ControlDesk

Measurement and Recording

For ControlDesk 7.4

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dSPACE

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About This Document

Content

This document introduces you to measurement and recording with ControlDesk.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazard that, if not avoided, could result in property damage.
Note	Indicates important information that you should take into account to avoid malfunctions.
Tip	Indicates tips that can make your work easier.
	Indicates a link that refers to a definition in the glossary, which you can find at the end of the document unless stated otherwise.
	Precedes the document title in a link that refers to another document.

Naming conventions

dSPACE user documentation uses the following naming conventions:

%name% Names enclosed in percent signs refer to environment variables for file and path names.

< > Angle brackets contain wildcard characters or placeholders for variable file and path names, etc.

Special folders

Some software products use the following special folders:

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

```
%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>
```

or

```
%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>
```

Documents folder A standard folder for user-specific documents.

```
%USERPROFILE%\Documents\dSPACE\<ProductName>\
<VersionNumber>
```

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

```
%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\
<ProductName>
```

Accessing dSPACE Help and PDF Files

After you install and decrypt dSPACE software, the documentation for the installed products is available in dSPACE Help and as PDF files.

dSPACE Help (local) You can open your local installation of dSPACE Help:

- On its home page via Windows Start Menu
- On specific content using context-sensitive help via **F1**

dSPACE Help (Web) You can access the Web version of dSPACE Help at www.dspace.com/go/help.

To access the Web version, you must have a *mydSPACE* account.

PDF files You can access PDF files via the icon in dSPACE Help. The PDF opens on the first page.

Tutorial

Where to go from here

Information in this section

Introduction to the Measurement and Recording Tutorial.....14
Preparing the Tutorial Project.....17
Lesson 1: Measuring on dSPACE Platforms.....23
Lesson 2: Recording on dSPACE Platforms.....45

Introduction to the Measurement and Recording Tutorial

Where to go from here

Information in this section

Working With this Tutorial..... 14
Provides information on the contents and structure of this tutorial.

User Interface of ControlDesk..... 15
Gives an overview of the user interface of ControlDesk.

Overview of Lessons..... 15
Gives an overview of the lessons in this tutorial.

Working With this Tutorial

Contents

This tutorial gives you step-by-step instructions for configuring and performing measurements and recordings with ControlDesk. It focuses on the concepts of measuring and recording with dSPACE hardware, which provides numerous flexible and sophisticated settings. For example, you can reduce the uploaded data stream by defining measurement triggers for the real-time application. Unlike ECUs, dSPACE platforms usually run measurements with high-frequency measurement rasters and data throughput has to be reduced.

The objective of this tutorial is to guide you through the first steps of measuring and recording and to show you the basic operating concepts.

Modular tutorial structure

The lessons in this tutorial are independent of each other. After you have prepared the tutorial project with its experiments, you can choose any lesson to start with. Each lesson uses its own experiment.

Glossary

For brief explanations on the most important expressions used in this tutorial, refer to the Glossary on page 383.

Preconditions

The following preconditions must be met for working through this tutorial:

Software You must have installed ControlDesk 7.4 on your host PC.

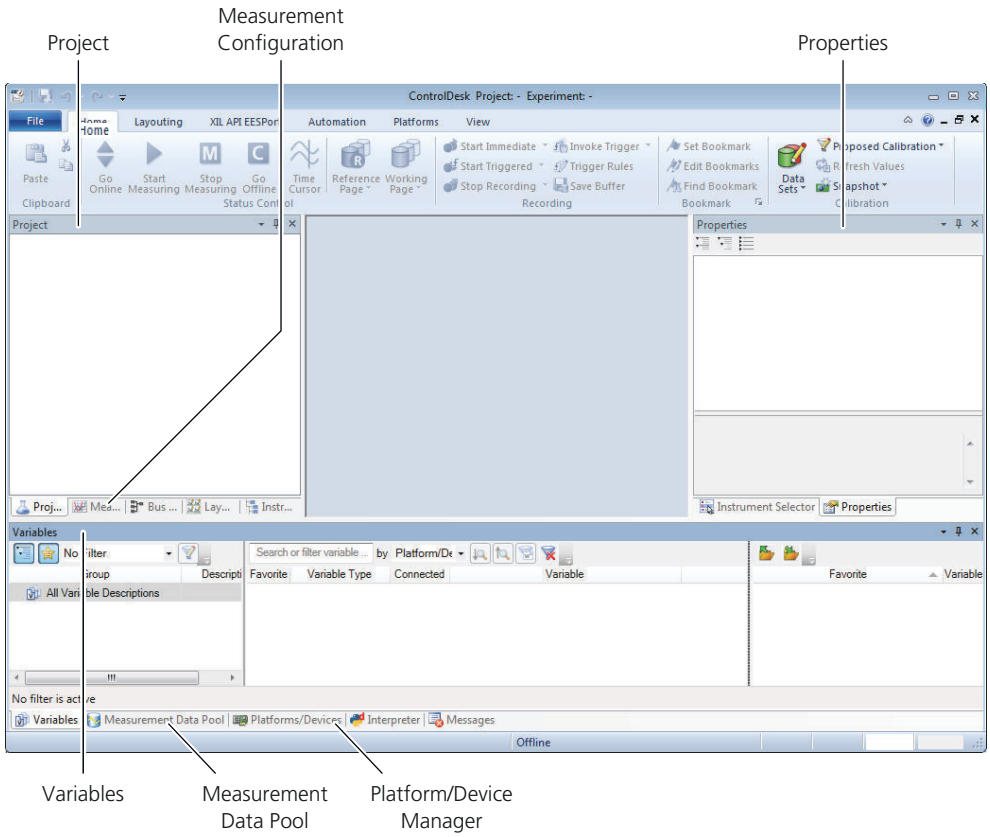
Hardware and registration Your dSPACE hardware, for example, a DS1007 PPC Processor Board or a SCALEXIO system, must be connected to your host PC and registered. Refer to How to Register a Platform (ControlDesk Platform Management 🕮).

Required knowledge Knowledge in handling projects and experiments and accessing platforms/devices in ControlDesk is assumed.

User Interface of ControlDesk

Illustration

The following illustration displays ControlDesk's user interface and shows the controlbars you will use in this tutorial.



Overview of Lessons

Introduction

When working through this tutorial, you should carry out its instructions as you go along.

Lessons

The tutorial contains the following lessons:

- Lesson 1: Measuring on dSPACE Platforms on page 23

  You will perform triggered and untriggered measurements on a dSPACE platform and learn how to change the Time Plotter settings to display them in different ways.
- Lesson 2: Recording on dSPACE Platforms on page 45

  You will learn how to configure and perform triggered and untriggered recordings of signals on dSPACE platforms.

Note

Before you start a lesson, you have to prepare the tutorial project. Refer to Preparing the Tutorial Project on page 17.

Duration

Working through the entire tutorial will take you about 90 minutes.

Related topics

Basics

Lesson 1: Measuring on dSPACE Platforms..... 23
Lesson 2: Recording on dSPACE Platforms..... 45

Preparing the Tutorial Project

Introduction

Before you work through one of the lessons in this tutorial you have to create a project with two experiments, as shown in the following instruction.

How to Prepare the Tutorial Project

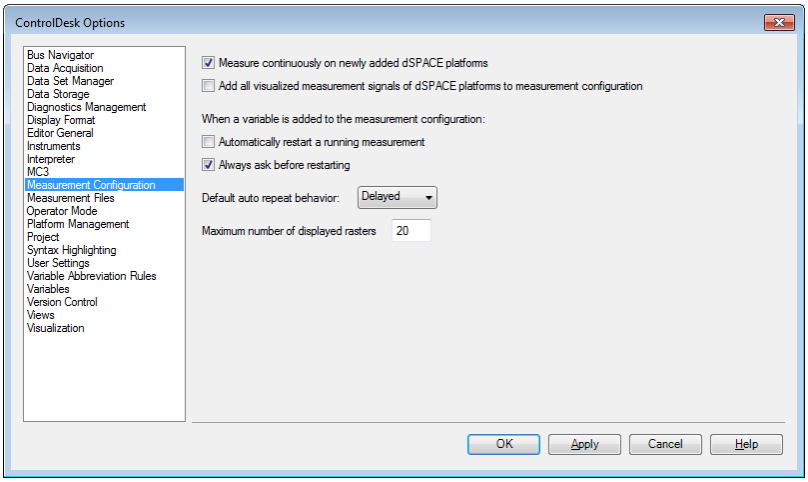
Objective

In this step you will create a new project with two experiments as the basis for the lessons in the tutorial.

Preconditions

- Your dSPACE hardware, for example, a DS1007 PPC Processor Board or a SCALEXIO system, must be connected to your host PC and registered. Refer to How to Register a Platform (ControlDesk Platform Management 🕮).
- General properties of the measurement configuration must be set to the default settings.

  On the File ribbon, click Options to open the ControlDesk Options dialog. Open the Measurement Configuration page and make sure that the checkboxes are configured as shown in the following illustration.



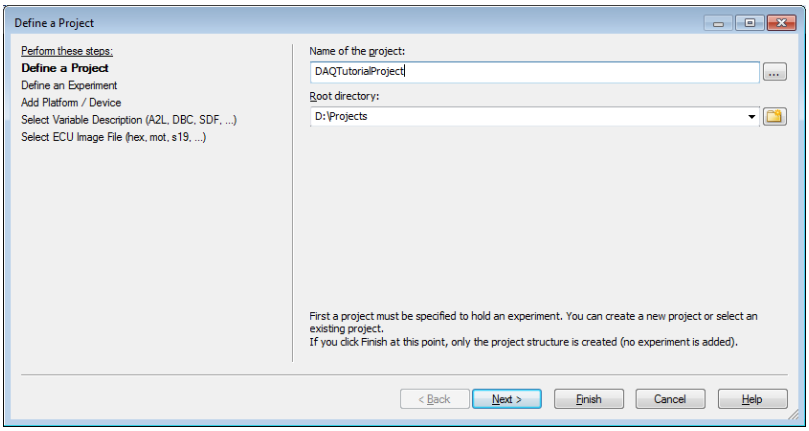
Part 1

To prepare the tutorial project

1. On the File ribbon, click New - New Project+Experiment.

   ControlDesk opens the Define a Project dialog.
2. In the Name of the project edit field, enter `DAQTutorialProject`.

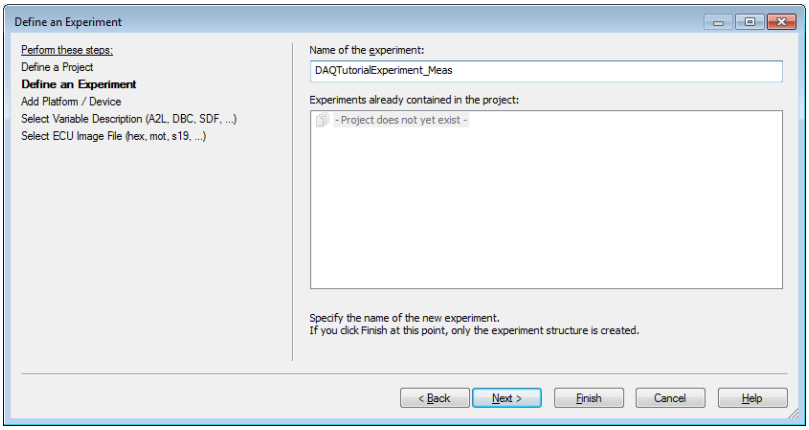
3 Select a root directory of your choice.



4 Click **Next**.

ControlDesk opens the **Define an Experiment** dialog.

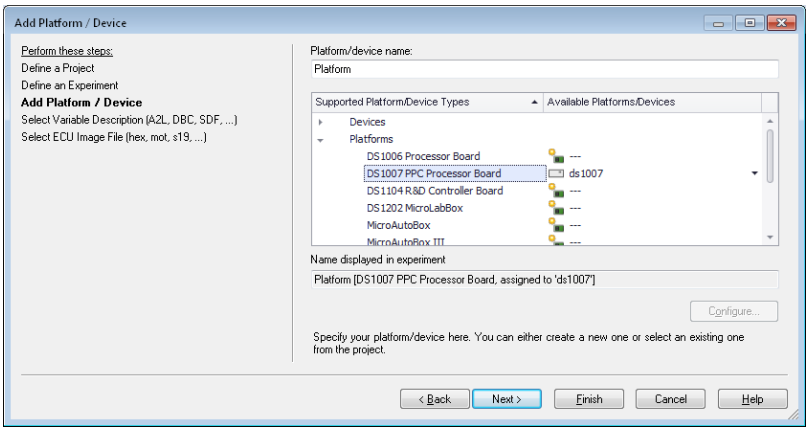
5 In the **Name of the experiment** edit field, enter `DAQTutorialExperiment_Meas`.



6 Click **Next**.

ControlDesk opens the **Add Platform/Device** dialog.

7 Select the real-time hardware that you registered. In the example, this is a DS1007 PPC Processor Board.



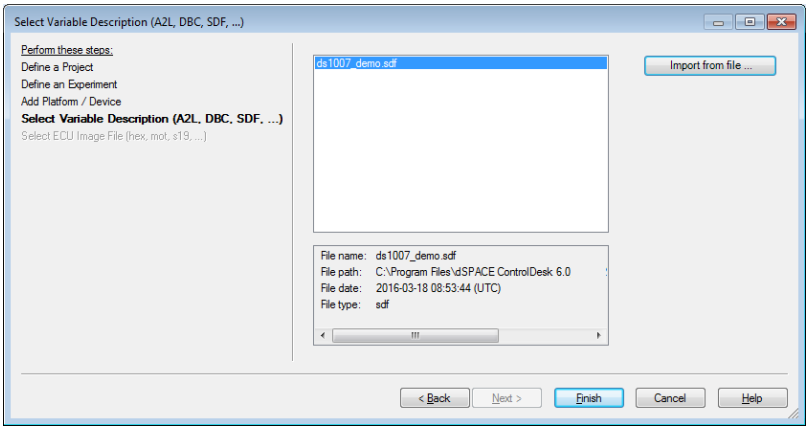
8 Click **Next**.

ControlDesk opens the **Select Variable Description** dialog.

9 Click **Import from file** to navigate to the installation folder of your ControlDesk installation, select the `<platform>_demo.sdf` variable description file for your real-time hardware from the `\Demos\RTApplications\<platform>` folder and click **Open**.

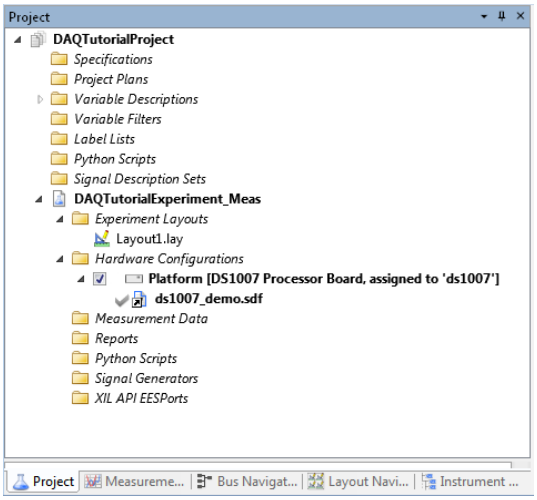
> **Tip**
>
> The folder that usually opens when you click **Import from file** is the project folder. This is not the installation folder. The installation folder is the folder your ControlDesk version has been installed in, for example, `C:\Program Files\dSPACE ControlDesk <x.y>`.

A typical path to the variable description file of the DS1007 PPC Processor Board in the example is: `C:\Program Files\dSPACE ControlDesk <x.y>\Demos\RTApplications\DS1007\DS1007_demo.sdf`.



10 Click Finish.

In the Project controlbar, you can see the project structure you have created so far.



Interim result

You created a new project with the DAQTutorialExperiment_Meas experiment that will be used in lesson 1. You can now add the DAQTutorialExperiment_Rec experiment for lesson 2.

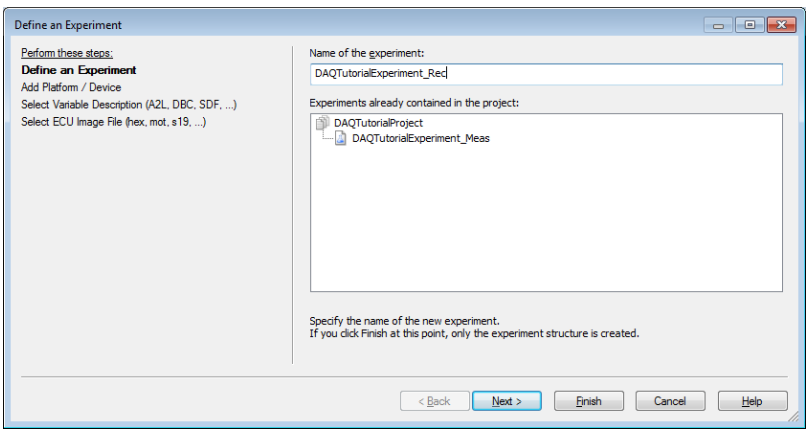
Part 2

To add another experiment to the tutorial project

1 On the File ribbon, click New – New Experiment.

ControlDesk opens the Define an Experiment dialog.

2 In the Name of the experiment edit field, enter `DAQTutorialExperiment_Rec`.



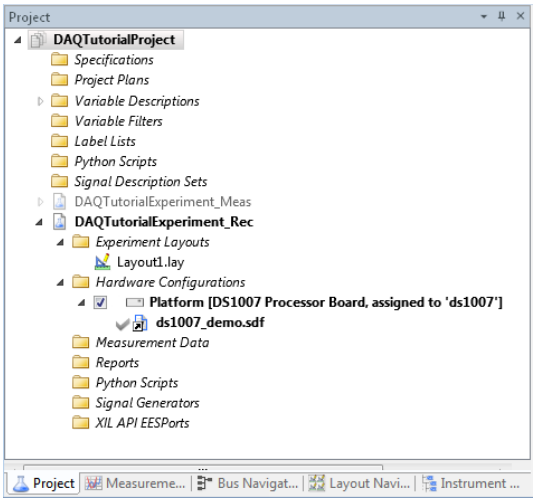
3 Click Next.

ControlDesk opens the Add Platform/Device dialog. The registered platform is already selected.

4 Click Next and select `<platform>_demo.sdf`.

5 Click Finish to close the dialog and add the experiment to the project.

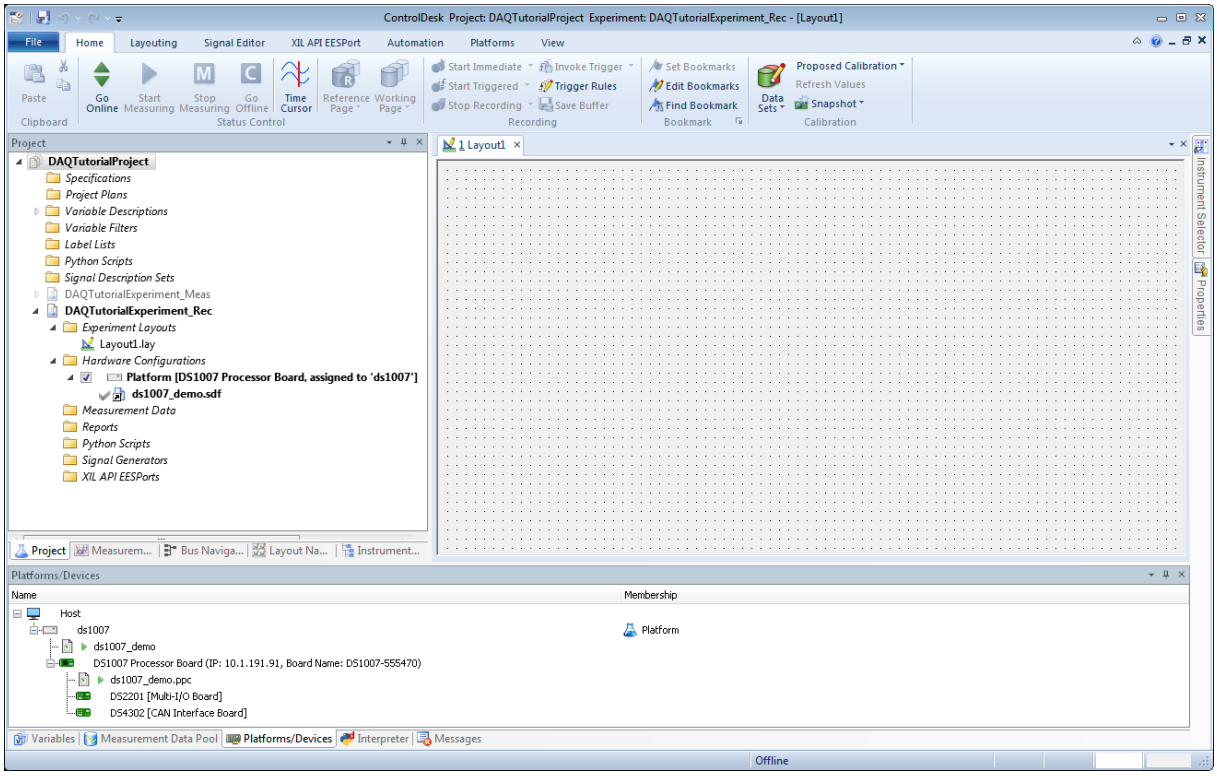
In the Project controlbar, you can see the project structure you have created so far.



6 Press `Ctrl+Shift+S` to save the experiment.

Result

You have defined a project with two experiments that access the same real-time platform. In the following illustration, the Project and the Platform/Device controlbars are opened to show this.



What's next

You can now start one of the lessons:

- If you want to learn how to configure and perform measurements on dSPACE platforms, refer to Lesson 1: Measuring on dSPACE Platforms on page 23.
- If you want to learn how to configure and perform a signal recording on dSPACE platforms, refer to Lesson 2: Recording on dSPACE Platforms on page 45.

Lesson 1: Measuring on dSPACE Platforms

Where to go from here

Information in this section

Overview of Lesson 1 24
Gives you an overview of lesson 1.

Step 1: How to Measure on a Platform with Default Measurement Settings 25
When you add a variable description to a dSPACE platform, ControlDesk adds a start trigger and a stop trigger to each measurement raster available for the related application. In this step, you will measure with default measurement settings.

Step 2: How to Activate a Triggered Measurement 28
You can easily switch between untriggered and triggered measurements. In this step, you will switch from a continuous (untriggered) to a triggered measurement.

Step 3: How to Measure with an Enabled Start Trigger and an Enabled Stop Trigger 32
Enabling a start trigger in combination with a stop trigger allows you to define a specific part of a signal to be uploaded from the dSPACE platform. In this step, you will enable a start trigger and perform a measurement with enabled start and stop triggers.

Step 4: How to Work with Triggered and Untriggered Time Plotter Visualization 35
The Time Plotter can use the trigger settings of a measurement raster for its display settings or display the data stream continuously. In this step, you will learn how to disable and enable the triggered visualization mode of a Time Plotter and observe the interactions between various trigger settings.

Step 5: How to Change the Leading Raster 38
If the variables that are connected to the Time Plotter are associated with several measurement rasters, you can select one measurement raster to specify the trigger settings for the Time Plotter display. This raster becomes the leading raster. In this step, you will learn how to change the leading raster.

Step 6: How to Change the Default Raster 41
One measurement raster is set as the device-specific default raster for the variables of the device. When you initially connect a variable of this device to a Time Plotter or a recorder, the default raster is used. In this step, you will learn how to change the default raster.

Result of Lesson 1 44
Gives you an overview of the result of lesson 1.

Overview of Lesson 1

What you will learn

In this lesson you will learn how to configure and perform measurements on dSPACE platforms.

- You will learn how to measure on dSPACE platforms with the default measurement settings.
- You will learn how to specify and enable start and stop triggers for measuring.
- You will switch between triggered and untriggered measurements.
- You will learn how to trigger the Time Plotter display to focus it on specific parts of the uploaded data stream.
- You will change the trigger settings for the Time Plotter display and the default raster for new signals.

Steps

This lesson contains the following steps:

- Step 1: How to Measure on a Platform with Default Measurement Settings on page 25
- Step 2: How to Activate a Triggered Measurement on page 28
- Step 3: How to Measure with an Enabled Start Trigger and an Enabled Stop Trigger on page 32
- Step 4: How to Work with Triggered and Untriggered Time Plotter Visualization on page 35
- Step 5: How to Change the Leading Raster on page 38
- Step 6: How to Change the Default Raster on page 41

Result and further information

To check the learning results of the steps you executed and for further information, refer to Result of Lesson 1 on page 44.

Duration

Working through this lesson will take you about 40 minutes.

Related topics

Basics

Measuring Data 77

HowTos

Step 1: How to Measure on a Platform with Default Measurement Settings 25
Step 2: How to Activate a Triggered Measurement 28
Step 3: How to Measure with an Enabled Start Trigger and an Enabled Stop Trigger 32
Step 4: How to Work with Triggered and Untriggered Time Plotter Visualization 35
Step 5: How to Change the Leading Raster 38
Step 6: How to Change the Default Raster 41

Step 1: How to Measure on a Platform with Default Measurement Settings

Objective

When you add a variable description to a dSPACE platform, ControlDesk adds a start trigger and a stop trigger to each measurement raster available for the related application.

Default Measurement Trigger Settings	
Start trigger	Platform trigger: Disabled
Stop trigger	Duration trigger (e.g., 1 second): Disabled

By default, the measurement triggers are disabled and ControlDesk performs continuous (untriggered) measurements.

Method

To measure on a platform with default measurement settings

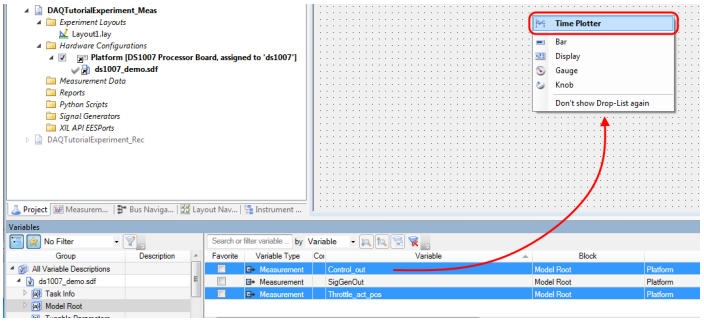
1 Open the DAQTutorialProject.

2 If the DAQTutorialExperiment_Meas experiment is not already active, activate it via its context menu.

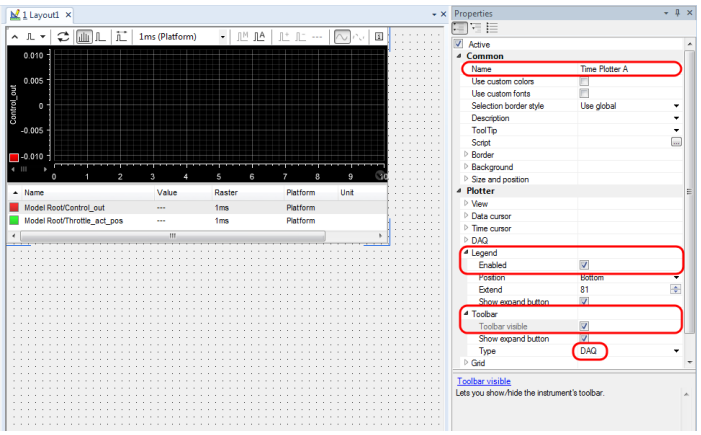
3 Click Variables to open the Variables controlbar, and select the Model Root node in the tree view.

4 In the variable list, select the following two variables and drag them onto Layout1 to place them in a Time Plotter:

- Control_out
- Throttle_act_pos

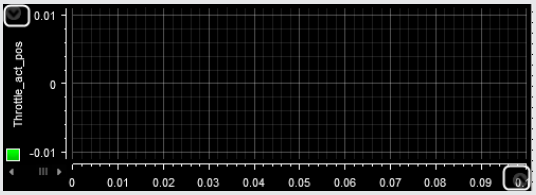


5 Name the Time Plotter **`Time Plotter A`** and open its toolbar (DAQ type) and its legend.

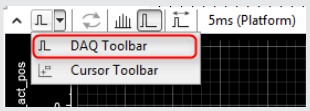


Tip

- You can open the legend and the toolbar by clicking the arrow symbols in the Time Plotter:

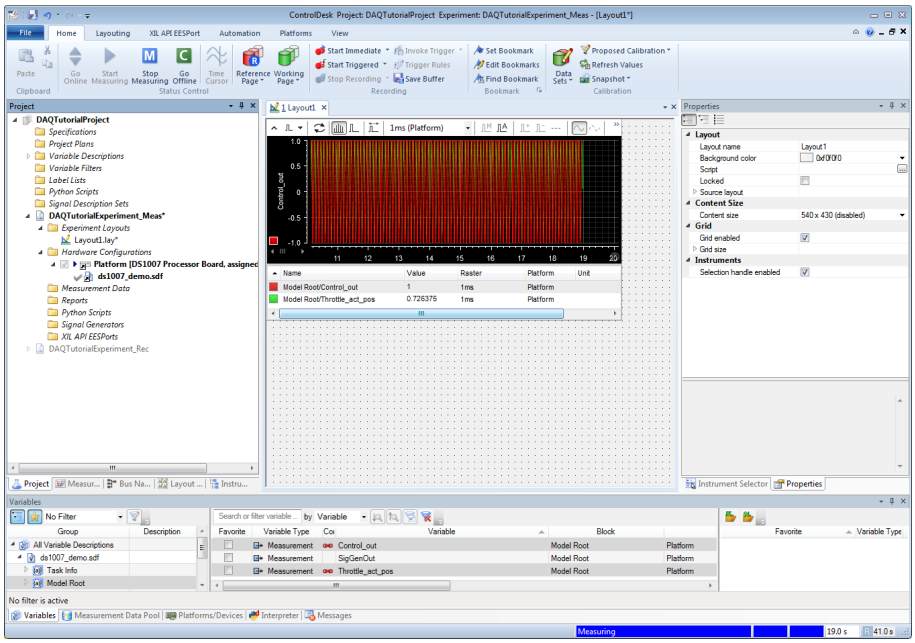


- You can select the toolbar type within the toolbar:

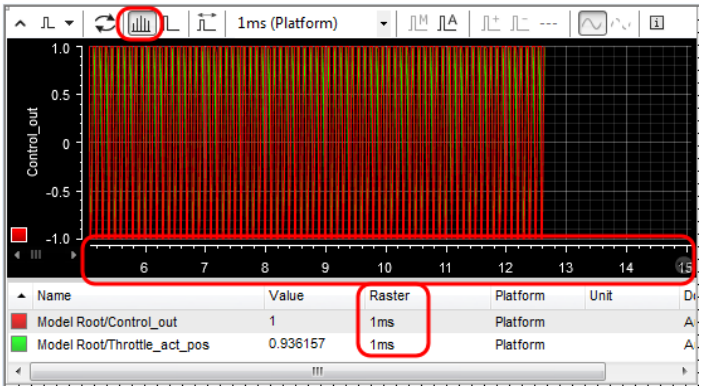


6 On the Home ribbon, click Status Control - Start Measuring to start a measurement.

If ControlDesk detects no errors for the platform, it starts online calibration and displays the two measured signals in the Time Plotter.



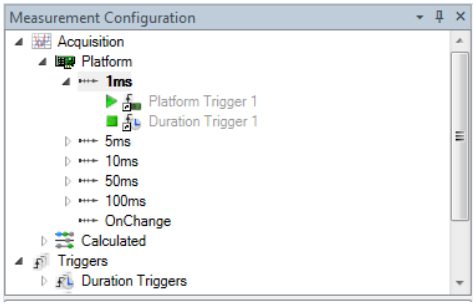
The Time Plotter is automatically set to continuous visualization mode. This is the default setting for connecting variables of a real-time application.



The following Time Plotter elements give you more information on the currently active settings:

- in the toolbar indicates that the Time Plotter is in continuous visualization mode.
- The x-axis shows a continuing time axis, which indicates that no duration trigger is enabled.
- The **Raster** column displays the measurement raster that is assigned to a signal.

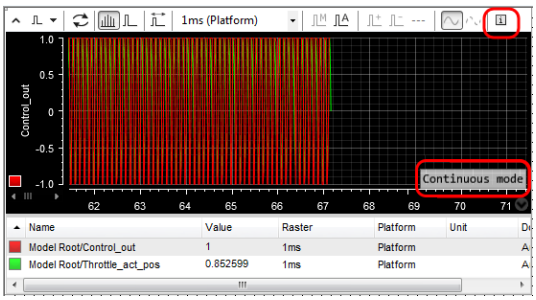
7 In the Measurement Configuration controlbar, open Acquisition – Platform – 1 ms to see the trigger settings of the 1 ms raster.



- The start trigger (Platform Trigger 1) is disabled.
- The stop trigger (Duration Trigger 1) is disabled.

If the Measurement Configuration controlbar is not visible, select the View ribbon and click Controlbar – Switch Controlbars – Measurement Configuration.

8 On the Time Plotter's toolbar, click to display the DAQ info.



The DAQ info displays the currently active display mode of the Time Plotter.

9 Press F6 to stop the running measurement.

10 Press `Ctrl+Shift+S` to save the experiment.

Result

You have placed two variables in a Time Plotter on the layout and started a measurement with default measurement settings.

What's next

In the next step, you will switch from a continuous to a triggered measurement.

Step 2: How to Activate a Triggered Measurement

Objective

Via the context menu of a measurement raster, you can easily switch between untriggered and triggered measurements.

Method

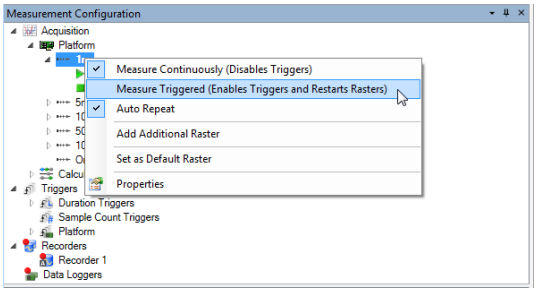
To activate a triggered measurement

1 Press **F5** to start measuring.

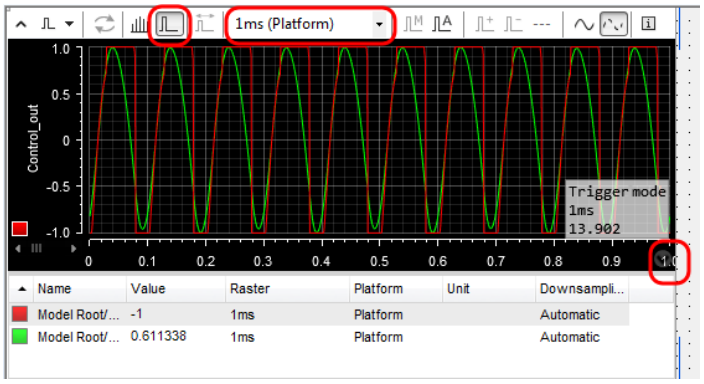
2 In the Measurement Configuration, right-click the 1 ms raster.

In the context menu, a ☑ symbol indicates that all triggers are disabled and measuring is performed continuously.

3 Select Measure Triggered (Enables Triggers and Restarts Rasters).

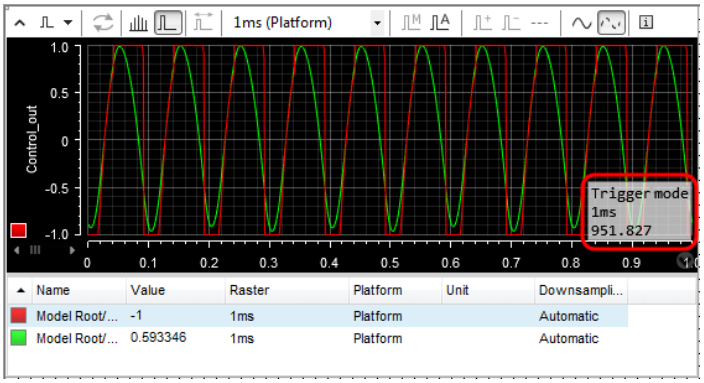


The Time Plotter display is automatically set to triggered visualization mode:



The following Time Plotter elements give you more information on the trigger settings:

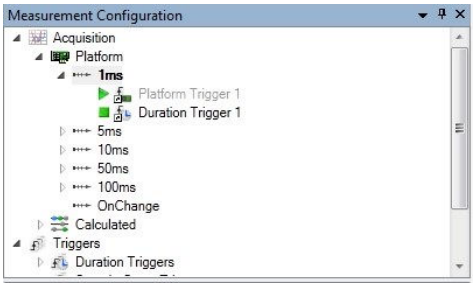
- in the toolbar indicates that the Time Plotter is in triggered visualization mode.
- The raster selection in the toolbar indicates that the trigger settings of the 1 ms measurement raster is used to trigger the Time Plotter display.
- The x-axis now has a maximum value of 1.0 s, which indicates that a duration trigger of 1 second is enabled.



The DAQ info displays

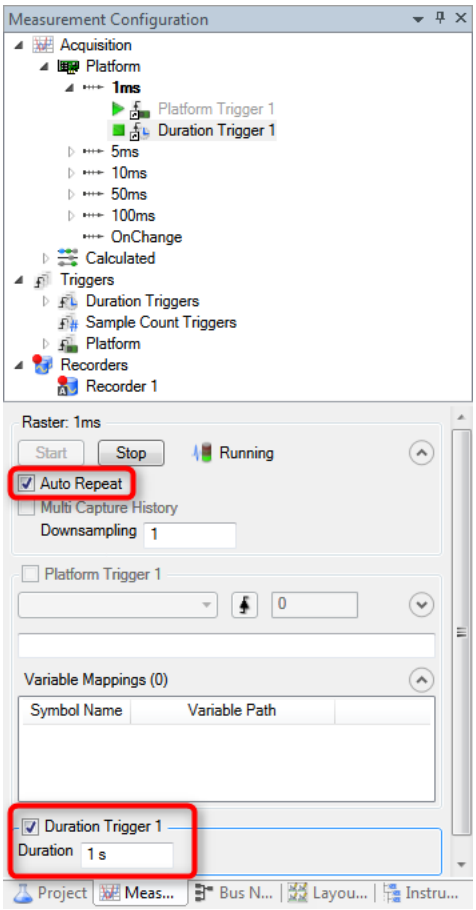
- The currently active display mode of the Time Plotter
- The measurement raster that is used to trigger the display
- The start time of the currently displayed measurement sample

4 In the **Measurement Configuration** controlbar, open **Acquisition – Platform – 1 ms** to see the trigger settings of the 1 ms raster.



- The start trigger (**Platform Trigger 1**) is disabled.
- The stop trigger (**Duration Trigger 1**) is enabled.

5 Select Duration Trigger 1.



- As expected, the duration trigger is set to a value of 1 second.
- If Auto Repeat is disabled, enable it and click Start. The one-second capture is started repeatedly.

> **Tip**
>
> If Auto Repeat or other sections are not visible, click the related arrow buttons on the right.

6 In the Time Plotter, the signal traces are renewed with each start.

If not already active, click ∿ to draw the curves on each new value.

7 Click ∿ to draw the curves when a triggered capture is complete. This prevents the displayed signal from flickering.

8 Press F6 to stop the running measurement.

Result

You have activated a triggered measurement for the 1 ms raster and configured the triggered visualization mode in the Time Plotter.

What's next

In the next step, you will learn to enable a start trigger.

Step 3: How to Measure with an Enabled Start Trigger and an Enabled Stop Trigger

Objective

Enabling a start trigger in combination with a stop trigger allows you to define a specific part of a signal to be uploaded from the dSPACE platform to the host PC.

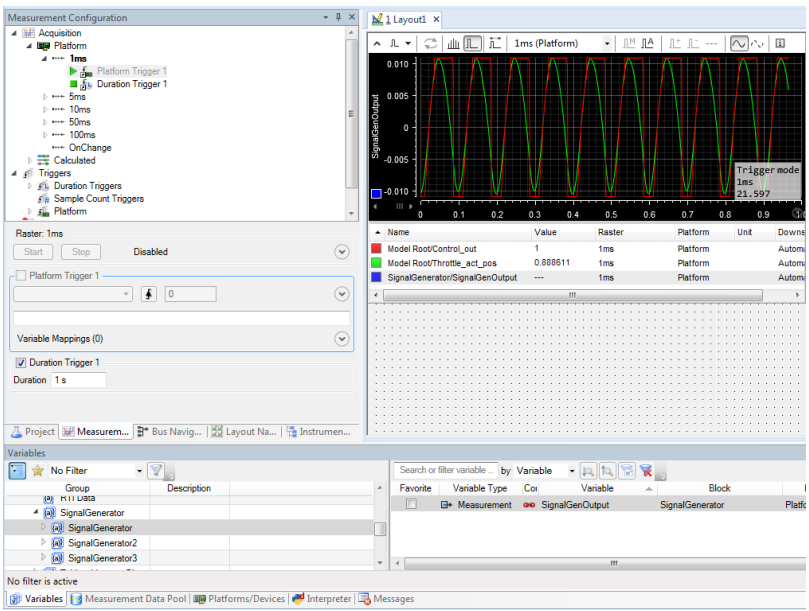
If the triggers are enabled for a measurement raster, the trigger conditions are evaluated on the real-time hardware when measurement is started. Data is transferred to the host PC only if the trigger conditions are met.

Method

To measure with an enabled start trigger and an enabled stop trigger

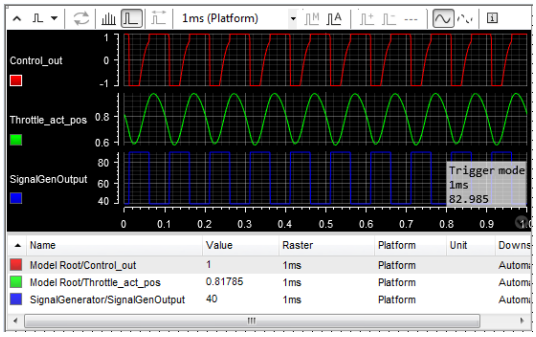
1 In the tree view of the Variables controlbar, select the Model Root – Signal Generator – Signal Generator node.

