on page 66.
- **Copy**: copies the content of the selected message to the clipboard. See "Saving Traces" on page 60.
- **Copy all**: copies the content of all messages to the clipboard. See "Saving Traces" on page 60.
- **Copy same as**: copies to the clipboard the content of all messages with the same description in the **Trace** column as the currently selected message. See "Saving Traces" on page 60.
- **Copy similar to**: copies to the clipboard the content of all messages with a similar description in the **Trace** column as the currently selected message. See "Saving Traces" on page 60.
- **Bookmarks**: gives access to the controls related to bookmarks (create, clear, jump to, select). See "Defining Bookmarks" on page 33.
- **Plot**: allows you to represent selected messages in the message plot. See "Browsing Through Traces" on page 27.
- **Open Analyzer**: allows you to extract the Analyzer traces to the viewer buffer and give access to the Analyzer controls in the Memento GUI. See "Activating the Analyzer" on page 35.
- **Analyze**: gives access to Analyzer controls from the message list when the Analyzer functionality is enabled and configured. See "Using Analyzer Tools" on page 42.
- **Auto-Follow plot**: shifts the message plot, without changing the zoom, to show the time frame where the selected message is displayed. See "Searching for and Finding back Traces" on page 30.
- **Show keyboard shortcuts**: opens the summary page with the list of keyboard shortcuts available in the Memento GUI.

3.7. Status Bar



The **Status Bar** area of the Memento application displays:

- **Traces: total #** The total number of Memento traces that have been extracted to the viewer buffer.
- **Traces: history #** The number of Memento traces that are currently available in the viewer buffer.
- **Delta time** The time difference between the selected message and the time reference. This value is also displayed in the delta column of the message list.
- **Status** The operating status – Running or Suspended – of the Memento application.

4. Monitoring the Activity

You can monitor traces in real-time as they are added to the ring buffer, check older traces still available in the ring buffer or analyze traces dumped to a log file.

The actions described in this chapter are also valid for message traces and Analyzer traces. Otherwise, this is specified. See chapter "Analyzing Events" on page 35 for analyzing operations specific to Analyzer traces.

4.1. Monitoring the Activity in Real Time

Default behavior

When you open the Memento application, the traces currently being added to the ring buffer automatically start being extracted to the viewer buffer.

By default, the Memento traces are therefore instantly made available in the Memento application and the most recent traces are displayed at the bottom of the message list.

This allows you to directly monitor the system activity in real time in the Memento application.

You can change the default behavior using the options **Follow/Following** and **Pause/Run** available in the Control bar.

NOTE
The operations of injecting traces to the ring buffer, extracting traces to the viewer buffer and displaying traces in the Memento application are based on default filtering criteria applied to traces. These filters are configurable at these three levels: injection, extraction and display. To change the filtering criteria, refer to section "Setting up Trace Display" on page 46.

Enable/Disable trace update

- Set the **Run/Pause** button to **Pause** (enabled) to continuously extract the messages from the ring buffer into the viewer buffer: the message list is dynamically updated with new messages and the time is running out in the activity plot. This is the default behavior, which allows real time activity monitoring.
- Set the **Run/Pause** button to **Run** (disabled) to stop extracting messages from the ring buffer and filling in the viewer buffer: the message list is not updated and the time is stopped in the activity plot.

Display automatically most recent traces

- Set the **Follow/Following** button to **Following** (enabled) when you want Memento to automatically scroll to the end of the message list and always display the most recent traces.

  This is the default behavior. As soon as you click a trace in the message list, the option however shifts to **Follow** to keep the focus on the selected message.

- Set the **Follow/Following** button to **Follow** (disabled) when you do not want to change the current display of messages.

  To display the most recent messages in this mode, you need to scroll manually to the end of the message list.

This option is mainly relevant when the **Run/Pause** option is set to **Run**.

4.2. Monitoring Earlier Stored Activity

Introduction

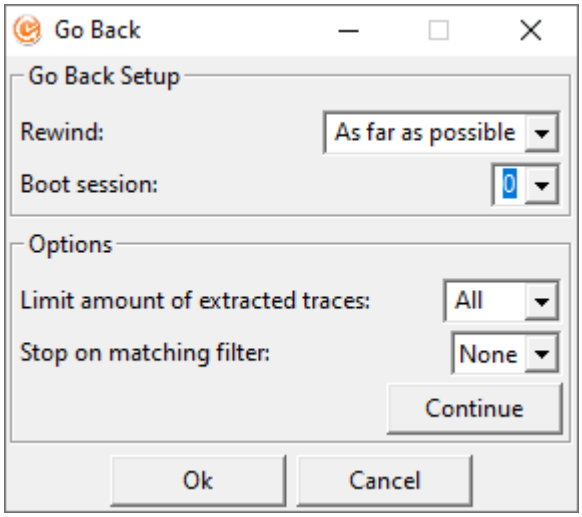
If a problem occurred some minutes ago in the production process, you can rapidly find back the related traces and load them in the Memento application, as long as the traces are available in the ring buffer. The **Go Back** function makes it possible to define the traces you want to extract to the viewer buffer and load into the Memento application.

NOTE
The extraction process by the viewer buffer and the actual display in the Memento application are based on default filtering criteria. If you want to extract and/or display more or less information in the Memento application when you perform a **Go Back**, you need to change the **Verbosity** filter and/or **Highlighting** filters before you perform a **Go Back** action. See section "Setting up Trace Display" on page 46.

Go back to earlier stored traces

1. Click the **Go Back** button.

   The **Go Back** dialog box appears:



2. In the Go Back Setup area, configure the Go Back action:
   - In the **Rewind** field, select how far in time or in positions from the most recent trace (in the specified boot session) you want to rewind in the ring buffer.
   - In the **Boot session** field, select the Memento driver boot session (0=current, 1= previous, ...) that you want to extract traces from. This is only relevant with a Windows OS.

   See Go Back setup options for more detailed information.

3. In the Go Back Options area, specify options for the Go Back action:
   - In the **Limit amount of extracted traces** field, select the number of traces (in the specified boot session) you want to view starting from the rewound position.
     The trace extraction will be paused each time the defined amount of traces has been extracted.
   - In the **Stop on matching filter**, select the highlighting filter you want to use as a condition to pause the trace extraction.
     The trace extraction will be paused each time the condition defined in the highlighting filter is met.

4. Click **OK**.

The message list is cleared, then filled in with the traces matching the **Go Back** definition.

If a Go Back option has been defined, the trace extraction is paused when one of the options is met. Click **Run** to resume the trace extraction.

The message plot display is not modified. To get the overview on all traces extracted with the **Go Back** option in the message plot, right-click in the message list and select **Plot** > **All**.

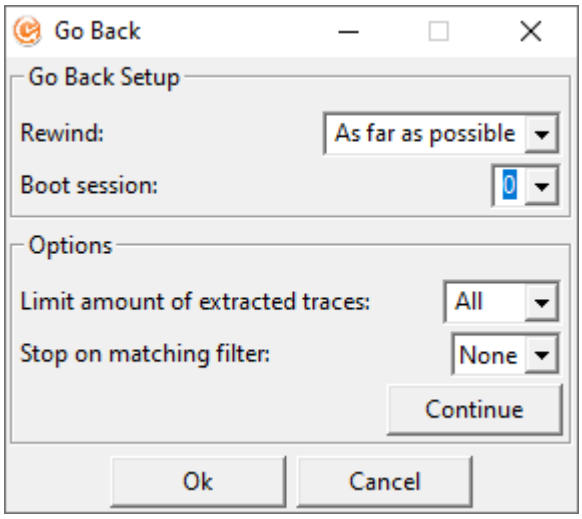
TIP

If you go back **as far as possible** in the ring buffer and extract **all** traces to the viewer buffer, all extracted traces might not be displayed in the message list as the number of displayed traces depends on the maximum capacity of the viewer buffer.

The data extraction mechanism indeed fills in the viewer buffer until the most recent traces are displayed. As a consequence, the oldest messages will not be displayed in the message list if the number of messages to be displayed exceeds the maximum capacity of the viewer buffer.

It is therefore recommended to limit the amount of extracted traces if you want to be sure to display the messages from the rewound position.

Go Back setup and options



Memento application – GUI mode – Go Back dialog box

Go Back setup

Rewind

This determines the time frame or number of positions to rewind in the Memento ring buffer before starting to extract data.

Possible values are:

Value	Description
As far as possible	Rewind as far as possible within the data of the specified boot session.
1ms, 1s, 10s, 1m, 1m30s, 10m, 1h	Rewind 1 ms, 1s, etc. in time compared to the most recent trace in the specified boot session.

Value	Description
10, 100, 1000, 10000, 100000	Rewind 10, 100, etc. positions compared to the most recent trace in the specified boot session.

Boot session

This specifies the number of boot sessions to rewind to. This is only relevant in Windows.

Possible values are:

Value	Description
0	Current boot session. Default setting.
1, 2, 3 …	Previous boot sessions, 1 being the more recent session (if still available in the ring buffer).

Go Back options

Limit amount of extracted traces

This option specifies how many messages are to be extracted starting from the rewound position in the Memento ring buffer.

By default, all traces of the specified boot session are extracted.

Stop on matching filter

This option specifies the highlighting filter to be used as a condition to pause the trace extraction.

To be used in the Go Back option, the highlighting filter has to be defined in the Highlighting Filters dialog box (See section "Customizing Trace Display" on page 50) but does not have to be enabled. This option therefore works independently from the standard use of highlighting filters.

Continue button

It allows you to change one of the options and to continue the trace extraction without clearing all messages in the message list.

4.3. Loading Traces from a Dump File

Introduction

If you have previously saved the traces added to the ring buffer to a dump file, you can load the dump file in the Memento application to view the saved data.

See the section "Saving Traces" on page 60 for detailed information on saving traces to a dump file.

Load traces from a dump file

- Double-click the dump file and it will directly open in a new instance of the Memento application.

NOTE
You can open a dump file that data is still being added to. In this case, the Memento application will load the data available in the dump file when it was opened. The data is not automatically refreshed. To view the most recent data from the dump file, close the Memento application and reopen the dump file in a new instance of the Memento application.

5. Looking for Traces

This chapter describes all standard actions that will help you find back the traces relevant for your investigations:

- focus on events in a specific time frame in the plot areas
- find back information in the message list based on a search
- adding bookmarks in the message list to easily identify given traces, etc.

5.1. Overview of Trace Display in Plots

Each message or Analyzer trace in the message list is represented visually in the message or Analyzer plot.

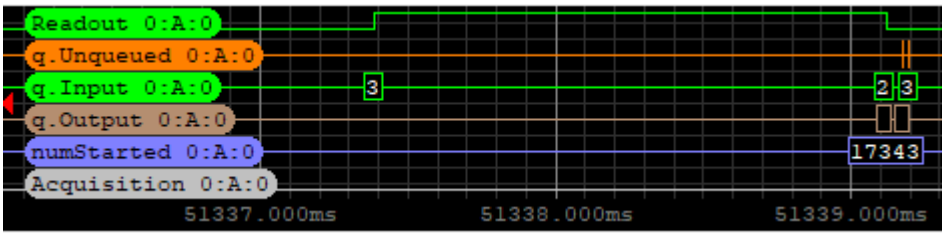
Message trace display in the message plot

- The symbol = represents one or more message traces in the message plot depending on the applied zoom.
- The symbols are displayed on horizontal lines. Each line corresponds to a verbosity level.
- The first line at the bottom represents the lowest verbosity level (verbose), the second line represents the next verbosity level (debug), and so on up to the highest verbosity level (critical).
- The symbols inherit the colors defined in the **Highlighting Filters** for the given verbosity level. This corresponds to the font color in the message list.

See also "Message Plot" on page 15.

Analyzer trace display in the Analyzer plot

- Start trace: the waveform moving up one level indicates the corresponding process starts.
- Reset trace: the waveform moving down one level indicates the corresponding process stops.
- Counter trace: a vertical line, an empty rectangle or a value (depending on the zoom level) displayed on a waveform means a value is issued in the corresponding process.



See also "Analyzer Plot" on page 16.

5.2. Browsing Through Traces

Zoom in the plot

This procedure allows you to zoom in and out by changing the timescale in the message plot (or Analyzer plot) in a general way.

1. Hover over the requested position in the message plot.
2. Rotate the mouse wheel up to zoom in and down to zoom out.

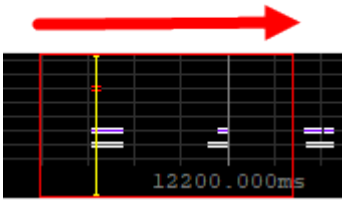
To zoom faster, press **CTRL** and rotate the mouse wheel as described in step 2.

Zoom on a specific portion of the plot

This procedure allows you to zoom in onto a specific portion of the message plot (or Analyzer plot).

1. On the message plot, right-click the position you will start zooming from.
2. Drag the mouse to the right up to the position you want to stop zooming.

As you drag, a red rectangle is displayed showing the portion to be zoomed on:



When you release the mouse, the zoomed portion is stretched to the whole plot area.

Repeat this action to dig more precisely in the message plot or Analyzer plot.

Shift the time frame in the plot

When traces are available on the left or right of the time frame displayed in the message plot, a red arrow appears on the left border or right border of the message plot (or Analyzer plot).

- In the message plot, click and drag to the left or right to change the displayed time frame keeping the same zoom level.

Move up and down in the message list

Move rapidly up and down in the message list with the standard shortcut keys:

- **PAGE UP** to move up in the message list and display the previous set of messages.
- **PAGE DOWN** to move down in the message list and display the next set of messages.
- **HOME** or **G** to move to the top of the message list.
- **END** to move to the bottom of the message list.
- **SHIFT + G** to move to the bottom of the message list and set the **Follow/Following** option to **Following**.

Display the plot for a set of traces

You can generate a plot corresponding to **all traces** of the current boot session, to the **traces displayed** in the message list or to a **selection of traces**.

The procedures below describe the various ways to plot message traces in the message plot. Similar controls are available to build graphs of Analyzer traces in the Analyzer plot.

Plot all traces of the current boot session

- Right-click in the message list and select **Plot > All** from the context menu.

The number of traces displayed is limited to the maximum capacity of the viewer buffer.

Plot the traces displayed in the message list

- Right-click in the message list and select **Plot > View** from the context menu.

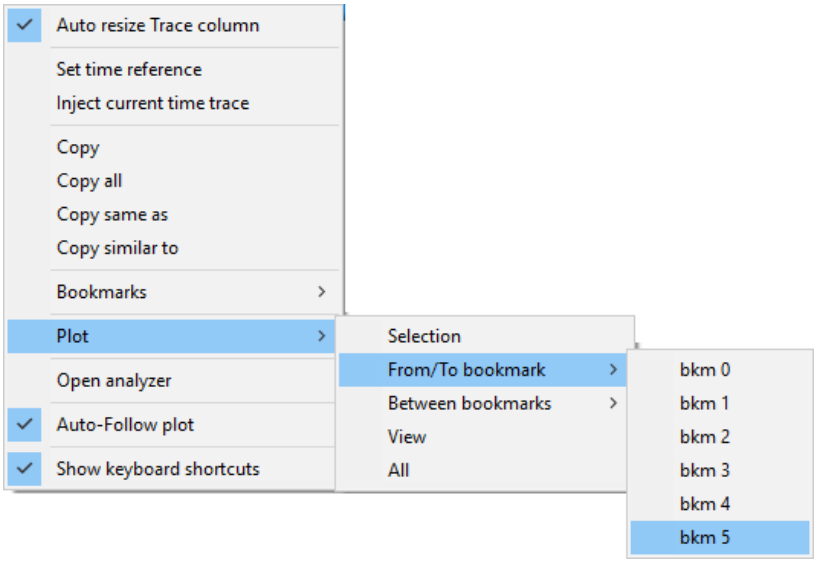
Plot traces selected in the message list

1. Select the first message in the message list.
2. Scroll to the last message of your selection.
3. Simultaneously press **SHIFT** and click the last message to select all messages between the first and the last.
4. Right-click the message list and select **Plot > Selection** from the context menu.

Plot traces between a selected message and a bookmark

This option is only available when at least one bookmark has been defined. See "Defining Bookmarks" on page 33.

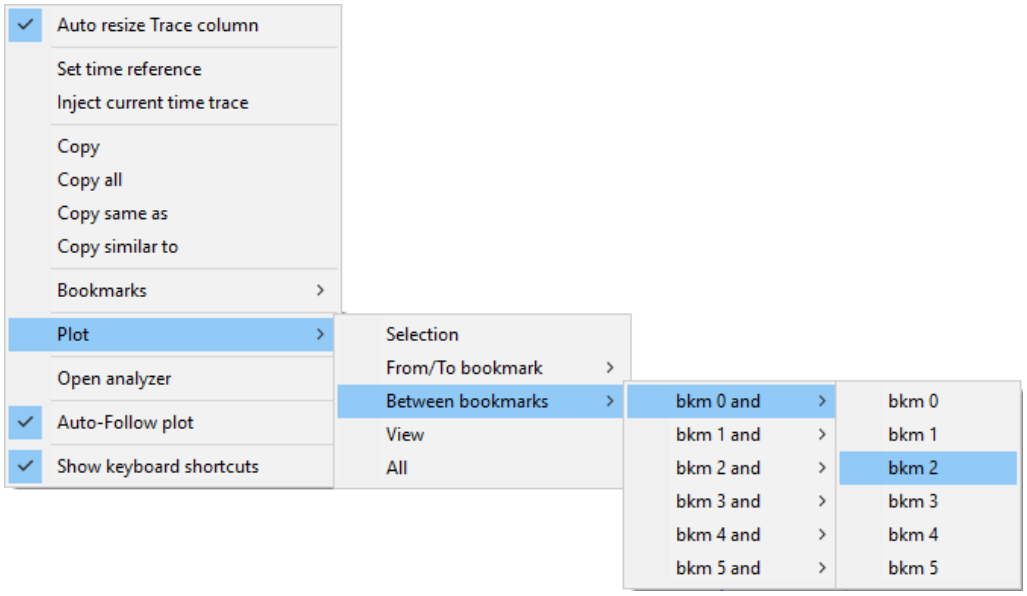
1. Click the message that you want to view the plot from/to.
2. Right-click, then select **Plot > From/To bookmark** and the requested bookmark name.



Plot traces between two bookmarks

This option is only available when two bookmarks have been defined. See "Defining Bookmarks" on page 33.

- Right-click in the message list, select **Plot > Between bookmark** and the boundary bookmarks in the subentries of the context menu.



NOTE
To build graphs of Analyzer traces, proceed similarly using the **Analyze** item in the context menu of the message list, and the corresponding subitem.

5.3. Searching for and Finding back Traces

Search for traces based on the Trace field content

To search for messages including a specific text string in the **Trace** column, proceed as follows:

1. Click the **Search** field in the Control bar and type the requested text string.
2. When applicable, select one of the search options:
   - **Aa check-box** to take into account the upper and lower cases in the entered text string.
   - **RE check-box** to specify you have used the Perl-like regular expression syntax in the **Search** field.
3. To search for the entered string,
   - press **F3** to search down.
   - press **SHIFT + F3** to search up.

Speed up your searches using keyboard shortcuts

The following shortcuts are available to speed up the search process:

In order to ...	Proceed as follows:
To enable the **Search** field ...	Press **/**.
To copy a trace from the message list to the **Search** field ...	Select the trace in the message list and press **Y**.
To repeat the last search you performed in the message list ... This does not necessarily corresponds to the last search criteria entered in the **Search** field.	Press **F3** or **N** to search down in the message list. Press **SHIFT+F3** or **SHIFT+N** to search up in the message list.

Search for traces having identical or similar content

When you identify a specific trace and want to find back other traces having the same or a similar description in the **Trace** field, or the same kind, level, PID or TID, you can perform such searches directly in the message list, without using the **Search** field.

By traces having a similar description in the **Trace** field, we mean traces having the same fixed frame but possibly different values for the optional arguments.

1. In the message list, identify the message having the content (value in Trace, Kind, Level, PID or TID field) you want to search for.
2. In this message, click the field with the value you want to search for.
3. Press the following keyboard or keyboard combination:
   - To search **downwards** for traces having the **same** content, press **J** (or ***** in the numeric pad).
   - To search **upwards** for traces having the **same** content, press **SHIFT + J** (or **SHIFT + *** in the numeric pad).
   - To search **downwards** for traces having a **similar** content, press **S** (or **-** in the numeric pad).
   - To search **upwards** for traces having a **similar** content, press **SHIFT + S** (or **SHIFT + -** in the numeric pad).

Find back bookmarked traces

When you have assigned bookmarks to traces, you can easily find such traces back in one of the following ways. See "Defining Bookmarks" on page 33.

The bookmark names are specified in the **Comment** column.

- In the message list, right-click and select **Bookmarks > Jump to** and the bookmark name.
- In the **Search** field, type the bookmark name or part of it and press **F3**.

Find back a trace from the message list in the plot

To directly find back, in the message plot (or Analyzer plot), a trace you have identified in the message list, proceed as follows:

1. In the message list, right-click and enable the option **Auto-Follow plot**.
2. In the message list, click the trace you want to find back in the plot.

The current position marker (yellow vertical bar) is displayed in the plot area to represent the position of the selected message.

If necessary, the message plot shifts to show the relevant time frame.

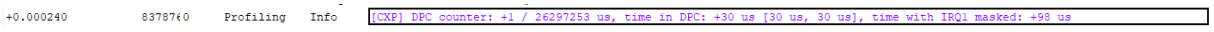
> **NOTE**
> Enabling the **Auto-Follow** option might degrade the performances when many traces are generated. It is therefore recommended to disable the option when you do not need it.

Find back a trace from the plot in the message list

To directly find back, in the message list, a trace you have identified in the message plot (or Analyzer plot), proceed as follows:

- Press **CTRL** and click on the trace symbol in the plot area.

In the message list, the **Trace** field of the corresponding trace is displayed in a black frame:



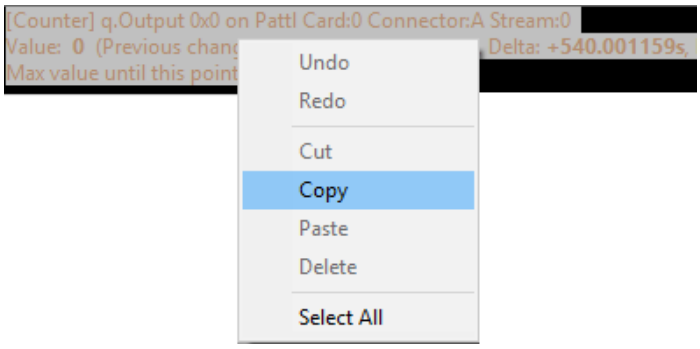
Copy a tooltip to the clipboard

The Tooltip area displays the information corresponding to the mouse cursor position. It is thus dynamically updated.