2 In the variable list, select the SignalGenerator/SignalGenerator/SignalGenOutput variable and drag it onto the legend of the Time Plotter.



3 Right-click the y-axis area and select Y-Axis view – Horizontal Stacked.

4 Press **F5** to start measurement.

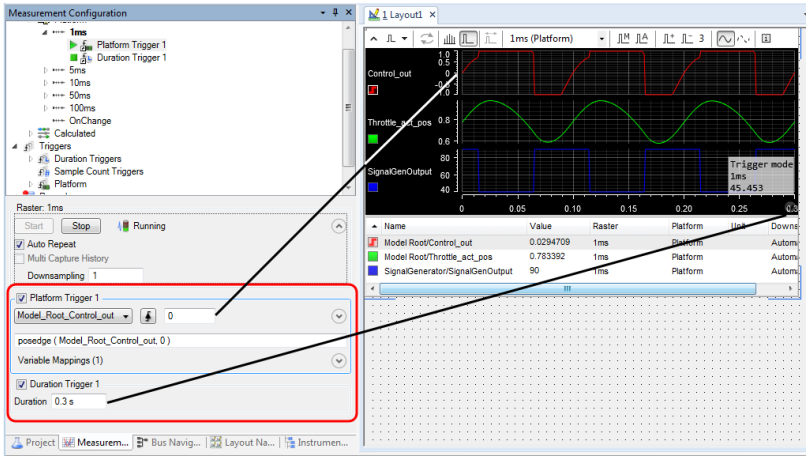


When a measurement is running, the Time Plotter can automatically add a start trigger to a measurement raster and calculate optimum start and stop trigger settings.

5 Select the **Control_out** signal in the legend and click in the toolbar.

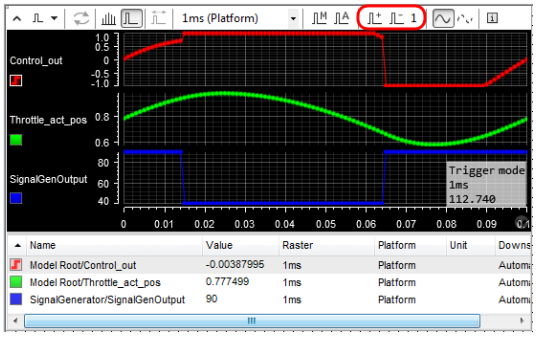
ControlDesk calculates optimum values for the start and the stop trigger.

You can see the changed values in the **Measurement Configuration** and their results in the Time Plotter:



- The start trigger **Platform Trigger 1** is enabled for the 1 ms raster.
- The trigger conditions for the platform trigger are specified.
- The duration trigger is specified. The length of the duration trigger depends on the number of displayed periods. You can decrease and increase the number of periods via the toolbar: .

6 Click the period symbols in the toolbar until one period is displayed.

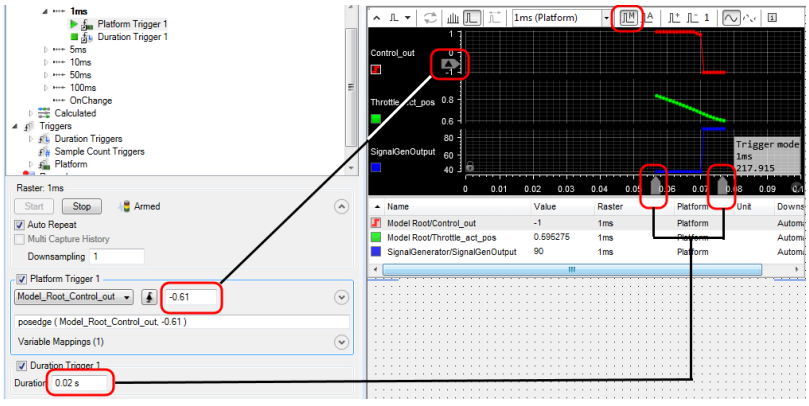


The Time Plotter now shows one period of the automatically calculated trigger settings.

Taking this result as starting point, you can change the trigger settings interactively.

7 Click ⎍ to activate the interactive trigger setting.

Three sliders are displayed on the Time Plotter axes.



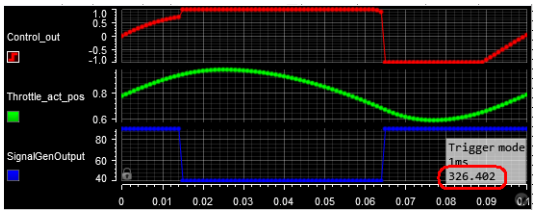
- On the y-axis, you can drag one slider to change the trigger value.
- On the x-axis, you can drag two sliders to change the trigger delay and the samples or duration settings.

Tip

You can change all the trigger settings manually. Even the trigger signal can be dragged manually to the Measurement Configuration controlbar. However, it is easier to place a signal in the Time Plotter and start with an automatic trigger setting.

8 Click ⎍ to reactivate the automatic trigger settings.

9 Clear the Auto Repeat checkbox and click the Start button several times.



- Each click starts a new capture.
- If the Time Plotter display is triggered, the time axis does not show the original time stamps of the running measurement. It starts at 0 when the condition of the start trigger is met. You can see the original time stamp (the time that passed between the start of the measurement and the triggering of the current capture) in the DAQ info area.

10 Select Auto Repeat and click Start.

Result

You have configured a start trigger and performed a measurement with enabled start and stop triggers.

What's next

In the next step, you will learn how to trigger the Time Plotter display to focus on the uploaded part of the signal and then untrigger it again.

Step 4: How to Work with Triggered and Untriggered Time Plotter Visualization

Objective

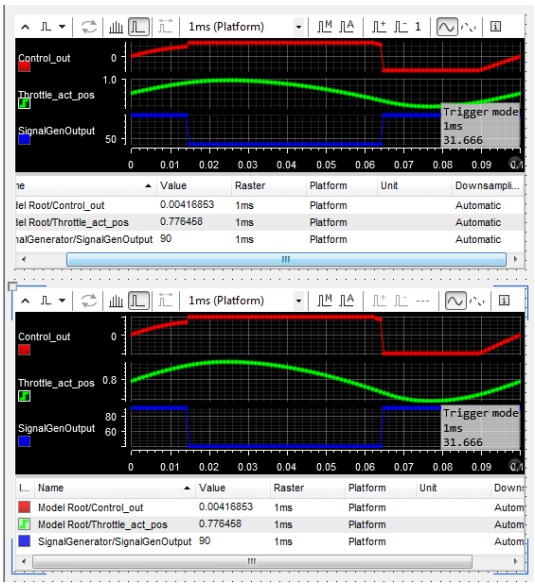
The Time Plotter can use the trigger settings of a measurement raster for its display settings or display the data stream continuously.

Method

To work with triggered and untriggered Time Plotter visualization

1 On the layout, select Time Plotter A and press `Ctrl+C` to copy it to the Clipboard.

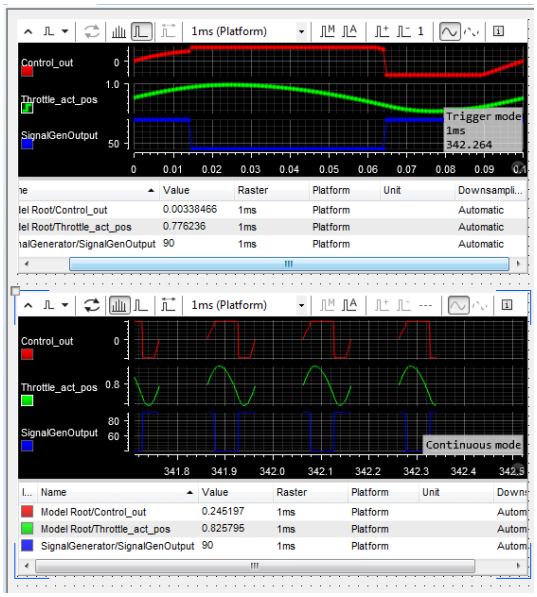
2 Right-click an empty area on the layout and select Paste Instruments with connections.



The new Time Plotter has the same settings as Time Plotter A.

3 From the context menu of the new Time Plotter, select Instrument Properties and change the name of the new Time Plotter to Time Plotter B.

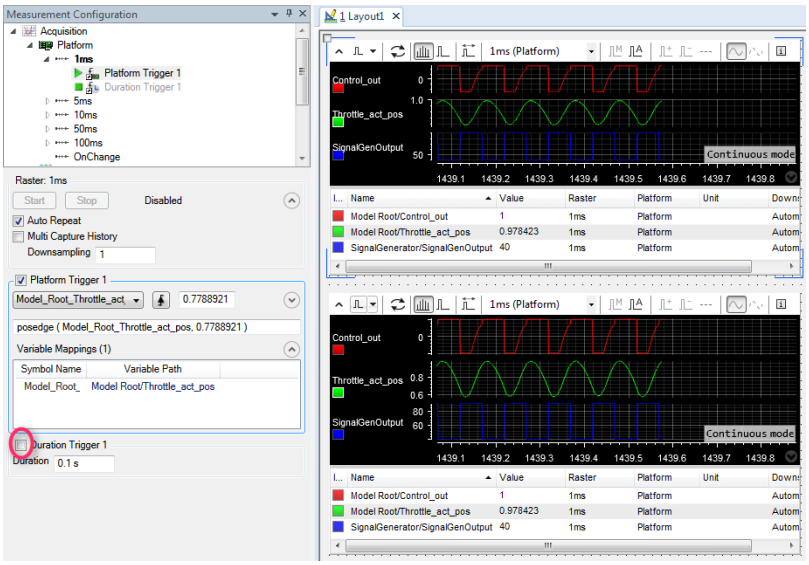
4 In the toolbar of Time Plotter B, click .



The DAQ info area and the x-axes of the Time Plotters show you that:

- Time Plotter A is in triggered visualization mode
- Time Plotter B is in continuous visualization mode

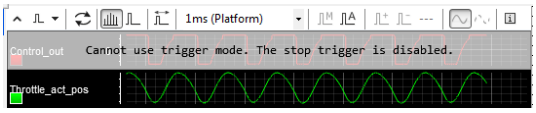
5 In the **Measurement Configuration** controlbar, disable **Duration Trigger 1**.



- **Time Plotter A** cannot display signals, if it stays in triggered visualization mode, because triggered visualization is only possible with an enabled stop trigger. ControlDesk therefore automatically switches **Time Plotter A** to untriggered mode.
- **Time Plotter B** is not affected, because it is in untriggered mode and displays all signals continuously.

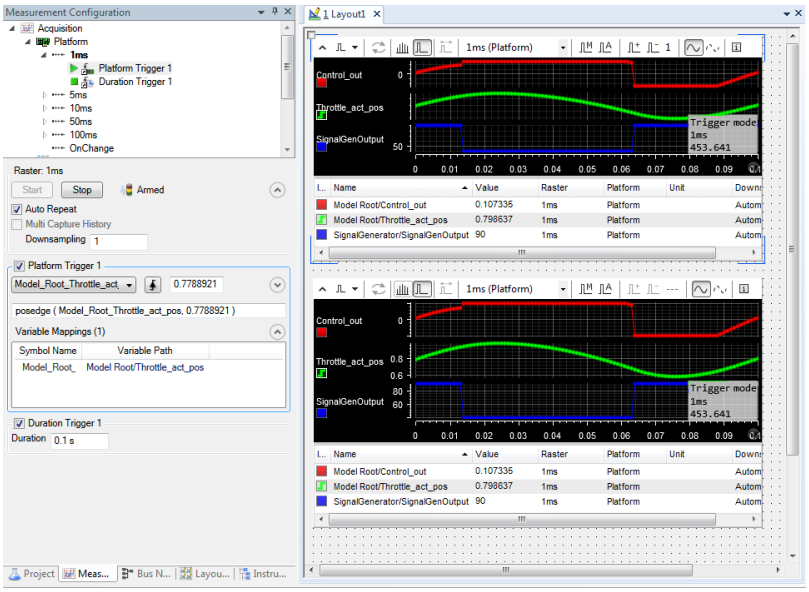
There are no gaps in the signals because the uploaded data stream is not triggered.

6 To see what happens if you switch **Time Plotter A** back to triggered mode manually, click in the toolbar of **Time Plotter A**.



Time Plotter A cannot switch the display mode, because triggered visualization is possible only with an enabled stop trigger.

7 In the Measurement Configuration controlbar, right-click the 1 ms raster and select Measure Triggered (Enables Triggers and Restarts Rasters).



Note that activating the triggered mode for the measurement raster also activates the triggered visualization mode for Time Plotters that use this raster as the leading raster:

- Time Plotter A can display the triggered signals again, because the stop trigger is active.
- Time Plotter B switches to triggered visualization mode.

Result

You have disabled and enabled the triggered visualization mode of a Time Plotter and observed the interactions between trigger settings for the measurement raster and trigger settings for the Time Plotter display.

What's next

In the next step, you will learn how to change the leading raster to specify the trigger settings for the Time Plotter display.

Step 5: How to Change the Leading Raster

Objective

If the variables that are connected to the Time Plotter are associated with several measurement rasters, you can select one measurement raster to specify the trigger settings for the Time Plotter display. This raster becomes the leading raster.

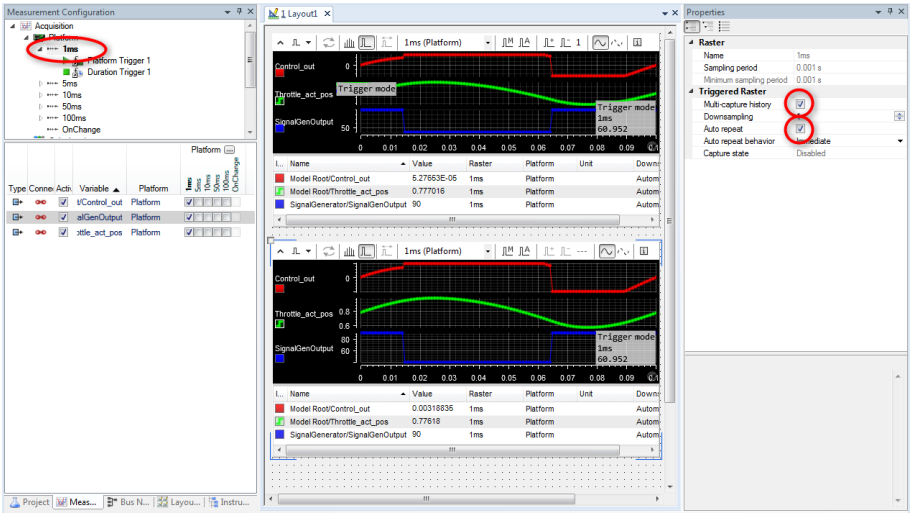
Method

To change the leading raster

1 Press **F6** to stop measuring.

2 Right-click the 1 ms raster and select Properties.

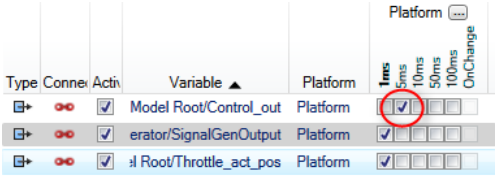
3 In the Properties controlbar, make sure that the following settings are set:
- Multi-capture history: Enabled
- Auto repeat: Enabled



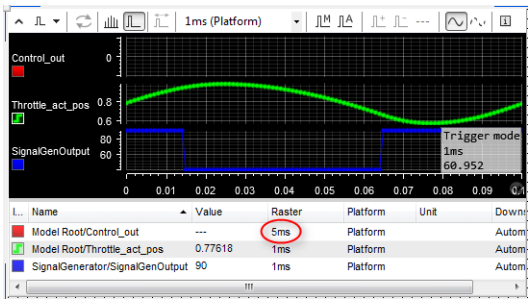
Tip

Click the pin button to toggle the pane's autohide function.

4 In the Measurement Configuration controlbar, select the 1 ms raster and click the 5 ms raster checkbox of the Model Root/Control_out variable in the Platform column of the configuration area.



The Model Root/Control_out variable is now measured as a 5 ms signal.

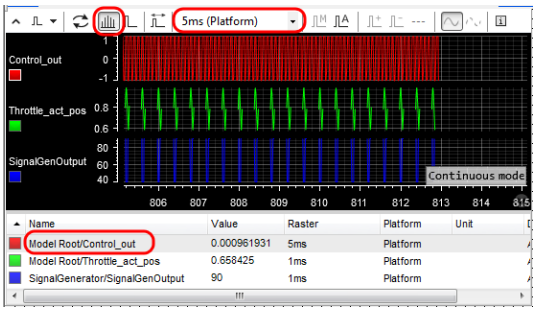


- The Plotter legend displays the new raster setting in the Raster column.
- The signal trace is not displayed in the analog view area, because no values have been measured in this raster so far.
- The raster list in the toolbar shows that the 1 ms raster is still used for the Time Plotter display. It is the leading raster.
- The x-axis of the Plotter is therefore still set to 0.1 seconds.

5 Press **F5** to start measuring.

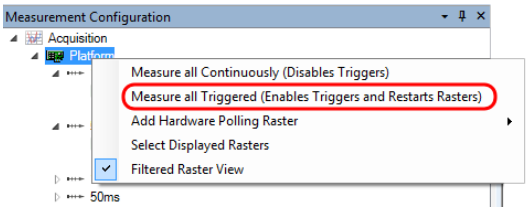
6 Change the following settings of Time Plotter B:

- In the legend, select the Control_out signal.
- In the toolbar, select the 5 ms raster in the raster list.



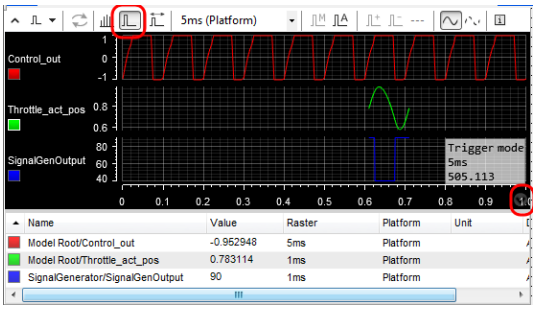
- The 5 ms raster is now the leading raster.
- The Plotter display is set to continuous mode, because the 5 ms raster already uses the default measurement raster.

7 In the Measurement Configuration, right-click Acquisition – Platform and select Measure all Triggered (Enables Triggers and Restarts Rasters).

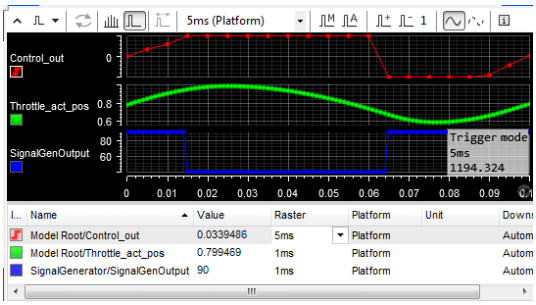


All measurement rasters are set to triggered measurement now.

The Plotter display switches to triggered mode:



8 In the toolbar of **Time Plotter B**, click to optimize the trigger settings.



ControlDesk sets the duration trigger for the 5 ms signal to 0.1 s. The 1 ms signals are visible again without gaps.

Result

You specified to measure a variable in another measurement raster. Then you switched the trigger settings of the Time Plotter display to this raster, which made it the leading raster.

What's next

In the next step, you can change the default raster for the variables of a device.

Step 6: How to Change the Default Raster

Objective

One measurement raster is set as the device-specific default raster for the variables of the device. It is displayed in bold letters. When you initially connect a variable of this device to a Time Plotter or a recorder, the default raster is used.

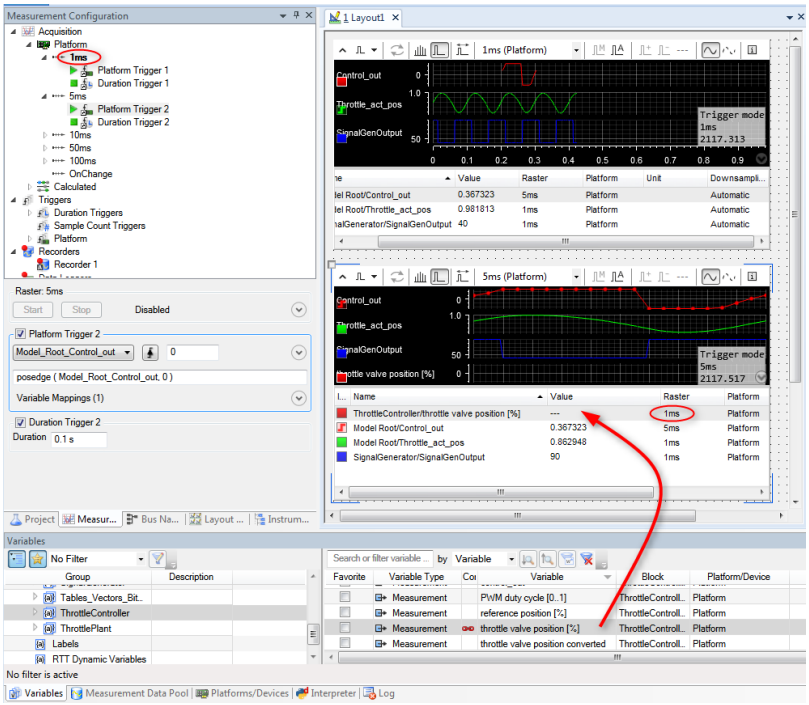
Default measurement rasters can also be defined for specific variables in the variable description. These variable-specific default rasters are not part of this tutorial.

Method

To change the default raster

1 Press **F6** to stop measuring.

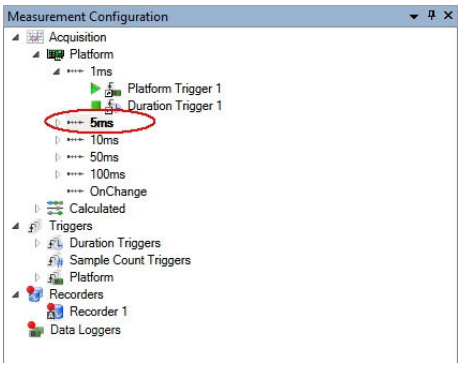
2 In the **Variables** controlbar, select **Model Root – ThrottleController** and drag the **throttle valve position [%]** variable to the legend of **Time Plotter B**.



- The new variable is added to the Time Plotter as a signal with a 1 ms measurement raster. You can see the reason for the raster setting in the **Measurement Configuration** controlbar: the **1 ms** measurement raster is displayed in bold letters, which shows that it is the device-specific default raster for this platform.
- The leading raster is still the 5 ms measurement raster.

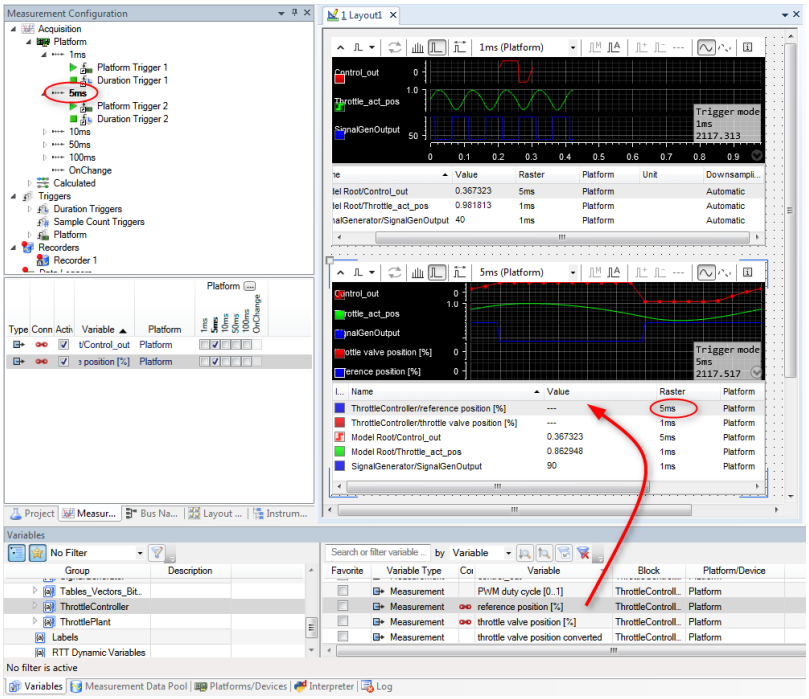
3 In the **Measurement Configuration** controlbar, select the **5 ms** raster and check its signal list.

4 In the navigation area, right-click the 5 ms raster, and select **Set as Default Raster**.



The 5 ms raster is now displayed in bold letters.

5 From the **Variables** controlbar, drag **reference position [%]** to the legend of **Time Plotter B**.



- The new variable is added to the Time Plotter as a signal with a 5 ms measurement raster, because this is now the default raster for the platform.
- The leading raster (5 ms) is not affected by changing the default raster setting.

Result

You have added signals with different measurement rasters to a Time Plotter by changing the device-specific default raster in the **Measurement Configuration**.

What's next

With this step, you finished the measurement tasks in this tutorial. For a summary of your working results and for further information, refer to the result of this lesson.

Result of Lesson 1

Overview

In this lesson you learned the basic steps and principles of configuring and performing measurements on dSPACE platforms:

- By default, a measurement on a dSPACE platform is a continuous measurement. Start and stop triggers are defined but not enabled.
- Specifying a start trigger and a stop trigger allows you to define the part of a signal to be uploaded from the dSPACE platform to the host PC.
- You can use context menu commands of the measurement raster to switch between triggered and untriggered measurements.
- The Time Plotter display can be triggered via the trigger settings of a measurement raster to show exactly the uploaded measurement section.
- You can switch the trigger settings for the Time Plotter display via the **Raster** column in the Time Plotter legend.
- You can change the device-specific default raster for new signals via the context menu of a measurement raster in the **Measurement Configuration**.

Further information

For a detailed description, refer to Measuring Data on page 77.

What´s next

The lessons in this tutorial are independent of each other.

If you want to learn how to configure and perform a signal recording refer to Lesson 2: Recording on dSPACE Platforms on page 45.

Related topics

Basics

Measuring Data 77

Lesson 2: Recording on dSPACE Platforms

Where to go from here

Information in this section

Overview of Lesson 2 45
Gives you an overview of lesson 2.

Step 1: How to Create a Recorder and Check its Signal List 46
In ControlDesk, recordings are managed via recorders. In this step, you will create a new recorder and check the recorder signal lists of the default and the new recorder, before and after adding signals to the measurement signal list.

Step 2: How to Configure the Signal List of a Recorder 51
You can configure the settings of a signal list. In this step, you will add signals to the signal list of a recorder via drag & drop and then change the measurement raster settings of the signals.

Step 3: How to Perform an Immediate Recording 54
You can start recordings immediately, which means without taking any trigger conditions into account. In this step, you will perform two immediate recordings and open the resulting measurement data files in the **Measurement Data Pool**.

Step 4: How to Perform a Triggered Recording 58
You can define triggers for a recording, which means that you start and stop a recording according to defined start and stop conditions. In this step, you will define and perform a triggered recording and open the resulting measurement data file in the **Measurement Data Pool**.

Step 5: How to Automatically Partition Long-Term Recordings 66
When you perform long-term recordings, ControlDesk collects a large amount of data. To handle the data more easily, you can automatically partition long-term recordings by using triggered recording. In this step, you will define and perform multiple recordings that are triggered sequentially.

Result of Lesson 2 70
Gives you an overview of the result of lesson 2.

Overview of Lesson 2

What you will learn

In this lesson you will learn how to configure and perform recordings of signals on dSPACE platforms.

- You will learn how to use recorders and configure the signals to be recorded.
- You will perform immediate and triggered recordings.

- You will open measurement data files in the **Measurement Data Pool** and visualize the recorded signals they contain.

Steps

This lesson contains the following steps:

- Step 1: How to Create a Recorder and Check its Signal List on page 46
- Step 2: How to Configure the Signal List of a Recorder on page 51
- Step 3: How to Perform an Immediate Recording on page 54
- Step 4: How to Perform a Triggered Recording on page 58
- Step 5: How to Automatically Partition Long-Term Recordings on page 66

Result and further information

To check the learning results of the steps you executed and for further information, refer to Result of Lesson 2 on page 70.

Duration

Working through this lesson will take you about 30 minutes.

Related topics

Basics

Recording Data..... 118

Step 1: How to Create a Recorder and Check its Signal List

Objective

In ControlDesk, recordings are managed via recorders. ControlDesk always creates one default recorder for each new experiment. You can create various further recorders with different signals to be recorded.

These signals are listed in recorder signal lists. A recorder signal list can be filled automatically with signals from the measurement signal list or manually, for example, by dragging variables from the **Variables** controlbar.

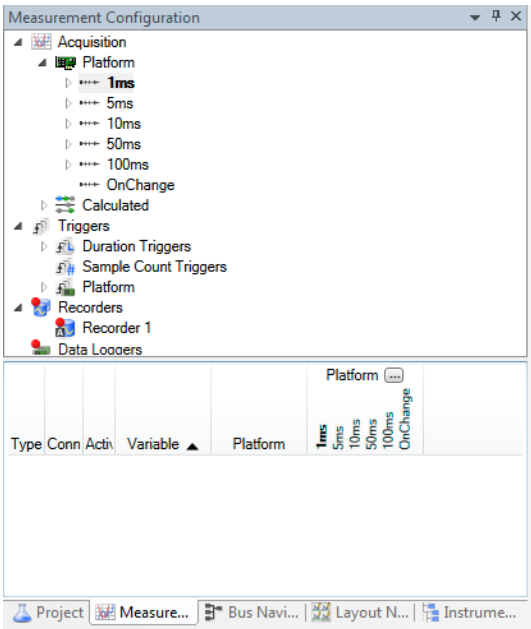
In this step you will create a new recorder and check the recorder signal lists of the default and the new recorder, before and after adding signals to the measurement signal list.

Method

To create a recorder and check its signal list

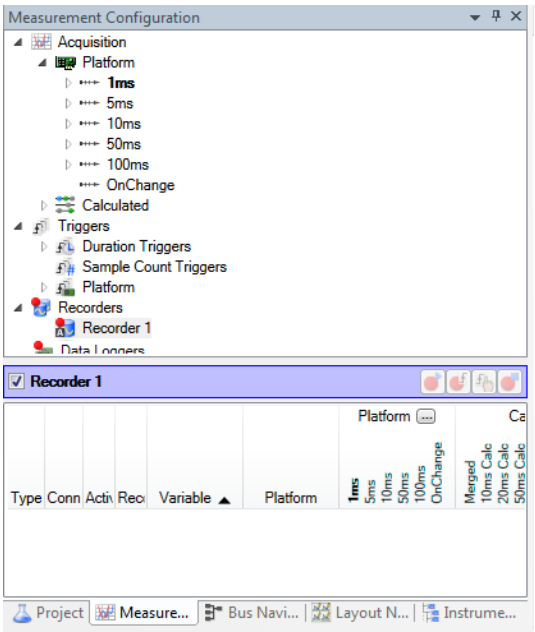
1. Open the **DAQTutorialProject**.
2. If the **DAQTutorialExperiment_Rec** experiment is not already active, activate it via its context menu.

3 In the **Measurement Configuration** controlbar, click **Acquisition – Platform – 1ms** and check the configuration settings for the 1 ms measurement raster.



- Note that the signal list in the measurement configuration area (below the navigation tree) is empty because you have not selected a signal to be measured.
- The navigation tree contains a default recorder element with the name **Recorder 1**.

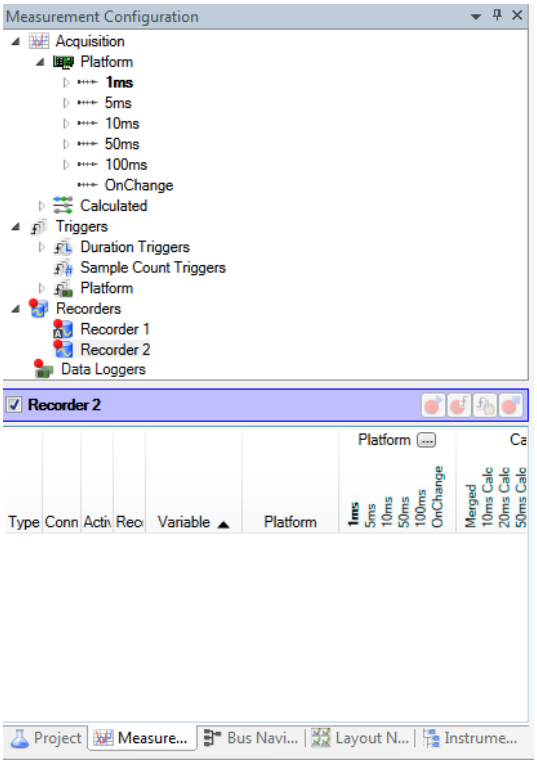
4 Click Recorders – Recorder 1 and check the configuration settings of the recorder.



Note that the signal list of Recorder 1 is empty.

5 Right-click Recorders and select Create New Recorder.

6 Select Recorder 2 to check its configuration settings.

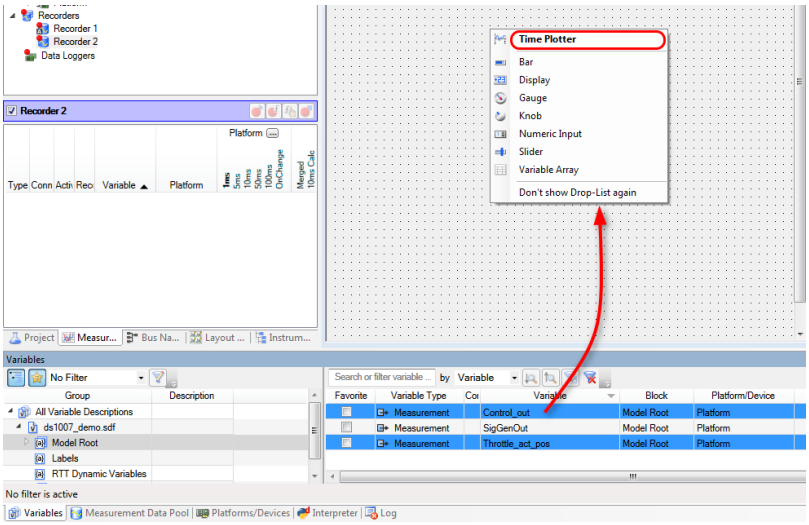


- The signal list of **Recorder 2** is also empty.
- Note that Recorder 1 has a little A in its symbol and **Recorder 2** does not. The *A* stands for *automatic* and shows that **Automatic signal configuration** is enabled for **Recorder 1**. You can enable this property for each recorder, but for **Recorder 1** it is enabled by default. **Automatic signal configuration** means that the signal list of a recorder is connected to the signal measurement list. Changes in the signal measurement list are automatically applied to the signal list of the recorder.

7 Open the **Variables** controlbar, and select the **Model Root** node in the tree view.

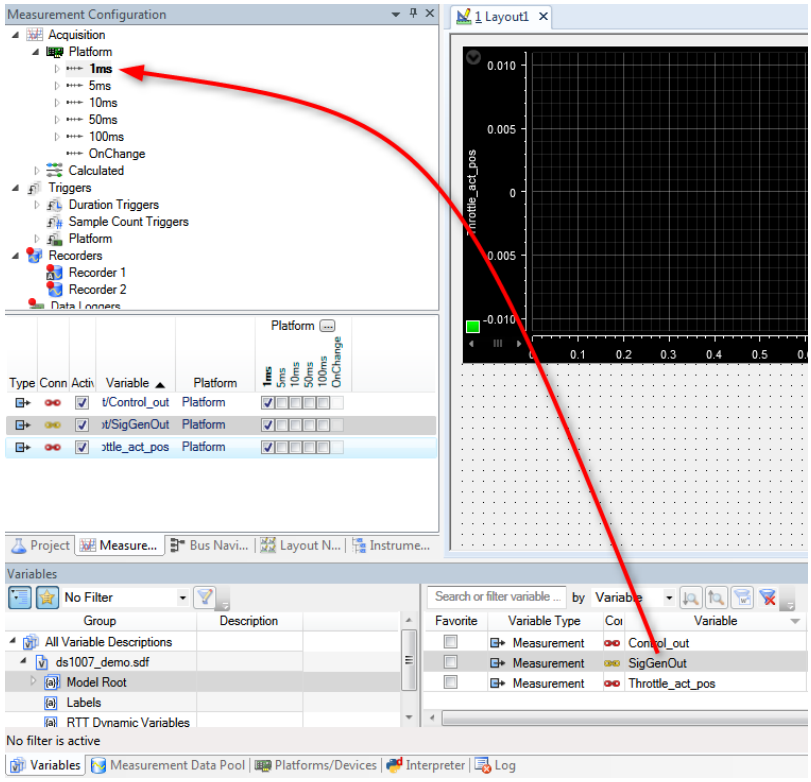
8 From the variable list, select the following two variables and drag them onto **Layout1** to place them in a Time Plotter:

- Control_out
- Throttle_act_pos

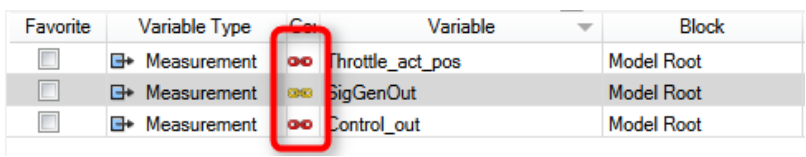


9 From the variable list, select the following variable and drag it onto the **1ms** raster node in the **Measurement Configuration** controlbar:

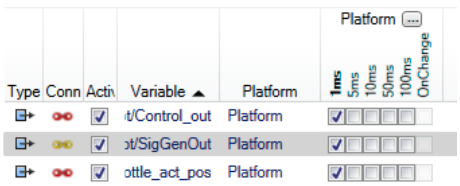
- SigGenOut

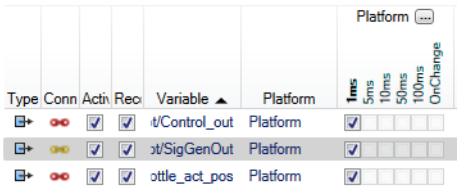


The chain symbols in the Variables controlbar show that 3 variables have been added to the measurement signal list. Two of them will be displayed in an instrument (red chain), one will be measured without visualization (yellow chain).



10 In the Measurement Configuration controlbar, check the measurement signal list of the 1 ms raster and the signal lists of Recorder 1 and Recorder 2 as described in the following table.

Selected Node	Configuration
Acquisition – Platform – 1ms	 The measurement signal list contains all the three selected signals.

Selected Node	Configuration
Recorders – Recorder 1	 The signal list of Recorder 1 contains all the three selected signals. They have been taken from the measurement signal list because Automatic signal configuration is enabled for the initial recorder by default (shown by an *A* in the recorder symbol).
Recorders – Recorder 2	 The signal list of Recorder 2 contains no signals. They have not been taken from the measurement signal list because Automatic signal configuration is disabled for this recorder (no *A* in the recorder symbol).

Result

Your experiment now has two recorders.

- The signal list of Recorder 1 has been filled together with the measurement signal list, because Automatic signal configuration was enabled for this recorder by default.
- Recorder 2 contains no signal because signals must be added to this recorder manually as long as Automatic signal configuration is disabled in its properties.

What's next

In the next step, you will add signals to Recorder 2 and configure the signal lists of both recorders.

Step 2: How to Configure the Signal List of a Recorder

Objective

You can configure the settings of a signal list, for example, by specifying the measurement raster settings of the signals to be recorded.

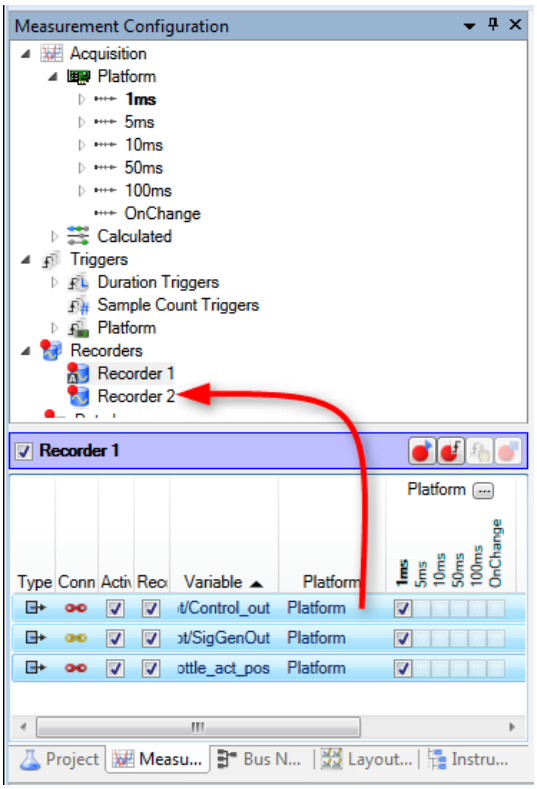
In this step, you will add signals to the signal list of a recorder via drag & drop and then change the measurement raster settings of the signals.