1. Position the mouse cursor on the requested trace in the message plot.

   The corresponding tooltip is displayed in the Tooltip area.

2. Press **SHIFT** to freeze the tooltip message in the Tooltip area.
3. Drag the mouse cursor to select the tooltip text.
4. Right-click and select **Copy** from the context menu.



The tooltip text has been added to the clipboard. You can paste it wherever you want.

5.4. Defining Bookmarks

Bookmark Use

Once bookmarks are created, they will help you perform a series of actions:

- Find bookmarked traces
- Plot traces using bookmarks as start and/or end boundaries
- Create a dump file of traces between bookmarks
- Display time interval between two bookmarks

etc.

> **WARNING**
> Bookmarks are lost when you close the **Memento** application.

Add a bookmark

1. In the message plot, select the trace you want to add a bookmark to.
2. Do one of the following actions:
   - Right-click and select **Bookmarks > Toggle**.
   - Press **F4**.

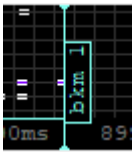
In the message list:

- The bookmarked trace is highlighted on a light blue background.
- A default bookmark name is added in the **Comment** column for this trace.

  The default bookmark name **bkm X** where X is a incremented number starting from 0

In the message plot:

- The bookmarked trace is represented by a blue marker with the default bookmark name.



Clear bookmarks

Clearing a bookmark disables the bookmark so that it is no longer highlighted in the message list nor displayed in the message plot. It is no longer available in the various options where you can use them.

Clearing a bookmark does not remove the default bookmark name in the **Comment** column. You need to clear the name manually in the **Comment** column.

To clear all bookmarks

- Right-click in the message list and select **Bookmarks > Clear all**.

To clear a single bookmark

1. Select **Bookmarks > Jump** and the bookmark name.
2. Press **F4** or select **Bookmarks > Toggle**.

Edit the bookmark name

When created, the Memento application assigns a default name to each bookmark: **bkm** followed by an incremented number.

To edit the bookmark name, proceed as follows:

- In the message list, click the bookmark name in the **Comment** column and type the requested name.

6. Analyzing Events

This chapter explains how to enable, configure and use the Analyzer functionality in the **Memento** application.

6.1. Activating the Analyzer

Introduction

Thanks to the **Analyzer** functionality, events and state changes in the various steps of the digital image acquisition process can be represented as waveforms in a specific **Analyzer plot**, below the message plot.

By default, the Analyzer functionality is not active in the Memento application. You need to enable and configure it as described below:

1. From the **Menu** button, select **Enable analyzer** to allow the extraction of the Analyzer traces to the viewer buffer and give access to the Analyzer controls in the Memento application.
2. From the **Menu** button, select **Open analyzer** to open the Analyzer Configurator window and the Analyzer plot in the main window.
3. In the Analyzer Configurator, define which Analyzer waveforms you want to display in the Memento application. See "Configuring Traces for Analysis" on page 38.

   When the Analyzer has been configured, the selected Analyzer waveforms appear in the Analyzer plot.
4. From the **Menu** button, select **Show analyzer traces** to show, in the message list, Analyzer traces that correspond to the events displayed in the Analyzer plot area.

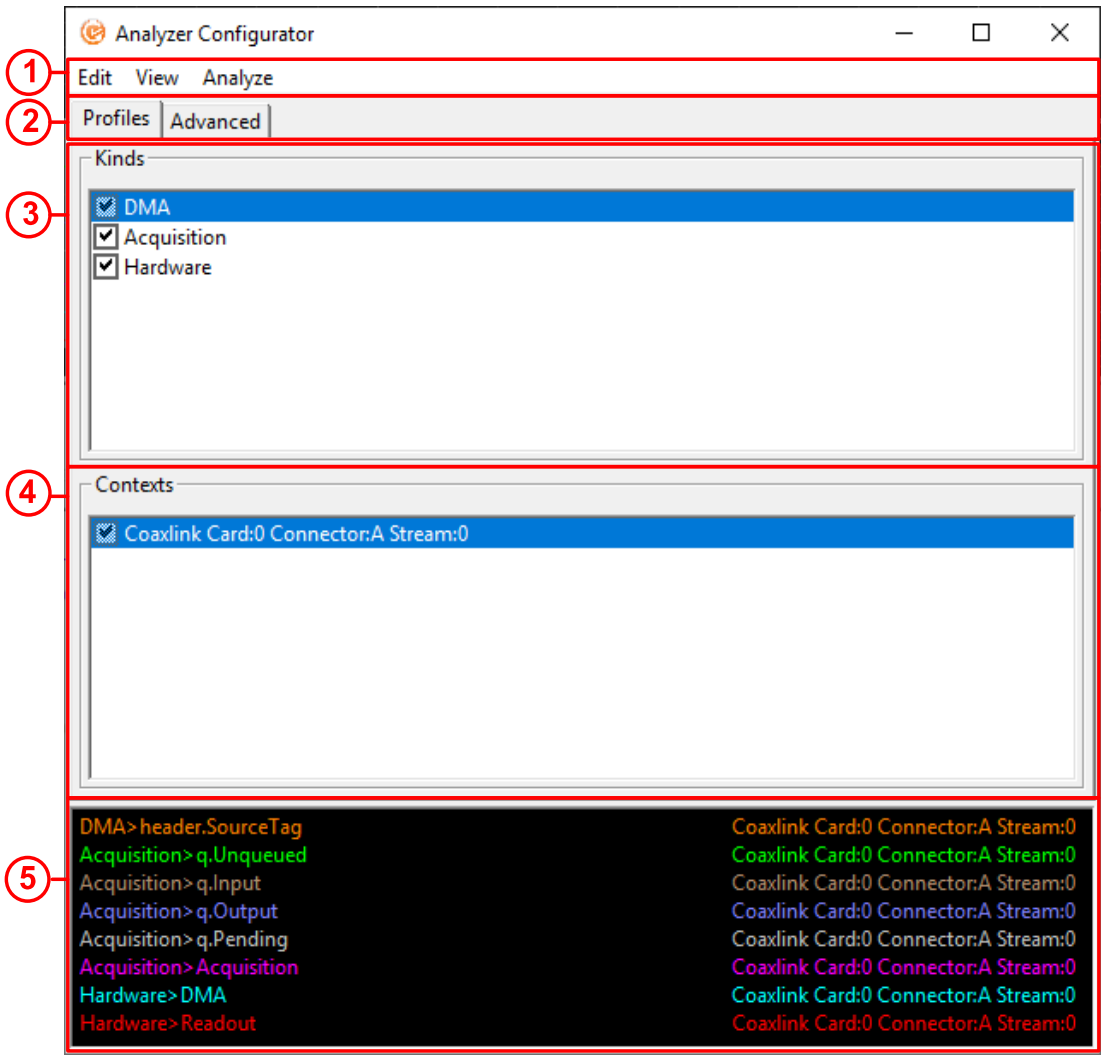
   The Analyzer traces will be displayed in the message list for all the events that will occur after you have selected this option.

6.2. Overview of the Analyzer Configurator

The Analyzer Configurator allows you to select the types of events or state changes you want to display as Analyzer waveforms in the Analyzer plot.

See "Configuring Traces for Analysis" on page 38 for more information on the configuration.

Click the **Menu** button ≡ in the Control bar and select **Open Analyzer** to open the Analyzer Configurator window. This option is only available if you have previously selected **Enable Analyzer** via the **Menu** button.



(1) Menu bar

The Menu bar includes the following menus and menu items:

- **Edit** menu: to select and deselect all trace kinds and contexts available in the **Profiles** or **Advanced** tab.
- **View** menu: to refresh the window.
- **Analyze** menu: to plot a set of traces in the Analyzer plot:
  - all Analyzer traces with **Analyze > All**
  - the Analyzer traces displayed in the message list with **Analyze > View**
  - the Analyzer traces selected in the message list **Analyze > Selection**

  The **Analyze** menu corresponds to the **Analyze > All / View / Selection** available in the context menu of the message list.

(2) Tabs

- The **Profiles** tab allows you to select which Analyzer waveforms you want to be available in the Memento application.
- The **Advanced** tab allows you to refine the selection of the Analyzer waveforms, change the name or the color of the waveforms in the Analyzer plot.

  This tab is not described as the **Profiles** tab provides enough selection criteria.

(3) Profile tab - Kinds area

The **Kinds** area allows you to perform a first selection, based on the kinds, of the Analyzer waveforms you want to display in the Analyzer plot.

The kinds provide a classification based on the nature or origin of the messages – for example messages related to the firmware, to an API, to the communication between components, etc.

The **Kinds** area displays only the kinds having Analyzer traces available in the ring buffer.

(4) Profile tab - Contexts area

The **Contexts** area allows you to perform a more refined selection of the Analyzer waveforms you want to display in Analyzer plot.

For each kind selected in the **Kinds** area, the selection in the **Contexts** area allows you to define the driver, card, connector (and possibly stream) you want to display the Analyzer waveforms for in the Analyzer plot.

(5) Profile Tab - Waveforms area

The **Waveforms** area show the Analyzer waveforms resulting from the selection in the **Kinds** and **Contexts** areas.

In this area, you can further remove and reorder the waveforms individually.

These waveforms will appear in the Analyzer plot.

6.3. Configuring Traces for Analysis

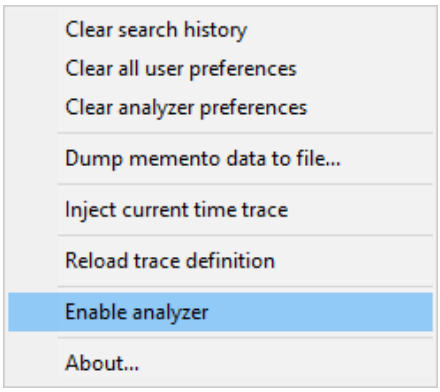
You can configure which Analyzer waveforms you want to display in the Analyzer plot using the Analyzer Configurator.

See the section "Overview of the Analyzer Configurator" on page 36 for a general description.

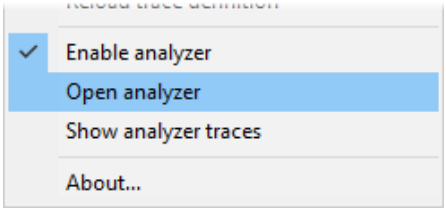
WARNING
Once you have configured the waveforms you want to view in the Memento application, you need to keep the Analyzer Configurator window open for the Analyzer plot to be displayed in the main window.

Accessing the Analyzer Configurator

1. If you have not enabled the Analyzer yet, click the **Menu** button ≡ and select **Enable analyzer**.



2. From the **Menu** button, select the **Open Analyzer** control.



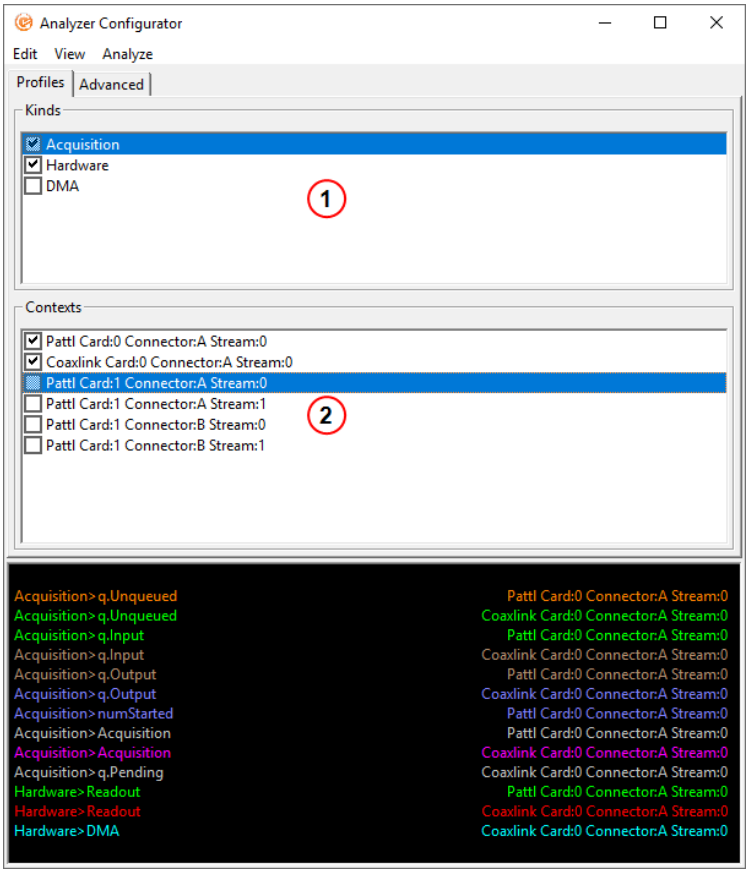
The **Analyzer Configurator** window opens.

Select the Analyzer waveforms

To select the Analyzer waveforms you want to display in the Analyzer plot, proceed as follows in the Analyzer Configurator:

1. In the **Kinds** area, select the kinds that you want Analyzer traces to be available for in the Memento application.
2. In the **Kinds** area, highlight a selected kind. In the **Contexts** area, select the waveforms (driver, card, connector and stream) you want to be available for this kind.

All Analyzer waveforms corresponding to the selected kinds and contexts are displayed in the **Waveform** area at the bottom of the Analyzer Configurator window.



TIP
To delete an individual waveform directly in the **Waveforms** area below, click the waveform and press **Delete**.

Reorder Analyzer waveforms

The order of the waveforms in the Analyzer plot corresponds to the order defined in the **Waveform** area at the bottom of the Analyzer Configurator window.

- To change the position of a waveform, click the waveform name in the **Waveform** area and drag it to the requested position.

Display Analyzer traces in the message list

By default, the Analyzer traces are only displayed in the Analyzer plot. You need to activate an option to see the corresponding messages in the message list:

1. In the main window, click the **Menu** button ☰ in the Control bar.
2. Select **Show analyzer traces** in the displayed menu.

The messages corresponding to Analyzer traces are displayed in the message list from then on.

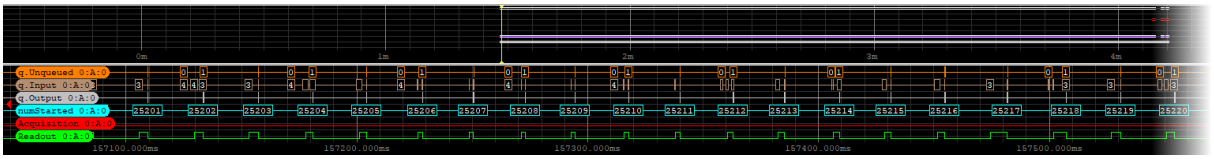
These traces start with the event descriptor: `[Counter]`, `[Start]` or `[Reset]`.

6.4. Modifying the Analyzer Trace Display

Default display of Analyzer waveforms

The default display settings for the Analyzer plot are the following ones:

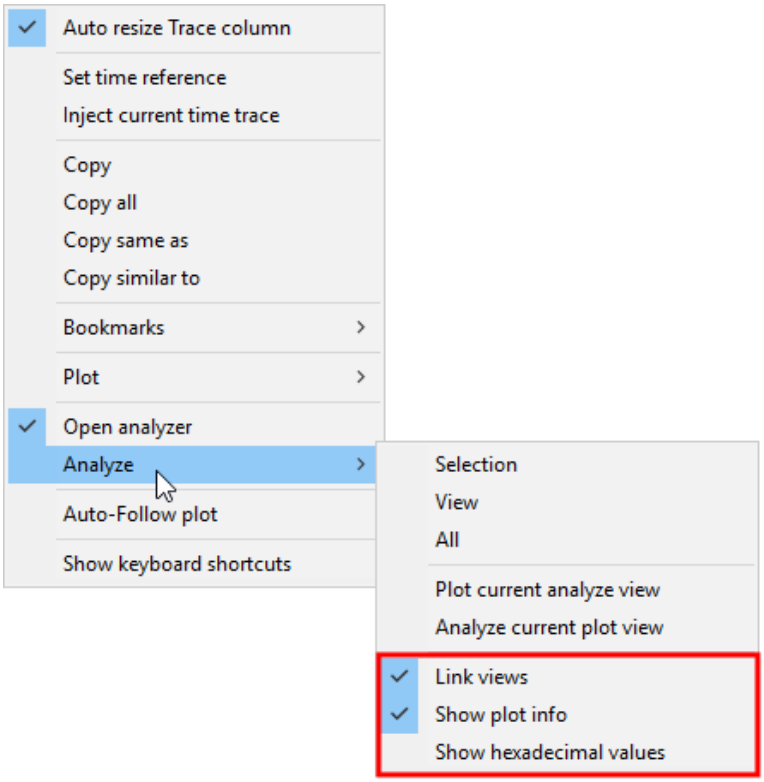
- The timescale views on the Analyzer plot and the message plot are not tied to each other.
- The name of the waveforms is displayed on the left of the Analyzer plot.
- The **counter** values in the Analyzer plots are displayed in the decimal numbering system.



Modify the default display settings

Some parameters are available to modify the default display of Analyzer waveforms. Most parameters are available in the context menu available from the message plot.

They are highlighted in the screenshot below:



Hide the waveform name

By default, the name of the waveforms is displayed on the left of the Analyzer plot.

To hide the waveform name in the Analyzer plot and show the plot information on the full timescale length:

- Right-click the message list and select **Analyze > Show plot info** from the context menu.

The name of the waveforms is now hidden. You can reactivate it in the same way.

Display values in hexadecimal notation

By default, the counter values on waveforms are displayed using the decimal notation.

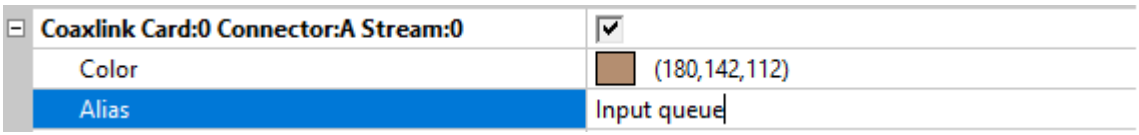
To display the counter values in hexadecimal notation:

- Right-click the message list and select **Analyze > Show hexadecimal values** from the context menu.

Use an alias for the waveform name

To customize the waveform names in the Analyzer plot, proceed as follows:

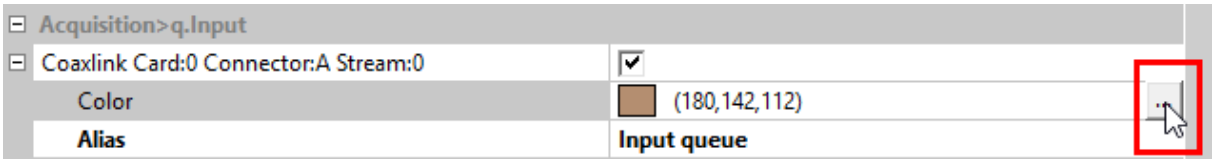
1. In the Analyzer Configuration window, select the **Advanced** tab.
2. Identify the waveform you want to assign an alias to.
3. Click the cell to the right of the **Alias** field and type the requested alias.



The waveform name will be adapted in the Analyzer plot.

Modify the color of a waveform

1. In the Analyzer Configuration window, select the **Advanced** tab.
2. Identify the waveform you want to change the color of.
3. Click the **More** button ... to the right of the field displaying the color.



The Color dialog box opens

4. In the Color window, select a color in the basic colors or type the RGB / HSL color coordinates and click **OK** to validate.

The waveform color is automatically adapted in the Analyzer plot.

6.5. Using Analyzer Tools

Available standard tools

Most actions available for message traces in the message plot are also available for Analyzer traces in the Analyzer plot. This is explicitly specified in the relevant procedures:

- "Browsing Through Traces" on page 27
- "Using Time Information" on page 66

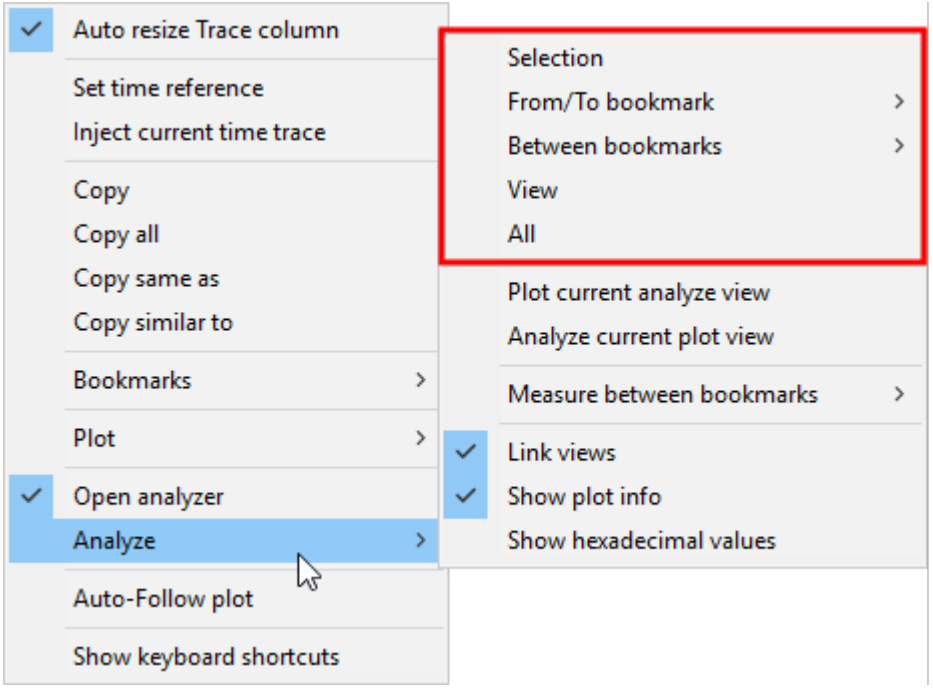
When the description of Analyzer traces is displayed in the message list (see "Display Analyzer traces in the message list" on page 39), you can search for these traces as described in the section "Searching for and Finding back Traces" on page 30.

Display the Analyzer graph for a set of traces

You can build a graph of Analyzer traces in the same way as you can plot the message traces. Similar controls are available, as well as controls that imply the use of bookmarks.

You can access the various controls for building Analyzer graphs in the context menu of the message list, from the **Analyze** menu.