Method

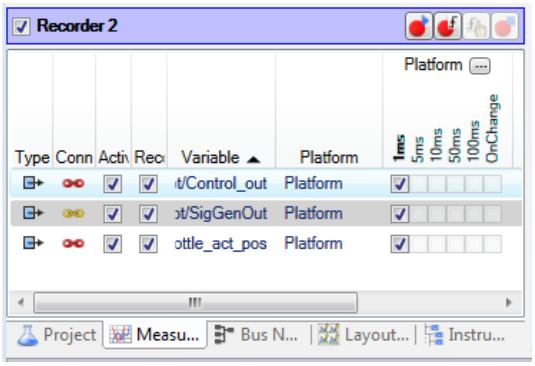
To configure the signal list of a recorder

1 In the Measurement Configuration controlbar, click Recorder 1.

2 From the signal list of Recorder 1, drag all the variables onto the Recorder 2 item.



3 Click Recorder 2 to check its signal list.



- The signal list of Recorder 2 now contains the same signals as that of Recorder 1.

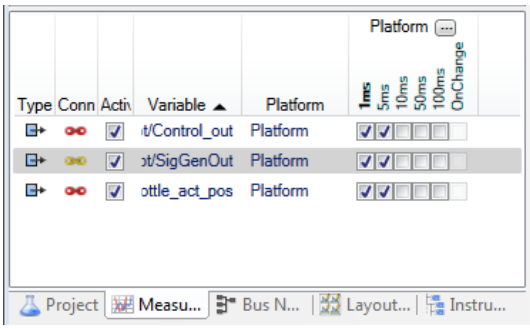
- All the signals will be recorded in the 1 ms measurement raster.

Note

You cannot select another measurement raster here. Only measurement rasters that are selected in the measurement signal list are available in the signal list of a recorder. For example, to select a 5 ms raster for signals, you must enable this raster in the measurement signal list first.
For this reason, you will now change the configuration of the measurement signal list.

4 Click Acquisition – Platform.

5 In the configuration area, select the 5 ms raster in addition to the 1 ms raster: Press the `Ctrl` key and select the 5 ms checkbox for each variable in the signal list.

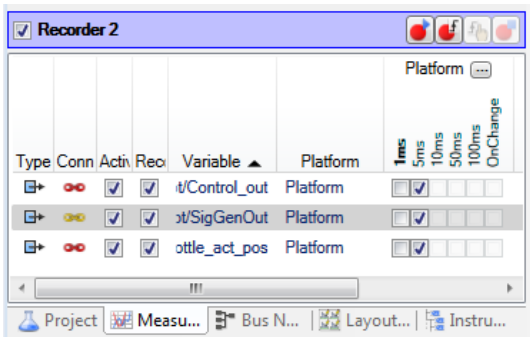


The measurement signal list now specifies two signals to be measured for each variable: one in a 1 ms raster and one in a 5 ms raster.

6 Check the signal list of Recorder 1 and Recorder 2.

- Recorder 1 has automatically used the additional measurement raster for its variables. The 1 ms raster and the 5 ms raster are both selected for recording.
- Recorder 2 has not changed its configuration, but it now lets you select the 5 ms raster for a variable manually.

7 Set the raster settings for all the variables of Recorder 1 to 1 ms and for Recorder 2 to 5 ms. The illustration shows the settings for Recorder 2.



Result

You have configured the signal lists of both recorders.

- The signals of Recorder 1 will be recorded in a 1 ms raster.
- The signals of Recorder 2 will be recorded in a 5 ms raster.

What's next

In the next step, you will perform an immediate recording.

Step 3: How to Perform an Immediate Recording

Objective

You can start recordings immediately, which means without taking any trigger conditions into account.

In this step, you will perform an immediate recording, first for one recorder and then for all. Finally, you will open the resulting measurement data files in the Measurement Data Pool.

Method

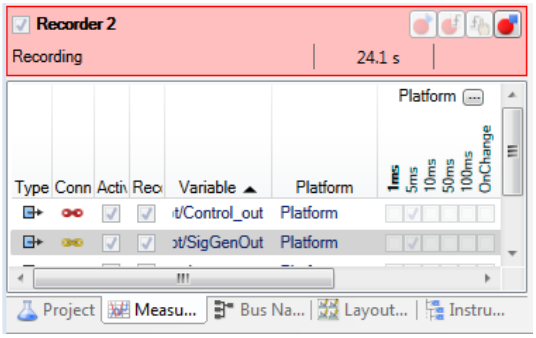
To perform an immediate recording

1 Press **F5** to start a measurement.

The running measurement is visualized by the blue status bar.

2 In the recorder toolbar above the signal list of Recorder 2, click .

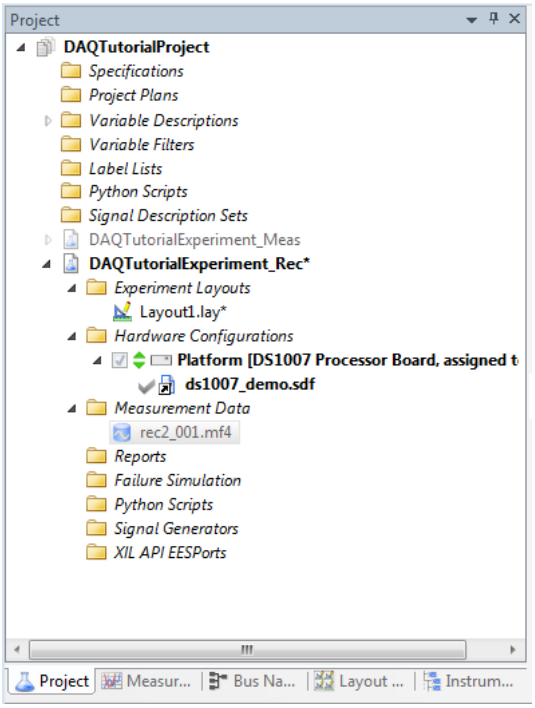
Recorder 2 starts measuring and recording.



The running recording is visualized in various ways, for example, by the red toolbar, the red status bar, and the running recording time.

3 Click to stop recording.

4 In the Project controlbar, click Measurement Data.



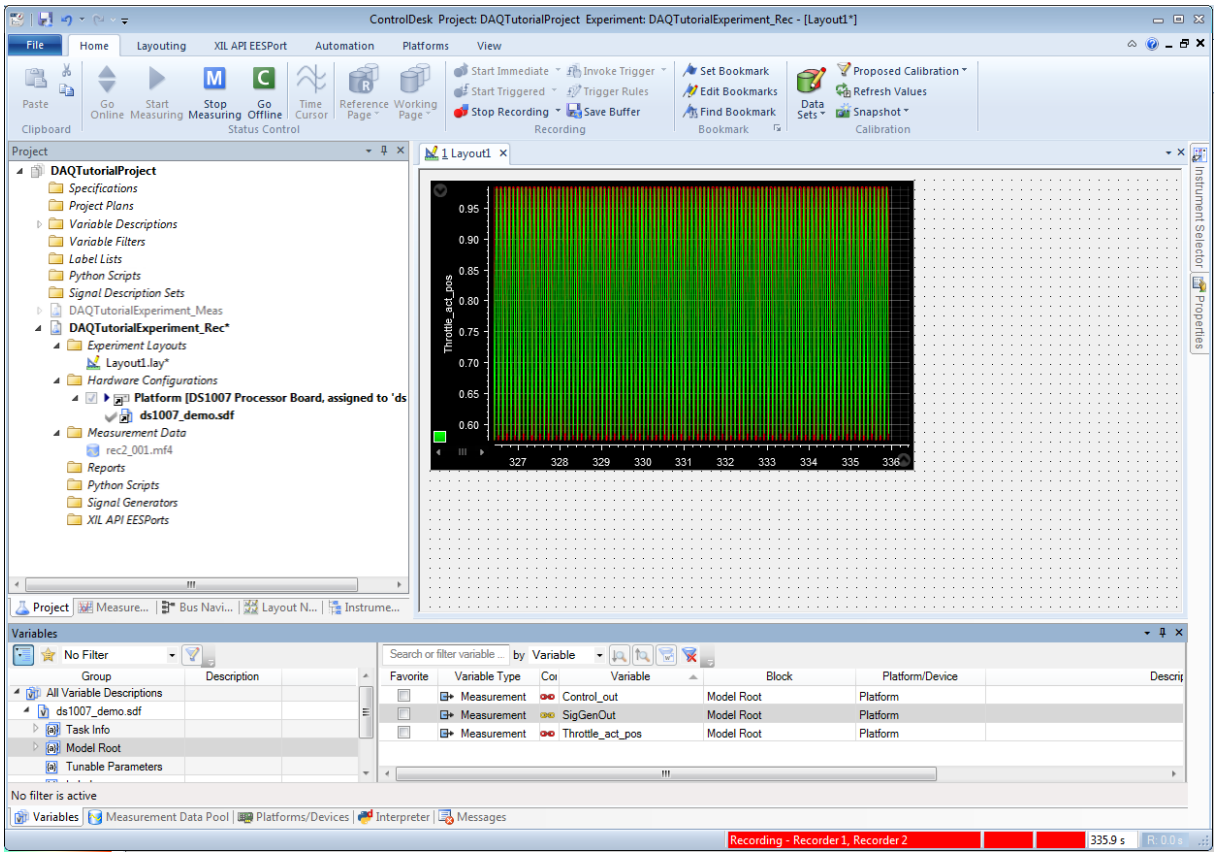
The measurement data file rec2_001.mf4 has been added to the project's Measurement Data folder. Note that the name indicates the recorder: rec2 stands for Recorder 2, 001 stands for the first recording by this recorder.

Tip

You can change the automatic naming of measurement data files via the Storage information category of the recorder properties. In the Measurement Configuration Controlbar, right-click the recorder and select Properties.

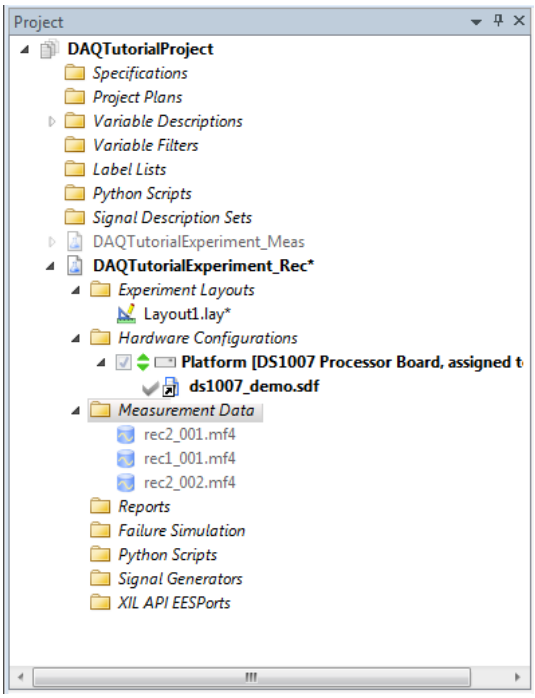
You will now start a new recording. This time all available recorders will be started together and you will use the ribbon instead of the recorder's toolbar.

5 On the Home ribbon, click Recording – Start Immediate.
ControlDesk starts a new recording.



In the status bar, you can see that Recorder 1 and Recorder 2 are involved.

6 On the Home ribbon, click Recording – Stop Recording to stop all recorders. Measurement continues running. You can stop it by pressing F6.



Three measurement data files are now stored in the project's Measurement Data folder. The first file of Recorder 1 and a second file of Recorder 2 have been added.

7 In the Project controlbar, multiselect the three recordings in the Measurement Data folder.

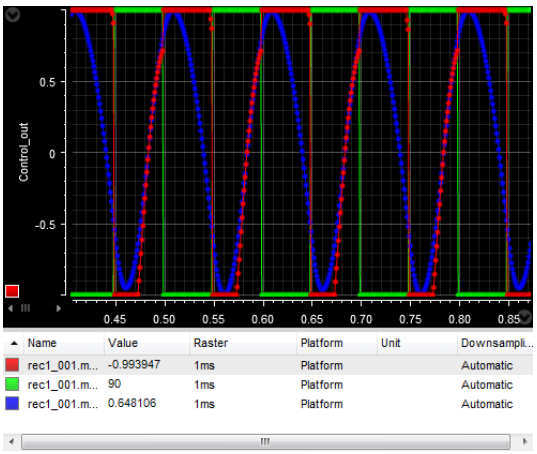
8 Right-click and select Open.

ControlDesk opens the recordings in the Measurement Data Pool.

9 On the Layouting ribbon, click Layouts - Insert Layout.

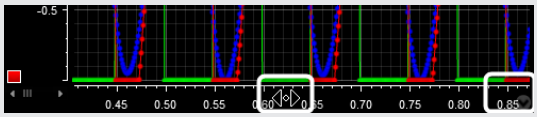
ControlDesk opens a new empty layout in the working area.

10 Drag the three variables from rec1_001.mf4 in the Measurement Data Pool onto the new layout and place them in one Time Plotter.



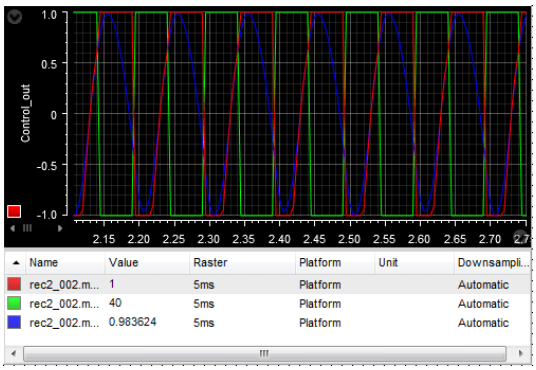
Note that the signals are all recorded in the 1 ms measurement raster, which matches the signal list configuration of Recorder 1.

Tip



- To zoom the x-axis, press `Ctrl` while dragging the pointer on the axis.
- To open the legend, click the symbol at the bottom right.

11 Drag the three variables from rec2_002.mf4 onto the new layout and place them in a new Time Plotter.



The signals in the second Time Plotter are recorded in the 5 ms measurement raster, because this recording is by Recorder 2.

Result

You performed two immediate recordings, and created three measurement data files and opened them in the Measurement Data Pool.

What's next

In the next step you will define start and stop conditions and perform a triggered recording.

Step 4: How to Perform a Triggered Recording

Objective

You can define triggers for a recording, which means that you start and stop a recording according to defined start and stop conditions.

In this step you will define and perform a triggered recording. Then you will open the resulting measurement data file in the Measurement Data Pool.

Triggered measurement vs. triggered recording

The triggers for triggered recordings differ from those used for triggered measurements.

	Triggered Measurement	Triggered Recording
Purpose	To trigger data captures on dSPACE platforms	To trigger recordings of data captures that have been uploaded from platforms/devices
Trigger Evaluation	On the dSPACE hardware during a running measurement	On the host PC after the data is captured
Focus	Determines which data is actually transferred from the hardware to the host PC.	Determines which data is stored in a measurement data file.

Method

To perform a triggered recording

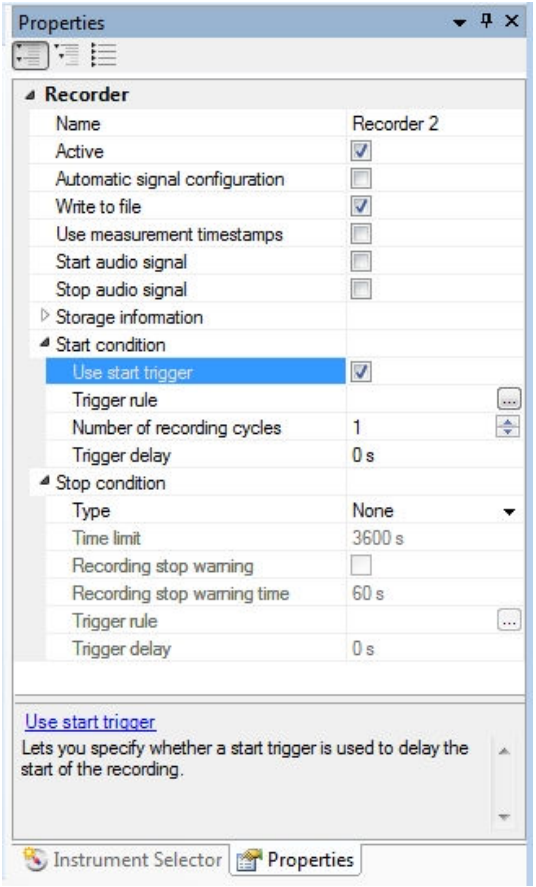
1 In the Measurement Configuration controlbar, right-click Recorder 2 and select Properties.

The Properties controlbar opens, displaying the properties of Recorder 2.

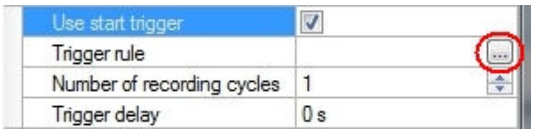
Tip

Click the pin button to toggle the pane's auto hide function.

2 Activate Start condition – Use start trigger.



3 Click the Browse button in the Trigger rule edit field.

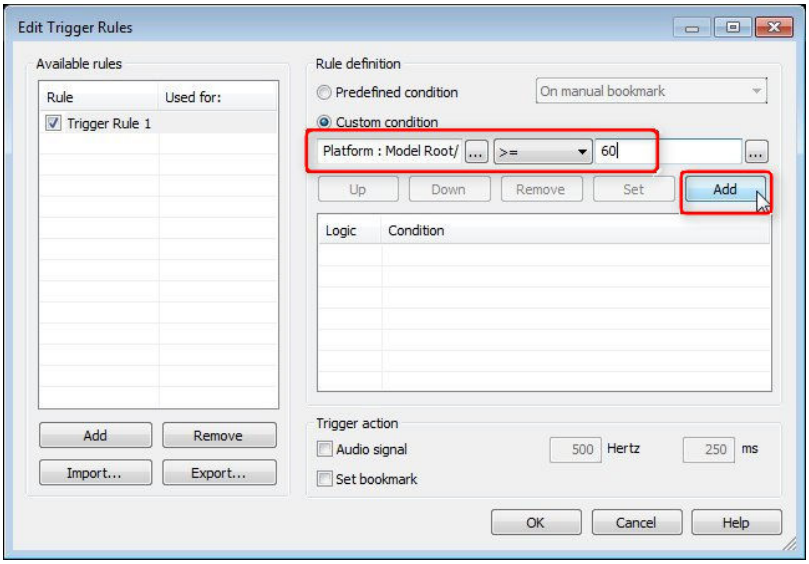


The Edit Trigger Rules dialog opens.

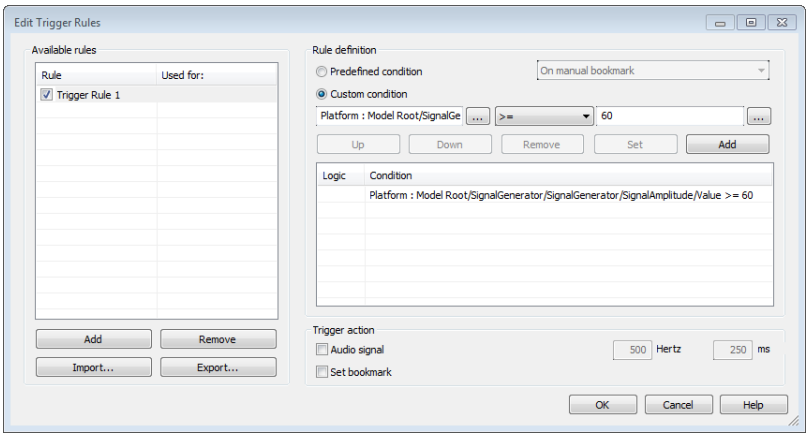
4 In the dialog, click Add and configure Trigger Rule 1 via the Custom condition edit fields.

Recording has to start when the SignalAmplitude/Value parameter is equal to or greater than 60.

To specify this, click the Browse button next to the left edit field and select the ModelRoot/SignalGenerator/SignalGenerator/SignalAmplitude/Value parameter. Then select >= in the middle and enter **60** in the right edit field. Finally, click the Add button below the right edit field.



The table below the **Add** button displays the condition created for **Trigger Rule 1**.

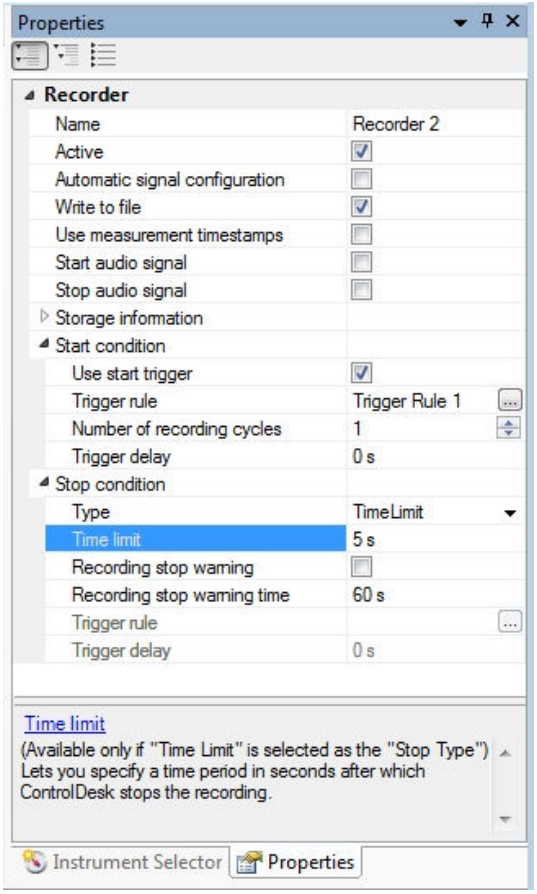


5 Click **OK** to close the dialog.

In the **Properties** controlbar, **Trigger Rule 1** is now active as a start condition.

6 Click **Stop condition – Type** and select **Time limit**.

7 In the Time limit edit field, enter **5** to limit the recording time to 5 seconds.



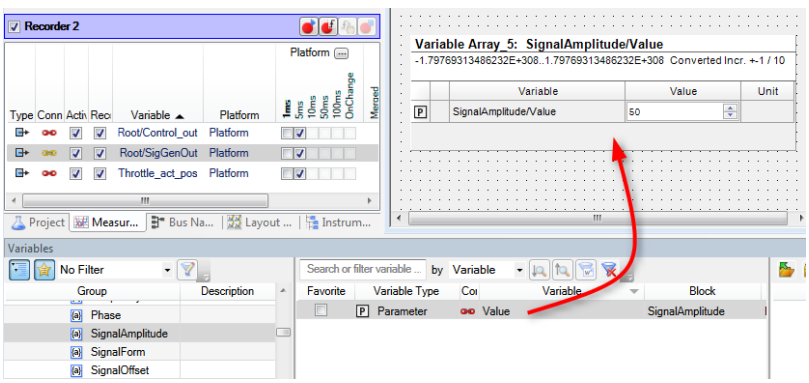
8 On the Layouting ribbon, click Layouts - Insert Layout.

ControlDesk opens a new empty layout in the working area.

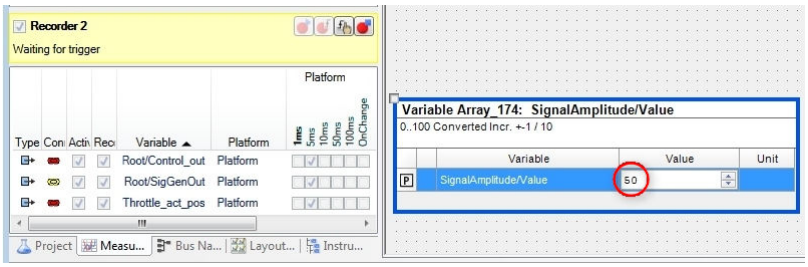
9 Click Variables to open the Variables controlbar, and select the Model Root/Signal Generator/Signal Generator/SignalAmplitude node in the tree view.

10 In the variable list, select the following parameter and drag it onto Layout3 to place it in a Variable Array:

- Value

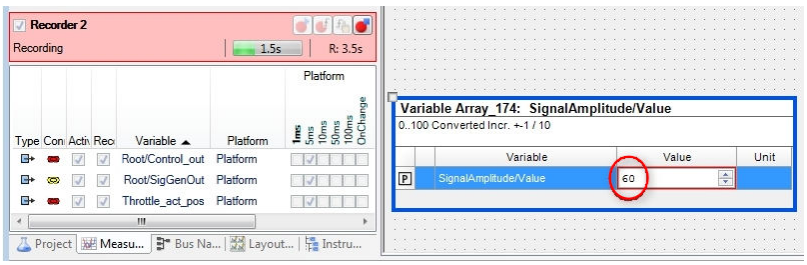


11 In the Measurement Configuration controlbar, select Recorder 2 and click in its toolbar.



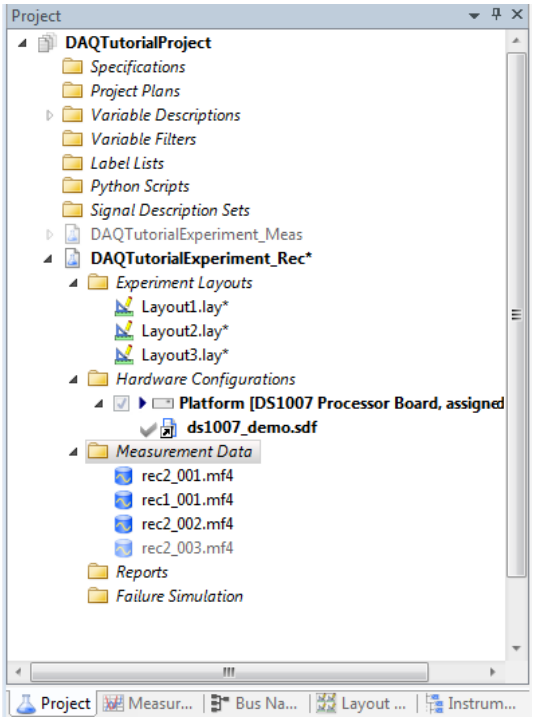
- The toolbar turns yellow.
- Waiting for trigger is displayed.
- The recording does not start until you set SignalAmplitude/Value to a value >= 60.

12 In the Variable Array, set SignalAmplitude/Value to **60**.



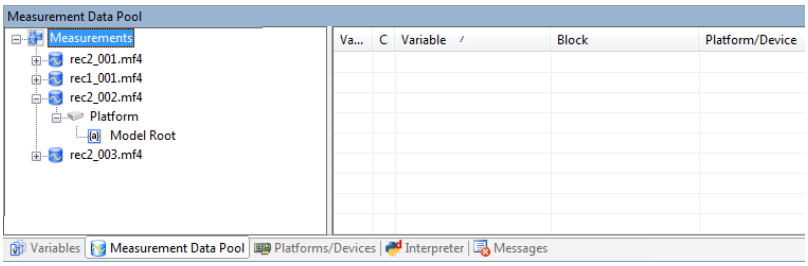
- The toolbar turns red when the recording starts.
- A progress bar within the toolbar displays the recording time.
- The recording stops after 5 seconds.

13 In the Project controlbar, click the Measurement Data folder.

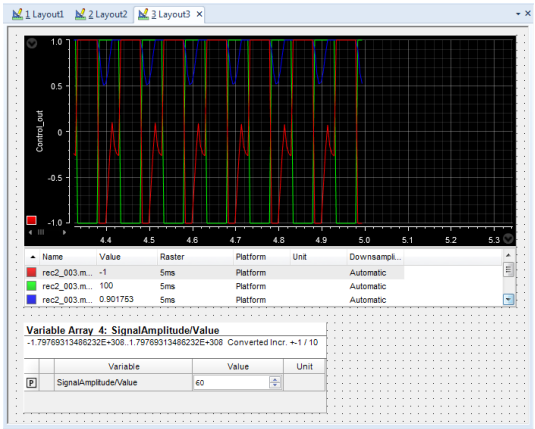


The rec2_003.mf4 file is added to the measurement files. It is grayed out, because it has not been opened in the Measurement Data Pool.

14 Right-click rec2_003.mf4 and select Open to open the new measurement data file in the Measurement Data Pool.



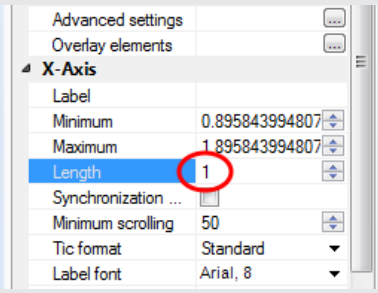
15 Drag the three variables from rec2_003.mf4 in the Measurement Data Pool onto the new layout to place them in a Time Plotter.



In the Time Plotter, you can see that recording has been stopped after 5 seconds, which matches your trigger settings for Recorder 2.

Tip

On your screen, the signals in the Time Plotter may look different to the illustration above because you have different settings for the time axis of the Time Plotter. You can adjust the settings via the Time Plotter properties.



In the Time Plotter, click the x-axis and open the Properties controlbar. Set X-Axis - Length to **1**.

Result

You performed a triggered recording, and created another measurement data file and opened it in the Measurement Data Pool.

What's next

In the next step you partition long-term recordings.

Step 5: How to Automatically Partition Long-Term Recordings

Objective

When you perform long-term recordings, ControlDesk collects a large amount of data that can be difficult or impossible to handle. To handle the data more easily, you can automatically partition long-term recordings by using triggered recording.

In this step, you will define and perform multiple recordings that are triggered sequentially.

Part 1

To automatically partition long-term recordings

1. If a measurement is running, stop it.
2. In the Measurement Configuration controlbar, right-click Recorder 1 and select Properties.

   The Properties controlbar opens, displaying the properties of Recorder 1.
3. Activate Start condition – Use start trigger.
4. In the Trigger rule edit field, click the Browse button.

   The Edit Trigger Rules dialog opens.
5. In the dialog, click Add and configure Trigger Rule 2 via the Custom condition edit fields.

   The recording must start immediately.

   To specify this, select:

   - <platform>_demo.sdf/Model Root/SigGenOut in the left edit field
   - = in the middle edit field
   - <platform>_demo.sdf/Model Root/SigGenOut in the right edit field

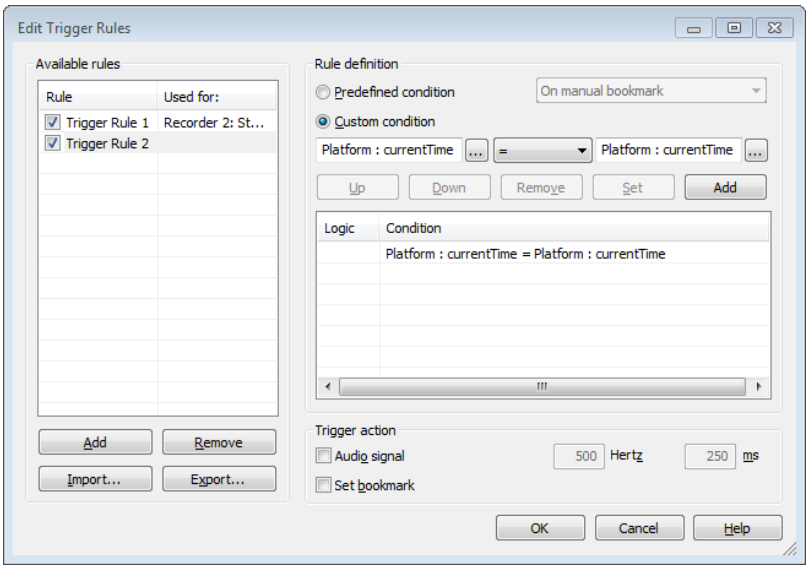
   This lets Trigger Rule 2 always apply so that no gaps occur between the recordings triggered sequentially.

   In the <platform>_demo.sdf demo application used in this tutorial, the SigGenOut variable meets this requirement, for example.

   When you use your own application, you have to search for an alternative such as a task counter or a time signal.

   Finally, click Add.

6 In the Available rules list, select Trigger Rule 2.



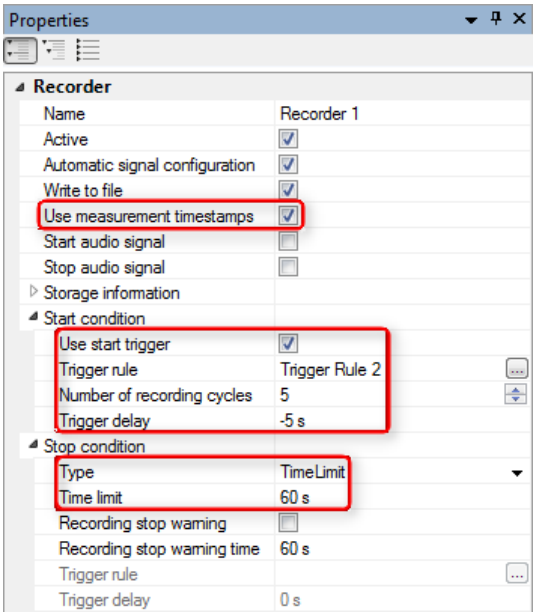
7 Click OK to close the dialog.

In the Properties controlbar, Trigger Rule 2 is now active as a start condition.

8 In the Properties controlbar, specify the following settings:

Property	Value
Write to file	enabled
Use measurement timestamps	enabled
Start condition – Number of recording cycles	5
Start condition – Trigger delay	-5 s
Stop condition – Type	TimeLimit
Stop condition – Time limit	60 s[1)]

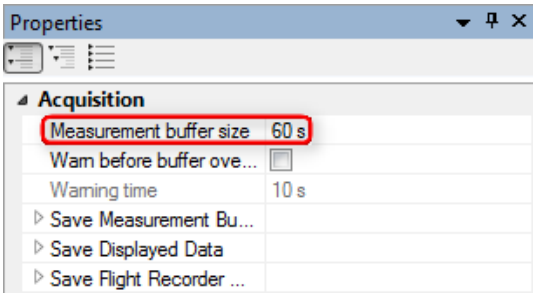
[1)] 60 s is only exemplary for this tutorial so you do not have to wait several hours for the step to complete. If you adjust this step to your needs, you can choose a longer time limit, such as an hour.



There are five recordings, each running for 60 seconds. The time stamps of the recordings are calculated from the beginning of the measurement in ControlDesk. To avoid gaps in the recorded data, the negative trigger delay starts the next recording 5 seconds before the previous recording has finished.

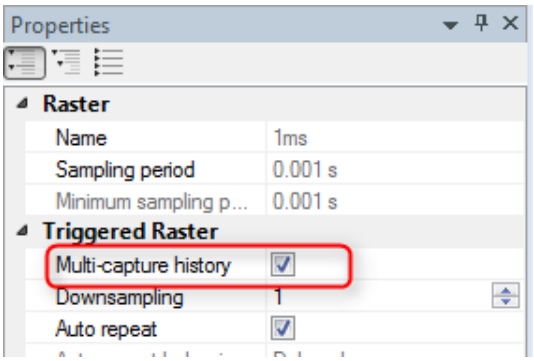
9 In the Measurement Configuration controlbar, right-click Acquisition and select Properties.

Specify a measurement buffer size at least as long as the Recorder 1's trigger delay. 60 seconds are sufficient for most cases.



10 Right-click the Platform – 1 ms raster and select Properties.

Select Multi-capture history.



This ensures that no data of the pretrigger (negative trigger delay) time is lost.

11 Right-click the Platform – 1 ms raster and select Measure Continuously (Disables Triggers).

This ensures that the raster is not triggered on the hardware.

12 In the Measurement Configuration controlbar, select Recorder 1 and click in its toolbar.

ControlDesk starts the triggered recording and stops after 5 minutes.

13 In the Project controlbar, multiselect the five recordings in the Measurement Data folder.

14 Right-click and select Open.

ControlDesk opens the recordings in the Measurement Data Pool.

Interim result

You created five partitioned recordings without gaps.

Part 2

To display partitioned recordings

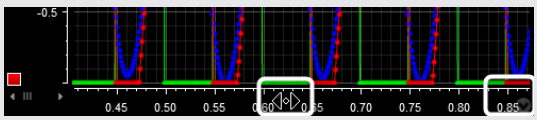
1 On the Layouting ribbon, click Layouts - Insert Layout.

ControlDesk opens a new empty layout in the working area.

2 In the Measurement Data Pool, select the three variables of the first recording and drag them onto the new layout to place them in a Time Plotter.

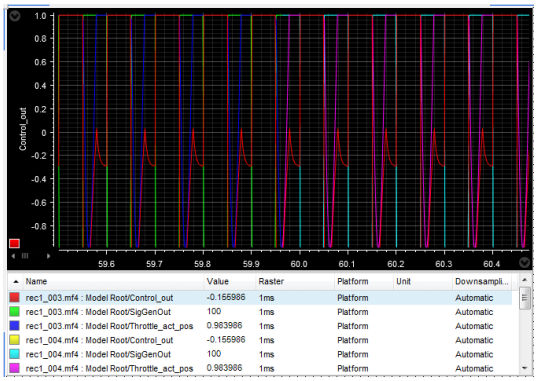
3 Repeat the previous step for the other four recordings. Drag all the signals to the legend of the same Time Plotter.

Tip



- To zoom the x-axis, press `Ctrl` while dragging the pointer on the axis.
- To open the legend, click the symbol at the bottom right.

In the Time Plotter, you can see the recordings.



Result

You displayed the five partitioned recordings in the Time Plotter. There are no gaps between the individual recordings.

What's next

With this step, you finished the recording tasks in this tutorial. For a summary of your working results and for further information, refer to the result of this lesson.

Note

You can also partition an existing long-term recording by using the DSSIGCONV command line tool. For instructions, refer to How to Extract Data from a Measurement Data File on page 201.

Result of Lesson 2

Overview

In this lesson you learned the basic steps and principles of configuring and performing recordings on dSPACE platforms:

- In ControlDesk, recordings are managed via recorders.
- Each recorder has a signal list that specifies the signals to be recorded. By default, a new experiment contains one default recorder that is automatically filled with the signals of the measurement signal list.
- Via a recorder and its signal list, you can configure a recording and start and stop it.
- You can perform immediate recordings. Settings for the start and stop conditions of a recording are ignored if you perform an immediate recording.
- You can define start and stop conditions for each recorder. To use these conditions, you have to perform a triggered recording.

- Each recording is stored in a measurement data file, which can be opened in the **Measurement Data Pool**.
- You can partition a long-term recording by using a triggered recording.

Further information

For a detailed description, refer to Recording Data on page 118.

What´s next

You have successfully completed working through the tutorial.

Related topics

Basics

Recording Data..... 118

Tutorial Videos

Tutorial Videos

Introduction	The dSPACE website provides measurement and recording tutorial videos.
Measuring on dSPACE platforms	You can perform triggered measurement on a dSPACE platform. The tutorial videos show you: ▪ How to use a Time Plotter to configure trigger settings automatically. ▪ How to use a Time Plotter to configure trigger settings interactively. ▪ How to select one measurement raster to specify the trigger settings for the Time Plotter display (leading raster). Refer to https://www.dspace.com/go/tutorial_cd_meas_on_platf.
Public product videos	For public product videos, refer to ControlDesk product videos.
Related topics	Basics Tutorial Videos for ControlDesk (ControlDesk Introduction and Overview 🕮)

Basics and Instructions

Where to go from here

Information in this section

Measuring Data.....77
To perform a measurement, you have to configure it by activating variables for it. You can specify trigger conditions for a measurement and perform quick start measurements on ECUs.

Recording Data.....118
To perform data recording, you have to configure the recording by selecting variables. You can specify trigger conditions for a recording and configure its storage settings.

Data Logging and Flight Recording.....149
Various dSPACE platforms allow you to perform long-term data recording without connection to a host PC. Depending on the platform, this is referred to as data logging or flight recording.

Working with Bookmarks, and Handling Acoustic Signals for Measurements and Recordings.....177
During a measurement and recording you can set bookmarks. You can also specify acoustic signals announcing measurement and recording actions.

Working with Recorded Data.....186
You can visualize recorded data on a layout when you open a measurement data file in the **Measurement Data Pool**. If you want to postprocess recorded data with MATLAB, you can export it to a MAT file.

Measurement Rasters.....212
ControlDesk lets you select measurement rasters for each variable to be measured.

Observing Variables.....224
ControlDesk lets you observe the variables of an application, even if no measurement is running.

Synchronized Data Acquisition Across ECUs, RCP and HIL Systems, and Bus Systems.....228
ControlDesk supports synchronized data acquisition across ECUs, RCP and HIL systems, and bus systems.

Measuring Data

Introduction

To perform a measurement, you have to configure it by activating variables for it. You can specify trigger conditions for a measurement and perform quick start measurements on ECUs.

Where to go from here

Information in this section

Configuring Measurement.....77
You configure a measurement by activating variables for it.

Configuring Triggered Measurement on dSPACE Platforms.....86
Before you can perform triggered measurement on dSPACE platforms, you must specify the trigger conditions.

Performing Measurements.....101
You can start and stop measurements. The measured data is buffered in the measurement buffer.

Performing Quick Start Measurements.....107
ControlDesk supports quick start measurement on ECUs. ECU measurement variables are measured and recorded, starting with the first execution of an ECU task.

Configuring Measurement

Introuction

You configure a measurement by activating variables for it.

Where to go from here

Information in this section

Basics on Configuring Measurement.....78
ControlDesk lists all the variables to be measured in the **Measurement Configuration** controlbar.

How to Activate Variables for Measurement.....81
In the measurement signal list, you can specify the variables to include in measurements and recordings.