These controls are highlighted in the screenshot below:



See the section "Display the plot for a set of traces" on page 28 for procedures on how to use these controls.

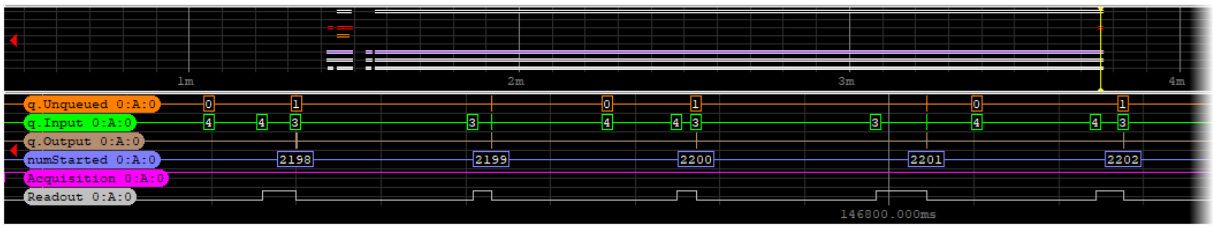
Plot current analyze view

When the **Link views** option is disabled and both message plot and Analyzer plot show different time frames, you can rapidly plot the message traces in the message plot based on the time frame displayed in the Analyzer plot:

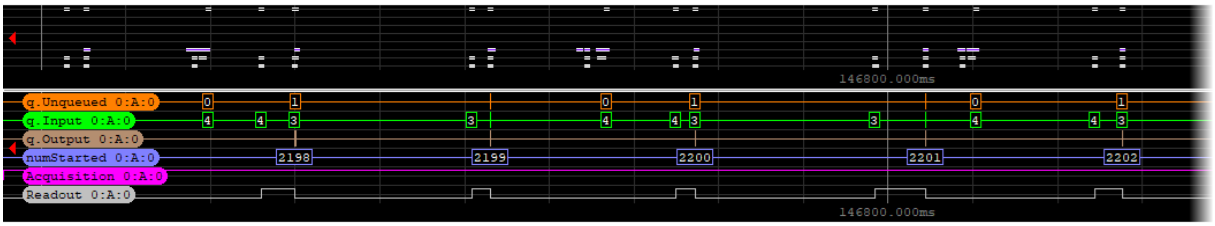
- Right-click in the message list and select **Analyze > Plot current analyze view** from the context menu.

Example

In the initial situation, the Analyzer plot covers a time frame of around 100 ms (around 146800.000 ms) whereas the message plot shows a time frame of about 4 minutes (from 0m to 4m).



When you request Memento to plot the current analyze view, it builds a plot **in the message plot** that spans over the time frame displayed **in the Analyzer plot** (100 ms around 146800.000 ms):



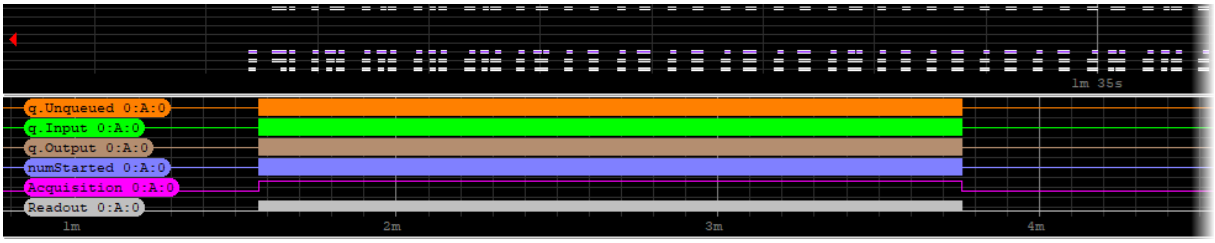
Analyze current plot view

When the **Link views** option is disabled and both message plot and Analyzer plot show different time frames, you can rapidly build waveforms in the Analyzer plot based on the time frame displayed in the message plot:

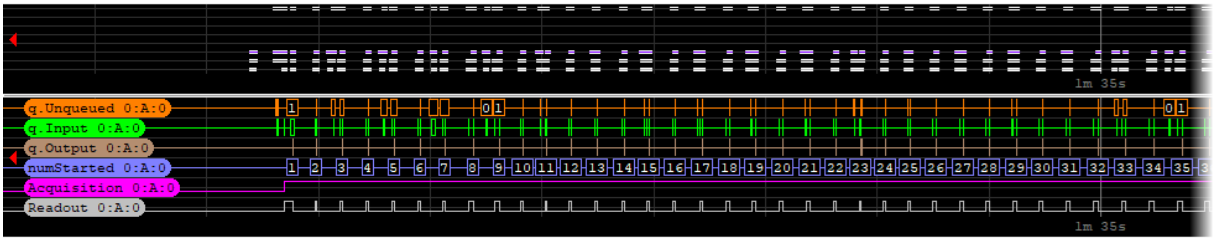
- Right-click in the message list and select **Analyze > Analyze current plot view** from the context menu.

Example

In the initial situation, the Analyzer plot covers a time frame of about 3 m (from around 1m to 4m) whereas the message plot shows a time frame of about 1s (from 1m 34ms to 1m 35s).



When you request Memento to build a graph of the current plot view, it spans the waveforms **in the Analyzer plot** over the time frame of about 1s displayed **in the message plot** (from 1m 34ms to 1m 35s):

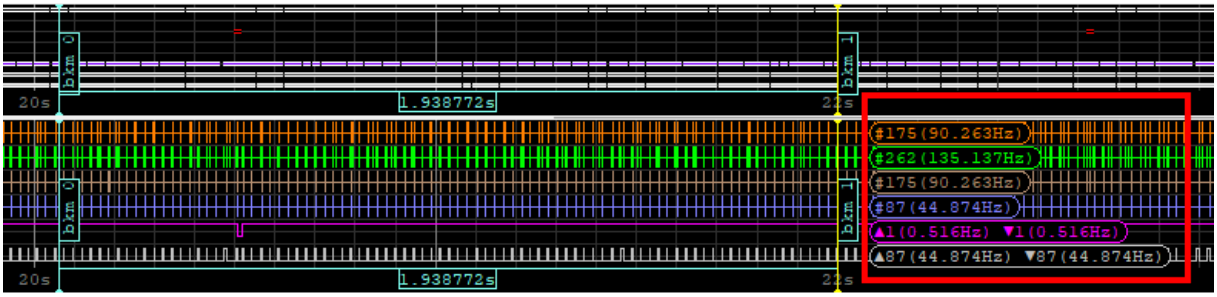


Measure the events between bookmarks

You can measure the number and frequency of events over a given time frame for all displayed waveforms:

1. Set two bookmarks to identify the time frame that you want to analyze the events in:
   a. Press **CTRL** and click on an event in the Analyzer plot to set the position for a new bookmark.
   b. Press **F4** to add the bookmark.
   c. Repeat both previous actions to define a second bookmark.
2. Right-click in the message list to open the context menu.
3. Select **Analyze > Measure between bookmarks** as well as the boundary bookmarks in the context menu.

The number and the frequency of events over the defined time frame are displayed on the right hand of the Analyzer plot, as highlighted in the screenshot below:



Call up the previous trace

To call up the previous trace on a waveform and display it at the cursor position in the Analyzer plot:

- Position the mouse cursor on a given waveform around the position you are searching for events and middle-click the mouse.

The waveform will shift and display the previous trace on that waveform.

7. Setting up Trace Display

This chapter explains how you can modify, at the three levels specified below, the default settings for filtering and/or displaying the traces :

- filtering before adding traces into the ring buffer
- filtering before adding traces to the viewer buffer
- hiding or highlighting traces directly in the Memento application

7.1. Filtering Traces in the Ring Buffer

Initial ring buffer Configuration

The ring buffer configuration (also called **Memento** configuration) consists in filtering, by means of ring filters, the traces to be added to the ring buffer for the various kinds of traces.

A default ring buffer configuration is applied. It is displayed in the screenshot below and explained in the section Setting up the Driver in the Getting Started Guide (D602).

You can modify the default ring buffer configuration before starting the Memento application. See Change the configuration in the Getting Started Guide (D602).

You can still change the ring buffer configuration settings in the Memento application, via the **Ring Filters** button available in the **Control bar**.

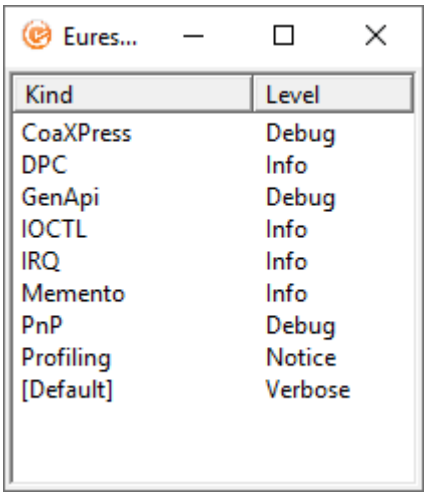
NOTE
If you change the ring filters in the Memento application, the new filters will be applied for all future messages that will be added to the ring buffer.

Ring Filters dialog box

To view the current ring buffer configuration, click Ring Filters... from the **Control bar**.

In the **Ring Filters** dialog box, you specify that all messages of a given kind and with at least a given verbosity level must be added to the ring buffer.

The messages that do not meet the filtering criteria will not be added to the ring buffer. You will never be able to view such messages in the Memento application.



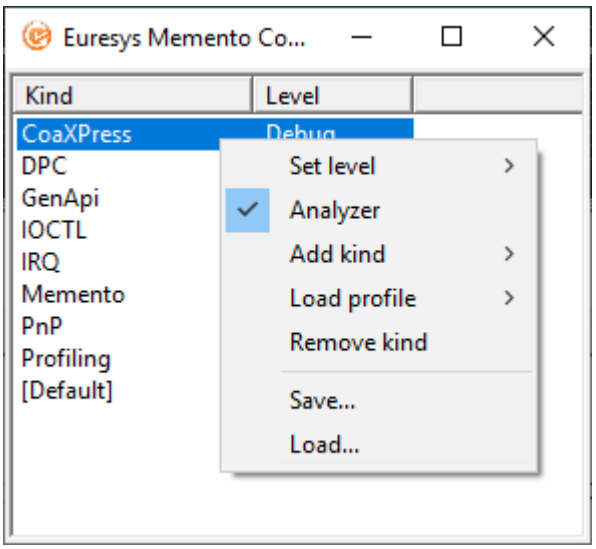
For example

Looking at the screenshot above, you can see that:

- The **CoaxPress** filter is defined with verbosity level **Debug**: all messages linked to the **CoaxPress** kind and having at least the verbosity **Debug** (that is **Debug, Info, Notice, Warning, Critical**) will be added to the ring buffer. For this kind, the **Verbose** messages will be disregarded.
- The **Default** filter applies to all kinds not explicitly defined in the **Ring Filter** dialog box. In this case, all messages will be added for these kinds as the defined verbosity level is **Verbose**.

Filter traces in the ring buffer

You can access all controls to refine the ring buffer filters by clicking Ring Filters... on the **Control bar**, and right-clicking to access the context menu:



NOTE
You cannot modify the ring buffer configuration when a dump file is open in the Memento application even the dump file is being fed with new traces from the ring buffer.