Basics on Configuring Measurement

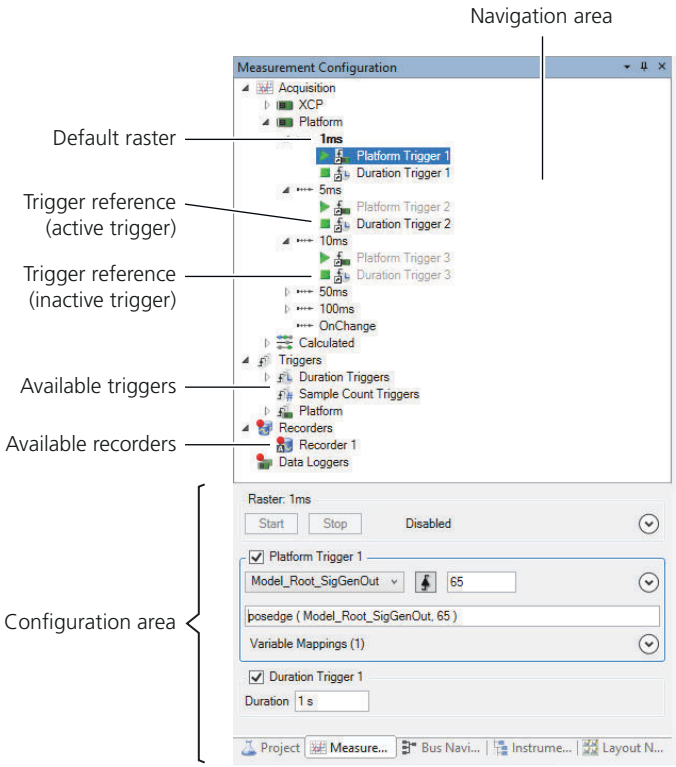
Introduction

ControlDesk lists all the variables to be measured in the **Measurement Configuration** controlbar.

Measurement Configuration controlbar

The **Measurement Configuration** controlbar lets you configure Measurement, Recording, and Data logging. You can define and manage triggers for measurements and data loggings. Other settings, such as triggers for recordings, can be specified via the **Properties** controlbar.

The illustration below shows the **Measurement Configuration** controlbar, displaying the configuration settings for the start trigger of a measurement raster.



For further information on the **Measurement Configuration** controlbar, refer to Measurement Configuration on page 290.

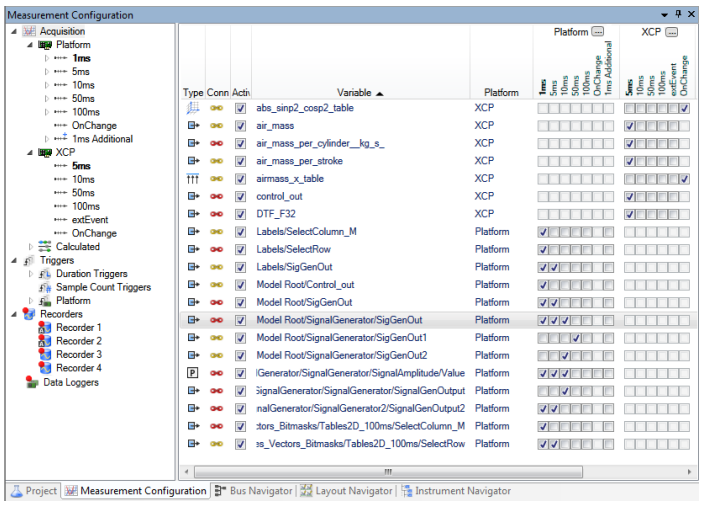
Tip

You can change the arrangement of the areas from vertical to horizontal and vice versa by double-clicking the splitter bar between them (for an animated graphic, refer to dSPACE Help).

Measurement signal list

The *measurement signal list* is global for all platforms/devices. It collects all the variables selected for measurements from all the platforms/devices of a current experiment.

The measurement signal list is shown in the configuration area of the **Measurement Configuration** controlbar.



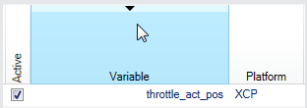
The content of the displayed signal list varies according to the item currently selected in the navigation area of the **Measurement Configuration** controlbar:

- If the **Acquisition** element is selected, the measurement signal list of all the platforms and devices in the active experiment is displayed.
- If a platform/device subnode of the **Acquisition** element is selected, the measurement signal list is filtered by the selected platform/device. Only the measurement signals that are measured on the selected platform/device are displayed.
- If a raster of a platform/device subnode is selected, the measurement signal list is filtered by the selected platform/device and the selected raster. Only the measurement signals that are measured on the appropriate platform/device with the selected measurement raster are displayed.

- If the subnode for calculated variables is selected, the measurement signal list is filtered by the calculated variables.

Tip

You can sort the signal list in ascending or descending order by clicking the header of a column.
Sorting is synchronized in all signal lists (if the selected column is contained in the list).



Adding variables to the measurement signal list

There are several ways to add a variable to the measurement signal list:

- If you visualize a variable in a plotter, the variable is added to the measurement signal list automatically.

Note

Variables are not automatically added to the measurement signal list when they are visualized in a single-shot instrument. In this case, they are not measured in ControlDesk, but observed.
For further information, for example, on changing the default settings, refer to Observing Variables on page 224.

- You can add a variable without visualization via its context menu (see Add to Measurement Signal List (ControlDesk Variable Management)).
- You can add a variable to the measurement signal list by dragging it from the **Variables** controlbar, a data logger signal list, or from an instrument.
- Input signals are added automatically in the following cases:
  - When a map or curve is added to the measurement signal list, its common axes and input signals are added, too.
  - When a calculated variable is added to the measurement signal list, its input signals are automatically added, too.
  - When configuring a trigger rule for a host trigger (used for triggered recording, bookmarks or acoustic signals), the input signals for the trigger rule are automatically added, too.

Note

You can even add a new measurement variable to the measurement signal list during a running measurement, but it will not be measured until measurement is restarted. ControlDesk therefore asks you if you want to continue the running measurement.

- If you let ControlDesk continue the running measurement, the new variable is not measured (until the next measurement restart).
- If you let ControlDesk stop and restart the measurement, the new variable is measured. Any running recording is stopped, but not started again. The data in the measurement data buffer is discarded.

You can select presettings for the measurement restart behavior in the **Options** dialog. Refer to Measurement Configuration Page on page 302.

Related topics

References

Measurement Configuration..... 290

How to Activate Variables for Measurement

Objective

In the measurement signal list, you can specify the variables to include in measurements.

Defining variables to be measured

The *measurement signal list* contains the variables to be included in subsequent measurements. The list is global for all platforms/devices of the current experiment. It is shown in the **Measurement Configuration** controlbar if the **Acquisition** element is selected in the navigation area.

The measurement signal list has checkboxes for activating the measurement of variables. Variables whose **Active** checkbox is selected are included in subsequent measurement runs. By default, measurement is activated for each variable that is added to the measurement signal list.

Note

Removing a signal from a layout does not remove it from the measurement signal list unless this is specified on the **Visualization** page in the **ControlDesk Options** dialog. Refer to Visualization Page (ControlDesk Layouting 🕮).

For further information on the measurement signal list and on how to add variables to or remove variables from it, refer to Basics on Configuring Measurement on page 78.

Symbols

The following symbols show whether the variable is connected to an instrument on a layout.

Symbol	Description
	A red chain indicates that the variable is visualized in an instrument.
	A yellow chain indicates that the variable is not visualized in an instrument but is on the measurement signal list.
(None)	The variable is not visualized in an instrument and is not on the measurement signal list.

Tip

You can save a label list file containing all the variables that are visualized in instruments. Refer to **Save Connected Variables in Label List** (ControlDesk Variable Management 🕮).

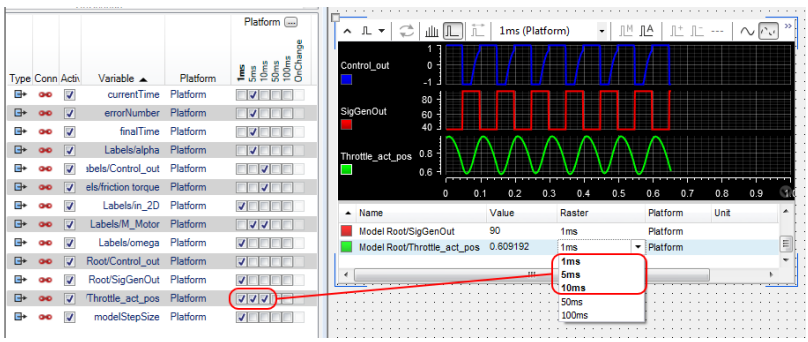
Measurement rasters

You can select one or more measurement rasters for each variable. The number of available rasters depends on various conditions. For more information on measurement rasters, refer to Basics on Measurement Rasters on page 212.

Tip

To select multiple measurement rasters, click the checkbox while holding the Ctrl key down.

Separate data stream for each raster When you select multiple measurement rasters for a variable, a separate data stream is activated for each raster. The Time Plotter and the Index Plotter have a drop-down list for you to select a raster.



In the list, the measurement rasters with active data streams are displayed in bold.

Filtered rasters If a Browse button is displayed to the right of the raster checkboxes, the raster list is filtered: i.e., one or more rasters are currently hidden.

Via the Browse button you can open the Select Used Rasters dialog that displays all available measurement rasters. For more information, refer to Handling a Large Number of Measurement Rasters on page 218.

Preconditions

A running measurement must be stopped first.

Method

To activate variables for measurement

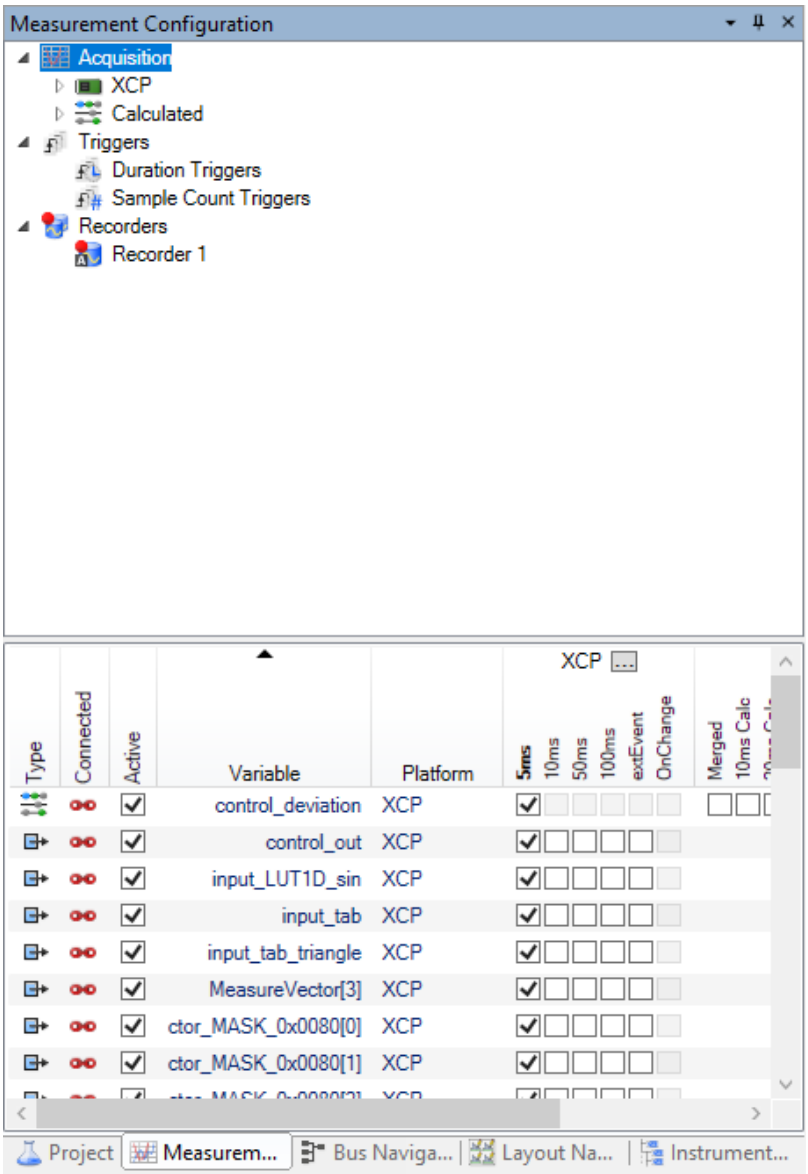
1 Add the variables that you want to measure to the measurement signal list:
   - Place the variables on a layout.

     Tip

     It is recommended to visualize a variable to be measured in a plotter instrument. Visualizing a variable in a plotter always adds the variable to the measurement signal list.

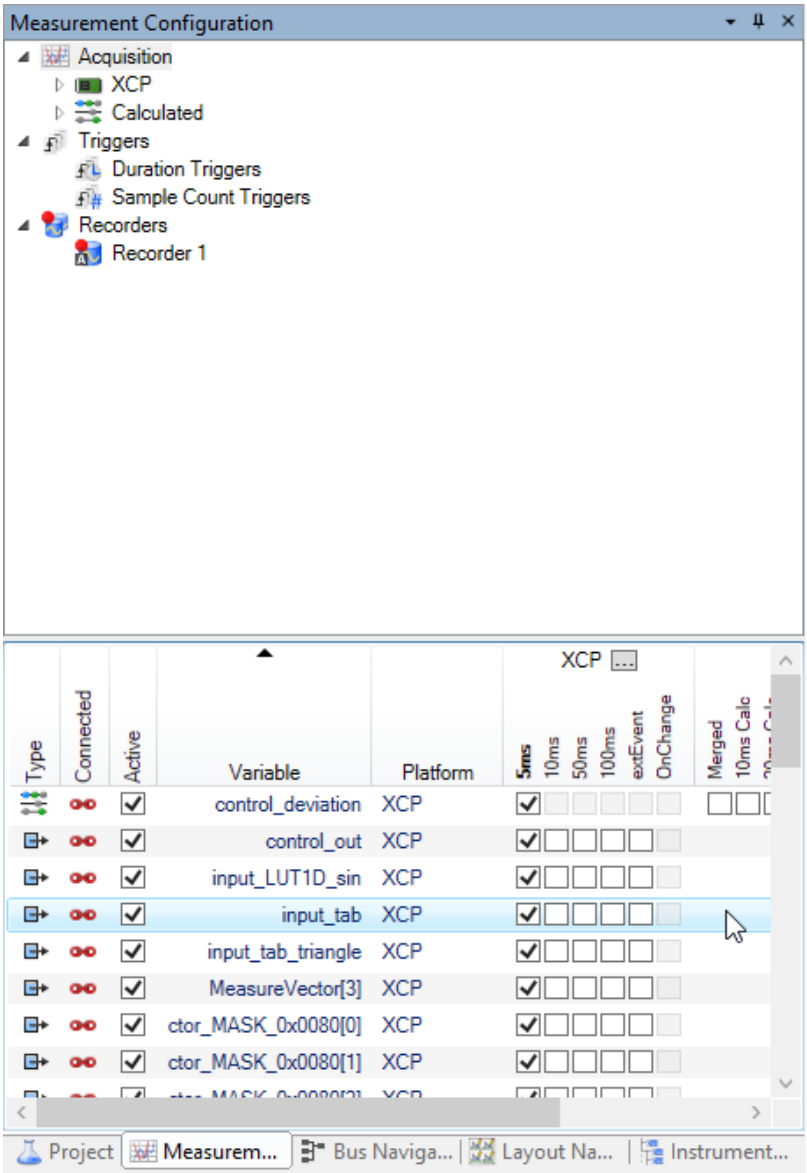
   - If you want to measure a variable without visualizing it in an instrument, or to measure an observed variable, you can drag it from the Variables controlbar to the measurement signal list or select the Add to Measurement Signal List command from its context menu.
2 In the Measurement Configuration controlbar, select the Acquisition item, a specific platform/device item or a specific raster item.

The measurement signal list opens, displaying all the variables selected for measurement so far according to the selected item.



3 In the Active column, select the checkboxes of all the signals you want to include in subsequent measurements and recordings. Recordings can be performed only for signals with measurement activated.

4 Via the raster columns, select one or more measurement rasters to be used. To select multiple rasters, click the checkbox while holding the Ctrl key down.



Result

The activated variables are included in subsequent measurements.

Tip

For multiple selection, press **`Ctrl`** or **`Shift`** when clicking a variable. Press **`Ctrl`** to select a number of single variables with the mouse or **`Shift`** to select a block of variables. Then select a checkbox or a measurement raster.

Next steps

- Now you can measure the activated variables. Refer to Measuring Data on page 77.
- If you want to record measurements, you can specify the variables to include via the signal list of a recorder. Refer to How to Activate Variables for Recording on page 121.

Related topics

References

Add Hardware Polling Raster..... 261
Add to Measurement Signal List (ControlDesk Variable Management 🕮)
Remove from Measurement Signal List (ControlDesk Variable Management 🕮)
Select Used Rasters..... 318

Configuring Triggered Measurement on dSPACE Platforms

Introduction

Before you can perform triggered measurement on dSPACE platforms, you must specify the trigger conditions.

Where to go from here

Information in this section

Basics on Triggered Measurement..... 87
Measurements on dSPACE real-time hardware and VEOS can be started and stopped by triggers.

Triggers for Triggered Measurement..... 89
You can use several trigger types in the measurement configuration.

Workflow for Configuring Triggered Measurement..... 91
You can configure triggered measurement on dSPACE real-time hardware or VEOS with this workflow.

How to Configure a Platform Trigger..... 92
You can define a trigger condition, a trigger delay and a trigger timeout.

How to Configure a Duration Trigger..... 95
You can define the length (duration) of a data capture.

How to Configure a Sample Count Trigger..... 97
You can define the number of samples in a data capture.

How to Change the Assignment of Triggers to Measurement Rasters.....98
You can modify the assignment of start and stop triggers to measurement rasters by rearranging the triggers or assigning newly created triggers.

Basics on Triggered Measurement

Introduction

With ControlDesk, you can perform triggered measurements on dSPACE real-time hardware and VEOS.

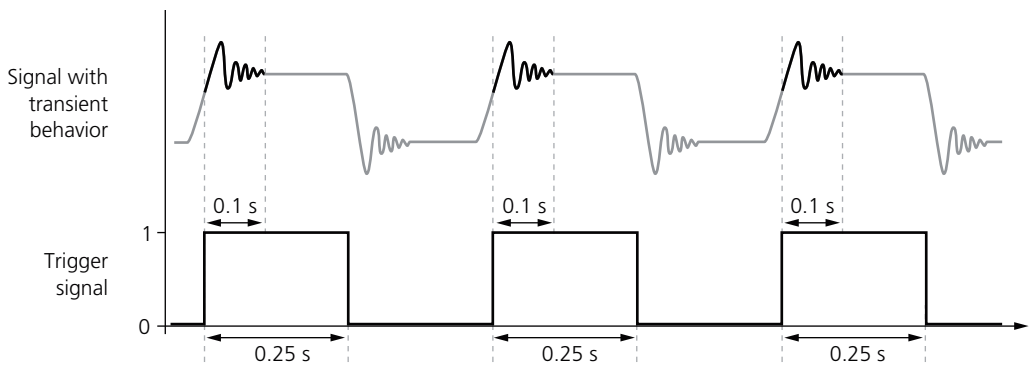
Triggered measurement

Performing triggered measurement means that data capture with a measurement raster can be started and stopped via triggers. Data capture is not started or stopped until certain trigger conditions are met. You can specify a start and a stop trigger to define the conditions for each measurement raster.

If the triggers are enabled for a measurement raster, the trigger conditions are evaluated on the real-time hardware or VEOS when measurement is started. Data is transferred to the host PC only if the trigger conditions are met, i.e., the data flow between the dSPACE real-time hardware or VEOS and the host PC is not continuous. This reduces the measurement data throughput.

The illustration below shows two signals:

- The *trigger signal* is used to start triggered measurement: Measurement is started with each rising edge of the signal.
- The upper signal has transient behavior that you want to analyze. Only a part of the signal needs to be measured for this. To analyze the transient behavior in the example below, the duration of each data capture is set to 0.1 s.



Trigger conditions Trigger conditions for triggered measurements can be defined and edited in ControlDesk. ControlDesk provides *platform triggers*, *duration triggers*, and *sample count triggers* for this.

- A platform trigger defines a trigger condition available on a platform and is used as a start trigger for a measurement raster. On the following platforms, a platform trigger can also be used as a stop trigger:
  DS1007 PPC Processor Board, DS1202 MicroLabBox, MicroAutoBox III, SCALEXIO, or VEOS.
- A duration trigger defines the duration of a data capture and is used as a stop trigger for a measurement raster.
- A sample count trigger defines a number of samples to be captured and is used as a stop trigger (usually for an event-based raster).

For further information, refer to Triggers for Triggered Measurement on page 89.

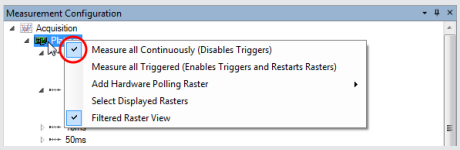
Continuous measurement when triggers are disabled If the start and stop triggers of a measurement raster are disabled, the raster is in the continuous mode. Data flow between the dSPACE real-time hardware or VEOS and the host PC is continuous for the raster.

Note

When you measure large amounts of data on dSPACE platforms, for example, when you perform *continuous (untriggered)* measurements using high-frequency measurement rasters, the operability of ControlDesk might be reduced. Refer to Problem When Measuring Large Amounts of Data on dSPACE Platforms on page 366.

Tip

Via the context menu of a platform or a measurement raster in the Measurement Configuration, you can easily check whether continuous measuring is enabled for a selected measurement raster or for all the measurement rasters of a platform. A check symbol indicates that measuring is performed continuously.



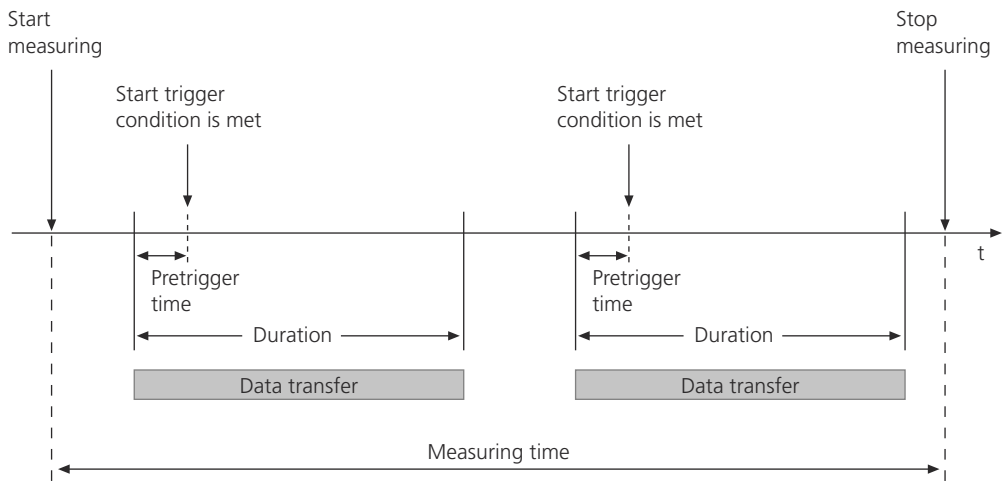
Pretriggering and posttriggering of data captures

With triggered measurement, it is possible to perform pretriggering and posttriggering. You must specify a trigger delay for the start trigger for this.

- A pretrigger time is a period of seconds for starting data capture before the start condition is met. A pretrigger time must be defined as a negative delay for an enabled start trigger. For example, with a delay value of -0.5, ControlDesk will actually start the data capture 0.5 seconds before the start condition is met.

- A posttrigger time defines a period of seconds for delaying data capture after the start trigger is invoked. A posttrigger time must be specified as a positive delay for an enabled start trigger. For example, with a delay value of 1, ControlDesk will actually start the data capture 1 second after the start condition is met.

Measuring time The illustration below shows the measuring time for a measurement raster with start and stop triggers enabled, and with a pretrigger time specified for the start trigger.



Triggered data logging

If a platform supports data logging, you can configure trigger conditions to start and stop the logging of data during a running data logging.

Configuring triggered data logging is almost the same as configuring triggered measurement. The main difference is that no data is uploaded to the host PC. All logged data is stored on the USB mass storage device that is connected to the real-time hardware.

For more information on data logging, refer to Data Logging on page 149.

Related topics

Basics

Problem When Measuring Large Amounts of Data on dSPACE Platforms..... 366
Triggers for Triggered Measurement..... 89

Triggers for Triggered Measurement

Introduction

You can use several trigger types in the measurement configuration.

Triggers for triggered measurement

With ControlDesk, you can perform triggered measurements on dSPACE real-time hardware and VEOS. Triggered measurement means that data capture with a measurement raster is not continuous, but started and stopped by triggers. Two trigger objects are assigned to each measurement raster for this purpose: one as the start trigger (indicated by a ▶ symbol), the other as the stop trigger (indicated by a ■ symbol).

Several trigger types are available in the measurement configuration.

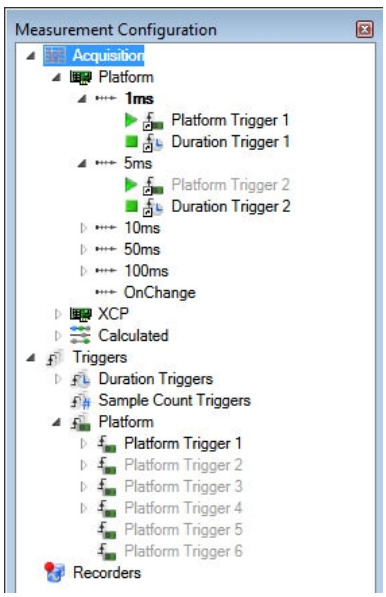
Platform trigger A trigger that is available for a platform and that is evaluated on the related dSPACE real-time hardware or VEOS.

Duration trigger A trigger that defines a duration. Using a duration trigger, you can, for example, specify the duration of data acquisition for a measurement raster. A duration trigger can be used as a stop trigger.

Sample count trigger A trigger that specifies the number of samples in a data capture.

A sample count trigger can be used as a stop trigger.

Default triggers for each measurement raster When a platform is added to an experiment, ControlDesk adds default triggers for each measurement raster contained in the platform's variable description (SDF file) to the measurement configuration and assigns them to the rasters as the start and stop triggers. ControlDesk holds the actual platform and duration triggers below the Triggers element and places references to them in the measurement rasters. The references are marked by an additional ◘ symbol.



Configuring triggered measurement You can specify the trigger conditions, enable/disable the start and stop triggers, modify the trigger assignments, and add further triggers to the measurement configuration. Each trigger can be assigned to one measurement raster only.

For details, refer to Configuring Triggered Measurement on dSPACE Platforms on page 86.

Related topics

Basics

Basics on Triggered Measurement.....87

Workflow for Configuring Triggered Measurement

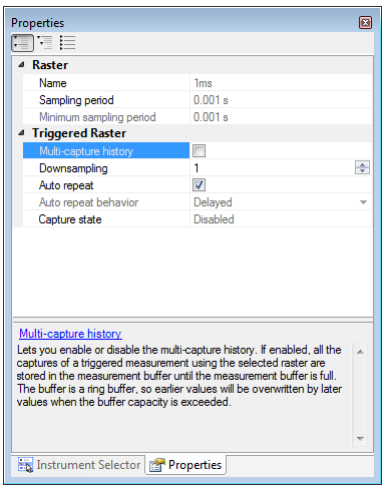
Introduction

You can configure triggered measurement on dSPACE real-time hardware or VEOS with this workflow.

Workflow

For each measurement raster involved in triggered measurement, you must perform the following configuration steps:

1. In the **Measurement Configuration** controlbar, open the measurement raster item (below the desired platform item) whose raster settings and raster triggerings you want to configure.
2. Configure the start trigger assigned to the measurement raster, and activate it. Refer to How to Configure a Platform Trigger on page 92.
3. Configure the stop trigger assigned to the measurement raster, and activate it. Refer to How to Configure a Duration Trigger on page 95 or How to Configure a Sample Count Trigger on page 97.
4. Optionally, you can specify further configuration settings for the measurement raster. For example, you can enable/disable the multi-capture history for the triggered raster, and specify a DAQ downsampling factor for the data capture.



Refer to Triggered Raster Properties on page 252.

Additional options

In addition to the workflow described above, you can do the following:

- You can assign other platform and duration triggers to a measurement raster. Refer to How to Change the Assignment of Triggers to Measurement Rasters on page 98.

Related topics

Basics

Basics on Triggered Measurement 87

How to Configure a Platform Trigger

Objective

You can define a trigger condition, a trigger delay and a trigger timeout.

Platform trigger

A trigger that is available for a platform and that is evaluated on the related dSPACE real-time hardware or VEOS.

Trigger condition

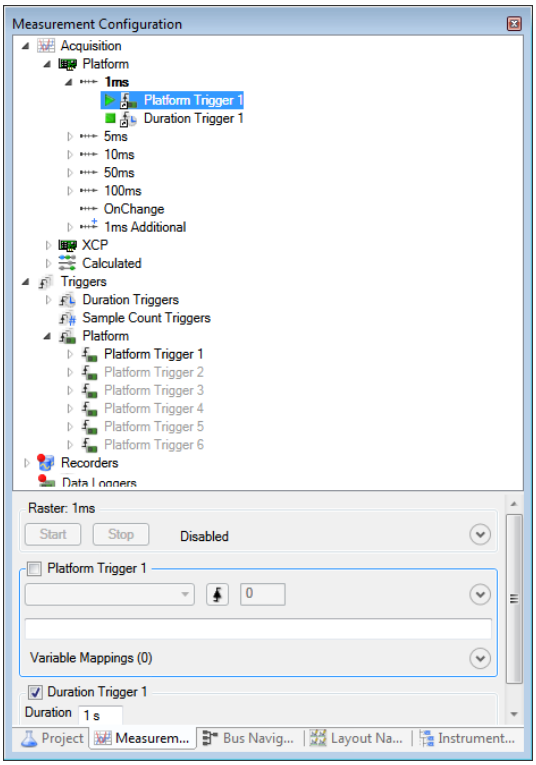
You can specify a falling or rising signal edge as the trigger condition for a platform trigger.

Method

To configure a platform trigger

1. In the navigation area of the Measurement Configuration controlbar, select the platform trigger you want to configure.

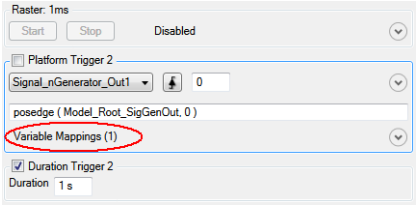
The configuration settings are displayed in the configuration area of the Measurement Configuration controlbar.



Tip

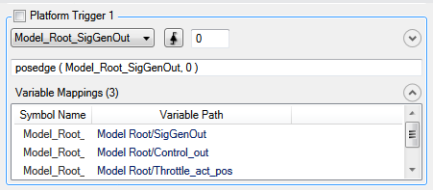
It does not matter whether you select the actual platform trigger below the Triggers node or a reference to it. The changes you make apply to the actual trigger and its reference.

2 Specify the variable you want to use for triggering. Select it in the Variables controlbar and drag it onto the platform trigger in the tree or the Variable Mappings list in the platform trigger configuration.



Tip

- ControlDesk allows you to specify several possible trigger signals. Drag several variables onto the **Variable Mappings** list for this. All these signals are displayed in the trigger signal drop-down list. When specifying the trigger condition later on, you can select a signal from the list.

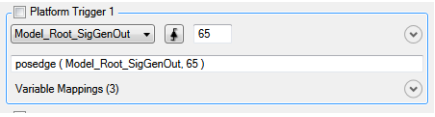


- A trigger signal used in the trigger condition of a platform trigger does not have to be included in the measurement signal list.

3 Specify the trigger condition as follows:

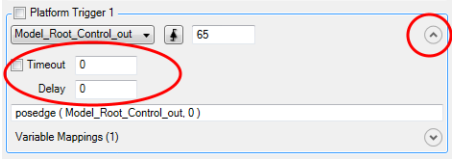
- From the drop-down list, select the trigger signal you want to use in the trigger condition. The list contains all the signals you previously specified as possible trigger signals.
- Specify whether you want to trigger on the rising or falling edge of the trigger signal. You can switch between falling and rising edge by clicking the operator button.
- Specify the reference value. The trigger event occurs when the values of the trigger signal cross the value (both rising and falling edges).

The specified trigger condition is also displayed as a formula in the **Trigger Condition** field.



As an alternative, you can edit the trigger condition string in the trigger condition edit field. If you do so, the trigger signal, the operator button, and the reference value are unavailable. The trigger condition must contain one or more symbol names from the **Variable Mappings** list. The syntax must be XIL API-compliant. For more information, refer to Measurement Configuration - Configuration Area on page 293. To edit the condition string, the trigger must be assigned to a platform on which a DsDAQ service is running.

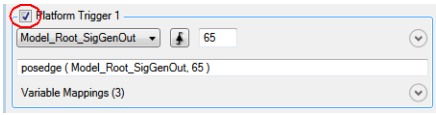
4 You can additionally configure a trigger delay time and a timeout for the platform trigger. A positive delay value stands for a posttrigger time, a negative delay value for a pretrigger time. If **Timeout** is enabled, the trigger is invoked after the timeout period, regardless of whether or not the trigger condition has been fulfilled during the specified time period.



Note

If you have started a measurement in ControlDesk and you reconfigure a platform trigger during the running measurement, in some cases you must stop and restart the measurement for the changes to take effect.

5 To activate the platform trigger, select the trigger checkbox.



The selected platform trigger is activated and will be evaluated when a measurement is started and during a running measurement.

Result

- The enabled platform trigger can be used as the start trigger for triggered measurement on dSPACE real-time hardware or VEOS with the assigned measurement raster. On the following platforms, a platform trigger can also be used as a stop trigger: DS1007 PPC Processor Board, DS1202 MicroLabBox, MicroAutoBox III, SCALEXIO, or VEOS.
- The next time you start measuring, the trigger conditions are evaluated for the assigned measurement raster on the real-time hardware or VEOS. Data capture with the measurement raster is delayed until the defined start condition is reached, and data capture with the measurement raster is stopped when the stop condition is reached.

Related topics

Basics

Basics on Triggered Measurement.....87
Workflow for Configuring Triggered Measurement.....91

HowTos

How to Change the Assignment of Triggers to Measurement Rasters.....98

How to Configure a Duration Trigger

Objective

You can define the length (duration) of a data capture.

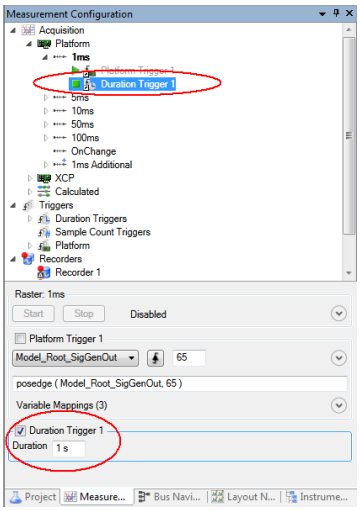
Duration trigger

A trigger that defines a duration. Using a duration trigger, you can, for example, specify the duration of data acquisition for a measurement raster. A duration trigger can be used as a stop trigger.

Method

To configure a duration trigger

1 In the navigation area of the Measurement Configuration controlbar, select the duration trigger you want to configure.



The configuration settings are displayed in the configuration area of the Measurement Configuration controlbar.

Tip

It does not matter whether you select the actual duration trigger below the "Triggers" element or a reference to it. The changes you make apply to the actual trigger and all of its references.

2 In the Duration edit field, enter a time value (in seconds) to define the length of a capture with the selected measurement raster.

3 To activate the duration trigger, select its checkbox.

The selected duration trigger is activated and will be evaluated when a measurement is started and during a running measurement.

Note

If you activate a duration trigger during a running measurement, you must stop and restart the measurement with the associated measurement raster for the trigger activation to take effect.

Result

The duration trigger configuration can be used as a stop condition for data captures on dSPACE real-time hardware or VEOS.

Tip

Alternatively, you can configure a duration trigger via the Properties controlbar. Refer to Trigger Properties on page 249.

Related topics

Basics

Basics on Triggered Measurement.....87
Workflow for Configuring Triggered Measurement.....91

HowTos

How to Change the Assignment of Triggers to Measurement Rasters.....98

How to Configure a Sample Count Trigger

Objective

You can define the number of samples in a data capture.

Sample count trigger

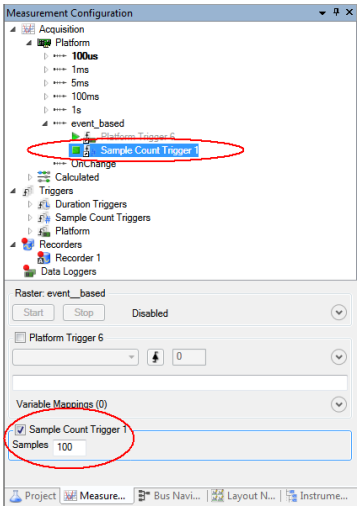
A trigger that specifies the number of samples in a data capture.

A sample count trigger can be used as a stop trigger.

Method

To configure a sample count trigger

1 In the navigation area of the Measurement Configuration controlbar, select the sample count trigger you want to configure.



The configuration settings are displayed in the configuration area of the **Measurement Configuration** controlbar.

> **Tip**
>
> It does not matter whether you select the actual sample count trigger below the **Triggers** element or a reference to it. The changes you make apply to the actual trigger and all of its references.

2 In the **Samples** edit field, enter a value to define the number of samples in a capture with the selected raster.

3 To activate the sample count trigger, select its checkbox.

The selected sample count trigger is activated and will be evaluated when a measurement is started and during a running measurement.

Result

The sample count trigger configuration can be used as a stop condition for data captures on dSPACE real-time hardware.

> **Tip**
>
> Alternatively, you can configure a sample count trigger via the **Properties** controlbar. Refer to Trigger Properties on page 249.

Related topics

Basics

Basics on Triggered Measurement.....87
Workflow for Configuring Triggered Measurement.....91

HowTos

How to Change the Assignment of Triggers to Measurement Rasters.....98

How to Change the Assignment of Triggers to Measurement Rasters

Objective

You can modify the assignment of start and stop triggers to measurement rasters by rearranging the triggers or assigning newly created triggers.

Assignment of triggers to measurement rasters

Automatic assignment When you add a variable description to a dSPACE platform in an experiment, ControlDesk automatically assigns a start trigger (platform trigger) and a stop trigger (*duration trigger* for time-based rasters or

sample count trigger for event-based rasters) to each measurement raster defined in the platform's application.

Changing the assignment ControlDesk lets you change the assignment of start and stop triggers to measurement rasters via drag & drop.

Note

By default, ControlDesk measures continuously on new measurement rasters. The start and stop triggers are assigned but not enabled.
You can change the default setting and let ControlDesk perform triggered measurement on new measurement rasters on the **Measurement Configuration** page of the **ControlDesk Options** dialog. Refer to Measurement Configuration Page on page 302.
This option affects only triggered measurement, not triggered data logging.

Creating new platform, duration, and sample count triggers

You can add new platform, duration, and sample count triggers to the measurement configuration. This allows you to specify further start and stop conditions for measurement rasters.

Trigger usage

Each trigger can be assigned only once. You cannot assign it to more than one measurement raster.

The following table shows how you can use the different trigger types.

Trigger Type	Trigger Usage
Platform trigger	▪ Start ▪ Start/Stop (for DS1007 PPC Processor Board, DS1202 MicroLabBox, MicroAutoBox III, SCALEXIO, or VEOS)
Duration trigger	Stop (for time-based raster)
Sample count trigger	Stop

Preconditions

At least one currently unassigned trigger must be in the measurement configuration. Refer to:

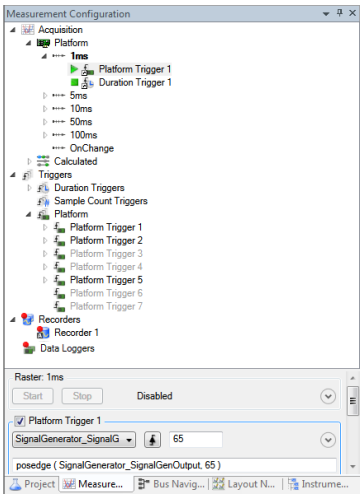
- Add New Platform Trigger on page 263
- Add New Duration Trigger on page 262
- Add New Sample Count Trigger on page 263

Method

To change the assignment of triggers to measurement rasters

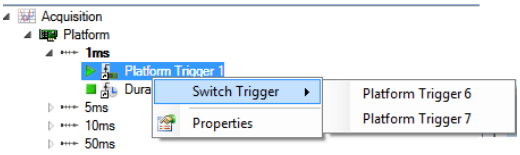
1. In the navigation area of the **Measurement Configuration** controlbar, open the measurement raster whose trigger assignment you want to change.

The currently assigned start and stop triggers are displayed.



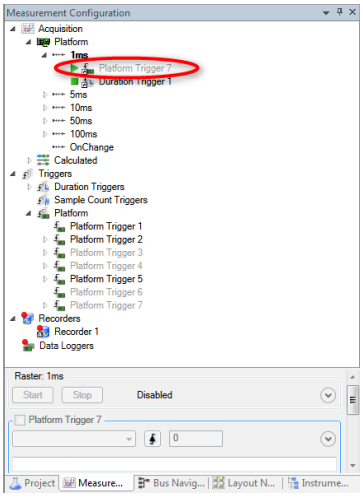
2 Right-click the trigger you want to change and select **Switch Trigger**.

The context menu shows the currently unassigned corresponding triggers that are available in the measurement configuration.



3 Select the trigger you want to assign to the measurement raster.

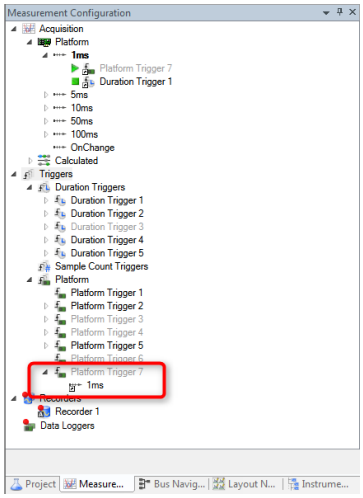
The "old" start or stop trigger is replaced with the newly assigned trigger.