Change the verbosity level for a kind

Kind available in the list

1. Right-click the requested kind to access the context menu.
2. Select **Set level** and the requested verbosity level.

Kind not available in the list

This means the Default verbosity level is applied to this kind:

1. Right-click to access the context menu.
2. Select **Add kind**and the requested kind from the context menu.
3. Right-click the kind, then select **Set level** and the requested verbosity level from the context menu.

Reset a kind to the default verbosity level

1. Right-click the requested kind to access the context menu.
2. Select **Remove kind** from the context menu.

Apply a profile

1. Right-click to access the context menu.
2. Select **Load profile** and the requested profile.

Save the current configuration to a file

1. Right-click to access the context menu.
2. Select **Save**.
3. In the **Save memento ring filters** dialog box, select the folder where you want to save the configuration file and click **Save**.

By default, the configuration file has the following name: `filters.memento-config`

Use the menu item **Load** to find back a previously saved configuration and apply it back.

Exclude Analyzer traces from the ring buffer

By default, the Analyzer traces are added to the ring buffer.

To prevent the Analyzer traces from being added to the ring buffer:

1. Right-click to access the context menu.
2. Click **Analyzer**.

The option is deselected in the context menu and the Analyzer traces are no longer added to the ring buffer.

7.2. Filtering Traces for the Viewer Buffer

Verbosity Filter

In the Memento application, you use the **Verbosity Filter** to define the traces to be extracted to the viewer buffer based on their criticality. The traces extracted to the viewer buffer are displayed by default in the Memento application.

The verbosity filter allows you to display only the messages having a verbosity level (`level` attribute) equal to or greater than the defined verbosity level.

By default, the verbosity filter is set to **Notice**: all traces having the verbosity **Notice**, **Warning**, **Error** or **Critical** are displayed in the Memento application.

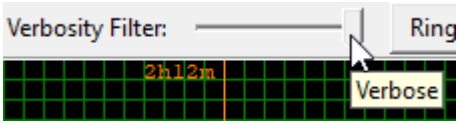
NOTE
When you change the verbosity filter in the Memento application, the new rules are applied to extract subsequent traces.

See the section Verbosity Filter in the Getting Started Guide (D602) for a detailed description of the verbosity filter.

Display the current verbosity level

The **Verbosity Filter** is available as a slider in the Control bar.

- Hover over the slider to display the current verbosity level taken into account for trace filtering in the viewer buffer.



Restrict or Broaden the traces to be extracted to the viewer buffer

- To restrict the number of traces to be extracted to the viewer buffer, move the **Verbosity Filter** slider to the left up to the requested verbosity level.
- To increase the number of traces to be extracted, move the **Verbosity Filter** slider to the right up to the requested verbosity level.

The verbosity level is displayed when you keep the mouse cursor on a slider position.

Once you have modified the verbosity filter, the new filtering rule is instantly applied to extract subsequent traces.

> **NOTE**
> If you want the same verbosity rules to be applied to all messages in the viewer buffer once have changed the verbosity filter, you need to clear the viewer buffer using the **Clear** button and perform a **Go Back** to regenerate the viewer buffer.

7.3. Customizing Trace Display

Highlighting filters

By default, all the traces extracted to the viewer buffer are displayed in the Memento application.

Using the **Highlighting Filters**, you can customize the display of the filtered message traces in order to:

- highlight the set of traces that meet (or do not meet) the filtering criteria.

(and/or)

- change the font color of traces that meet (or do not meet) the filtering criteria.

(or)

- hide the traces that meet the (or do not meet) the filtering criteria.

Each highlighting filter has two sets of controls:

- The controls for the **filter rule** that select a specific set of messages.
- The controls for the **filter action** that define the actions to be performed on the selected set of messages.

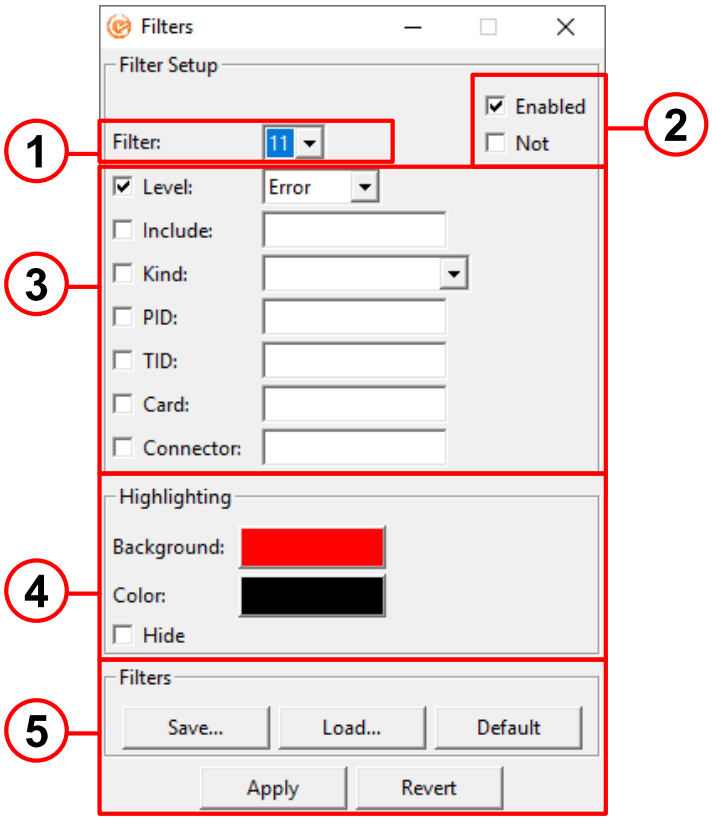
NOTE
The **Highlighting Filters** are applied to all messages displayed in the Memento application. In other words they apply also to messages that would already have been available in the user interface before you modify the **Highlighting Filters**.

Working principles

- Sixteen **Highlighting Filters** are available in the Memento application.
- Only enabled filters are taken into account.
- When a trace meets a filter rule, the layout options for that filter are applied. Subsequent filters are disregarded for this trace.
- The Memento application parses the filters from filter 1 to filter 16.
- By default, the filters from 11 to 16 are enabled. Each of them is configured to apply predefined layout options for a given verbosity level.
- As a consequence, a user-defined filter (1 to 10) has priority over the default filters (11-16).

Highlighting Filters dialog box

To access the Highlighting Filters, click Highlighting Filters... from the **Control bar**:



(1) Filter Number field

The **Filter** field allows you to select the filter number you want to set up.

When a filter is selected, all other fields in the dialog box allow you to set up the selected filter.

(2) Enable field and Polarity field

Enabled field

The **Enable** control allows you to enable/disable each filter individually while keeping the other filter settings unchanged.

When the **Enable** control is not selected, the highlighting filter is not applied.

Polarity field

The **Polarity** control determines whether or not the action has to be executed when all the enabled filtering criteria are **True**:

- When unselected, the action is executed only when all the enabled filtering criteria are **True**.
- When selected, the action is always executed except when all the enabled filtering criteria are **True**.

(3) Filtering criteria

These fields allow you to define the filtering criteria for the selected filter.

Six filtering criteria are based on attribute values and one filtering criterion is based on the content of the message trace:

Filtering criteria based on attribute value

A filtering criterion is available for each of the following message attributes: `Level`, `Kind`, `PID`, `TID`, `Card`, `Connector`.

Each criterion has an **Enable** control and a value.

The criterion is only taken into account when the **Enable** control is selected (and when the corresponding filter is also enabled).

The filtering criterion is evaluated to **True** when the attribute value of a message matches the value defined in filtering criterion.

Filtering criterion based on message content

One filtering criterion is based on the content of the message. It has an **Enable** control and a text string value.

The filtering criterion is only taken into account when the **Enable** control is selected (and when the corresponding filter is also enabled).

The filtering criterion on the message content is evaluated to **True** when the message body contains the specified text.

(4) Filter Action fields

The action of an highlighting filter is defined using the following fields:

- A **Hide** control
- A **Background Color** selector
- A **Font Color** selector

Hide control

The **Hide** check-box determines whether or not messages matching the filter rule have to be hidden.

This option applies to the messages in the message list and to the trace display in the message plot.

When the **Hide** check-box is selected, the messages matching the filter rule are hidden.

When the **Hide** check-box is unselected, the messages matching the filter rule are displayed using the selected font color and/or background color.

By default, the **Hide** check-box is unselected.

Background and font color selectors

The **Background** field and **Color** field offer a set of basic and custom colors to respectively highlight the message and/or change the font color of the message in the message list. Both actions can be applied simultaneously.

The **Background** option impacts the highlighting color of the trace message in the message list and the color of the trace display in the message plot.

The **Color** field only impacts the font color of the **Trace** field in the message list.

By default, the message in the message list is displayed:

- in black font
- on a white background

(5) Filter Management fields

The **Filter Management** fields allow you to perform the following actions:

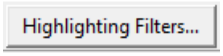
Click ...	in order to ...
Save	save the entire **Highlighting Filter** configuration to a file called `filters.memento-filters` by default.
Load	load a previously saved configuration file.
Default	reset the entire **Highlighting Filter** configuration to the default configuration.
Apply	apply the current configuration defined to the data displayed in the Memento application.
Revert	cancel the changes defined since the last time you applied the changes (using the **Apply** button).

Default Configuration

By default, the highlighting filters are configured as follows:

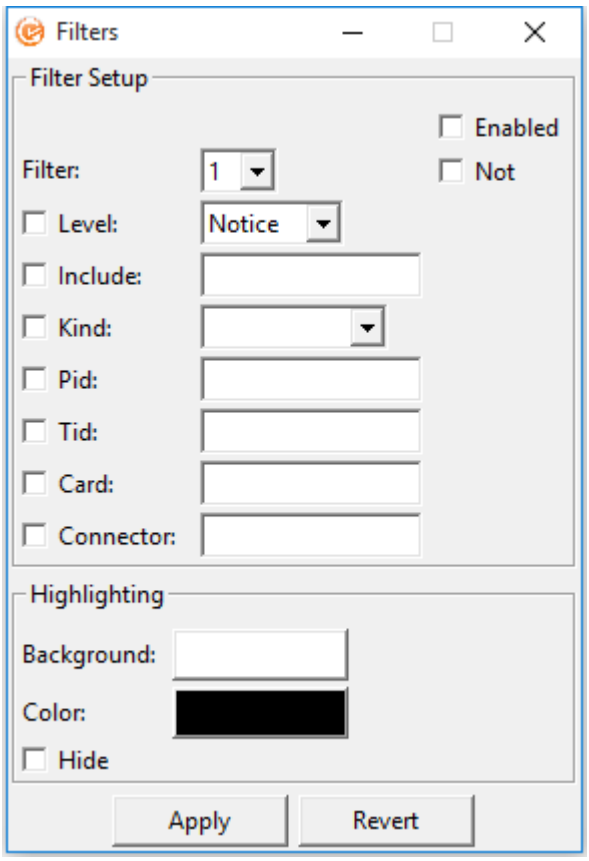
Filter #	Filter Rule	Filter Action
1 to 10	*Disabled*	
10	Level=User	Highlight – Green text | white background
11	Level=Error	Highlight – Black text | red background
12	Level=Warning	Highlight – Black text | orange background
13	Level=Notice	Highlight – Green text | white background
14	Level=Info	Highlight – Purple text | white background
15	Level=Debug	Highlight – Grey text | white background
16	Level=Verbose	Highlight – Light Grey text | white background

Customize the trace display

1. In the **Control bar**, click 

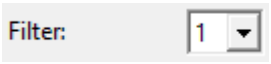
to display the **Filters** dialog box.

   The dialog box opens on the definition on the configuration of the highlighting filter #1.

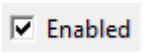


2. In the **Filter** drop-down box, select the filter you want to customize.

   By default, only the filters 11 to 16 are enabled and implement the default highlighting scheme.

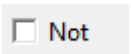


3. Select the **Enable** check-box to enable the filter.



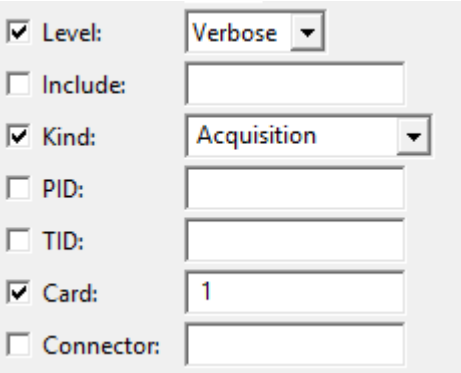
4. If requested, invert the filter rule by selecting the **Not** check-box:

   - When the check-box is not selected, the filter action is executed only when all the enabled filtering criteria are **True**.
   - When the check-box is selected, the action is always executed except when all the enabled filtering criteria are **True**.



5. For each filtering criteria you want to apply:
   - Select the check-box in front of the filter criteria.
   - Type or select the value to be used as filtering criterion.

   See "(3) Filtering criteria" on page 53 for more information.

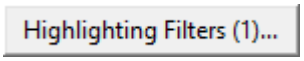


6. Define the action(s) to be performed when the filter rule is met.

   See "(4) Filter Action fields" on page 53 for more information.

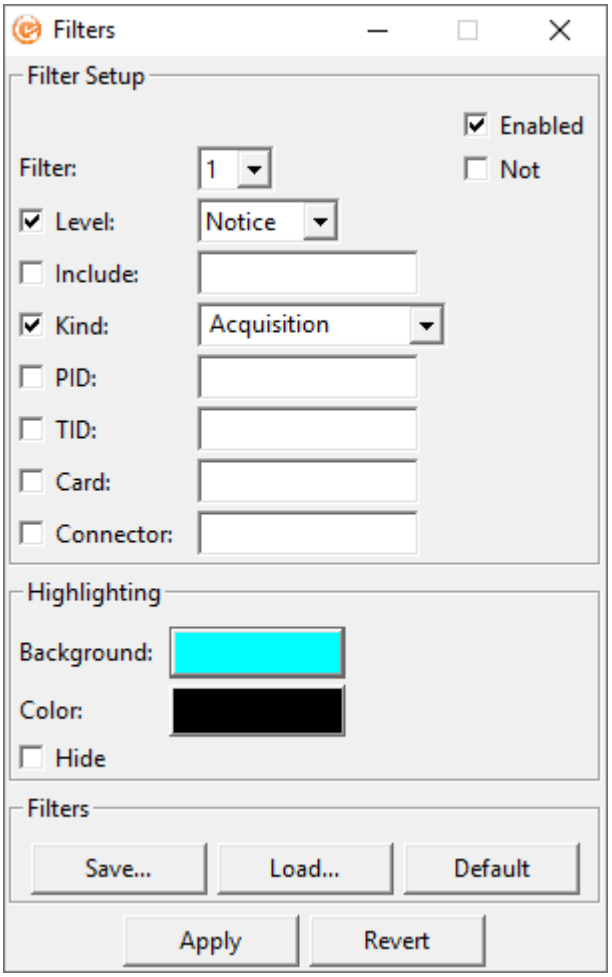
7. Click **Apply** to apply the filters to the data displayed in the Memento application.

A number is added onto the Highlighting Filters button to show how many filters have been customized:



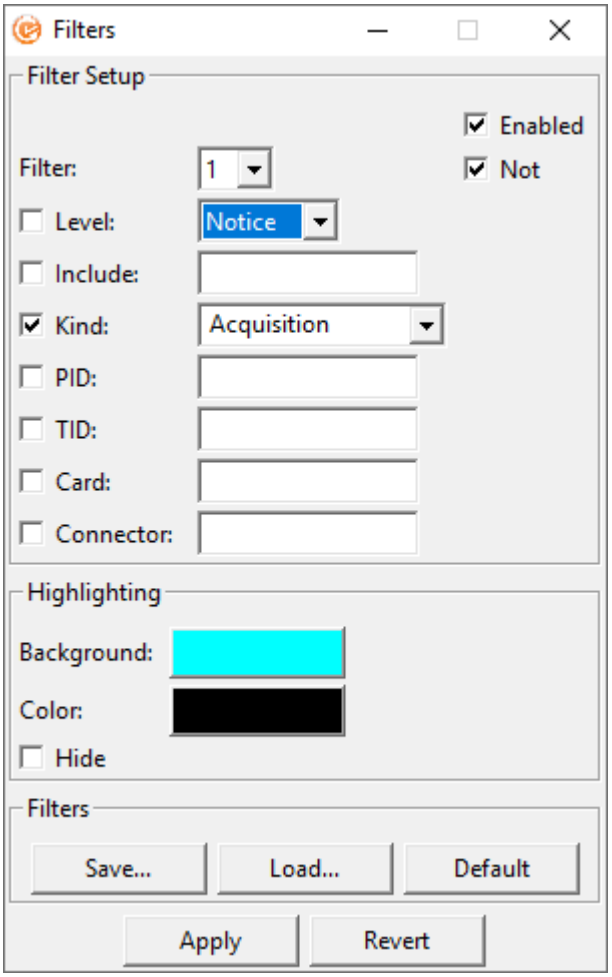
Example 1

In this example, the traces having the verbosity level **Verbose**and the kind **Acquisition** will be highlighted in light blue in the message list and the trace symbol in the same color in the message plot. The font color of the message in the message list remains black.



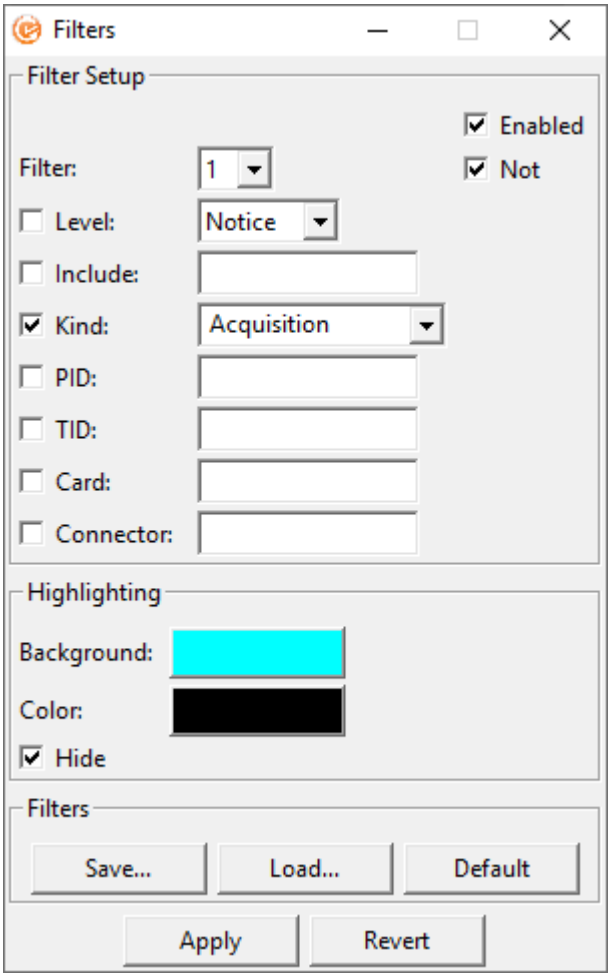
Example 2

In this example, the traces having all but the **Acquisition** kind will be highlighted in light blue in the message list and the corresponding trace symbol in the same color in the message plot. The traces having the **Acquisition** kind will not be highlighted.



Example 3

In this example, the traces having all but the **Acquisition** kind are hidden in the message list, and the corresponding trace symbols will be hidden in the message plot. The traces having the **Acquisition** kind are displayed with the default background color (white) and font color (black).



Increase or decrease the font size in the message list

To increase the font size, use one of the following keyboard combinations:

- Press **Z**
- Press **CTRL** + **+** (in the numeric pad)

To decrease the font size, use one of the following keyboard combinations:

- Press **SHIFT** + **Z**
- Press **CTRL** + **-** (in the numeric pad)

8. Saving Traces

Purpose for saving traces

You can save traces from the ring buffer to a dump file mainly for backup or investigation purposes:

- You want to back up all traces added to the ring buffer.

  In this case, you will continuously record the traces into one dump file, or several smaller ones. Doing this, you do not run the risk of losing the traces that will be overwritten in the ring buffer.

  See "Save all traces to a dump file" on the next page.

- You want the Euresys Support team to investigate a past issue or an issue you have reproduced.

  In this case, you create a dump file that includes all events stored in the ring buffer and located around the past or reproduced issue.

  See "Save selected traces to a dump file" on page 63.

You can also copy and save traces into a spreadsheet for your own records. However, the dump file remains the most appropriate source of information for the Euresys Support team to investigate issues.

NOTE
The dump file includes **all** the traces added to the ring buffer from a given time point or position in the ring buffer. This does not take into account the verbosity filter and highlighting filters as they are applied after the ring buffer in the message flow.

Start quickly saving traces

Without opening the Memento application, you can start saving the data added subsequently to the ring buffer into a dump file as follows:

- From the Windows Start menu, select the command **Euresys Memento > Start Memento Logging**.

When you select this option, the Memento application:

- creates a dump file `dumXXXX.memento` saved to `%USERPROFILE%\memento\` where XXXX is an automatically generated alphanumeric string.
- opens a command line window that displays the dump file size.

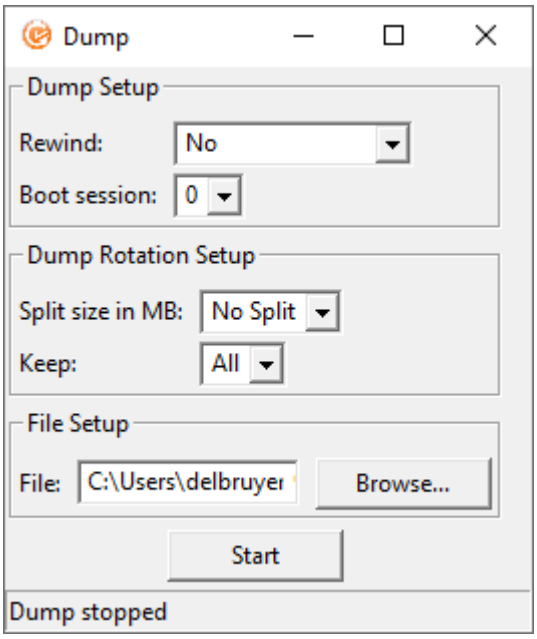
- feeds the dump file continuously with the subsequent data from the ring buffer as long as the command line window remains open.

Save all traces to a dump file

To start backing up existing and/or future traces to a dump file as of now and/or from a given time or position in the past, proceed as follows:

1. In the Control bar, click ≡ and select **Dump memento data to file**.

   The **Dump** dialog box opens:



2. In the **Dump Setup** area, specify the traces you want to dump.

   See the section "Dump Setup options" on the next page for more details.