Result

You changed the trigger assignment to a measurement raster.

The measurement configuration tree gives you information on where each measurement trigger is currently used.



Related topics

Basics

Basics on Triggered Measurement.....87
Workflow for Configuring Triggered Measurement.....91

References

Add New Duration Trigger.....262
Add New Platform Trigger.....263
Add New Sample Count Trigger.....263
Switch Trigger.....342

Performing Measurements

Introduction

You can start and stop measurements. The measured data is buffered in the measurement buffer.

Where to go from here

Information in this section

Basics on the Measurement Buffer.....102
Each time you start a measurement, the measured data is buffered in the measurement buffer.

How to Start Measuring..... 103
To start measuring.

How to Stop Measuring..... 106
To stop measuring.

Basics on the Measurement Buffer

Introduction

The measurement buffer size determines the amount of data that can be buffered.

Measurement buffer

Each time you start a measurement, the measured data is buffered in the measurement buffer. As this is a ring buffer, earlier values are overwritten by later values when its capacity is exceeded (buffer overflow). If you perform triggered measurement (see Basics on Triggered Recording on page 125), only the last data captured with a triggered measurement raster is buffered in the measurement buffer by default. You can change the buffering behavior for a triggered raster by enabling the multi-capture history via the **Properties** controlbar.

You can configure the size of the measurement buffer to increase or decrease its capacity via the Acquisition Properties on page 241. When you start a measurement, you can see the remaining time to buffer overflow in the status bar. Additionally, you can let ControlDesk output an acoustic signal before the buffer capacity is reached.

You can save the current content of the measurement buffer to a measurement data file.

Before ControlDesk starts a measurement, it estimates the required memory space. The required memory space depends on the specified **measurement buffer size** and on the measurement raster settings of the signals to be measured. The actual length of the saved measurement may therefore differ from the specified **measurement buffer size**.

- For a time-based raster, the length of the saved measurement is very close to the specified **measurement buffer size**.
- For an event-based raster, ControlDesk uses the **minimum sampling period** specified for that raster to estimate the required memory space. If the number of measured values differs from the specified **minimum sampling period**, the length of the saved measurement differs more or less from the specified **measurement buffer size**.

- For the OnChange raster, ControlDesk estimates one value change per second. Additionally, it measures the value every three seconds. If no value change occurs, the length of the saved measurement is three times longer than the specified **measurement buffer size** (plus a safety margin of one measured value).

Measurement buffer for pretriggering

If you perform triggered recording with pretriggering (see Basics on Triggered Recording on page 125), the value you specify for the pretrigger time must be smaller than or equal to the measurement buffer size.

Related topics

HowTos

How to Save the Measurement Buffer as a Recording..... 143

References

Acquisition Properties..... 241
Triggered Raster Properties..... 252

How to Start Measuring

Objective

When you change parameter values, you should start a measurement to observe the effects of these changes on the relevant measurement variables.

Note

Do not run self-starting programs, such as a virus scan or backup software, while ControlDesk is running measurements or recordings over a long time.

Increasing the synchronization accuracy on measurement start

ControlDesk initially synchronizes the time stamps of different platforms/devices when online calibration is started globally for the first time. If a high synchronization accuracy on measurement start is required, wait for about 20 s after going online before you start measuring. For more information, refer to Basics on Synchronized Data Acquisition on page 228.

Preconditions

The hardware or VPU that corresponds to the platforms/devices in the experiment must be connected.

Method

To start measuring

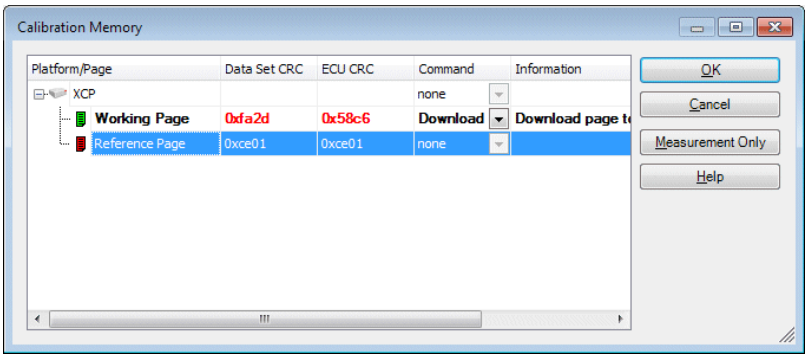
1 On the Home ribbon, click Status Control – Start Measuring, or press **F5**.

If online calibration is started, ControlDesk starts measurement immediately. Otherwise, ControlDesk must first switch to the online calibration mode.

Before you can start online calibration, ControlDesk compares the parameter values on the connected hardware or VEOS with the corresponding parameter values in ControlDesk.

As a consequence, ControlDesk opens the Calibration Memory dialog if one of the following conditions is true:

- The parameter values on the hardware or VEOS and in ControlDesk differ.
- There is at least one platform in the experiment whose *start online calibration behavior* is set to 'Prompt user'. See General Settings Properties (ControlDesk Platform Management 🕮).
- Parameters outside the defined memory segments are selected for calibration.
- No memory segments are defined in the A2L file.



Tip

To prevent ControlDesk from always opening the Calibration Memory dialog, you can specify a default start online calibration behavior for each platform/device individually during platform/device configuration. ControlDesk then equalizes the parameter values on the hardware or VEOS and in ControlDesk according to the specified settings without opening the Calibration Memory dialog. However, if parameter upload/download according to the specified default behavior is not possible (for example, parameter values are to be downloaded, but no initial data is available), the Calibration Memory dialog nevertheless opens.

2 In the dialog, select a download or upload command for the relevant memory pages from the Command drop-down list, then click OK.

This equalizes the parameter values on the hardware or VPU and on the host PC.

Tip

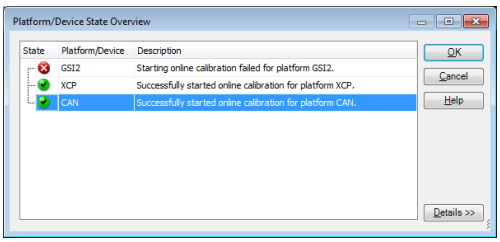
If you only want to measure variables, you can also click **Measurement only**. This has the following effects:

- Calibrating parameters is not possible.
- Measuring variables is possible.

ControlDesk checks if online calibration is possible for each platform/device in the experiment, as follows:

- Is the corresponding platform/device hardware physically connected to the host PC or the corresponding VPU loaded to VEOS that runs on the host PC?
- Is the platform/device configured correctly?
- Is the ControlDesk license still valid?

If online calibration is impossible for at least one platform/device, ControlDesk opens the **Platform/Device State Overview** dialog (unless you disable the display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog). The dialog looks similar to the following:



Online calibration is possible only for the platforms/devices whose platform/device state is ✔ .

3 Select **OK** (available only if online calibration is possible for at least one platform/device) or **Cancel**.

- If you click **OK**, ControlDesk starts online calibration for the platforms/devices for which it has detected no errors. Starting online calibration fails for all other platforms/devices, so that you cannot perform measurements, recordings, or online calibration on them.
- If you click **Cancel**, ControlDesk does not start online calibration. This lets you reconfigure the platforms/devices of your experiment or connect missing hardware to the host PC or load VPU(s) to VEOS, for example, before you try to start online calibration again.

Result

If ControlDesk detects no errors for at least one platform/device, it can switch to the online mode, and starts measurement.

The text **Measuring**, the increasing measurement time and the time that remains until the measurement buffer overflows are shown in the status bar:

Immediately after you start online calibration, the memory pages specified by the **Initial Page** platform/device configuration settings are automatically activated in ControlDesk and on the ECU.

Tip

While measurement is running, ControlDesk lets you selectively stop and restart measurements for single platforms/devices. For example, this can be useful if you want to stop a measurement for a specific platform/device while measurement continues for the other platforms/devices in the experiment. For details, refer to Stop Measurement (for Single Platform/Device) on page 339 and Start Measurement (for Single Platform/Device) on page 328.

Next steps

You can start a recording without stopping the measurement. Refer to Performing Data Recording on page 135.

Related topics

HowTos

How to Stop Measuring 106

References

Calibration Memory Dialog (ControlDesk Platform Management 🕮)
Platform/Device State Overview Dialog (ControlDesk Platform Management 🕮)
Start Measuring 329

How to Stop Measuring

Objective

When you stop parameter calibration, you might also want to stop a running measurement.

Method

To stop measuring

1 On the **Home** ribbon, click **Status Control** – **Stop Measuring**, or press **F6**.

Result

ControlDesk stops the measurement for all platforms/devices of the current experiment. If a recording is running, it is stopped, too.

Tip

ControlDesk lets you also stop measurement for a single platform/device only, while measuring keeps running for the other platforms/devices of the experiment. Refer to Stop Measurement (for Single Platform/Device) on page 339.

Related topics

HowTos

How to Start Measuring..... 103

References

Stop Measuring..... 340

Performing Quick Start Measurements

Where to go from here

Information in this section

Basics on Quick Start Measurements..... 108
ControlDesk supports quick start measurements.

How to Prepare a Quick Start Measurement on an ECU with XCP or DCI-GSI2..... 108
ControlDesk supports quick start measurements on ECUs with XCP on CAN and XCP on Ethernet, and on ECUs with DCI-GSI2. Before a quick start measurement on an ECU with XCP or DCI-GSI2, you have to prepare ControlDesk and the ECU.

How to Perform a Quick Start Measurement on an ECU with XCP or DCI-GSI2..... 111
After you prepare ControlDesk and the ECU, you can perform a quick start measurement on an ECU with XCP or DCI-GSI2.

How to Prepare a Quick Start Measurement on an ECU with CCP..... 113
ControlDesk supports quick start measurements on ECUs with CCP. Before a quick start measurement on an ECU with CCP, you have to prepare ControlDesk and the ECU.

How to Perform a Quick Start Measurement on an ECU with CCP..... 115
After you prepare ControlDesk and the ECU, you can perform a quick start measurement on an ECU with CCP.

Basics on Quick Start Measurements

Quick start measurement

A type of measurement in which all the ECU variables configured for measurement are measured and recorded, starting with the first execution of an ECU task. ControlDesk supports quick start measurements on ECUs with DCI-GSI2, CCP, and XCP (except for XCP on Ethernet with the TCP transmission protocol).

Quick start measurement can be used to perform cold start measurements. Cold start means that the vehicle and/or the engine are cooled down to the temperature of the environment and then started. One reason for performing cold start measurements is to observe the behavior of an engine during the warm-up phase.

Related topics

HowTos

How to Perform a Quick Start Measurement on an ECU with CCP..... 115
How to Perform a Quick Start Measurement on an ECU with XCP or DCI-GSI2..... 111

How to Prepare a Quick Start Measurement on an ECU with XCP or DCI-GSI2

Objective

ControlDesk supports quick start measurements on ECUs with XCP on CAN and XCP on Ethernet (only with the UDP transmission protocol, not with the TCP transmission protocol) and ECUs with DCI-GSI2. Before a quick start measurement on an ECU with XCP or DCI-GSI2, you have to prepare ControlDesk and the ECU.

Basics

In a quick start measurement, all ECU measurement variables of a predefined measurement configuration are measured and recorded starting with the first execution of an ECU task.

Preconditions

- The *Resume Mode* must be implemented in the XCP service and in the ECU code according to the XCP specification.

- The ECU is connected to the host PC.
  - For an ECU with XCP on CAN, refer to How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC (ECU Interfaces Hardware Installation and Configuration 🕮).
  - For an ECU with XCP on Ethernet, refer to Connecting an ECU with XCP on Ethernet (ECU Interfaces Hardware Installation and Configuration 🕮).
  - For an ECU with DCI-GSI2, refer to Connecting an ECU with DCI-GSI2 (ECU Interfaces Hardware Installation and Configuration 🕮).
- The vehicle's ignition is switched on.
- Your ControlDesk experiment must contain an XCP or DCI-GSI2 device. Refer to How to Add a Platform/Device to an Experiment (ControlDesk Platform Management 🕮).

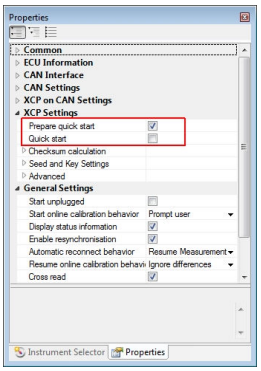
Method

To prepare a quick start measurement on an ECU with XCP or DCI-GSI2

1. If not already done, open the ControlDesk experiment containing the XCP or DCI-GSI2 device that corresponds to your ECU.
2. Configure the measurement according to your specific quick start measurement requirements.

   For details, refer to How to Activate Variables for Measurement on page 81.
3. If not already done, press **Ctrl+F8** to stop online calibration.
4. Select the XCP or DCI-GSI2 device in ControlDesk's **Project** controlbar.
5. From the context menu of the device, select **Disconnect Platform/Device**. This allows you to configure the device via the **Properties** controlbar.
6. In the **Properties** controlbar, select **Prepare quick start**.

   The illustration below shows the dialog for an XCP on CAN device.

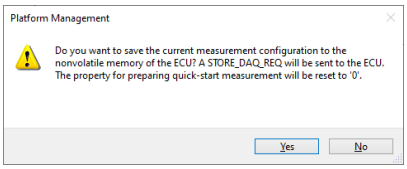


7. On the **Home** ribbon, click **Status Control – Start Measuring**, or press **F5**.
   - ControlDesk does not start an actual measurement, that is, no measurement data is displayed in the ControlDesk instruments.
   - ControlDesk transmits the current measurement configuration to the ECU.
   - ControlDesk sends the `SET_REQUEST` command to the ECU (with enabled `STORE_DAQ_REQ` bit). This prepares the ECU to save the current

measurement configuration to its nonvolatile memory. The ECU saves the configuration later, e.g., during the next shutdown.

- ControlDesk saves the measurement configuration in the current experiment.

8 Click **Yes** to confirm the following dialog.



The ECU is now prepared for quick start measurement.

9 On the **Home** ribbon, click **Status Control** – **Stop Measuring**, or press **F6**.

10 Press **Ctrl+F8** to stop online calibration.

11 Press **Ctrl+Shift+S** to save the experiment.

12 Switch off the vehicle's ignition.

The ECU saves the measurement configuration to its nonvolatile memory, for example, during the next shutdown.

13 Close the experiment.

Result

The ControlDesk experiment and the ECU are now prepared for quick start measurement.

Note

Do not modify the measurement configuration saved in the ControlDesk experiment before you perform the quick start measurement, for example, by adding or removing variables to/from the measurement signal list. This would lead to an inconsistent quick start measurement.

Next steps

You can now perform a quick start measurement. Refer to How to Perform a Quick Start Measurement on an ECU with XCP or DCI-GSI2 on page 111.

Related topics

References

Configure Platform/Device (ControlDesk Platform Management 🕮)
Measurement Configuration..... 290
Start Measuring..... 329

How to Perform a Quick Start Measurement on an ECU with XCP or DCI-GSI2

Objective

After you prepare ControlDesk and the ECU, you can perform a quick start measurement on an ECU with XCP or DCI-GSI2.

Restrictions

- A quick start measurement on an ECU with XCP on Ethernet is possible only with the UDP transmission protocol, not with the TCP transmission protocol.
- Calibrating parameters of an ECU with XCP or DCI-GSI2 is not possible during a quick start measurement since you do not have write access to the parameter values. To change these values after a quick start measurement, you have to stop online calibration and then restart it.

Preconditions

- ControlDesk and the ECU are prepared for quick start measurement. Refer to How to Prepare a Quick Start Measurement on an ECU with XCP or DCI-GSI2 on page 108.
- The ECU is connected to the host PC.
  - For an ECU with XCP on CAN, refer to How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC (ECU Interfaces Hardware Installation and Configuration 🕮).
  - For an ECU with XCP on Ethernet, refer to Connecting an ECU with XCP on Ethernet (ECU Interfaces Hardware Installation and Configuration 🕮).
  - For an ECU with DCI-GSI2, refer to Connecting an ECU with DCI-GSI2 (ECU Interfaces Hardware Installation and Configuration 🕮).
- The vehicle's ignition is switched off.

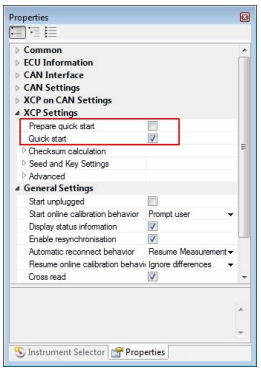
Method

To perform a quick start measurement on an ECU with XCP or DCI-GSI2

1. If not already done, start ControlDesk.
2. Open the ControlDesk experiment containing the prepared quick start measurement configuration.
3. Select the XCP or DCI-GSI2 device in ControlDesk's **Project** controlbar.
4. If not already done, disconnect the device by selecting **Disconnect Platform/Device** from its context menu.

5 In the **Properties** controlbar, select **Quick start**.

The illustration below shows the dialog for an XCP on CAN device.

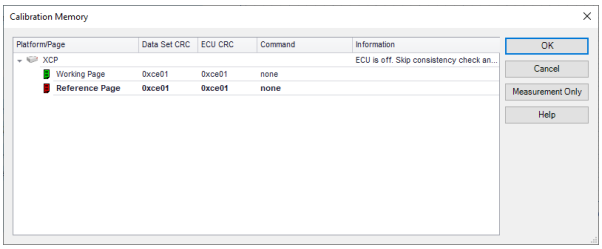


The effect is that ControlDesk does not initialize communication to the ECU when online calibration is started, but waits for measurement data from the ECU.

ControlDesk is now prepared for quick start measurement.

6 On the **Home** ribbon, click **Status Control – Start Measuring**, or press **F5**.

ControlDesk displays the **Calibration Memory** dialog. Since ControlDesk is prepared for quick start measurement, the **Perform Quick Start** command is preselected.



7 Click **OK** to confirm the dialog.

Measurement now is started. ControlDesk's XCP or DCI-GSI2 device is waiting for measurement data from the ECU.

If ControlDesk displays the **Platform/Device State Overview** dialog, ensure that ControlDesk detects no errors for the XCP or DCI-GSI2 device, and click **Continue**.

8 Switch on the vehicle's ignition.

The ECU is powered up, and ControlDesk immediately starts measuring data from the ECU.

Result

You performed a quick start measurement on an ECU with XCP or DCI-GSI2.

Tip

To clear the measurement configuration from the ECU's nonvolatile memory, select **Clear Quick Start Configuration** from the context menu of the corresponding XCP or DCI-GSI2 device.

Related topics

References

Calibration Memory Dialog (ControlDesk Platform Management 🕮)
Configure Platform/Device (ControlDesk Platform Management 🕮)
Measurement Configuration..... 290
Start Measuring..... 329

How to Prepare a Quick Start Measurement on an ECU with CCP

Objective

ControlDesk supports quick start measurements on ECUs with CCP. Before a quick start measurement on an ECU with CCP, you have to prepare ControlDesk and the ECU.

Basics

In a quick start measurement, all ECU measurement variables of a predefined measurement configuration are measured and recorded starting with the first execution of an ECU task.

Preconditions

- The *Resume Mode* must be implemented in the CCP service and in the ECU code according to the CCP specification.
- The ECU with CCP is connected to the host PC. Refer to How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC (ECU Interfaces Hardware Installation and Configuration 🕮).
- The vehicle's ignition is switched on.
- Your ControlDesk experiment must contain a CCP device. Refer to How to Add a Platform/Device to an Experiment (ControlDesk Platform Management 🕮).

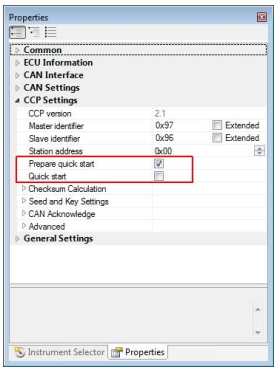
Method

To prepare a quick start measurement on an ECU with CCP

1. If not already done, open the ControlDesk experiment containing the CCP device that corresponds to your ECU.
2. Configure the measurement according to your specific quick start measurement requirements.

   For details, refer to How to Activate Variables for Measurement on page 81.
3. If not already done, press **`Ctrl+F8`** to stop online calibration.
4. Select the CCP device in ControlDesk's **Project** controlbar.
5. From the context menu of the device, select **Disconnect Platform/Device**. This allows you to configure the device via the **Properties** controlbar.

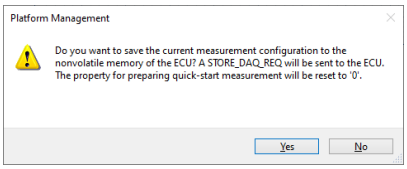
6 In the Properties controlbar, select Prepare Quick Start.



7 On the Home ribbon, click Status Control – Start Measuring, or press **F5**.

- ControlDesk does not start an actual measurement, that is, no measurement data is displayed in the ControlDesk instruments.
- ControlDesk transmits the current measurement configuration to the ECU.
- ControlDesk sends the `SET_S_STATUS` command to the ECU (with enabled `RESUME` bit). This prepares the ECU to save the current measurement configuration to its nonvolatile memory. The ECU saves the configuration later, e.g., during the next shutdown.
- ControlDesk saves the measurement configuration in the current experiment.

8 Click Yes to confirm the following dialog.



The ECU is now prepared for quick start measurement.

9 On the Home ribbon, click Status Control – Stop Measuring, or press **F6**.

10 Press **`Ctrl+F8`** to stop online calibration.

11 From the context menu of the device, select Configure Platform/Device.

The Configure Platform/Device wizard opens.

12 Click Next > until the CCP Settings dialog opens.

13 Specify '0' for the Prepare ECU for Quick Start value.

14 Click Finish to close the dialog.

15 Press **`Ctrl+Shift+S`** to save the experiment.

16 Switch off the vehicle's ignition.

The ECU saves the measurement configuration to its nonvolatile memory, for example, during the next shutdown.

17 Close the experiment.

Result

The ControlDesk experiment and the ECU are now prepared for quick start measurement.

Note

Do not modify the measurement configuration saved in the ControlDesk experiment before you perform the quick start measurement, for example, by adding or removing variables to/from the measurement signal list. This would lead to an inconsistent quick start measurement.

Next steps

You can now perform a quick start measurement. Refer to How to Perform a Quick Start Measurement on an ECU with CCP on page 115.

Related topics

References

Configure Platform/Device (ControlDesk Platform Management 🕮)
Measurement Configuration..... 290
Start Measuring..... 329

How to Perform a Quick Start Measurement on an ECU with CCP

Objective

After you prepare ControlDesk and the ECU, you can perform a quick start measurement on an ECU with CCP.

Restrictions

Calibrating parameters of an ECU with CCP is not possible during a quick start measurement since you do not have write access to the parameter values. To change these values after a quick start measurement, you have to stop online calibration and then restart it.

Preconditions

- ControlDesk and the ECU are prepared for quick start measurement. Refer to How to Prepare a Quick Start Measurement on an ECU with CCP on page 113.
- The ECU with CCP is connected to the host PC. Refer to How to Connect an ECU with CCP or an ECU with XCP on CAN to the Host PC (ECU Interfaces Hardware Installation and Configuration 🕮).
- The vehicle's ignition is switched off.

Method

To perform a quick start measurement on an ECU with CCP

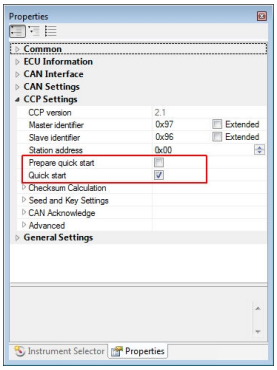
1 If not already done, start ControlDesk.

2 Open the ControlDesk experiment containing the prepared quick start measurement configuration.

3 Select the CCP device in ControlDesk's Project controlbar.

4 If not already done, disconnect the device by selecting Disconnect Platform/Device from its context menu.

5 In the Properties controlbar, select Quick Start.

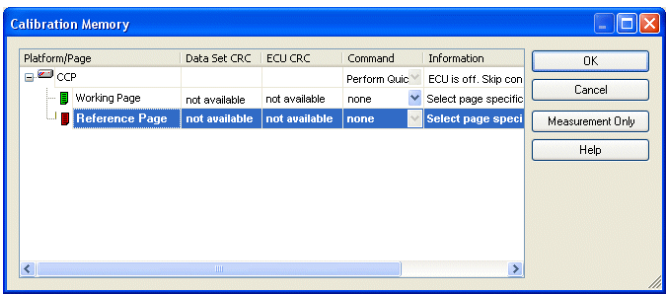


The effect is that ControlDesk does not initialize communication to the ECU when online calibration is started, but waits for measurement data from the ECU.

ControlDesk is now prepared for quick start measurement.

6 On the Home ribbon, click Status Control – Start Measuring, or press **F5**.

ControlDesk displays the Calibration Memory dialog. Since ControlDesk is prepared for quick start measurement, the Perform Quick Start command is preselected.



7 Click OK to confirm the dialog.

Measurement now is started. ControlDesk's CCP device is waiting for measurement data from the ECU.

If ControlDesk displays the Platform/Device State Overview dialog, ensure that ControlDesk detects no errors for the CCP device, and click Continue.

8 Switch on the vehicle's ignition.

The ECU is powered up, and ControlDesk immediately starts measuring data from the ECU.

Result

You performed a quick start measurement on an ECU with CCP.

Related topics

References

Calibration Memory Dialog (ControlDesk Platform Management 🕮)
Configure Platform/Device (ControlDesk Platform Management 🕮)
Measurement Configuration..... 290
Start Measuring..... 329

Recording Data

Introduction

To perform data recording, you have to configure the recording by selecting variables. You can specify trigger conditions for a recording and configure its storage settings.

Where to go from here

Information in this section

Configuring Recording 118
To perform data recording, you have to configure the recording by selecting variables. You can specify trigger conditions for a recording and configure its storage settings.

Configuring Triggered Recording 124
Before you can perform triggered data recording, you must specify the trigger conditions.

Configuring the Storage of Recorded Data 131
If you want to record measurements, you should first configure the storage settings.

Performing Data Recording 135
There are different ways of recording data in ControlDesk. You can start and stop recording immediately, you can define trigger conditions to start and stop recording, and you can store the last measured data which is held in the measurement buffer.

Configuring Recording

Introduction

To perform data recording, you have to configure the recording by selecting variables. You can specify trigger conditions for a recording and configure its storage settings.

Where to go from here

Information in this section

Basics on Configuring Recording 119
ControlDesk lists all the variables to be recorded in the Measurement Configuration controlbar.

How to Activate Variables for Recording..... 121
In the recorder signal lists, you can specify the variables to include in recordings.

Basics on Configuring Recording

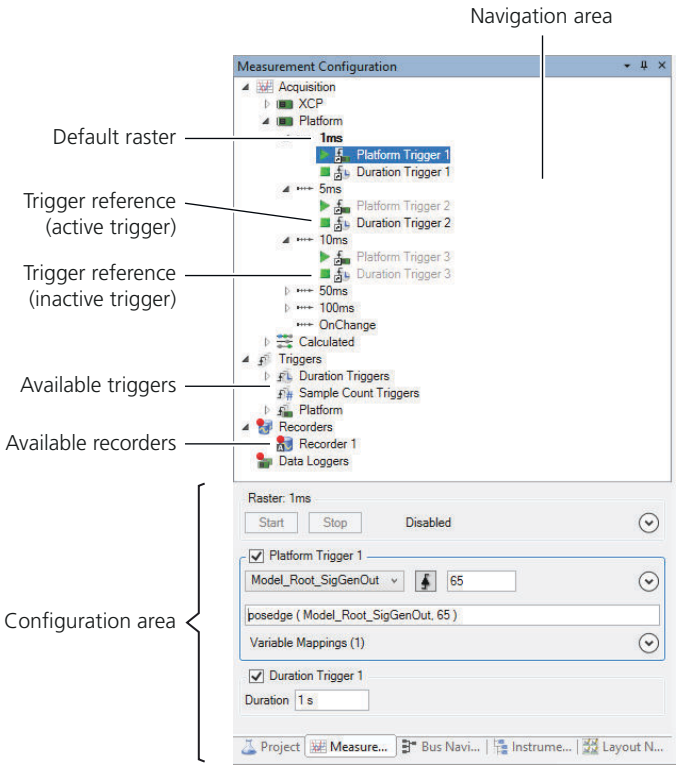
Introduction

ControlDesk lists all the variables to be measured and recorded in the **Measurement Configuration** controlbar.

Measurement Configuration controlbar

The **Measurement Configuration** controlbar lets you configure Measurement, Recording, and Data logging. You can define and manage triggers for measurements and data loggings. Other settings, such as triggers for recordings, can be specified via the **Properties** controlbar.

The illustration below shows the **Measurement Configuration** controlbar, displaying the configuration settings for the start trigger of a measurement raster.



For further information on the **Measurement Configuration** controlbar, refer to Measurement Configuration on page 290.

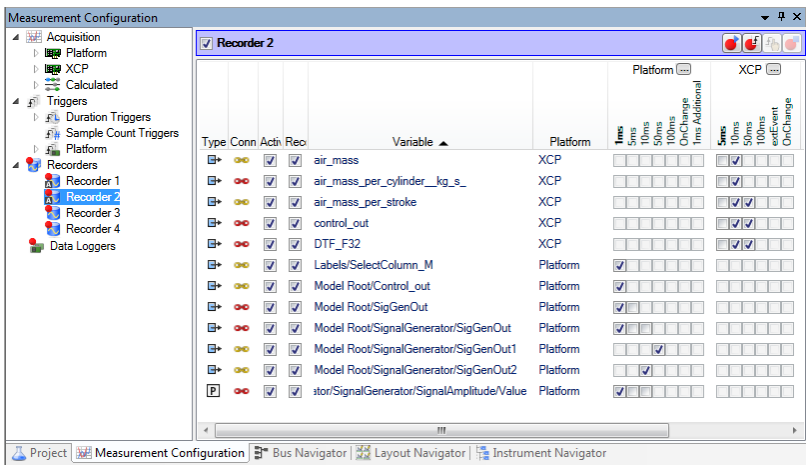
Tip

You can change the arrangement of the areas from vertical to horizontal and vice versa by double-clicking the splitter bar between them (for an animated graphic, refer to dSPACE Help).

Recorder signal list

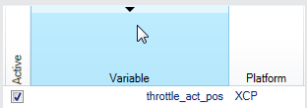
A *recorder signal list* collects variables selected for recordings from all the platforms/devices of a current experiment. You can create several recorders, each with its own recorder signal list.

A recorder signal list is shown in the configuration area of the **Measurement Configuration** controlbar, if you select a **Recorder** element in the navigation area of the **Measurement Configuration** controlbar.



Tip

You can sort the signal list in ascending or descending order by clicking the header of a column.
Sorting is synchronized in all signal lists (if the selected column is contained in the list).



The content of the displayed signal list varies according to the item currently selected in the navigation area of the **Measurement Configuration** controlbar:

- If the **Recorders** element is selected, toolbars for all available recorders are displayed. Immediate and triggered recordings can be controlled via the recorder toolbars.
- If a single **Recorder** element is selected, its recorder signal list is displayed. The recorder signal list is a subset of the measurement signal list containing the signals that are selected for a specific recording (see below).

Adding/removing variables to/from a recorder signal list

A recorder signal list consists of the same signals as the measurement signal list or a subset of them. Since recordings are only performed for variables with measurement activated, a recorder signal list cannot contain variables that are not in the measurement signal list.

- ControlDesk lets you add a variable to the recorder signal list by dragging it from the **Variables** controlbar, from another signal list, or from an instrument.
- If you enable the **Automatic signal configuration** property of a recorder, a signal is automatically added to the recorder's signal list when it is added to the measurement signal list. The recorder symbol visualizes this by adding an *A*: (see Recorder Properties on page 245).
- If you disable the **Write to file** property of a recorder, the measured data is not stored in the measurement data file. The recorder symbol visualizes this by an orange recorder symbol: (see Recorder Properties on page 245).
- Removing a signal manually from the measurement signal list also removes it from the recorder signal list (see Remove (Variable) on page 311).
- You can remove a signal manually from the recorder without removing it from the measurement signal list (see Remove from Recorder on page 313).
- You can export a recorder to a file and import the complete recorder including its property settings and signals, or the signals only. Refer to Export (Recorder) on page 279.

Related topics

References

Measurement Configuration..... 290

How to Activate Variables for Recording

Objective

In recorder signal lists, you can specify the variables to include in recordings.

Defining variables to be recorded

A *recorder signal list* contains variables to be included in subsequent recordings. It is shown in the **Measurement Configuration** controlbar if a **Recorder**

element is selected in the navigation area. Each **Recorder** element has its own *recorder signal list*.

A recorder signal list has checkboxes for activating the measurement and recording of variables. Variables whose **Active** checkbox is selected for measurement and recording are included in subsequent recording runs.

Note

Removing a signal from a layout does not remove it from the measurement signal list or a recorder signal list unless this is specified on the **Visualization** page in the **ControlDesk Options** dialog. Refer to Visualization Page (ControlDesk Layouting 🕮).

For further information on the recorder signal list and on how to add variables to or remove variables from it, refer to Basics on Configuring Recording on page 119.

Symbols

The following symbols show whether the variable is connected to an instrument on a layout.

Symbol	Description
	A red chain indicates that the variable is visualized in an instrument.
	A yellow chain indicates that the variable is not visualized in an instrument but is on the measurement signal list.
(None)	The variable is not visualized in an instrument and is not on the measurement signal list.

Preconditions

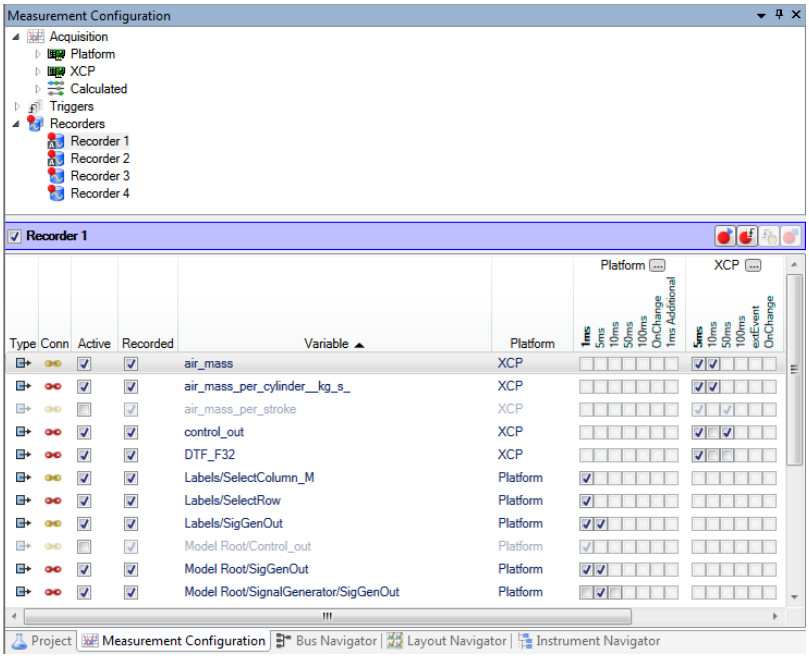
A running measurement must be stopped first.

Method

To activate variables for recording

1. In the **Measurement Configuration** controlbar, select a **Recorder** item.

   The signal list of the selected recorder opens, displaying all the variables of all the platforms/devices in the current project selected for this recorder so far.



Tip

If you want to create a new, empty recorder, you can do this via the context menu of the Recorders element.

2 Change the recorder signal list according to your needs by removing and adding variables.

To add new variables to the recorder, drag them to the recorder signal list from the Variables controlbar, the measurement signal list, or an instrument.

Tip

If you activate the automatic signal configuration property of a recorder, a signal is automatically added to the recorder's signal list when it is added to the measurement signal list.

3 In the Active and Recorded columns, select the checkboxes of all the measurement variables to be included in subsequent measurements and recordings when this recorder is active. Recordings can be performed only for variables with measurement activated. If multiple rasters are activated for measurement, you can activate/deactivate each raster separately for recording.

4 To exclude a signal permanently from subsequent recordings but not from subsequent measurements, you can remove it from the recorder signal list. Select the signal in the recorder signal list and press **`Delete`**, or right-click the variable and select Remove from Recorder from its context menu.

The signal is removed from the recorder, but is still in the measurement signal list.

Result

The activated variables are included in subsequent measurements and recordings as long as the recorder is active.

Tip

For multiple selection, press **Ctrl** or **Shift** when clicking a variable. Press **Ctrl** to select a number of single variables with the mouse or **Shift** to select a block of variables. Then select a checkbox or a measurement raster.

Next steps

If you want to record measurements, you should first configure the storage settings. Refer to How to Configure the Storage Settings for Recording on page 131.

Related topics

References

Add to Recorder..... 266
Recorder Properties..... 245
Remove from Recorder..... 313

Configuring Triggered Recording

Introduction

Before you can perform triggered data recording, you must specify the trigger conditions.

Where to go from here

Information in this section

Basics on Triggered Recording..... 125
You can start and stop the recording of data if specific conditions are met.

How to Configure Trigger Conditions for Triggered Recording..... 127
If you want a recording to start and stop depending on defined conditions, you can enable a start and a stop trigger.

How to Define a Trigger Rule for Triggered Recording..... 129
You can define trigger rules for the start and stop conditions of triggered recordings.

Basics on Triggered Recording

Introduction

With ControlDesk, each **Recorder** element can be started and stopped via an individual trigger.

Triggered recording

Triggered recording means that the recording is not started or stopped until certain trigger conditions are met. You can specify start and stop triggers to define the conditions.

Trigger conditions Conditions for triggered recording can be defined and edited in ControlDesk. They can be used independently for starting or stopping a recording. These are examples of start and stop trigger conditions:

- A threshold value of a variable
- A positive or negative signal edge

The trigger conditions are evaluated on the ControlDesk PC.

Note

Note that the triggers for triggered recordings differ from those used for triggered measurements.

- Triggers for triggered measurements are used for data captures on dSPACE real-time hardware or VEOS. They are evaluated on the dSPACE hardware or VEOS during a running measurement. They determine which data is actually transferred from the hardware to the host PC.
- Triggers for triggered recordings are evaluated on the host PC after the data is captured. They can use only data that was actually transferred to the host PC.

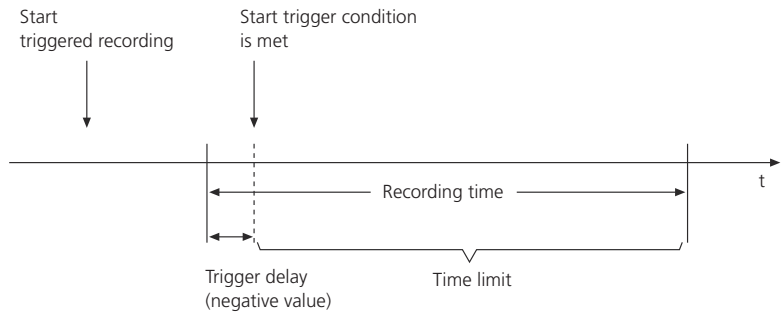
Trigger delay With triggered recording, you can perform pretriggering and posttriggering by specifying negative and positive trigger delays. For example, with a start trigger delay of -5 seconds, ControlDesk will actually start the recording 5 seconds before the start trigger condition is met (pretriggering).

Note

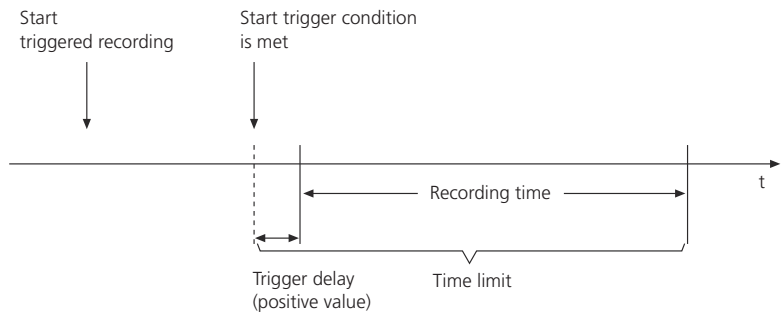
The measurement data for a negative start trigger delay is taken from the measurement buffer. The delay value of a negative start trigger delay must therefore be smaller than or equal to the measurement buffer size. To configure the measurement buffer size, refer to Acquisition Properties on page 241.

Recording time The recording time depends on the configuration of start and stop conditions. The following illustrations show the effects of positive and negative trigger delays on the recording time.

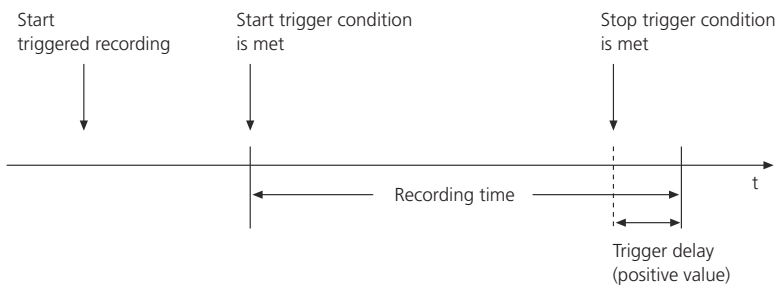
- A start trigger with a negative trigger delay is enabled and a time limit is specified:



- A start trigger with a positive trigger delay is enabled and a time limit is specified:



- A start trigger without a trigger delay and a stop trigger with a positive trigger delay are enabled:



Related topics

HowTos

How to Configure Trigger Conditions for Triggered Recording..... 127
How to Define a Trigger Rule for Triggered Recording..... 129
How to Perform a Triggered Recording..... 139

References

Recorder Properties..... 245
Start Triggered (Recording)..... 332
Stop Recording..... 340

How to Configure Trigger Conditions for Triggered Recording

Objective

If you want a recording to start and stop depending on defined conditions, you can enable a start and a stop trigger.

Tip

You can define separate start and stop triggers for each recorder element in the **Measurement Configuration** controlbar.

Start trigger

A start trigger defines the condition for the start of a recording. If a triggered recording includes a start trigger, ControlDesk delays the start of the recording until its condition is reached.

Stop trigger

You can define a time limit for recording or use a stop trigger.

A stop trigger defines the conditions to end a recording. If a triggered recording includes a stop trigger, ControlDesk stops the recording when its condition is reached.

Trigger delay

You can specify positive and negative trigger delays for start and stop triggers. A trigger delay can increase or reduce the recording time. Refer to Basics on Triggered Recording on page 125.

Preconditions

A running measurement must be stopped first.

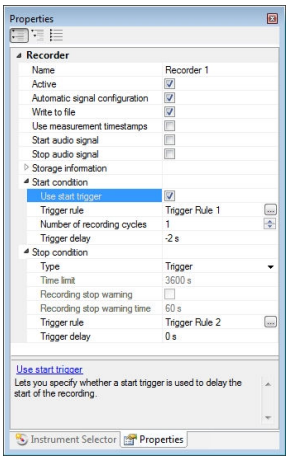
Method

To configure trigger conditions for triggered recording

1 In the Measurement Configuration controlbar, select a Recorder element.

The recorder signal list is displayed in the Measurement Configuration controlbar, and the Properties controlbar shows the Recorder properties.

2 In the Properties controlbar, navigate to the Start Condition properties.



3 To enable a start trigger, select Use start trigger and specify the trigger rule.

If you want to select another trigger rule or edit the trigger conditions of the displayed trigger rule, click ... to open the Edit Trigger Rules dialog.

4 You can also configure additional settings, like the number of recording cycles or a positive or negative trigger delay.

5 In the Properties controlbar, navigate to the Stop Condition properties.

6 To enable a stop trigger, select Trigger from the Type drop-down list, and specify the trigger rule for the stop trigger.

If you want to select another trigger rule or edit the trigger conditions of the displayed trigger rule, click ... to open the Edit Trigger Rules dialog.

7 If desired, you can configure a positive or negative trigger delay.

Result

The next time you start a triggered recording via the selected recorder, ControlDesk delays the recording until the start condition is reached. It stops the recording when the stop condition is reached.

Next steps

You can now start a recording that will be started and stopped when the defined conditions are reached. Refer to How to Perform a Triggered Recording on page 139.

Related topics

Basics

Basics on Triggered Recording..... 125

HowTos

How to Define a Trigger Rule for Triggered Recording..... 129
How to Define an Acoustic Signal..... 184

References

Recorder Properties..... 245

How to Define a Trigger Rule for Triggered Recording

Objective

You can define trigger rules for the start and stop conditions of triggered recordings.

Trigger rules

A trigger rule consists of conditions like 'If the value of variable A is greater than the value of variable B'. A trigger rule can contain a combination of conditions.

The conditions can be connected via an OR or an AND operator, for example: 'If the value of variable A is greater than 2.34 OR the value of variable D is lower than the value of variable E'.

The usage of an AND operator must be considered carefully. Often it results in a combination of conditions that will never be reached. It is very unlikely, for example, that two differently defined edge trigger conditions are met at the same time stamp.

Preconditions

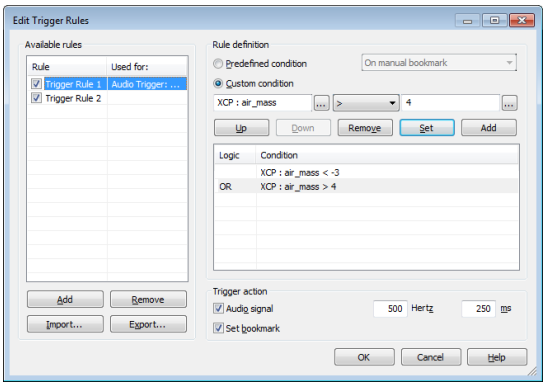
A running measurement must be stopped first.

Method

To define a trigger rule for triggered recording

1 On the Home ribbon, click Recording – Edit Trigger Rules, or press `Ctrl+T`.

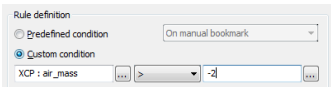
The **Edit Trigger Rules** dialog opens.



2 Under the list of available rules, click **Add** to define a new rule.

The proposed rule name is selected automatically. You can change it by entering a new name.

3 Select one of the predefined conditions (occurrence of a manual or automatic bookmark) or use the edit fields and the operator field under **Custom condition** to specify the rule conditions. In the edit fields, you can enter values or select variables with the Browse button.



4 Click **Add** to create a new entry in the trigger condition list.

If you add more than one condition to the trigger condition list, they are combined with an OR in the Logic column. Click the OR entry, if you want to change it to AND.

5 If you want ControlDesk to output a sound each time the trigger conditions are reached, select the **Audio Signal** checkbox and configure its settings.

6 If you want to enable ControlDesk to set bookmarks automatically when the selected trigger is invoked, select **Set bookmark**.

Tip

If ControlDesk does not set a bookmark on the occurrence of a trigger, make sure that trigger events are enabled in the Bookmark Types dialog on page 275.

Result

The new trigger rule can be used for start and stop conditions for recordings in the **Recorder** properties.

Next steps

You can now use the new trigger rule to set start and stop conditions for a recording. Refer to How to Configure Trigger Conditions for Triggered Recording on page 127.

Related topics

References

Recorder Properties..... 245
Trigger Rules..... 344

Configuring the Storage of Recorded Data

Introduction

If you want to record measurements, you should first configure the storage settings.

Where to go from here

Information in this section

How to Configure the Storage Settings for Recording..... 131
You can configure a number of storage settings for recordings.

How to Display a Storage Settings Dialog after Each Recording..... 134
You can specify a prompt requesting for the storage settings each time you stop a recording.

How to Configure the Storage Settings for Recording

Objective

You can configure a number of storage settings for recordings.

Storage settings

It is possible to record a measurement without configuring the storage settings at all. ControlDesk's default settings guarantee that the measurement is stored in a measurement data file in the measurement data folder of the project. You can open this file in the **Measurement Data Pool** and add it to the experiment later on.

If you want to ensure that ControlDesk adds recordings to the experiment and opens them in the **Measurement Data Pool**, you can configure this in the storage settings of a **Recorder**. Additionally, you can configure file name settings, the file description text and export settings.

Tip

In ControlDesk, you can also save already measured data, such as data from the measurement data buffer or flight recorder data, to a measurement data file. The storage settings for these recordings are set via the Acquisition properties.

Method

To configure the storage settings for recording

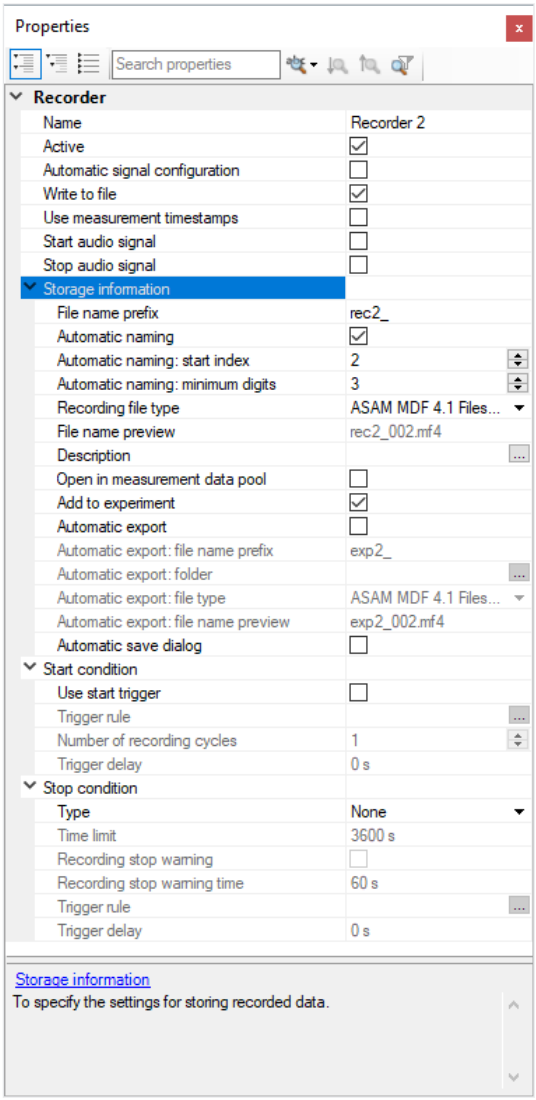
1. Select a Recorder element in the navigation area of the Measurement Configuration controlbar.

   The recorder signal list is displayed in the Measurement Configuration controlbar, and the Properties controlbar shows the Recorder properties.

2. In the Properties controlbar, select Write to file.

3. Navigate to the Storage information properties, and configure the storage settings.

   You can define the file name settings. The default file name prefix contains the number of the recorder. You can preview the file name of the next recording in the Properties controlbar. All other storage settings are optional.



Result

All subsequent recordings use the new storage settings.

Next steps

- Now you can start a recording. Refer to Performing Data Recording on page 135.
- If you want use start and stop conditions for recording, you must first configure them. Refer to How to Configure Trigger Conditions for Triggered Recording on page 127.

Related topics

References

Recorder Properties..... 245

How to Display a Storage Settings Dialog after Each Recording

Objective

You can specify a prompt requesting for the storage settings each time you stop a recording.

Preconditions

A running measurement must be stopped first.

Method

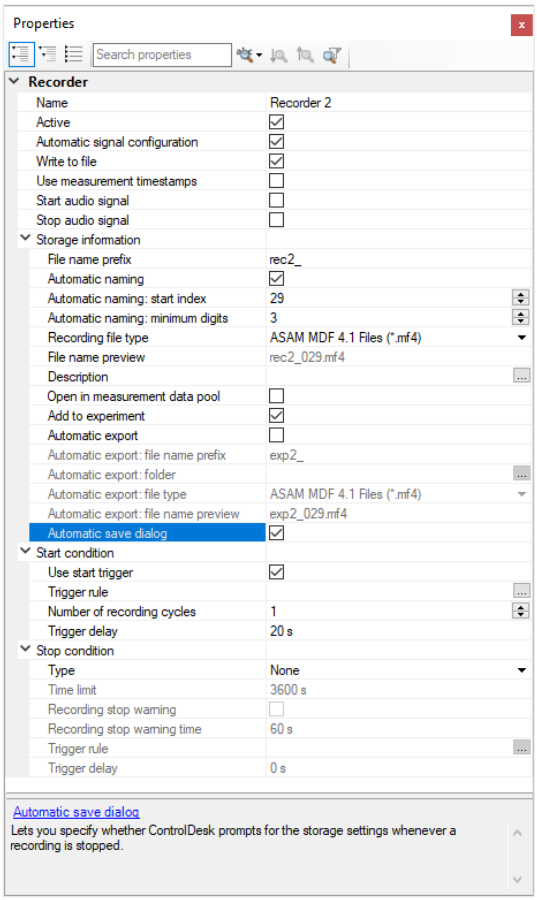
To display a storage settings dialog after each recording

1. Select a Recorder element in the navigation area of the Measurement Configuration controlbar.

   The recorder signal list is displayed in the Measurement Configuration controlbar, and the Properties controlbar shows the Recorder Properties.

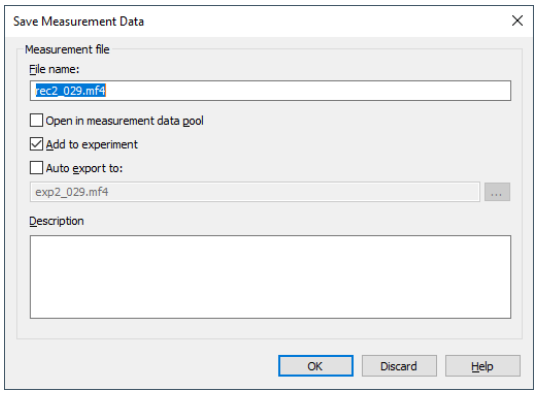
2. In the Properties controlbar, navigate to the Storage information properties.

3. Select Automatic save dialog.



Result

After each recording with the selected recorder, ControlDesk displays the **Save Measurement Data** dialog.



You can change the storage settings or discard the measurement.

Related topics

References

Recorder Properties..... 245

Performing Data Recording

Introduction

There are different ways of recording data in ControlDesk. You can start and stop recording immediately, you can define trigger conditions to start and stop recording, and you can store the last measured data which is held in the measurement buffer.

Where to go from here

Information in this section

How to Perform an Immediate Recording..... 136
You can start a recording immediately.

How to Perform a Triggered Recording..... 139
If you want to start and stop a recording depending on a condition, you can define start and stop conditions. To use these conditions, you have to perform a triggered recording.

How to Save the Measurement Buffer as a Recording..... 143
You can save the current data of the measurement buffer to a measurement data file using the current storage settings.

How to Save Time Plotter Data as a New Measurement..... 144
You can save the data that is currently displayed in a Time Plotter to a measurement data file.

How to Export Recorded Data..... 146
You can export recorded data to various export formats.

How to Perform an Immediate Recording

Objective

You can start a recording immediately.

Note

Do not run self-starting programs, such as a virus scan or backup software, while ControlDesk is running measurements or recordings over a long time.

Preconditions

- The platform/device hardware or VPU must be connected.
- The recording is performed with the settings you made in the **Measurement Configuration** controlbar and the **Properties** controlbar. You should configure the following settings:
  - Select the variables to be recorded. Refer to How to Activate Variables for Measurement on page 81.
  - Specify storage settings. Refer to How to Configure the Storage Settings for Recording on page 131.

  Settings for the start and stop conditions made in the **Recorder** properties are ignored if you perform an immediate recording.

Method

To perform an immediate recording

1 On the **Home** ribbon, click **Recording** – **Start Immediate**, or press **F11**.

Note

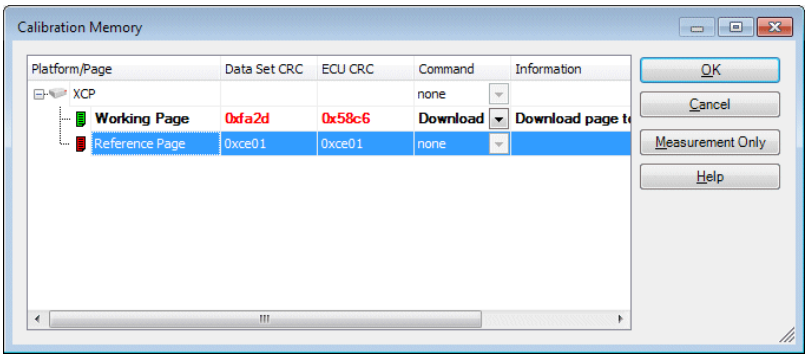
If you do not want to start all recorders at once, you can select single recorders via subelements in the **Home** – **Recording** ribbon group. You can also use the recorder toolbars in the **Measurement Configuration** controlbar to control all or selected recorders. For an overview, refer to Measurement Configuration on page 290.

If online calibration is started, ControlDesk starts recording immediately. Otherwise, ControlDesk must first start the measurement.

Before you can start online calibration, ControlDesk compares the parameter values on the connected hardware or VEOS with the corresponding parameter values in ControlDesk.

As a consequence, ControlDesk opens the **Calibration Memory** dialog if one of the following conditions is true:

- The parameter values on the hardware or VEOS and in ControlDesk differ.
- There is at least one platform in the experiment whose *start online calibration behavior* is set to 'Prompt user'. See General Settings Properties (ControlDesk Platform Management 🕮).
- Parameters outside the defined memory segments are selected for calibration.
- No memory segments are defined in the A2L file.



Tip

To prevent ControlDesk from always opening the **Calibration Memory** dialog, you can specify a default start online calibration behavior for each platform/device individually during platform/device configuration. ControlDesk then equalizes the parameter values on the hardware or VEOS and in ControlDesk according to the specified settings without opening the Calibration Memory dialog. However, if parameter upload/download according to the specified default behavior is not possible (for example, parameter values are to be downloaded, but no initial data is available), the Calibration Memory dialog nevertheless opens.

2 In the dialog, select a download or upload command for the relevant memory pages from the **Command** drop-down list, then click **OK**.

This equalizes the parameter values on the hardware or VPU and on the host PC.

Tip

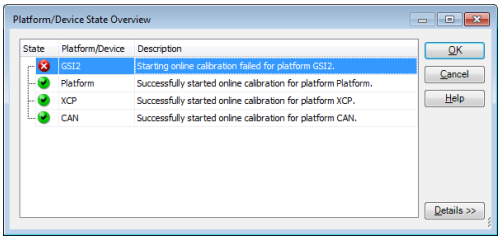
If you only want to measure variables, you can also click **Measurement only**. This has the following effects:

- Calibrating parameters is not possible.
- Measuring variables is possible.

ControlDesk checks if online calibration is possible for each platform/device in the experiment, as follows:

- Is the corresponding platform/device hardware physically connected to the host PC or the corresponding VPU loaded to VEOS that runs on the host PC?
- Is the platform/device configured correctly?
- Is the ControlDesk license still valid?

If online calibration is impossible for at least one platform/device, ControlDesk opens the **Platform/Device State Overview** dialog (unless you disable the display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog). The dialog looks similar to the following:



Online calibration is possible only for the platforms/devices whose platform/device state is ✔ .

3 Select **OK** (available only if online calibration is possible for at least one platform/device) or **Cancel**.

- If you click **OK**, ControlDesk starts online calibration for the platforms/devices for which it has detected no errors. Starting online calibration fails for all other platforms/devices, so that you cannot perform measurements, recordings, or online calibration on them.
- If you click **Cancel**, ControlDesk does not start online calibration. This lets you reconfigure the platforms/devices of your experiment or connect

missing hardware to the host PC or load VPU(s) to VEOS, for example, before you try to start online calibration again.

The names of the running recorders, the increasing recording time (if possible), the increasing measuring time and the time that remains until the measurement buffer overflows are shown in the status bar.

4 Click , or press **F12** to stop all running recordings. You can also stop selected recordings.

Note

You must stop the recording manually. Stop conditions for a triggered recording are ignored.

Result

If ControlDesk detects no errors for at least one platform/device, it switches to the online calibration mode, and starts the recording. If measurement is not yet running, it is started, too.

Next steps

You can export the new measurement data file. Refer to How to Export Recorded Data on page 146.

Related topics

References

Calibration Memory Dialog (ControlDesk Platform Management 🕮)
Platform/Device State Overview Dialog (ControlDesk Platform Management 🕮)
Start Immediate (Recording)..... 325
Stop Recording..... 340

How to Perform a Triggered Recording

Objective

If you want to start and stop a recording depending on a condition, you can define start and stop conditions. To use these conditions, you have to perform a triggered recording.

Note

Do not run self-starting programs, such as a virus scan or backup software, while ControlDesk is running measurements or recordings over a long time.

Basics on triggered recording

For basics on triggered recording and trigger conditions, refer to Configuring Triggered Recording on page 124.

Tip

You can define separate start and stop triggers for each recorder element in the **Measurement Configuration** controlbar.

Preconditions

- The platform/device hardware or VPU must be connected.
- The recording is performed with the settings you made in the **Measurement Configuration** controlbar and the **Properties** controlbar. You should configure the following settings:
  - Select the variables to be recorded. Refer to How to Activate Variables for Recording on page 121.
  - Specify the start and stop conditions for recording. Refer to How to Configure Trigger Conditions for Triggered Recording on page 127.
  - Specify storage settings. Refer to How to Configure the Storage Settings for Recording on page 131.

Method

To perform a triggered recording

1 On the **Home** ribbon, click **Recording** – **Start Triggered** , or press **F9** to start all recorders according to the defined trigger conditions.

Note

If you do not want to start all recorders at once, you can select single recorders via subelements in the **Home** – **Recording** ribbon group. You can also use the recorder toolbars in the **Measurement Configuration** controlbar to control all or selected recorders. For an overview, refer to Measurement Configuration on page 290.

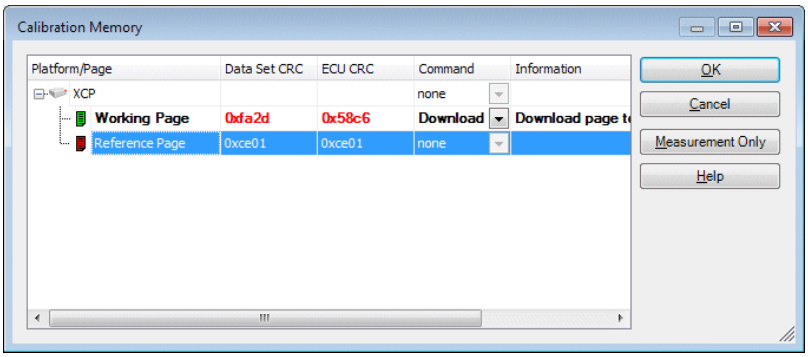
If ControlDesk is offline, it must first switch to the online calibration mode.

Before you can start online calibration, ControlDesk compares the parameter values on the connected hardware or VEOS with the corresponding parameter values in ControlDesk.

As a consequence, ControlDesk opens the **Calibration Memory** dialog if one of the following conditions is true:

- The parameter values on the hardware or VEOS and in ControlDesk differ.
- There is at least one platform in the experiment whose *start online calibration behavior* is set to 'Prompt user'. See General Settings Properties (ControlDesk Platform Management 🕮).

- Parameters outside the defined memory segments are selected for calibration.
- No memory segments are defined in the A2L file.



Tip

To prevent ControlDesk from always opening the **Calibration Memory** dialog, you can specify a default start online calibration behavior for each platform/device individually during platform/device configuration. ControlDesk then equalizes the parameter values on the hardware or VEOS and in ControlDesk according to the specified settings without opening the Calibration Memory dialog. However, if parameter upload/download according to the specified default behavior is not possible (for example, parameter values are to be downloaded, but no initial data is available), the Calibration Memory dialog nevertheless opens.

2 In the dialog, select a download or upload command for the relevant memory pages from the **Command** drop-down list, then click **OK**.

This equalizes the parameter values on the hardware and on the host PC.

Tip

If you only want to measure variables, you can also click **Measurement only**. This has the following effects:

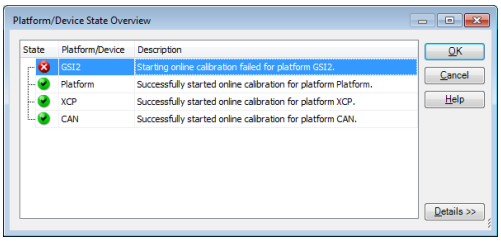
- Calibrating parameters is not possible.
- Measuring variables is possible.

ControlDesk checks if online calibration is possible for each platform/device in the experiment, as follows:

- Is the corresponding platform/device hardware physically connected to the host PC?
- Is the platform/device configured correctly?
- Is the ControlDesk license still valid?

If online calibration is impossible for at least one platform/device, ControlDesk opens the **Platform/Device State Overview** dialog (unless you disable the

display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog). The dialog looks similar to the following:



Online calibration is possible only for the platforms/devices whose platform/device state is ✔ .

3 Select **OK** (available only if online calibration is possible for at least one platform/device) or **Cancel**.

- If you click **OK**, ControlDesk starts online calibration for the platforms/devices for which it has detected no errors. Starting online calibration fails for all other platforms/devices, so that you cannot perform measurements, recordings, or online calibration on them.
- If you click **Cancel**, ControlDesk does not start online calibration. This lets you reconfigure the platforms/devices of your experiment or connect missing hardware to the host PC, for example, before you try to start online calibration again.

Result

If ControlDesk detects no errors for at least one platform/device, it switches to the online calibration mode, and starts measuring. The text 'Waiting for trigger' is shown in the status bar.

When the start conditions are reached, the names of the running recorders, the increasing recording time (if possible), the increasing measuring time and the time that remains until the measurement buffer overflows are shown in the status bar.

When the stop conditions are reached, ControlDesk stops recording.

Note

- To stop waiting for the start conditions, you can force ControlDesk to start the triggered recording. On the **Home** ribbon, click **Recording – Invoke Trigger**, or press **F10** to do this for all waiting recordings. Use the related sub elements to control selected recorders.
- If no stop condition is defined or you do not want to wait for the stop condition, you can stop recording manually. On the **Home** ribbon, click **Recording – Stop Recording**, or press **F12** to do this for all running recordings. Use the related sub elements to control selected recorders.

Related topics

Basics

Basics on Triggered Recording..... 125

HowTos

How to Configure Trigger Conditions for Triggered Recording..... 127
How to Define a Trigger Rule for Triggered Recording..... 129

References

Calibration Memory Dialog (ControlDesk Platform Management 📖)
Platform/Device State Overview Dialog (ControlDesk Platform Management 📖)
Start Triggered (Recording)..... 332

How to Save the Measurement Buffer as a Recording

Objective

You can save the current data of the measurement buffer to a measurement data file using the current storage settings.

Measurement buffer

Each time you start a measurement, the measured data is buffered in the measurement buffer. As the buffer is a ring buffer, earlier values are overwritten by later values when the buffer capacity is exceeded.

You can configure the size of the buffer in ControlDesk. Additionally, you can save its current content if you have performed a measurement.

Before ControlDesk starts a measurement, it estimates the required memory space. The required memory space depends on the specified **measurement buffer size** and on the measurement raster settings of the signals to be measured. The actual length of the saved measurement may therefore differ from the specified **measurement buffer size**.

- For a time-based raster, the length of the saved measurement is very close to the specified **measurement buffer size**.
- For an event-based raster, ControlDesk uses the **minimum sampling period** specified for that raster to estimate the required memory space. If the number of measured values differs from the specified **minimum sampling period**, the length of the saved measurement differs more or less from the specified **measurement buffer size**.
- For the OnChange raster, ControlDesk estimates one value change per second. Additionally, it measures the value every three seconds. If no value change occurs, the length of the saved measurement is three times longer than the specified **measurement buffer size** (plus a safety margin of one measured value).

Restrictions	The amount of data you can save depends on the size of the measurement buffer. Refer to Acquisition Properties on page 241.
Preconditions	You must have started a measurement. Refer to Measuring Data on page 77.
Method	**To save the measurement buffer as a recording** **1** On the Home ribbon, click Recording – Save Buffer, or press `Alt+F3`. The data is saved to a measurement data file using the storage settings defined via the properties of the Acquisition element on the Measurement Configuration controlbar. Refer to Acquisition Properties on page 241.
Result	The current data of the measurement buffer is saved to a measurement data file.
Related topics	References Save Buffer.....316

How to Save Time Plotter Data as a New Measurement

Objective	You can save the data that is currently displayed in a Time Plotter to a measurement data file.
Saving selected variables for a specified time interval	If you want to save a specified number of signals within a specified time interval, you can do this by configuring a Time Plotter in such a way that it displays the data and then saves it to a measurement data file.
Saving downsampled data	When you save Time Plotter data to a new measurement data file, the data can be downsampled, for example, to reduce the amount of recorded data. You can downsample the data by defining an interval of data points or a time interval. For each signal, all the data points measured in this interval are then represented by one saved data point, for example, the maximum value in the interval.
Method	**To save Time Plotter data as a new measurement** **1** In the Measurement Data Pool, open the measurement data file that contains the measurement data you want to save a part of.

Connect the variables you want to save to a Time Plotter on a layout.

Tip

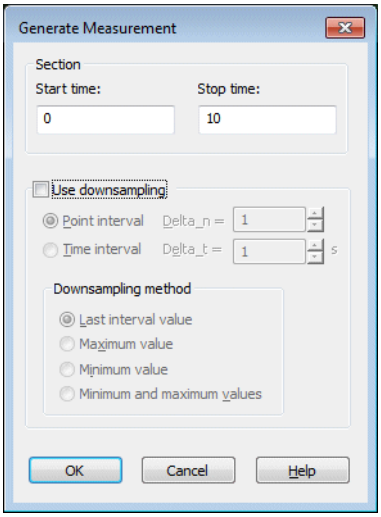
You can also stop a running measurement to save the currently displayed data.

2 Select the measurement section you want to display by moving and zooming the chart.

For more information on moving and zooming, refer to Zooming and Moving the Chart (Time Plotter) (ControlDesk Instrument Handling 🕮).

3 From the context menu of the Time Plotter, select **Save Displayed Data as New Measurement**.

4 ControlDesk opens the **Generate Measurement** dialog. The dialog shows the start and stop times of the data currently displayed in the Plotter.



5 You can change the start and stop times in the dialog.

6 If you want to downsample the saved data, activate **Use downsampling** and configure the downsampling settings.

7 Click **OK** to save the data.

Result

ControlDesk saves the Time Plotter data as a new measurement data file.

The data is saved to a measurement data file using the storage settings defined via the properties of the **Acquisition** element on the **Measurement Configuration** controlbar. Refer to Acquisition Properties on page 241.

Related topics

HowTos

How to Configure the Storage Settings for Recording..... 131

References

Save Displayed Data as New Measurement (ControlDesk Instrument Handling 🕮)

How to Export Recorded Data

Objective

You can export recorded data to various export formats.

Supported export formats

You can export recorded data to the following export file formats:

- ASAM MDF 4.1 file (file name extension: MF4)

  File format for binary files containing measurement data in ASAM MDF format version 4.x. MDF 4.x is ControlDesk's standard file format for measurement data files. ControlDesk includes *reduction data* when measurement data is saved/exported to the ASAM MDF 4.x file format.
- Comma Separated Values file (CSV)
- MATLAB file (MAT)

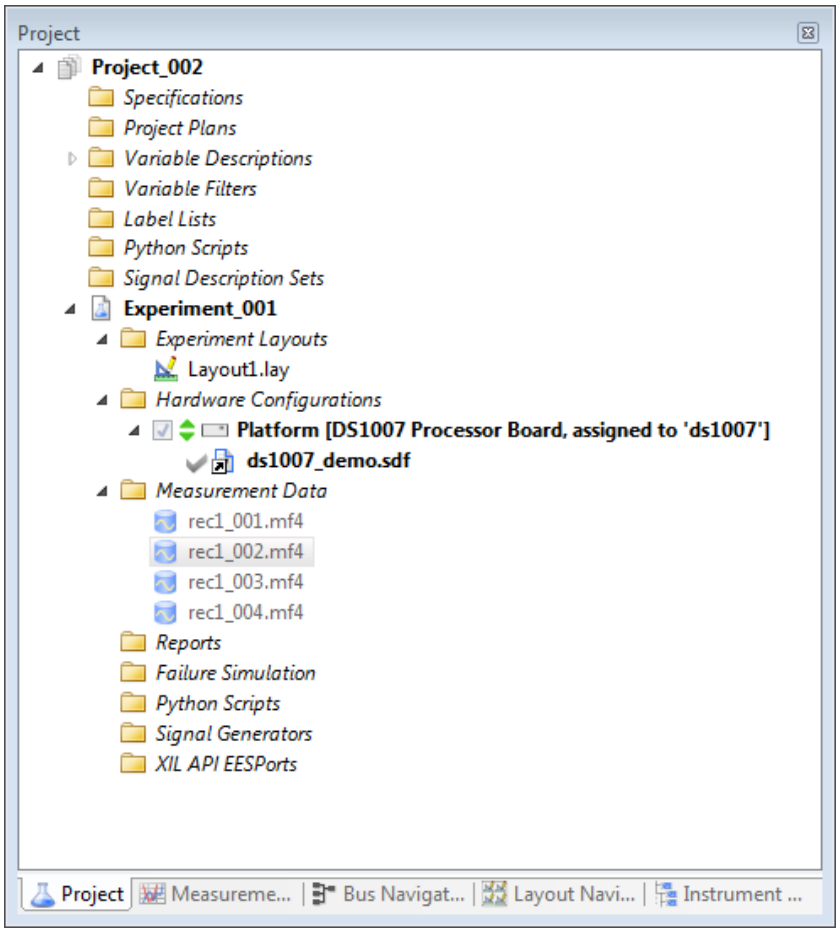
  MATLAB® binary file format.

  For details on the structure of MAT files generated by exporting recorded data, refer to Structure of MAT Files Generated by Exporting Recorded Data on page 209.

Method

To export recorded data

1 In the Project controlbar, select a measurement data file.



2 From the context menu of the file, select Export.
A standard file dialog opens.

3 Select a file format and specify a path and file name.

Result

The selected file is saved in the new file format.

Tip

- You can select more than one file to export by pressing the `Ctrl` key while clicking the files. You can export all measurement data files via the context menu of the `Measurement Data` node. In both cases Export opens the Export Measurement Files dialog. In this dialog you can set the file format and specify what to do if a target file already exists.
- For the ASAM MDF file format, you can specify whether to export variables with or without path and block group information. Refer to Measurement Files Page on page 303.

Related topics

HowTos

How to Use Exported Data in MATLAB 205

References

Export (Measurement Data File) 277
Measurement Files Page 303

Data Logging and Flight Recording

Introduction

Various dSPACE platforms allow you to perform long-term data recording without connection to a host PC. Depending on the platform, this is referred to as *data logging* or *flight recording*.

Supporting platforms

Data logging The following platforms support data logging:

- MicroAutoBox III
- SCALEXIO system based on a DS6001 Processor Board (except for SCALEXIO multiprocessor systems)

Flight recording The following platforms support flight recording:

- DS1007 PPC Processor Board
- DS1202 MicroLabBox
- MicroAutoBox II

Where to go from here

Information in this section

Data Logging 149
ControlDesk lets you configure data logging on dSPACE real-time hardware. After downloading the configuration to the real-time hardware and performing data logging, you can upload and import the resulting MF4 file.

Flight Recording 168
RTI and RTLib let you configure flight recording on dSPACE real-time hardware. In ControlDesk, you can upload the resulting BIN file.

Data Logging

Introduction

ControlDesk lets you configure data logging on dSPACE real-time hardware. After downloading the configuration to the real-time hardware and performing data logging, you can upload and import the resulting MF4 file.

Where to go from here

Information in this section

Basics on Data Logging..... 150
Provides general information on data logging and USB handling for data logging.

Configuring Data Logging..... 153
You configure data logging by selecting and activating variables for it.

Performing Data Logging..... 160
After a data logging configuration is loaded to the real-time hardware it runs independently of ControlDesk. As long as the platform is connected and online calibration is started, you can also start and stop it via ControlDesk.

Basics on Data Logging

Introduction

Provides general information on data logging and USB handling for data logging.

Introduction to Data Logging

Introduction

Data logging is the recording of data on dSPACE real-time hardware that does not require a physical connection between the host PC and the real-time hardware. The values of real-time variables are written to a USB mass storage device that is connected to the dSPACE real-time hardware.

Supporting platforms

The following platforms support data logging:

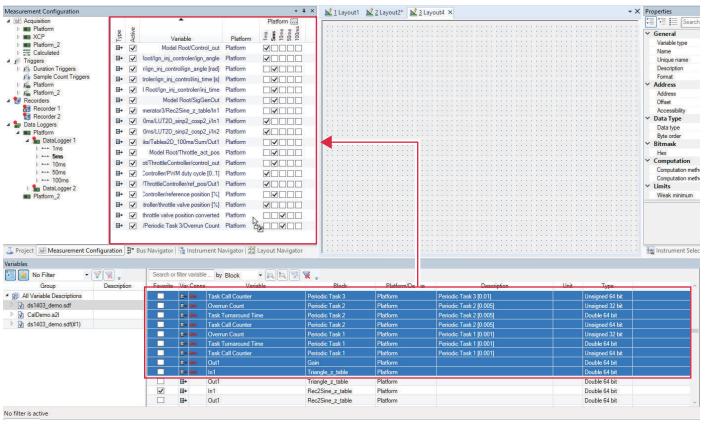
- MicroAutoBox III
- SCALEXIO system based on a DS6001 Processor Board (except for SCALEXIO multiprocessor systems)

Workflow

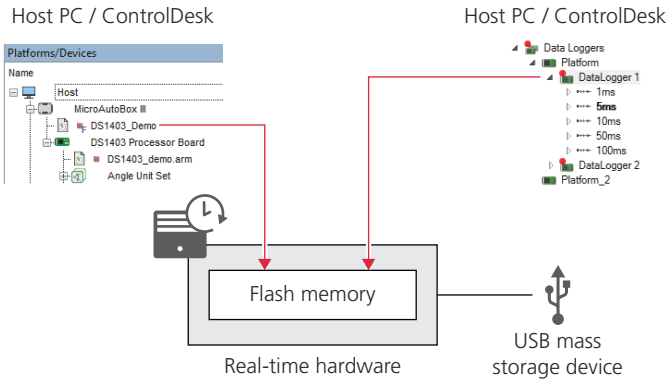
The following workflow shows the steps you have to follow to perform data logging.

1. On the host PC, configure data logging via ControlDesk by adding variables to a data logger and specifying the settings for data logging.

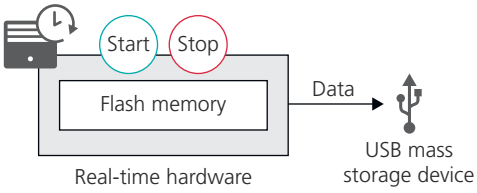
Host PC / ControlDesk



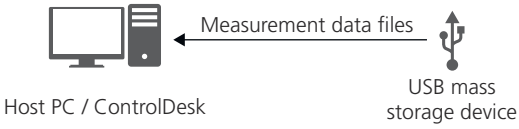
2. Connect the real-time hardware to the host PC and download the real-time application and the data logger configuration to the flash memory of the real-time hardware.



3. Disconnect the real-time hardware and restart it. Each restart now starts a new data logging session and logs data to a new measurement data file on the USB mass storage device.



4. Upload the measurement data files to the host PC and import them to ControlDesk.



USB device

The following table provides information on characteristics related to handling the USB mass storage device for data logging.

Characteristic	Description
Supported file systems	FAT32, ext2, ext3, ext4
Quick removal of USB mass storage device	Not supported. To safely remove the USB mass storage device, you must eject it first via the hardware eject button of the real-time hardware. Refer to How to Stop Data Logging on page 165.
USB status LED	The USB status LED of the MicroAutoBox III displays the current status of the USB device and the data logging: ▪ Off: No USB device is connected or you have pressed the hardware eject button. ▪ Green: USB device is connected and data logging is not running. ▪ Green flashing: USB device is connected and data logging is running. ▪ Orange: USB device is full. ▪ Red: Write error when accessing the USB device, for example, if the device was removed while the data logger was running.
Connecting via USB hub	Not supported

Logged data files

The following table provides information on characteristics related to the logged measurement data files.

Characteristic	Description
Maximum file size	Depends on the file system
File format	ASAM MDF format version 4.1 (MF4)
Support of multicore (MC) applications	One file for each application process
Overwrite strategy	Discard new data: When the USB mass storage device is full, no further data is logged.

File name	The name of the MF4 file contains the application name, a consecutive number, and the start date and time of the data logging. See the following example:
	`ds1403_demo_1_20200226_09_58_21.mf4`
	▪ `ds1403_demo`: Name of the application
	▪ `_1_`: Consecutive number
	▪ `20200226_09_58_21`: date and time
	The file name of a running data logging session begins with a `##CURRENT##` declaration:
	`##CURRENT##ds1403_demo_2_20200226_11_15_29.mf4`

Data logging features

The following table provides information on features related to data logging.

Feature	Description
Number of variables that can be logged	Limited. Refer to Limitations for data logging on page 379
Variable types	Strings are not supported
Signal names	Automatically derived from the names of the signals in the related simulation model..
Startup behavior	When an application is started from flash (known as *cold start* or *flash boot*) along with a data logger configuration, the application starts immediately whereas the data logger requires additional time to initialize. As a result, data from the first few seconds after startup is not recorded by the data logger. You can prevent this by using the prestart feature of the MicroAutoBox III. Refer to Basics on Prestarting the MicroAutoBox III (MicroAutoBox III Hardware Installation and Configuration 🕮).
Triggered data logging	Supported. Refer to Configuring triggered data logging on page 156.

Limitations for data logging

There are some limitations for data logging. For more information, refer to Limitations for data logging on page 379.

Related topics

Basics

Basics on Configuring Data Logging..... 154
Basics on Flight Recording..... 169

HowTos

How to Activate Variables for Data Logging..... 157
How to Load a Data Logging Configuration to the Real-Time Hardware..... 161

References

Data Logger Properties..... 242

Configuring Data Logging

Introduction

You configure data logging by selecting and activating variables for it.

Where to go from here

Information in this section

Basics on Configuring Data Logging..... 154
ControlDesk lists the variables to be logged in the Measurement Configuration controlbar.

How to Activate Variables for Data Logging..... 157
In the signal list of a data logger, you specify the variables to be logged.

Basics on Configuring Data Logging

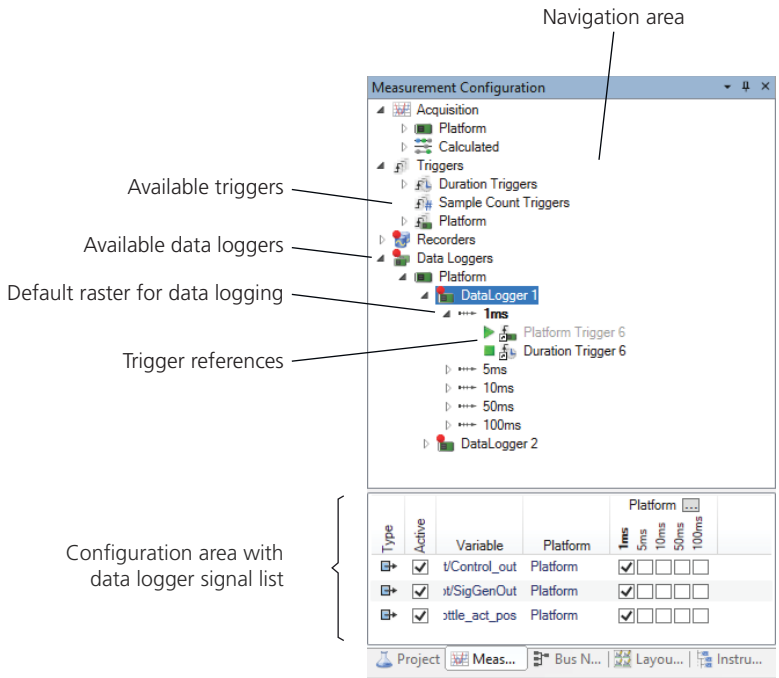
Introduction

ControlDesk lists the variables to be logged in the Measurement Configuration controlbar.