3. In the **Dump Rotation Setup** area, specify how to split the dump file and whether to delete older dump files.

   See the section "Dump Rotation Setup options" on the next page for more details.

4. If requested, change the default location for saving the dump files by clicking **Browse** in the **File Setup** field.

5. Click **Start** to start saving the traces to the dump file.

The dump file is created by default in the **Memento** application directory `%USERPROFILE%\dump.memento\` or in the folder specified in step 4.

As long as the dump file is open, you can stop saving to the dump file by clicking the **Stop** button displayed instead of the **Start** button in the dialog box.

Dump Setup options

Rewind

The **Rewind** option determines the number of positions or minutes to rewind in the ring buffer before starting to dump traces.

Possible values are:

Value	Description
No	No rewind. **Default setting.**
As far as possible	Rewind as far as possible within the data of the specified boot session.
1s, 1m, 1h	Rewind 1 second, 1 minute, 1 hour back within the data of the specified boot session.
10, 100, 1000, 10000, 100000	Rewind 10, 100, 1000, 10000, 100000 positions.

Boot session

The **Boot session** option specifies the number of boot sessions to rewind to.

Possible values are:

Value	Description
0	Current Boot Session **Default setting.**
1, 2, 3 …	Previous boot sessions. **1** is the previous session the closest in time. This is only available with Windows when data from previous sessions are still available in the ring buffer. This is not available with Linux OS and macOS.

Dump Rotation Setup options

Split size in MB

The **Split size in MB** option allows you to split the dumped data over multiple files by specifying a size limit.

Possible values are:

Value	Description
No Split	One file per dump session. **Default setting.**
256, 512, 1024	Allows the dump file to be split into multiple files having a maximum size of respectively 256, 512 or 1024 Megabytes

Keep

The **Keep** option allows to limit the number of dump files to keep.

Possible values are:

Value	Description
All	Keeps all dump files. **Default setting.**
10	Keeps only the 10 most recent dump files.

File Setup option

This option allows you to select another file name and location.

The default file name is: `dump.memento`.

The default file location is `%USERPROFILE%\dump.memento\`.

The Memento application keeps previous dump files in the same directory by assigning a numerical suffix to their name. Assuming the file name is set to `dump.memento`, older files are named `dump.1.memento`, `dump.2.memento`, `dump.3.memento`, etc.

Every time a new dump file is created, the Memento application:

- increments the numerical suffix of all existing dump files (file name rotation).
- renames the previous dump file by adding the '.1' suffix.

TIP
Euresys recommends to keep the filename suffix `.memento`.

Save selected traces to a dump file

To save only a selection of traces to a dump file to be sent for investigation, you can select directly the requested traces in the message list or use bookmarks for the selection:

Save traces selected manually to a dump file

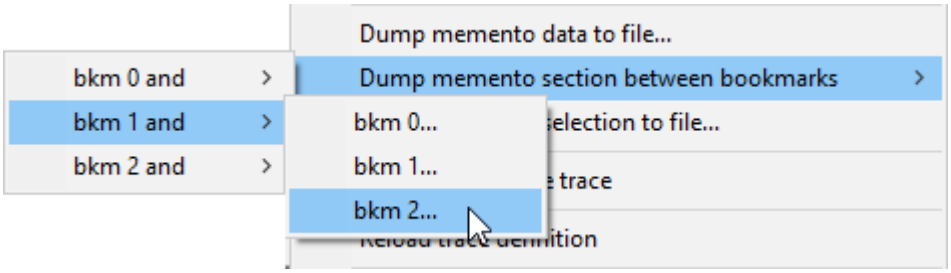
1. In the message list, select the first message to save into a dump file.
2. Scroll to the last message to be selected and press **CTRL** + **SHIFT** to select all messages between the first and the last.
3. In the Control bar, click  and select **Dump memento selection to file** from the menu.
4. In the Dump memento to file window, select the folder where you want to store the dump file and edit the name, if requested (keep the `.memento` extension).
5. Click **Save**.

The dump file includes the content of the ring buffer between the time stamps of the first and last selected messages.

Save traces selected between two bookmarks to a dump file

This option is only available when at least two bookmarks have been defined. See "Defining Bookmarks" on page 33.

1. In the Control bar, click ≡ and select **Dump memento section between bookmarks** from the menu, and the bookmarks to be used as boundaries for the dump file.



2. In the Dump memento to file window, select the folder where you want to store the dump file and edit the name, if requested (keep the `.memento` extension).
3. Click **Save**.

The dump fill includes the content of the ring buffer between the time stamps of the selected bookmarks.

Copy messages to the clipboard

To further process messages from the message list, you can copy them to the clipboard and save them to a spreadsheet or text file.

Either you select and copy several messages or you select a single message and request Memento to find back the same or similar messages in the message list:

Copy a selection of messages

1. Click the first message of your selection in the message list.
2. Scroll to the last message and simultaneously press **SHIFT** and click the last message to select all messages between the first and the last.
3. Right-click and select **Copy** from the context menu.

Copy all displayed messages

- Right-click and select **Copy all** from the context menu.

Copy all occurrences of the same message or similar messages

1. In the message list, click the message that you want to copy all identical or similar occurrences of.
2. Right-click and select on of the following options from the context menu:
   - **Copy same as**: copies to the clipboard the content of all messages with the same description in the **Trace** column as the currently selected message.

- **Copy similar to**: copies to the clipboard the content of all messages with a similar description in the **Trace** column as the currently selected message.
  Similar messages are messages where only the attribute values may differ compared to the selected message.

Once the messages are copied to the clipboard, simply paste them to the requested application.

9. Using Time Information

You can use the following tools to get additional time information related to the traces:

Change the time reference

In the message list, the **Delta** field value is used as the time reference. By default, the first trace displayed message list gets the time reference +0.000000 (with microseconds precision) whether the viewer buffer is read in real-time monitoring or using the **Go Back** function.

If the number of traces to be displayed exceeds the maximum capacity of the viewer buffer (250000 entries), the first visible trace might have a different time reference.

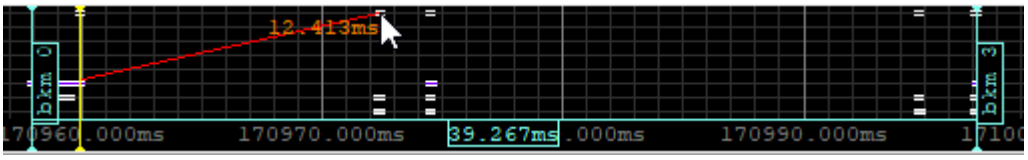
To set the time reference to another message than the first displayed message, do one of the following actions:

- Right-click the message to be assigned the time reference and select **Set time reference** from the context menu.
- Click the message to be assigned the time reference and press **T** from the keyboard.

Measure time interval between two traces

- Press **SHIFT** and simultaneously click and drag the mouse between both traces to measure the time interval.

  The red line symbolizes the calculated time interval displayed in orange.



TIP
The time interval between two bookmarks is automatically displayed on the message plot when allowed by the zoom level.

Inject current timecode in the ring buffer

A message containing the current UTC date and time of kind **Time** and the verbosity level **Notice** is inserted at regular intervals into the ring buffer. This provides a sync point between the Memento time scale and the system time, itself possibly synchronized to an Internet Time Server.

When you are monitoring the process in real time, you can also inject manually such a message in the ring buffer:

- Right-click the message list and select **Inject current time trace** from the context menu.

10. Administration Tools

The following administration tools are available from the **Menu** button  in the Control bar:

- **Clear search history** to clear the history of the search strings in the **Search** field.
- **Clear all user preferences** to clear the history of all user preferences (verbosity filter, layout preferences, etc.). The Ring filter and Highlighting filters are not reset with this control.
- **Clear Analyzer preferences** to clear the Analyzer configuration.
- **Clear history before bookmark** to clear the message list before the selected bookmark (available when at least a bookmark is defined).

11. Appendix 1 - Keyboard Shortcuts

Action	Shortcut
Search Text	F3 Enter
Search Text Backwards	Shift+F3 Shift+Enter
Repeat Search	N
Repeat Search Backwards	Shift+N
Enable Search Text Field	/
Copy cell contents to search	Y
Go to Top	G Home
Go to Bottom	Shift+G
Go to Bottom and follow	End
Increase font size	Ctrl+Num + Z
Decrease font size	Ctrl+Num - Shift+Z
Copy current trace to clipboard	Ctrl+C
Reset time reference on current trace	T
Jump to next trace with same cell contents	Num * J
Jump to previous trace with same cell contents	Num - Shift+J
Jump to next trace with similar cell contents	Shift+Num * S
Jump to previous trace with similar cell contents	Shift+Num - Shift+S
Freeze tooltip	Shift
Toggle bookmark	F4
Toggle bookmark information in plot regions	F6
Toggle measure information in plot regions (double-click)	F7

12. Glossary

A

ACTIVITY PLOT

Area in the Memento application (GUI) that displays a plot of the number of Memento traces recently added to the Memento ring buffer. In other words, this shows the recent activity of the Memento contributors.

ANALYZER PLOT

Area in the Memento application (GUI) that displays waveforms representing events and state changes occured over a time frame in selected steps of the image acquisition process.

ANALYZER TRACE

Memento traces that can help users analyze, detect and understand issues during system component discovery and defects during image acquisition. Such traces are displayed in the Analyzer plot.

H

HIGHLIGHTING FILTERS

Set of filters allowing users to customize the display of the Memento traces in the Memento application.

M

MEMENTO APPLICATION

User interfaces of the Memento system. The Memento application is available in two modes: a Console mode allowing users to interact with the Memento system in command line, and the GUI mode allowing users to interact with the Memento system via a graphical user interface.

MEMENTO CONTRIBUTOR

Frame grabber driver and library, or user space application that inject event messages to the Memento ring buffer

MEMENTO MESSAGE

Event-related data record in the Memento application including a message body (text string that described the event) and message attributes (data related to the event)

MEMENTO TRACE

Message and graphical representation, in the Memento application, of an event or information written by a Memento contributor in the Memento ring buffer. Memento generates a Memento trace by mapping the event data injected by the Memento contributor with the corresponding message stored in the Memento dictionary. A Memento trace also refers to the event data generated by a software macro executed on the Memento contributor side and injected into a message slot of the Memento ring buffer.

MESSAGE KIND

Classification of Memento traces based on their nature or origin

MESSAGE LIST

Area in the Memento application (GUI) that displays a filtered set of Memento messages.

MESSAGE PLOT

Area in the Memento application (GUI) that displays a plot showing the message traces issued over a time frame based on their severity.

MESSAGE TRACE

Memento traces providing log information that can help users detect issues in the image acquisition process. Each message trace has a given origing (kind) and severity (verbosity). Such traces are displayed in the message plot.

R

RING BUFFER

Common memory space reserved by the Memento driver on the computer, in which the Memento contributors inject event data.

RING FILTER

Filter used to define the traces to be added to the Memento ring buffer based on their kind and the requested verbosity level.

V

VERBOSITY FILTER

Filter used to define the traces to be extracted to the viewer buffer based on their criticality.

VERBOSITY LEVELS

Classification of Memento traces based on the message criticality and on the requested amount of messages to be displayed. The levels are the following from the least verbose (most critical) to the most verbose (least critical): Critical, Error, Warning, Notice, Info, Debug, Verbose

VIEWER BUFFER

Memory area where the Memento application stores the messages to be displayed in the Memento application.