Measurement Configuration controlbar

The Measurement Configuration controlbar lets you configure measurement, recording, and data logging. You can define and manage start and stop triggers for measurements and data loggings.

The illustration below shows the Measurement Configuration controlbar, displaying the signal list of a selected data logger.

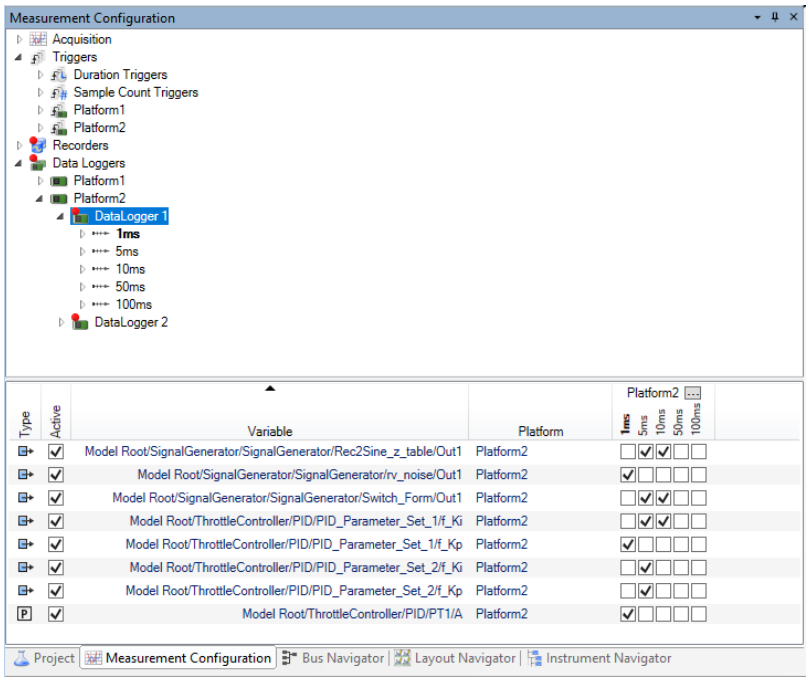


For more information on the **Measurement Configuration** controlbar, refer to Measurement Configuration on page 290.

Data logger signal list

A *data logger signal list* collects variables selected for data logging on a platform of the current experiment. You can create several data loggers for a platform, each with its own signal list.

A data logger signal list is shown in the configuration area of the **Measurement Configuration** controlbar, if you select a **Data Logger** element in the navigation area of the **Measurement Configuration** controlbar.



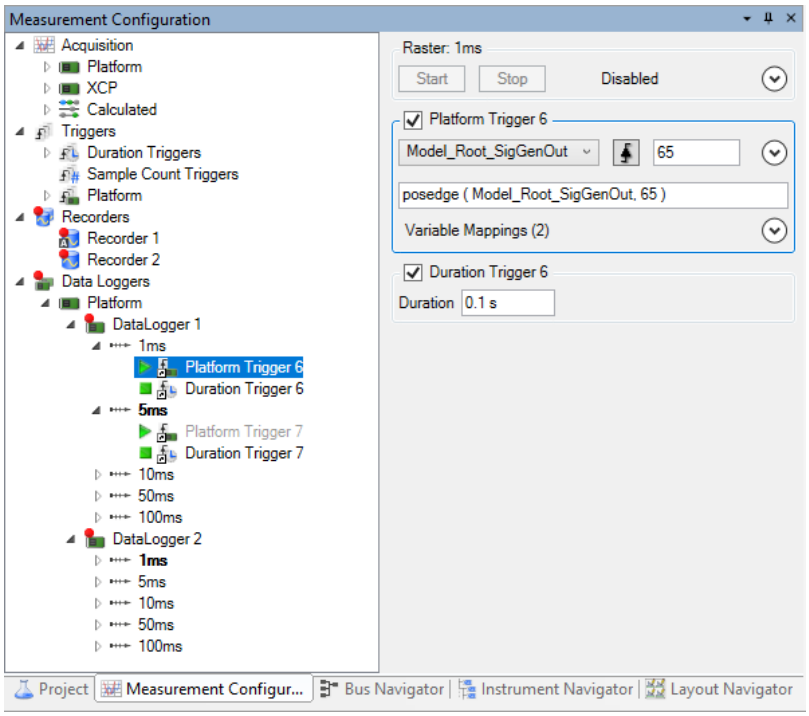
If a **Data logger** element is selected, its signal list is displayed.

Note

In contrast to a recorder signal list, a data logger signal list is completely independent of the measurement signal list.

Configuring triggered data logging

You can configure trigger conditions to start and stop the logging of data during an active data logging run.



Configuring triggered data logging is almost the same as configuring triggered measurement. The main difference is that no data is uploaded to the host PC. All logged data is stored on the USB mass storage device that is connected to the real-time hardware.

For more information on configuring triggered measurement, refer to Configuring Triggered Measurement on dSPACE Platforms on page 86.

Related topics

Basics

Introduction to Data Logging 150

HowTos

How to Activate Variables for Data Logging 157
How to Load a Data Logging Configuration to the Real-Time Hardware 161

References

Add Data Logger 260
Data Logger Properties 242
Remove (Data Logger) 311

How to Activate Variables for Data Logging

Objective

In the signal list of a data logger, you specify the variables to be logged.

Defining variables to be logged

A *data logger signal list* contains the variables that are included in a data logging. It is shown in the **Measurement Configuration** controlbar if a **Data Logger** element is selected in the navigation area. Each **Data Logger** element has its own *data logger signal list*.

A data logger signal list has checkboxes for activating the data loggings of variables. Variables whose **Active** checkbox is selected are included in data loggings.

> **Note**
>
> A data logger signal list is completely independent from the measurement signal list, the recording signal list, and from visualized signals on a layout.

For more information on the data logger signal list, refer to Basics on Configuring Data Logging on page 154.

Measurement rasters

You can select one or more measurement rasters for each variable. The number of available rasters depends on various conditions. For more information on measurement rasters, refer to Basics on Measurement Rasters on page 212.

> **Tip**
>
> To select multiple measurement rasters, click the checkbox while holding the `Ctrl` key down.

Filtered rasters If a **Browse** button is displayed to the right of the raster checkboxes, the raster list is filtered: i.e., one or more rasters are currently hidden.

Via the **Browse** button you can open the **Select Used Rasters** dialog that displays all available measurement rasters. For more information, refer to Handling a Large Number of Measurement Rasters on page 218.

Restrictions

The following platforms support data logging:

- MicroAutoBox III
- SCALEXIO system based on a DS6001 Processor Board (except for SCALEXIO multiprocessor systems)

Preconditions

- A platform that supports data logging must be added to the experiment.

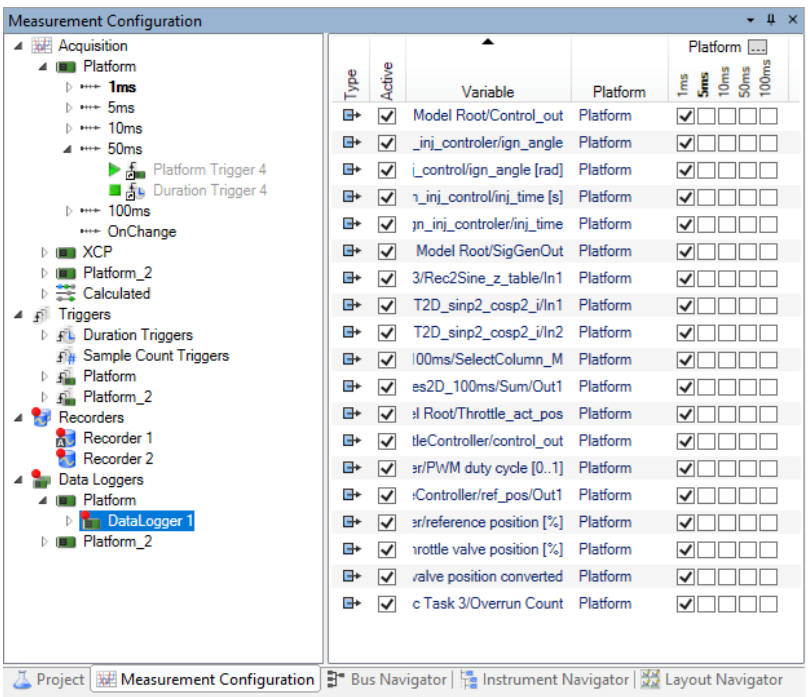
Method

To activate variables for data logging

1. In the Measurement Configuration controlbar, right-click a platform below the Data Loggers node and select Add Data Logger.
2. Select the new Data Logger item.
3. Add variables to the data logger signal list by dragging them from the Variables controlbar, from another signal list, or from an instrument.

Note

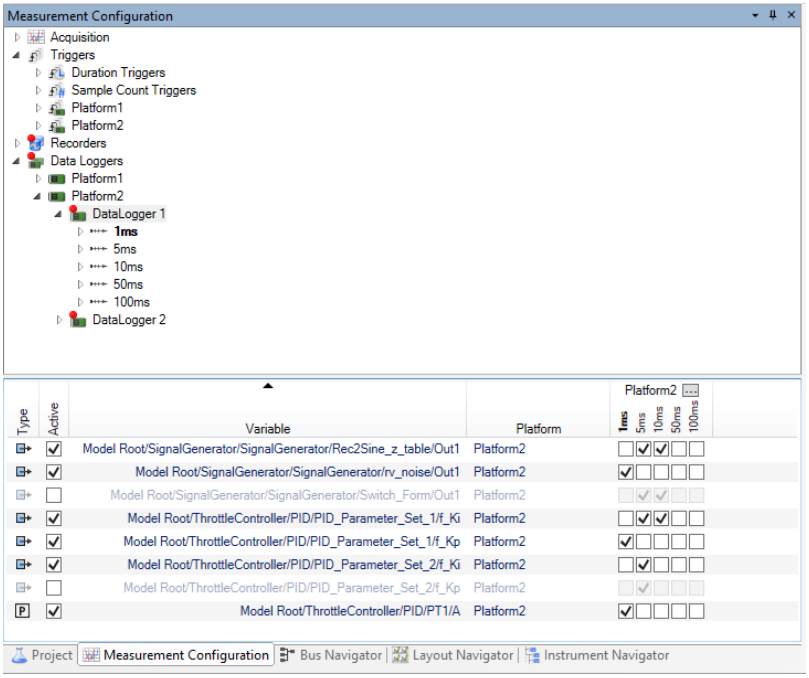
You can add variables only from the platform, to which the data logger belongs to. If you have problems adding a variable, check whether the variable and the data logger are associated to the same platform.



4. If you want to change an existing data logging configuration, select a Data Logger item.

   The signal list of the selected data logger opens, displaying all the variables of the platform in the current project selected for this data logger so far.

5 In the Active column, clear the checkboxes of all the measurement variables to be excluded from data logging when the data logger configuration is loaded to the flash memory of the real-time hardware. If multiple rasters are activated, you can also activate/deactivate each raster separately.



Tip

For multiple selection, press **`Ctrl`** or **`Shift`** when clicking a variable. Press **`Ctrl`** to select a number of single variables with the mouse or **`Shift`** to select a block of variables. Then select a checkbox or a measurement raster.

6 To exclude a signal permanently from data loggings, you can remove it from the data logger signal list. Select the signal in the data logger signal list and press **`Delete`**, or right-click the variable and select Remove from its context menu.

Result

The activated variables are included in data loggings when the data logger configuration is loaded to the flash memory of the real-time hardware.

Next steps

After you have configured a data logger, you can load the configuration to the flash memory of the real-time hardware. Refer to How to Load a Data Logging Configuration to the Real-Time Hardware on page 161.

Related topics

Basics

Basics on Configuring Data Logging..... 154
Introduction to Data Logging..... 150

HowTos

How to Load a Data Logging Configuration to the Real-Time Hardware..... 161

References

Add Data Logger..... 260
Data Logger Properties..... 242
Remove (Data Logger)..... 311

Performing Data Logging

Introduction

After a data logging configuration is loaded to the real-time hardware it runs independently of ControlDesk. As long as the platform is connected and online calibration is started, you can also start and stop it via ControlDesk.

Where to go from here

Information in this section

How to Load a Data Logging Configuration to the Real-Time Hardware..... 161
To perform data logging you must load the real-time application and a data logger configuration to the flash memory of the real-time hardware.

How to Start Data Logging..... 163
You can start data logging via ControlDesk, or independently of it.

How to Stop Data Logging..... 165
Data Logging can be stopped independently of ControlDesk or via the Measurement Configuration.

How to Upload Logged Data..... 167
ControlDesk can access USB mass storage devices that are connected to dSPACE real-time hardware and used for data logging.

How to Load a Data Logging Configuration to the Real-Time Hardware

Objective

To perform data logging you must load the real-time application and a data logger configuration to the flash memory of the real-time hardware.

Preconditions

- A platform that supports data logging must be connected in the active experiment. For information on supporting platforms, refer to Introduction to Data Logging on page 150
- A USB mass storage device must be connected to the real-time hardware. For information on USB handling for data logging, refer to Introduction to Data Logging on page 150.
- You must have configured a data logger by activating variables for it. Refer to How to Activate Variables for Data Logging on page 157.

Method

To load a data logger to the real-time hardware

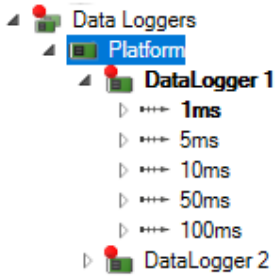
1. In the Platforms/Devices controlbar, make sure that the desired real-time application is loaded to the flash memory of the real-time hardware, indicated by the icon next to the application icon.

   Otherwise open the platform's context menu and select Real-Time Application - Load to Flash
2. On the Home ribbon, click Status Control – Go Online to start online calibration, or press `Ctrl+F7`.
3. In the Measurement Configuration, right-click the data logger with the data logging configuration that you want to load to the real-time hardware.
4. From the context menu, select Load to flash.

Result

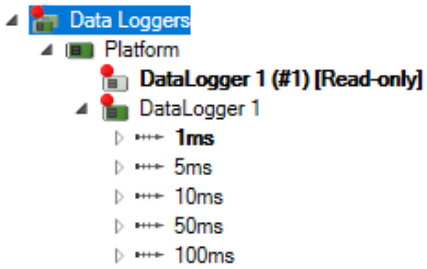
The data logging configuration is loaded to the flash memory of the real-time hardware.

The loaded data logger is displayed in bold letters.



Data logging is automatically started when the real-time hardware is restarted. The logged data is stored in the MF4 file.

Unknown data logging configurations When you start online calibration and ControlDesk detects a data logging configuration on the real-time hardware that was not configured via the active experiment, a data logger for this configuration is displayed with a gray symbol and a [Read-only] declaration. A consecutive number is added if the name of this data logger matches one in the active experiment.



- The read-only data logger is displayed in bold because its configuration is loaded on the real-time hardware.
- You cannot configure a read-only data logger, but you can use it to start and stop data logging.
- If you load a data logging configuration from the experiment to the real-time hardware, the read-only data logger is overwritten. A running data logging is stopped and its data stored to an MF4 file on the USB mass storage device.

Next steps

You can now start data logging. Refer to How to Start Data Logging on page 163.

Related topics

Basics

Basics on Configuring Data Logging 154
Introduction to Data Logging 150

HowTos

How to Activate Variables for Data Logging 157
How to Load an Application to the Flash Memory of dSPACE Real-Time Hardware (ControlDesk Platform Management 🕮)
How to Start Data Logging 163
How to Stop Data Logging 165
How to Upload Logged Data 167

References

Load to Flash (Data Logger) 285

How to Start Data Logging

Objective

You can start data logging via ControlDesk, or independently of it.

Restrictions

When an application is started from flash (known as *cold start* or *flash boot*) along with a data logger configuration, the application starts immediately whereas the data logger requires additional time to initialize. As a result, data from the first few seconds after startup is not recorded by the data logger. You can prevent this by using the prestart feature of the MicroAutoBox III. Refer to Basics on Prestarting the MicroAutoBox III (MicroAutoBox III Hardware Installation and Configuration 🕮).

Preconditions

Starting data logging via ControlDesk If you want to start data logging via ControlDesk, you must consider the following preconditions:

- A platform that supports data logging must be connected in the active experiment. For information on supporting platforms, refer to Introduction to Data Logging on page 150
- USB mass storage device must be connected to the real-time hardware. For information on USB handling for data logging, refer to Introduction to Data Logging on page 150.
- You must have configured a data logger by activating variables for it. Refer to How to Activate Variables for Data Logging on page 157.
- You must have loaded the application and the data logging configuration to the flash memory of the real-time hardware. Refer to How to Load a Data Logging Configuration to the Real-Time Hardware on page 161

Starting data logging independently of ControlDesk If you want to start data logging independently of ControlDesk, you must consider the following preconditions:

- A USB mass storage device must be connected to the real-time hardware. For information on USB handling for data logging, refer to Introduction to Data Logging on page 150.
- You must have loaded the application and the data logger to the flash memory of the real-time hardware. Refer to How to Load a Data Logging Configuration to the Real-Time Hardware on page 161

Possible methods

- If you want to start data logging on the platform via ControlDesk, refer to Method 1 on page 164.
- If you want to start the data logging on the platform independently of ControlDesk, refer to Method 2 on page 164.

Method 1

To start data logging via ControlDesk

1 On the Home ribbon, click Status Control – Go Online to start online calibration, or press `Ctrl+F7`.

2 In the Measurement Configuration, right-click the data logger with the configuration that is loaded on the real-time hardware, i.e., the data logger in bold letters, and select Start.

Method 2

To start data logging independently of ControlDesk

1 Restart the real-time hardware with activated autostart of the flash application. Refer to REBOOT Page (MicroAutoBox III Hardware Installation and Configuration 🕮) and FLASH Page (MicroAutoBox III Hardware Installation and Configuration 🕮).

2 In the case you have stopped a data logging by ejecting and removing the USB mass storage device, reconnect the USB device. For information on a safe removal of the USB device, refer to How to Stop Data Logging on page 165.

Result

- A running data logging is stopped and its data stored to an MF4 file on the USB mass storage device.
- The new data logging session is started. The logged data is written to an MF4 file on the USB mass storage device that is connected to the real-time hardware.
- For detailed information on the name of the MF4 file, refer to Introduction to Data Logging on page 150.

Next steps

You can stop a running data logging via ControlDesk or independently of ControlDesk. Refer to How to Stop Data Logging on page 165.

Related topics

Basics

Basics on Configuring Data Logging..... 154
Introduction to Data Logging..... 150

HowTos

How to Activate Variables for Data Logging..... 157
How to Connect and Remove USB Devices (MicroAutoBox III Hardware Installation and Configuration 🕮)
How to Load a Data Logging Configuration to the Real-Time Hardware..... 161

How to Load an Application to the Flash Memory of dSPACE Real-Time Hardware (ControlDesk Platform Management 🕮)
How to Stop Data Logging..... 165

References

Load to Flash (Data Logger)..... 285

How to Stop Data Logging

Objective

Data Logging can be stopped independently of ControlDesk or via the Measurement Configuration.

Preconditions

A data logger is running on the real-time hardware. Refer to How to Start Data Logging on page 163.

Possible methods

- If you want to stop a running data logging via ControlDesk, refer to Method 1 on page 165.
- If you want to stop a running data logging independently of ControlDesk, refer to Method 2 on page 166.

Method 1

To stop data logging via ControlDesk

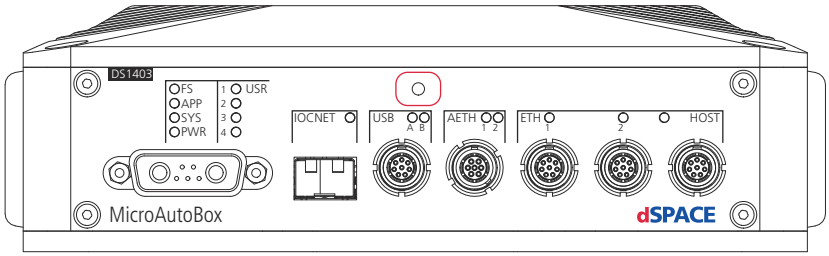
1. On the Home ribbon, click Status Control – Go Online to start online calibration, or press `Ctrl+F7`.
2. In the Measurement Configuration, right-click the data logger that is loaded on the real-time hardware, i.e., the data logger in bold letters, and select Stop.

Method 2

To stop data logging independently of ControlDesk

1 Prepare a safe remove of the USB mass storage device.

For example, for a MicroAutoBox III, press the USB eject button and wait until the USB LEDs are off.



2 Remove the USB device from the real-time hardware.

Result

- The running data logging is stopped and its data stored to an MF4 file on the USB mass storage device.
- For detailed information on the name of the MF4 file, refer to Introduction to Data Logging on page 150.

Next steps

- To start the next data logging session, refer to How to Start Data Logging on page 163.
- To import logged data from the USB mass storage device, refer to .How to Upload Logged Data on page 167

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Connect and Remove USB Devices (MicroAutoBox III Hardware Installation and Configuration 🕮)
How to Start Data Logging..... 163
How to Upload Logged Data..... 167

References

Stop (Data Logger)..... 338

How to Upload Logged Data

Objective

ControlDesk can access USB mass storage devices which are connected to dSPACE real-time hardware and used for data logging.

Preconditions

- The dSPACE real-time hardware must be connected to the host PC.
- A USB mass storage device must be connected to the dSPACE real-time hardware.
- Data logging must be stopped.
- The real-time application must be stopped.
- In ControlDesk, online calibration must be stopped.
- To upload MF4 files, the host PC must have enough disk space to store the files.

Method

To upload logged data via ControlDesk

1. In the Project controlbar, select Explore Logged Data from the context menu of the platform.

   The Logged Data on Mass Storage Device dialog opens, displaying the connected dSPACE real-time hardware and listing the MF4 files which were written to the USB mass storage device.

2. Select the MF4 files that you want to upload.

   Tip

   You can use the `Ctrl` and `Shift` keys for multiselection.

3. To upload the selected MF4 files, select Upload from the context menu of the selected files.

   A standard Windows dialog opens for you to specify the target folder, and click OK.

   ControlDesk loads the selected MF4 files to the specified folder.

   Note

   The upload can take a long time, especially if multiple files are selected for uploading.

Result

The files are uploaded to the host PC.

Alternative ways to upload logged data There are alternative ways to upload logged data to the host PC.

- You can connect the USB mass storage device to a USB interface of the host PC, and copy the MF4 files to the host PC.

- While the dSPACE real-time hardware is connected to the host PC, you can use an FTP client (or the File Explorer as FTP client) to access the USB mass storage device, and copy the MF4 files to the host PC.

  Use `ftp://<IP_address>`, where `IP address` stands for the IP address of the dSPACE real-time hardware.

  Note

  The following preconditions apply to this alternative:
  - Data logging must be stopped.
  - The real-time application must be stopped.
  - In ControlDesk, online calibration must be stopped.

Next steps

1. Add reduction data to the MF4 file before you import it to ControlDesk. You can add reduction data to an MF4 file by using the `DSSIGCONV` tool. Refer to How to Add Reduction Data to a Measurement Data File on page 202.
2. Import the uploaded MF4 file to an experiment to work with the logged data in ControlDesk. Refer to How to Import a Measurement Data File on page 200.

Related topics

Basics

Introduction to Data Logging 150

HowTos

How to Start and Stop Online Calibration (ControlDesk Calibration and Data Set Management)
How to Start Data Logging 163
How to Stop Data Logging 165

References

Explore Logged Data (ControlDesk Platform Management)

Flight Recording

Introduction

RTI and RTLib let you configure flight recording on dSPACE real-time hardware. In ControlDesk, you can upload the resulting BIN file.

Where to go from here

Information in this section

Basics on Flight Recording..... 169
Various dSPACE platforms support flight recording to perform long-term data recording without connecting to a host PC. Flight recording is configured via RTI or RTLib.

How to Upload Flight Recorder Data from a USB Mass Storage Device..... 170
ControlDesk can access USB mass storage devices which are connected to dSPACE real-time hardware and used for flight recording.

How to Upload Flight Recorder Data Written to the Internal Flash Memory..... 172
You can upload flight recorder data from the flash memory of a platform to use it as a measurement data file in ControlDesk.

Merging, Extracting and Converting BIN Files of a Flight Recorder..... 175
To merge, extract, and convert BIN files, you can use the `FlightRecMerge` utility.

Basics on Flight Recording

Introduction

Various dSPACE platforms support flight recording to perform long-term data recording without connecting to a host PC. Flight recording is configured via RTI or RTLib.

Supporting platforms

The following platforms support flight recording:

- DS1007 PPC Processor Board
- DS1202 MicroLabBox
- MicroAutoBox II

Recorded data

Depending on the platform, the recorded data can be stored in a BIN file on a USB mass storage device or in the internal flash memory of the real-time hardware.

The following table gives an overview:

Platform	Flight Recording (USB)	Flight Recording (Internal Flash Memory)	File Format
DS1007 PPC Processor Board	✓ [1)]	–	BIN

Platform	Flight Recording (USB)	Flight Recording (Internal Flash Memory)	File Format
DS1202 MicroLabBox	✓ [1]	–	BIN
MicroAutoBox II	✓ [1]	✓ [2]	BIN

[1] For details on using a USB mass storage device for flight recording data, refer to Basics on USB Flight Recorder (RTI USB Flight Recorder Blockset Reference 🕮).

[2] For details on using internal flash memory for flight recording data, refer to Flight Recorder (Flash Memory) (MicroAutoBox II Features 🕮).

Uploading flight recorder data

Flight recorder data is stored in a BIN file. You can upload BIN files and save them as measurement data files in ControlDesk.

- For details on uploading data from a USB mass storage device, refer to How to Upload Flight Recorder Data from a USB Mass Storage Device on page 170.
- For details on uploading data from the internal flash memory, refer to How to Upload Flight Recorder Data Written to the Internal Flash Memory on page 172.

Merging, extracting, and converting BIN files of a flight recorder

You can use the `FlightRecMerge` utility to merge, extract, and convert BIN files to a MAT file.

- For details, refer to Merging, Extracting and Converting BIN Files of a Flight Recorder on page 175.

Related topics

Basics

Introduction to Data Logging..... 150
Merging, Extracting and Converting BIN Files of a Flight Recorder..... 175

HowTos

How to Upload Flight Recorder Data from a USB Mass Storage Device..... 170
How to Upload Flight Recorder Data Written to the Internal Flash Memory..... 172

How to Upload Flight Recorder Data from a USB Mass Storage Device

Objective

ControlDesk can access USB mass storage devices which are connected to dSPACE real-time hardware and used for flight recording.

The following instructions apply to the following platforms only:

- DS1007 PPC Processor Board
- DS1202 MicroLabBox
- MicroAutoBox II

Note

Do not disconnect the USB data mass storage device while flight recorder data is being uploaded to the host PC or the real-time application is running.

Flight recording

You can connect USB mass storage devices to dSPACE real-time hardware to record data during simulation. For details of implementing a flight recorder, refer to Basics on USB Flight Recorder (RTI USB Flight Recorder Blockset Reference 🕮).

Handling flight recorder data

Flight recorder data is saved to the USB mass storage device in BIN format.

BIN files can be uploaded by ControlDesk or via the file system of the host PC:

- ControlDesk can access the USB mass storage device and display its contents while it is connected to dSPACE real-time hardware. You can select BIN files, upload them, and delete obsolete BIN files from the USB mass storage device.
- You can also connect the USB mass storage device to a USB interface of the host PC, and then copy or delete the BIN files via the file system.

In a next step, you can import the uploaded BIN files and save them as measurement data files.

Preconditions

- The dSPACE real-time hardware must be connected to the host PC.
- A USB mass storage device must be connected to the dSPACE real-time hardware.
- The real-time application must be stopped.
- The host interface firmware of MicroAutoBox II must be at least revision 1.4.
- To upload BIN files, the host PC must have enough disk space to store the files.

Method

To upload flight recorder data from a USB mass storage device

1. From the context menu of the platform, select **Explore Logged Data**.

   The **Logged Data on Mass Storage Device** dialog opens, displaying the connected dSPACE real-time hardware and listing the BIN files which were written to the USB mass storage device.

2. Select the BIN files which you want to upload.

   Tip

   You can use the **`Ctrl`** and **`Shift`** keys for multiselection.

3 To upload the selected BIN files, select **Upload** from the context menu of the selected BIN file(s).

A standard Windows dialog opens for you to specify the target folder, and click **OK**.

ControlDesk loads the selected BIN files to the specified folder.

Note

The upload can take a lot of time, especially if several files are selected for uploading.

Result

The files are uploaded to the host PC.

Next steps

To work with the uploaded data in ControlDesk, you have to import the uploaded BIN files and save them as measurement data files. Refer to Import (Measurement Data File) on page 282.

Tip

To convert BIN files to a MAT file, you can also use the `FlightRecMerge` utility. Refer to Merging, Extracting and Converting BIN Files of a Flight Recorder on page 175.

Related topics

References

Explore Logged Data (ControlDesk Platform Management 🕮)

How to Upload Flight Recorder Data Written to the Internal Flash Memory

Objective

You can upload flight recorder data from the flash memory of dSPACE real-time hardware to use it as a measurement data file in ControlDesk.

The following instructions apply to the following platforms only:

- MicroAutoBox II platform

Flash memory and flight recording

Flash memory on dSPACE real-time hardware allows you to use the hardware without a connection to the ControlDesk PC. You can use the different sections of the flash memory for the following tasks:

- Storing a real-time application in the flash application section
- Storing user-defined data in the nonvolatile data section
- Storing offline recorded data in the flight recorder section

You can specify the size of the flash memory sections that are used for the application, the nonvolatile data, and the flight recorder, via RTI blocks or RTLib functions.

You can use ControlDesk to upload recorded data from the flight recorder flash memory section.

You can also clear the flash memory (completely or partly), refer to Clear Flash (ControlDesk Platform Management 🕮).

Preconditions

If an application is running on the platform, it must be stopped.

For details on using flash memory for flight recording, refer to Flight Recorder (Flash Memory) (MicroAutoBox II Features 🕮).

Possible methods

There are several ways to upload flight recorder data:

- Via ControlDesk. Refer to Method 1 on page 173.
- Via a command line tool. Refer to Method 2 on page 174.
- Via the Measurement Data API. Refer to Method 3 on page 174.

Method 1

To upload flight recorder data written to the internal flash memory via ControlDesk

1. Open an experiment containing the platform whose flight recorder data you want to upload.
2. In the **Project** controlbar, select the platform.
3. From the context menu of the platform, select **Upload Flash Flight Recorder Contents**.

   The data is saved to a measurement data file using the storage settings defined via the properties of the **Acquisition** element on the **Measurement Configuration** controlbar. Refer to Acquisition Properties - Save Flight Recorder (refer to Acquisition Properties on page 241).

Tip

You can also use ControlDesk's automation interface to upload internal flash memory. See the following example:

```
Application.ActiveExperiment.Platforms[0].\
            UploadFlightRecorderData()
```

Method 2

To upload flight recorder data written to the internal flash memory via the DSFRUpload command line tool

1 Open a Command Prompt window and change to the `\Main\Bin` folder of your ControlDesk installation.

2 Enter `dsfrupload [parameters]`.

Syntax for the DSFRUpload command line tool

Use the following syntax for the `DSFRUpload` command line tool:

```
dsfrupload [source destination | /cfl:board | /cnv:board | /l |
 /? | /h] [n:client]
```

You can use the following parameters:

Parameter	Description
`source`[1]	The name of a registered board for flight recorder upload or a BIN file to be converted to a measurement file
`destination`	Destination file. The file type must be supported by ControlDesk. For information on the supported export file types, refer to How to Export Recorded Data on page 146. A destination BIN file can be used for a flight recorder upload
`/cfl:board`[1]	Clears the flight recorder flash memory on the specified board Example: `/cfl:ds1401`
`/cnv:board`[1]	Clears the nonvolatile data flash memory on the specified board Example: `/cnv:ds1401`
`/l`[1]	Lists the currently registered boards that support flight recording
`/? or /h`	Displays a help screen that lists all parameters with a short description
`/n:client`	Connects a network client specified via its IP address Example: `/n:192.168.140.1`

[1] For a network connection, you also have to specify the `/n:client` parameter.

Examples

- The following example shows how to read the flight recorder data from a binary file and save it to an MF4 file:

  ```
  dsfrupload srcrec.bin dest.mf4
  ```

- Network connection: The following example shows how to display the name of a registered MicroAutoBox II. The name (ds1401) is then used as the `source` parameter to read the flight recorder data. The uploaded data is saved to an MF4 file.

  ```
  dsfrupload /l /n:192.168.140.1
  dsfrupload ds1401 c:\temp\dest.mf4 /n:192.168.140.1
  ```

Method 3

To upload flight recorder data via the Load function of the Measurement Data API

1 Pass a string with the name of the registered board (instead of a file name) to the `Load` method of the `Measurements` collection.

2 Use the measurement's `Export` function to convert the uploaded data to a supported file type.

Example

The following example shows how to upload flight recorder data from a MicroAutoBox II (network connection) and save its contents to a measurement data file in the MATLAB file format:

```
import measurementdataapilib
Measurements = measurementdataapilib.Measurements()
Measurement = Measurements.Load("ds1401@192.168.140.1")
Measurement.Export("flupload.mat")
```

Result

You have uploaded flight recorder data and saved it to a measurement data file.

Related topics

References

Export (Measurement) (ControlDesk Measurement Data API 🕮)
Load (Measurements) (ControlDesk Measurement Data API 🕮)
Upload Flash Flight Recorder Contents (ControlDesk Platform Management 🕮)

Merging, Extracting and Converting BIN Files of a Flight Recorder

Introduction

`FlightRecMerge` helps you to handle several BIN files. It merges several BIN files in one MAT file. It can write all the variables to the MAT file, or only specified variables. It can discard values with time stamps older and newer than specified time stamps.

`FlightRecMerge` is a DOS utility and can be used only in a Command Prompt window (Command Prompt window).

Installation

The `FlightRecMerge` utility is not installed by default. The utility is in the `\Solutions\FlightRecDataMerger` folder on the dSPACE DVD. You can copy it to a suitable folder on the host PC.

Syntax

`FlightRecMerge bin_file(s) [options]`

bin_file(s) Lets you specify the BIN files which you want to merge and convert to one MAT file. You can use the wildcards (?,*) to specify several files.

options Lets you specify the options in the following table.

Option	Description
`/i`	Provides information about the contents of the specified BIN files only. It displays the variables and the first and last time stamp. No MAT file is generated.
`/?`	Provides information on the utility.
`/o` **`OutputFileName`**	Specifies the name of the MAT file to be generated.
`/v` **`VariableName`**	Specifies a variable to be written to the MAT file. If /v is not specified, all the variables are written. /v can be used several times.
`/s` **`StartTime`**	Specifies a start time. Values with a time stamp older than the specified time are discarded. The format is: `YYYY-MM-DD_HH:MM:SS.SSSS`
`/e` **`EndTime`**	Specifies an end time. Values with a time stamp newer than the specified time are discarded. The format is: `YYYY-MM-DD_HH:MM:SS.SSSS`

Example

The following example shows how to use the utility:

```
FlightRecMerge TestData1.bin TestData2.bin /s 2018-12-22_15:30
/e 2018-12-22_16:00 /v TestVar1 /v Testvar2 /v Testvar3
/o MyMatfile.mat
```

The example creates the `MyMatfile.mat` file from the `TestData1.bin` and `TestData2.bin` files. The MAT file contains the TestVar1, TestVar2, and TestVar3 variables, whose time stamps are between 15:30 and 16:00 on December 22, 2018.

Working with Bookmarks, and Handling Acoustic Signals for Measurements and Recordings

Introduction

During a measurement and recording you can set bookmarks. You can also specify acoustic signals announcing measurement and recording actions.

Where to go from here

Information in this section

Working with Bookmarks..... 177
During a measurement or recording you can set bookmarks to mark certain measurement points. After the measurement or recording, you can search for bookmarks, and edit them.

Handling Acoustic Signals for Measurements and Recordings..... 183
You can specify a number of acoustic signals announcing measurement and recording actions.

Working with Bookmarks

Introduction

During a measurement or recording you can set bookmarks to mark certain measurement points. After the measurement or recording, you can search for bookmarks, and edit them.

Where to go from here

Information in this section

Basics on Bookmarks..... 178
During a measurement or recording you can set bookmarks manually or let ControlDesk set them automatically to mark certain measurement points.

How to Set Bookmarks Manually..... 179
You can set bookmarks during a measurement or a recording to mark certain measurement points you want to analyze later.

How to Find a Bookmark..... 181
You can search for bookmarks in a measurement or recording.

How to Edit a Bookmark..... 182
You can edit and synchronize bookmarks.

Basics on Bookmarks

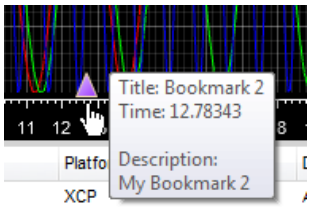
Introduction

During a measurement or recording you can set bookmarks manually or let ControlDesk set them automatically to mark certain measurement points.

Manual bookmarks

You can set bookmarks manually during a measurement or a recording to mark certain measurement points you want to analyze later. The time position of a manual bookmark is marked by a red triangle in all Time Plotters.

The illustration below shows a manual bookmark and its description as a tooltip.

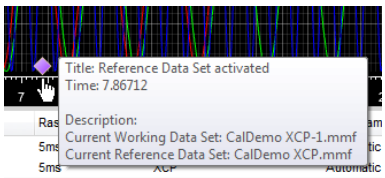


Refer to How to Set Bookmarks Manually on page 179.

Automatic bookmarks

You can let ControlDesk set bookmarks automatically on various events, such as a memory page activation. Calculated variables generate bookmarks when a calculation error occurs. To avoid performance problems, a latency time of 5 seconds is defined in which no bookmarks are generated. The time position of an automatic bookmark is marked by a red rhombus in all Time Plotters.

The illustration below shows an automatic bookmark and its description as a tooltip.



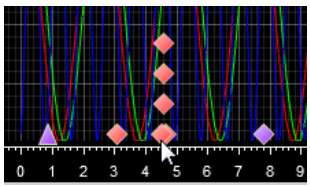
Refer to Edit Bookmark Settings on page 275.

Bookmark colors

In measurement data files, bookmarks that belong to the same recording have the same color.

Grouped bookmarks

If bookmarks would overlap other bookmarks in the Time Plotter display, they are represented by a grouped bookmark symbol. Move the pointer onto a grouped bookmark symbol to access the single bookmark symbols it contains.



Bookmarks as trigger conditions

You can use manual and automatic bookmarks as predefined trigger conditions in a triggered recording. Refer to How to Define a Trigger Rule for Triggered Recording on page 129.

Related topics

HowTos

How to Edit a Bookmark..... 182
How to Find a Bookmark..... 181
How to Set Bookmarks Manually..... 179

References

Edit Bookmark Settings..... 275

How to Set Bookmarks Manually

Objective

You can set bookmarks during a measurement or a recording to mark certain measurement points you want to analyze later.

Preconditions

A measurement and/or recording must be started.

Method

To set a bookmark manually

1. On the Home ribbon, click Bookmark – Set Bookmark, or press **Spacebar**.

   A Set Bookmark dialog opens.
2. If you want to set more bookmarks, repeat step 1 as often as necessary.

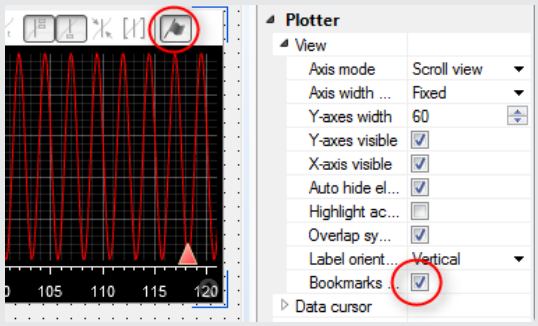
   Every time you set a new bookmark, a new Set Bookmark dialog opens. This new Set Bookmark dialog always opens at the position of the Set Bookmark dialog last opened or moved.
3. In the Set Bookmark dialog, enter a title and description, if desired.

Result

A bookmark is set. The time position of the bookmark is marked by a red triangle in all Time Plotters.

Tip

If no bookmark symbols are displayed in a Time Plotter, activate them via the toolbar or the Properties controlbar.



Next steps

- You can search for bookmarks. Refer to How to Find a Bookmark on page 181.
- You can edit the new bookmark. Refer to How to Edit a Bookmark on page 182.

Related topics

Basics

Basics on Bookmarks 178

HowTos

How to Edit a Bookmark 182
How to Find a Bookmark 181

References

Set Bookmark 321

How to Find a Bookmark

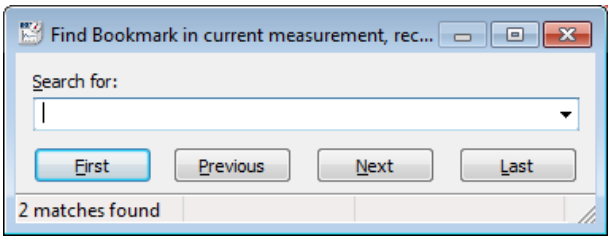
Objective

You can search for bookmarks in a measurement or recording.

Method

To find a bookmark

1 On the Home ribbon, click Bookmark – Find Bookmark.
The Find Bookmark dialog opens.



2 Choose a filter string or enter a new one.

Result

In the status bar of the Find Bookmark dialog, you can see the number of the match, the total number of bookmarks found, the time stamp of the found bookmark and the name of the file the bookmark was found in.

Note

Different files are searched for bookmarks depending on how you access the Find Bookmark dialog. For more information, refer to Find Bookmarks on page 281.

Next steps

You can edit bookmarks. Refer to How to Edit a Bookmark on page 182.

Related topics

Basics

Basics on Bookmarks..... 178

HowTos

How to Edit a Bookmark..... 182

References

Find Bookmarks..... 281

How to Edit a Bookmark

Objective

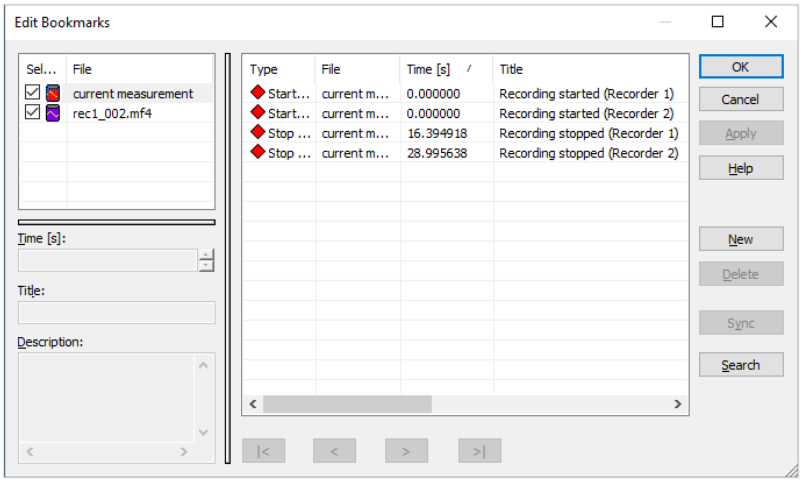
You can edit and synchronize bookmarks.

Method

To edit a bookmark

1 On the Home ribbon, click Bookmark – Edit Bookmark, or double-click a bookmark symbol (or) in a Time Plotter or in the Measurement Data Pool.

The Edit Bookmarks dialog opens.



2 In the list at top left, called the measurement list below, activate the checkbox of the measurement whose bookmarks you want to see.

The bookmarks are displayed in the list at top right, called the bookmark list below.

3 Select a bookmark from the bookmark list.

The time stamp, title and description edit field are activated.

4 If desired, you can edit the time stamp of the selected bookmark.

5 If desired, you can enter a new title for the selected bookmark.

6 If desired, you can enter a description for the selected bookmark.

7 If you want to create a new bookmark, select a measurement file in the measurement file list and click New.

A new bookmark is set and displayed in the first row of the bookmark list.

8 If you want to synchronize bookmarks, select at least two bookmarks belonging to different measurements in the bookmark list and click Sync.

The selected bookmarks are made synchronous by changing the x-axis offset in one or more measurement files. The times of all bookmarks in these files are changed.

9 Click OK to confirm the settings.

Result

The bookmark is edited.

Related topics

Basics

Basics on Bookmarks..... 178

HowTos

How to Set Bookmarks Manually..... 179

References

Edit Bookmarks..... 273

Handling Acoustic Signals for Measurements and Recordings

Where to go from here

Information in this section

Acoustic Signals for Measurements and Recordings..... 183
You can specify a number of acoustic signals announcing measurement and recording actions.

How to Define an Acoustic Signal..... 184
You can define an acoustic signal that is output each time a condition is reached.

Acoustic Signals for Measurements and Recordings

Introduction

You can specify a number of acoustic signals announcing measurement and recording actions.

Overview

The following table shows an overview of the acoustic signals ControlDesk can output during measurement or recording.

Action	Settings	Refer to
Recording starts	▪ Enabled/Disabled	How to Configure Trigger Conditions for Triggered Recording on page 127

Action	Settings	Refer to
Recording stops	▪ Enabled/Disabled	How to Configure Trigger Conditions for Triggered Recording on page 127
A trigger condition is reached	▪ Enabled/Disabled ▪ Frequency ▪ Duration	How to Define an Acoustic Signal on page 184
Capacity of measurement buffer will be reached soon	▪ Enabled/Disabled ▪ Time to buffer overflow	Basics on the Measurement Buffer on page 102

Related topics

Basics

Basics on the Measurement Buffer..... 102

HowTos

How to Configure Trigger Conditions for Triggered Recording..... 127
How to Define an Acoustic Signal..... 184

How to Define an Acoustic Signal

Objective

You can define an acoustic signal that is output each time a condition is reached.

Preconditions

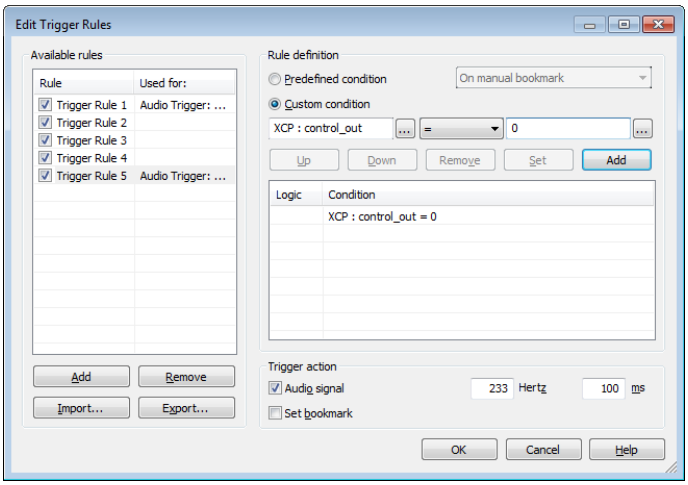
A running measurement must be stopped first.

Method

To define an acoustic signal

1 On the Home ribbon, click Recording – Edit Trigger, or press `Ctrl+T`.
The Edit Trigger Rules dialog opens.

2 From the **Available rules** list, select a trigger rule, or click **Add** to define a new one.



3 After you have selected or defined the trigger rule, select **Audio Signal** and configure the frequency (in Hertz) and the duration (in ms) of the sound.

Result

ControlDesk outputs the specified sound each time the trigger condition is reached.

Note

If you specify an acoustic signal or bookmark setting for a trigger rule that contains at least one state trigger (operators: =, <>,<, <=, >, >=, BIT HIGH, BIT LOW, CHANGE), a dead time of 5 seconds is used to avoid performance problems. No acoustic signals or bookmarks are generated during the dead time.

Related topics

References

Trigger Rules..... 344

Working with Recorded Data

Introduction

You can visualize recorded data on a layout when you open a measurement data file in the **Measurement Data Pool**. If you want to postprocess recorded data with MATLAB, you can export it to a MAT file.

Where to go from here

Information in this section

Introduction to Working with Recorded Data..... 186
Recordings are saved to the experiment's measurement data folder by default. To visualize recorded data on a layout you must open a measurement data file in the Measurement Data Pool.

Visualizing Recorded Data..... 188
You can open a measurement data file in the **Measurement Data Pool** to visualize the recorded data on a layout.

Postprocessing Recorded Data With MATLAB..... 204
You can use MATLAB for postprocessing recorded data.

Introduction to Working with Recorded Data

Introduction

Recordings are saved to the experiment's measurement data folder by default. To visualize recorded data on a layout you must open a measurement data file in the Measurement Data Pool.

Basics on the Measurement Data Pool

Introduction

Recordings can be opened in the **Measurement Data Pool**.

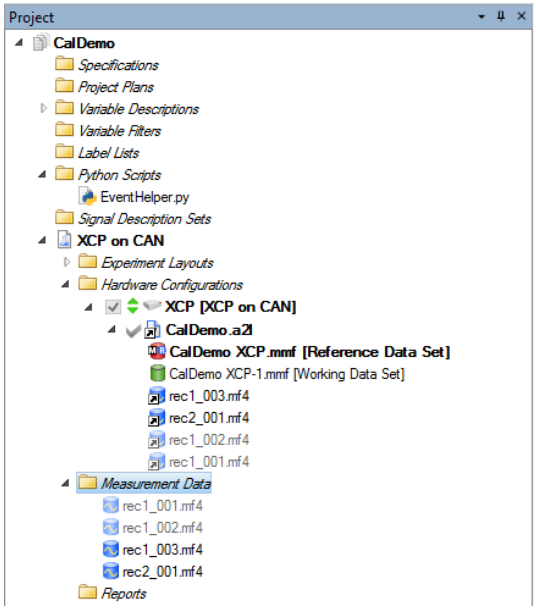
Configuration of recordings

ControlDesk lists all the variables of all the platforms and devices in the active experiment to be measured and recorded in the **Measurement Configuration** controlbar. Refer to Basics on Configuring Recording on page 119.

You can make some default settings for recordings (for example, file naming and trigger settings) via the **Properties** controlbar. Refer to Recorder Properties on page 245.

Measurement data folder

All recordings are saved to the experiment's measurement data folder and added to the experiment by default.

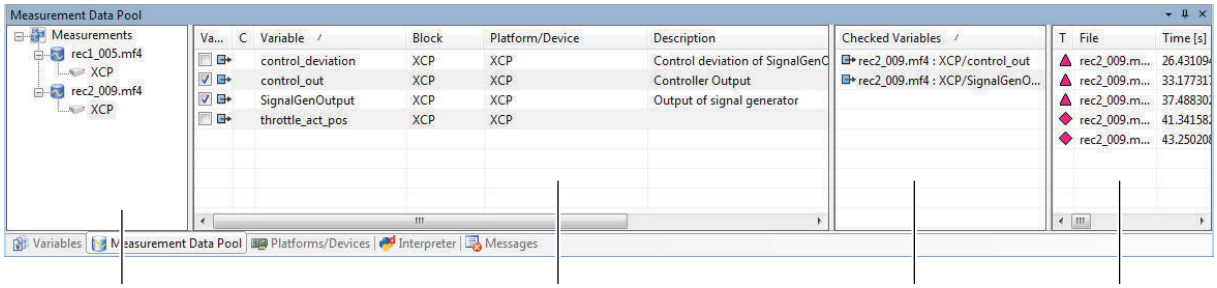


Links to the recorded measurements can be displayed under the nodes of variable description references. Refer to Show Measurement Links on page 322.

Measurement Data Pool

You can visualize recorded data on a layout. To do so, the measurement data file must be open in the **Measurement Data Pool**. The **Measurement Data Pool** contains the recorded data file list which shows all the loaded measurements in a tree.

If you select a platform/device node in the tree, information is displayed on all the variables that have been recorded on the respective platform/device. For some platforms/devices further subnodes may exist below the platform/device node. These subnodes represent the structure of the corresponding platform/device.



Measurement data file list | Variable list | Checked variables list | Bookmark list (hidden by default)

The layout of the variable list can be customized. For further information, refer to Measurement Data Pool on page 304.

Removing variables from a measurement data file You can use the Measurement Data Pool to remove variables from a measurement data file. Refer to Remove Variables on page 314.

Related topics

References

Measurement Data Pool 304

Visualizing Recorded Data

Introduction

You can open a measurement data file in the Measurement Data Pool to visualize the recorded data on a layout.

Where to go from here

Information in this section

How to Open a Measurement Data File in the Measurement Data Pool 189
If you want to visualize recorded data on a layout, it must be opened in the Measurement Data Pool.

How to Visualize Recordings with an Existing Layout 190
You can use an existing layout with suitable instruments and variable connections to visualize the recorded data.

How to Visualize Recordings from Scratch 192
You can visualize the recorded data from scratch. If you choose this method to visualize recorded data, you must create a new layout and place the variables to be visualized in instruments on it.

How to Visualize Recordings and Running Measurements Simultaneously 193
You can visualize recorded data and running measurements in a plotter at a time.

How to View Values at a Specific Point in Time (Time Cursor) 194
You can use the time cursor to view signal values at a specific point in time. If you move the time cursor, all measured signals and the respective parameters are updated. Instruments and bus monitoring lists display the values that are available at the selected time position.

How to Switch the Data Source of Variable Connections Within a Layout 197
To compare values of different recordings and the current measurement, you can switch the data sources of variable connections within a layout.

How to Insert Recorded Data into the Measurement Data Pool..... 199
To insert recorded data into the **Measurement Data Pool**, you can use a measurement data file in the **Project** controlbar or in an experiment folder. After each recording, a measurement data file is written to the appropriate folder of your experiment.

How to Import a Measurement Data File..... 200
You can import a measurement data file to the experiment and open it in the **Measurement Data Pool**.

How to Extract Data from a Measurement Data File..... 201
If you want to decrease the amount of data in a measurement data file, you can extract time sections or signals from it, or split the file into parts.

How to Add Reduction Data to a Measurement Data File..... 202
Adding reduction data improves the performance of the visualization of recorded data. If an MF4 file does not contain reduction data, you can add it using the `DSSIGCONV` command line tool.

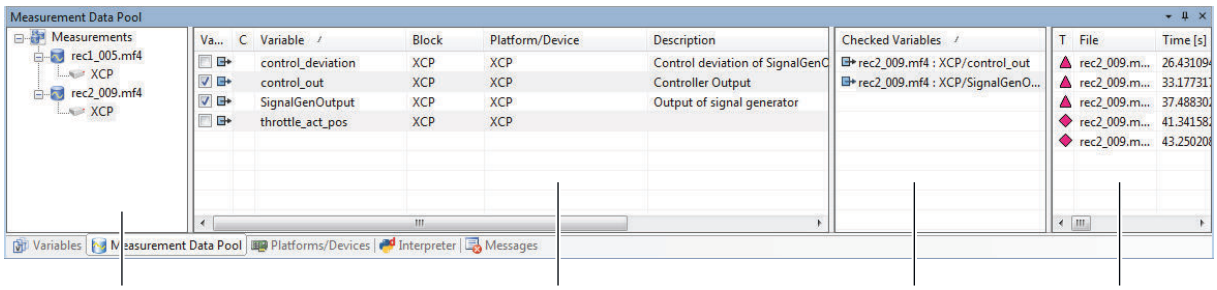
How to Open a Measurement Data File in the Measurement Data Pool

Objective

If you want to visualize recorded data on a layout, the data must be opened in the **Measurement Data Pool**.

Measurement Data Pool

A controlbar that provides access to measurement data and measurement data files. It shows the variables of measurement data files. A recording must be opened in the **Measurement Data Pool** to make its variables available for visualizing on a layout.



Measurement data file list | Variable list | Checked variables list | Bookmark list (hidden by default)

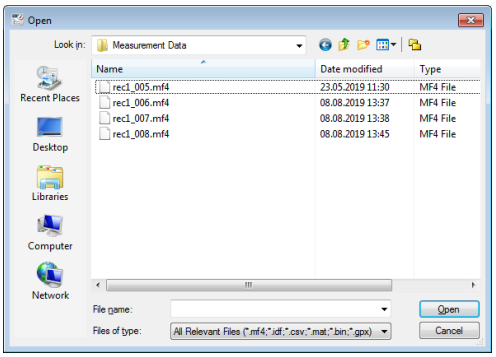
Tip

If you select the **Open in measurement data pool** checkbox in the **Recorder** properties in the **Properties** controlbar, all subsequent measurements are opened in the **Measurement Data Pool** automatically.

Method

To open a measurement data file in the Measurement Data Pool

1 From the context menu of the Measurement Data Pool, select Open.
A standard Open dialog opens for you to select a measurement data file.



2 Select the desired measurement data file.

Tip

Multiselection of measurement data files is possible.

Result

The measurement data file is opened in the Measurement Data Pool.

Next steps

- You can now add the opened measurement data files to the active experiment via their context menus. Refer to Add to Experiment (Measurement Data Pool) on page 265.
- You can place the variables of the opened measurement data files in instruments on layouts. Refer to Visualizing Recorded Data on page 188.

Related topics

References

Open (Measurement Data File)..... 307

How to Visualize Recordings with an Existing Layout

Objective

You can use an existing layout with suitable instruments and variable connections to visualize the recorded data.

Restrictions

In the measurement signal list, you can activate nonscalar variables such as measurement arrays, curves, or maps, but only measurement arrays are stored in a measurement data file.

Preconditions

- At least one measurement data file must be in the Measurement Data Pool.
- The layout must contain suitable instruments and variable connections for the recorded data.

Method

To visualize recordings with an existing layout

1. Select a desired layout.

   ControlDesk displays the selected layout with its instruments and variable connections. The instruments can display variable values from different data sources.

2. Right-click into an empty area on the layout.
3. To select a measurement data file, select Switch Data Source and the appropriate submenu from the context menu.

   ControlDesk switches the variable connections of the instruments on the current layout to the selected measurement data file.

   Note

   ControlDesk can visualize recorded data only if the variables of the measurement data file are connected to the instruments on the layout appropriately. If an instrument does not display the expected values, check the variable connections.

Result

You visualized the recorded data on an existing layout.

Tip

You can copy an existing layout to create a further layout with the same instruments and variable connections. The new layout is added to the currently active ControlDesk experiment. Copying an existing layout can be useful, for example, if you want to visualize several recordings on several layouts at a time. Refer to Create Copy (ControlDesk Layouting 🕮).

Next steps

You can switch the variable connections to different data sources. Refer to How to Switch the Data Source of Variable Connections Within a Layout on page 197.

Related topics

Basics

Visualizing Recorded Data..... 188

References

Create Copy (ControlDesk Layouting 🕮)

How to Visualize Recordings from Scratch

Objective

You can visualize the recorded data from scratch. If you choose this method to visualize recorded data, you must create a new layout and place the variables to be visualized in instruments on it.

You can switch between different measurement data files after visualizing recordings from scratch.

Restrictions

In the measurement signal list, you can activate nonscalar variables such as measurement arrays, curves, or maps, but only measurement arrays are stored in a measurement data file.

Preconditions

At least one measurement data file must be in the **Measurement Data Pool**.

Method

To visualize recordings from scratch

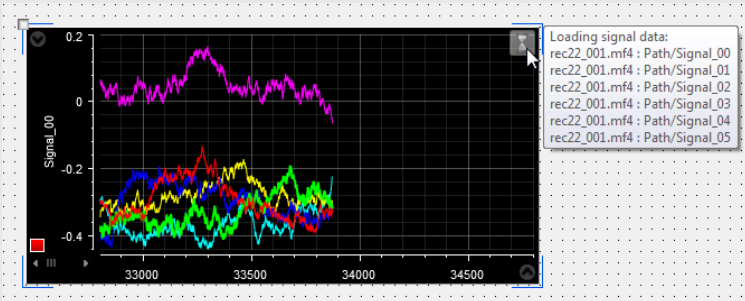
1. On the **Layouting** ribbon, click **Layouts – Insert Layout**.
   ControlDesk creates a new layout.
2. From the **Measurement Data Pool**, select the measurement data file.
3. From the measurement data file, select the platform/device.
   A list of all the measurement variables is displayed.
4. Select a measurement variable, drag it to the new layout and visualize it in an instrument on the layout.

Tip

You can place a variable from the **Measurement Data Pool** on a layout in the same way as a variable from the **Variables** controlbar. Refer to How to Place Variables on a Layout via the Variables Controlbar (ControlDesk Layouting 🕮) and How to Place Variables on a Layout via the Instrument Selector (ControlDesk Layouting 🕮).

Note

Usually, if you visualize variables in a plotter, the signals are displayed immediately, even for large recordings.



However, if the loading of signal data takes longer, an hourglass symbol is displayed in the top right corner. The context menu shows the signals that are still in process.

ControlDesk loads the data in the background. You can continue working without being affected.

You can minimize the risk of prolonged signal loading by using MDF 4.1.x files. ControlDesk supports optimized loading processes for them, such as partial loading or using reduction data (if available).

Result

You visualized the recorded data from scratch.

Related topics

Basics

Visualizing Recorded Data..... 188

How to Visualize Recordings and Running Measurements Simultaneously

Objective

You can visualize recorded data and running measurements in a plotter at a time.

Measurements and recordings shown together

In a Time Plotter or an Index Plotter, you can display recorded signals and running measurements simultaneously.

Preconditions

At least one measurement data file must be in the **Measurement Data Pool**.

Method

To visualize recordings and running measurements in a plotter

1. Place a Time Plotter or an Index Plotter on a layout.
2. From the **Variables** controlbar, connect the variables you want to measure.
3. From the **Measurement Data Pool**, connect the variables you want to display simultaneously to the running measurement.
4. Start measuring.

Result

You visualize recorded data in a plotter simultaneously to a running measurement.

Next steps

You can switch between different data sources within the layout. Refer to How to Switch the Data Source of Variable Connections Within a Layout on page 197.

Related topics

Basics

Visualizing Recorded Data..... 188

How to View Values at a Specific Point in Time (Time Cursor)

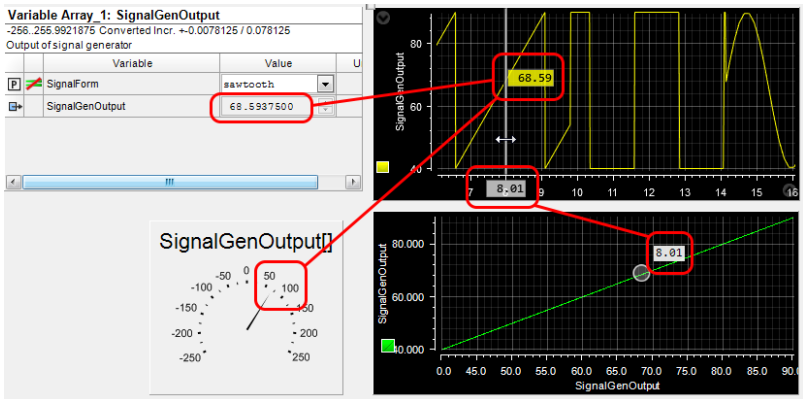
Objective

You can use the time cursor to view signal values at a specific point in time. If you move the time cursor, all measured signals and the respective parameters are updated. Instruments and bus monitoring lists display the values that are available at the selected time position.

Time cursor in instruments

If you enable the time cursor in ControlDesk, the Time Plotter and the Index Plotter display it in their chart area. If you move the time cursor in one plotter, it is synchronously moved in the other plotters. Other instruments, such as a Gauge or a Slider, show the value of the selected time position.

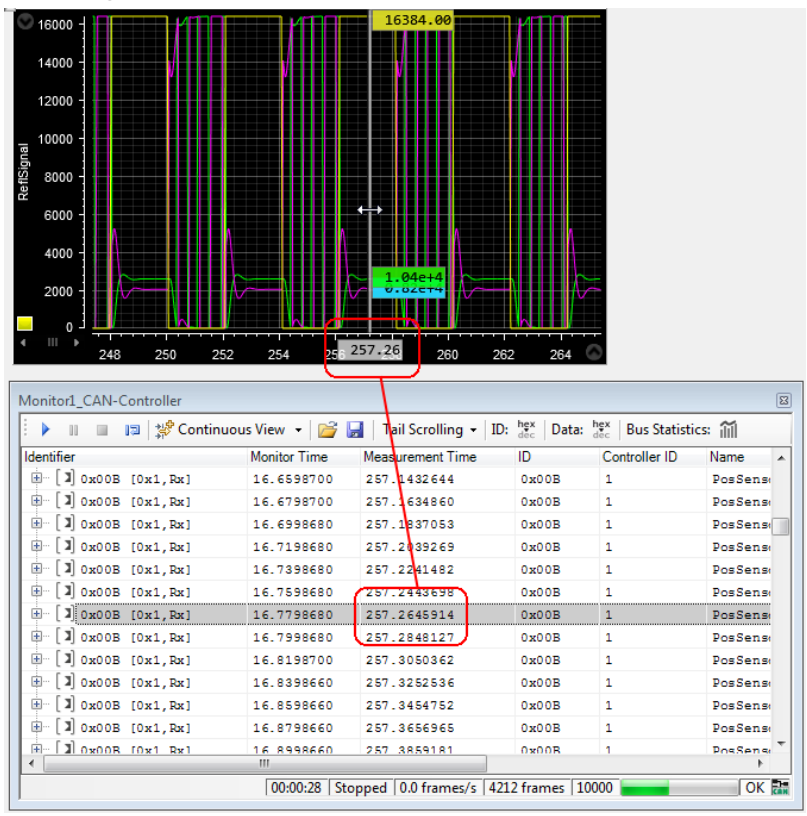
The following illustration shows the time cursor in a Time Plotter and an XY Plotter and the synchronously displayed values in a Variable Array and a Gauge.



Time cursor in bus monitoring lists

If the time cursor is enabled in ControlDesk, it is visible in bus monitoring lists. The row that is related to the selected time position is highlighted. Selecting another row also moves the time cursor position.

The following illustration shows the time cursor in a Time Plotter and a bus monitoring list.



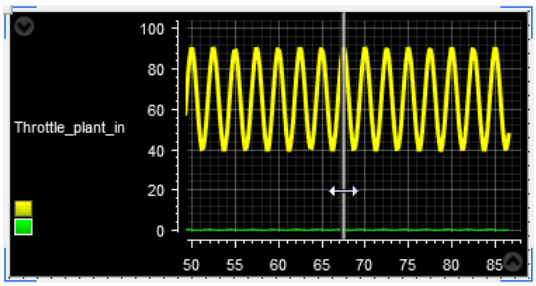
If you want to use the time cursor synchronously in a monitoring list and a recording, synchronize the bus monitoring data and measurement data first. Refer to Synchronizing Bus Monitoring Data with Recorded Data on page 370.

Method

To view values at a specific point in time (Time Cursor)

1 On the Home ribbon, click Time Cursor, or press `Ctrl+F11`.

2 The time cursor is displayed to indicate the selected time position.

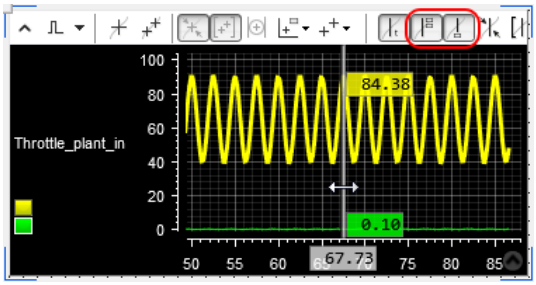


Click the time cursor and hold down the left mouse button to move the time cursor to the left or right.

Tip

To use the time cursor during a running measurement, pause the visualization by moving or zooming the chart.

3 Via the Time Plotter's properties or the toolbar, you can enable tooltips that display the time position and the signal values.



Result

You selected a position for the time cursor. You can view the corresponding values in various instruments and in bus monitoring lists.

Automated playback of recorded data via the time cursor

The automation interface of the time cursor provides the `Playback` property to play back the visualization of recorded data.

You can specify the following playback properties:

- The start and stop time (or the duration) of the playback in the recording
- The playback acceleration factor
- Automatic repetition of the playback

To control the playback, the `Playback` property provides a `Start` and a `Stop` method.

Refer to TimeCursor / IXaTimeCursor <<Interface>> (ControlDesk Automation 🕮).

Example The following listing shows how to configure and start the playback of recorded data as an example:

```
Application.TimeCursorManagement.TimeCursor.Active = 1
Application.TimeCursorManagement.TimeCursor.Playback.StartPosition = 6.0
Application.TimeCursorManagement.TimeCursor.Playback.Duration = 1
Application.TimeCursorManagement.TimeCursor.Playback.AccelerationFactor = 1
Application.TimeCursorManagement.TimeCursor.Playback.AutoRepeat = 1
Application.TimeCursorManagement.TimeCursor.Playback.Start()
Application.TimeCursorManagement.TimeCursor.Playback.Stop()
Application.TimeCursorManagement.TimeCursor.Playback.AccelerationFactor = 0.5
Application.TimeCursorManagement.TimeCursor.Playback.Start()
Application.TimeCursorManagement.TimeCursor.Playback.Stop()
```

Related topics

References

Show Toolbar (ControlDesk Instrument Handling 🕮)
Time Cursor..... 342
Time Cursor Properties (ControlDesk Instrument Handling 🕮)

How to Switch the Data Source of Variable Connections Within a Layout

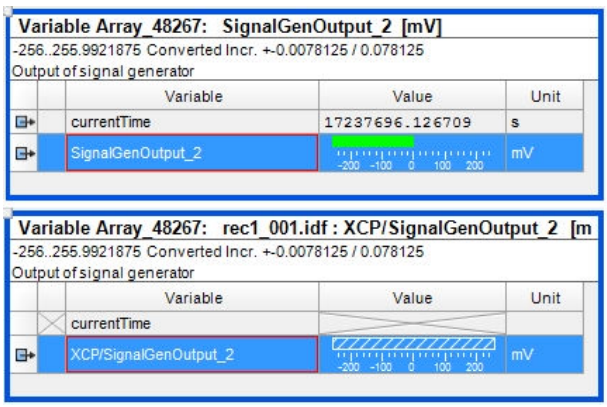
Objective

To compare values of different recordings and the current measurement, you can switch the data sources of variable connections within a layout.

Preserving variable connections

If the data source changes and the variable of a variable connection is not available any longer, the instrument preserves the variable name.

The following example shows this case after the data source of the layout has been switched to a different measurement data file:



ControlDesk reactivates the variable connection when the data source offers an appropriate variable with the same name and data type again.

Method

To switch the data source of variable connections within a layout

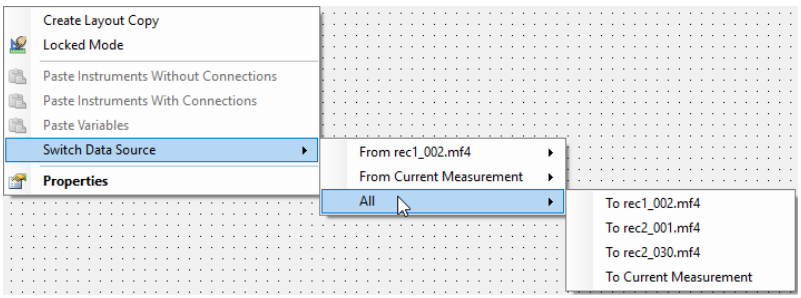
1 Select a layout.

2 Right-click the layout, and select Switch Data Source from the context menu.

A submenu with the data source(s) currently used for variable connections in the instruments on the layout is displayed.

3 From the submenu, select the "old" data source you want to replace.

A submenu with the available data source(s) is displayed. Up to five open measurement data files and the current measurement (if available) are displayed.



4 From the submenu, select the "new" data source.

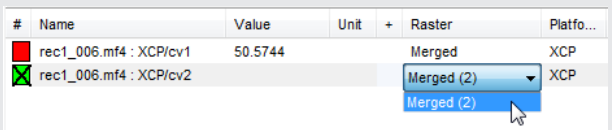
ControlDesk switches the variable connections from the old to the new data source.

Result

You switched the data source of variable connections. In the current layout, all variable connections between the instruments and the "old" data source are deleted. They are replaced by variable connections between the instruments and the "new" data source. Variable connections with a data source other than the "old" data source are not replaced.

Note

If a plotter contains calculated variables and you switch to a data source based on an MF4 file, some signals might be invisible. In contrast to a current measurement, an MF4 file uses incremented numbers to differentiate between identical raster names, for example Merged, Merged(2), Merged(3), ... To make such signals visible again, select the incremented raster name manually in the plotter legend.



Related topics

Basics

Visualizing Recorded Data..... 188

References

Switch Data Source (ControlDesk Layouting 🕮)

How to Insert Recorded Data into the Measurement Data Pool

Objective

To insert recorded data into the Measurement Data Pool, you can use a measurement data file in the **Project** controlbar or in an experiment folder. After each recording, a measurement data file is written to the appropriate folder of your experiment.

Restrictions

Depending on the RAM resources of the ControlDesk PC, a measurement data file can be too large to load it into the Measurement Data Pool. In these cases you can decrease the amount of data by splitting the large file into a number of smaller files using the DSSIGCONV tool. Refer to How to Extract Data from a Measurement Data File on page 201.

The amount of loaded data depends on the selected measurement data file format. Refer to Open (Measurement Data File) on page 307.

Possible methods

- You can insert recorded data into the Measurement Data Pool via the Project controlbar. Refer to Method 1 on page 199.
- You can insert recorded data into the Measurement Data Pool via the Open dialog. Refer to Method 2 on page 199.

Method 1

To insert recorded data into the Measurement Data Pool via the Project Controlbar (standard)

1. From the Project controlbar, select the desired measurement data file.
2. Double-click the measurement data file.

Method 2

To insert recorded data into the Measurement Data Pool via the Open dialog

1. From the context menu of the Measurement Data Pool, select Open.
   ControlDesk displays the Open dialog.

2 Select the desired measurement data file from the appropriate folder.

3 Click Open.

Result

The recorded data is inserted in the Measurement Data Pool.

Related topics

Basics

Visualizing Recorded Data..... 188

HowTos

How to Import a Measurement Data File..... 200

References

Open (Measurement Data File)..... 307

How to Import a Measurement Data File

Objective

You can import a measurement data file in various file formats, such as the MF4 (ASAM MDF 4.1.x), MAT, and CSV file formats. An imported measurement data file is also opened in the Measurement Data Pool.

Measurement data pool limit

Depending on the RAM resources of the ControlDesk PC, a measurement data file can be too large to load into the Measurement Data Pool. In these cases you can decrease the amount of data by splitting the large file into a number of smaller files using the DSSIGCONV tool. Refer to How to Extract Data from a Measurement Data File on page 201.

Method

To import a measurement data file

1 From the Project controlbar, select the Measurement Data node.

2 In the Project controlbar, right-click the Measurement Data node.

3 From the context menu, select Import.
The Open dialog is displayed.

4 In the Open dialog, select the desired file.

5 Click Open.

Result

You imported a measurement data file. The file is added to the experiment and opened in the **Measurement Data Pool**.

Related topics

Basics

Visualizing Recorded Data..... 188

References

Import (Measurement Data File)..... 282

How to Extract Data from a Measurement Data File

Objective

If you want to decrease the amount of data in a measurement data file, you can extract time sections or signals from it, or split the file into parts.

Removing selected variables

An easy way to reduce the amount of data in a measurement data file is to open it in the **Measurement Data Pool** and remove selected variables. Refer to Remove Variables on page 314.

Tip

Another way to extract data from a measurement or recording is to save the data currently displayed in a Time Plotter (with or without downsampling). Refer to How to Save Time Plotter Data as a New Measurement on page 144.

Measurement Data Pool limit

Depending on the RAM resources of the ControlDesk PC, a measurement data file can be too large to load into the **Measurement Data Pool**. In these cases you can decrease the amount of data by splitting the large file into a number of smaller files using the DSSIGCONV tool.

DSSIGCONV tool

The *DSSIGCONV* tool is a DOS command line tool. You have to start it in a Command Prompt window. The `DSSIGCONV.EXE` file is located in the `.\Main\Bin` folder of your ControlDesk installation.

For information on the syntax, refer to Using DSSIGCONV on page 347.

Method

To extract data from a measurement data file

1 Open a Command Prompt window and change to the `.\Main\Bin` folder of your ControlDesk installation.

2 Enter `dssigconv [parameters]`

Tip

To get brief information on the command in the Command Prompt window, enter `dssigconv /?`.

Result

One or more destination files are created according to the specified parameters.

Example

The following list shows some examples with `srcrec.mf4` as the source file and `dest.mf4` as the name for the destination file(s).

- To display information on the source file, enter:

  ```
  dssigconv srcrec.mf4 /i
  ```

- To extract the signals sigA and sigB:

  ```
  dssigconv srcrec.mf4 dest.mf4 /s:sigA,SigB
  ```

- To split the source file into 4 parts, enter:

  ```
  dssigconv srcrec.mf4 dest.mf4 /p:4
  ```

- To extract a time section from second 5 to second 20.5, split the result into 3 parts, and create a separate destination file for each signal, enter:

  ```
  dssigconv srcrec.mf4 dest.mf4 /t:5,20.5 /p:3 /1
  ```

Related topics

HowTos

How to Import a Measurement Data File..... 200
How to Insert Recorded Data into the Measurement Data Pool..... 199

References

Import (Measurement Data File)..... 282
Using DSSIGCONV..... 347

How to Add Reduction Data to a Measurement Data File

Objective

Adding reduction data improves the performance of the visualization of recorded data. If an MF4 file does not contain reduction data, you can add it using the `DSSIGCONV` command line tool.

Reduction data

Reduction data is an additional content in an MF4 file that allows for visualizing the MF4 file data depending on the visualization resolution. Reduction data therefore improves the performance of the visualization of measurement data.

By using the `DSSIGCONV` tool, you can add reduction data to an MF4 file that does not contain it already. Reduction data is created separately for each measurement raster in an MF4 file.

DSSIGCONV tool

The *DSSIGCONV* tool is a DOS command line tool. You have to start it in a Command Prompt window. The `DSSIGCONV.EXE` file is located in the `.\Main\Bin` folder of your ControlDesk installation.

For information on the syntax, refer to Using DSSIGCONV on page 347.

Restrictions

When you add reduction data to an MF4 file using the `DSSIGCONV` command line tool, the following restrictions apply:

- If the MF4 file contains a signal whose variable type is not supported, the `DSSIGCONV` tool generates no reduction data for the measurement raster the signal is measured with.
- The `DSSIGCONV` tool does not support MF4 files with unsorted data. No reduction data is generated for such MF4 files.
- The `DSSIGCONV` tool lets you add reduction data only to time-based measurement data only.

Method

To add reduction data to a measurement data file

1. Open a Command Prompt window and change to the `.\Main\Bin` folder of your ControlDesk installation.
2. Enter `dssigconv <source> <destination> /rd`.

   You can use the following parameters:

Parameter	Description
`source`	Lets you specify the source measurement file to be converted. The file format must be ASAM MDF 4.1.x (MF4).
`destination`	Lets you specify the destination file. The file format must be MF4.
`/rd`	Lets you copy the source file to the destination and add reduction data to it. ▪ Source and destination must be MF4 files. ▪ Source and destination can be identical to modify the source file. ▪ All the other parameters are ignored.

Result

A destination file with reduction data is created.

Example

The following list shows some examples with `srcrec.mf4` as the source file.

- To create a destination file named `dest.mf4` and add reduction data to it, enter:

  ```
  dssigconv srcrec.mf4 dest.mf4 /rd
  ```

- To add reduction data to the source file, enter:

  ```
  dssigconv srcrec.mf4 srcrec.mf4 /rd
  ```

Related topics

References

Using DSSIGCONV..... 347

Postprocessing Recorded Data With MATLAB

Where to go from here

Information in this section

How to Export Recorded Data to the MAT File Format..... 204
To work with a measurement data file in MATLAB, you have to export it to the MATLAB-compatible MAT format.

How to Use Exported Data in MATLAB..... 205
To work with exported data in MATLAB, you must load the generated MAT file.

Example of Using Exported Data in MATLAB..... 206
Shows an example of using exported data in MATLAB.

Structure of MAT Files Generated by Exporting Recorded Data..... 209
In ControlDesk, you can export a recorded data or table data to the MAT file format. To use the data in MATLAB, you should familiarize yourself with the generated structure.

How to Export Recorded Data to the MAT File Format

Objective

To work with a measurement data file in MATLAB, you have to export it to the MATLAB-compatible MAT format.

Method

To export record data to the MAT file format

1. In the Project controlbar or the Measurement Data Pool, right-click the desired measurement data file.
2. From the context menu, select Export.
3. The Save As dialog opens.
4. In the Save As dialog, select the MATLAB file format and enter an appropriate name. Alternatively, you can select an existing MAT file and overwrite it.
5. Click Save.

Result

You exported a measurement data file to the MAT file format.

Related topics

Basics

Visualizing Recorded Data..... 188

References

Export (Measurement Data File)..... 277

How to Use Exported Data in MATLAB

Objective

To work with exported data in MATLAB, you must load the generated MAT file.

Structure of the MAT file

MAT files generated by ControlDesk consist of one single struct array – which has the same name as the file – and various substructs. For details on all available substructs, see Structure of MAT Files Generated by Exporting Recorded Data on page 209.

Preconditions

You must have exported recorded data to the MAT file format first. Refer to How to Export Recorded Data to the MAT File Format on page 204.

Method

To use exported data in MATLAB

1 Start MATLAB.

2 In the MATLAB Command Window, type **`load %filename%`**.

The MAT file `%filename%.mat` is loaded to MATLAB's Workspace. Repeat this for all MAT files you want to load.

Result

Now you can work with the exported data contained in the `%filename %.mat` file.

Example

For a number of examples, refer to Example of Using Exported Data in MATLAB on page 206.

Related topics

HowTos

How to Export and Import Values (ControlDesk Instrument Handling 🕮)
How to Export Recorded Data to the MAT File Format..... 204

References

Structure of MAT Files Generated by Exporting Recorded Data..... 209

Example of Using Exported Data in MATLAB

Example

Suppose you have exported recorded data to a file named `rec002.mat` and copied the file to MATLAB's `work` directory (in this case you can reach the file without entering a path).

The following table shows various examples of working with the exported data:

In the MATLAB Command Window, type ...	Result	Output Example
`load rec002`	Opens the file with the exported data	-

`rec002`	Shows information on the measurement file. You can see the maximum index number for x– and y–data in the `struct` information.	`rec002 =`
		`Info: [1x1 struct]`
		`X: [1x3 struct]`
		`Y: [1x5 struct]`
		`Description: [1x1 struct]`

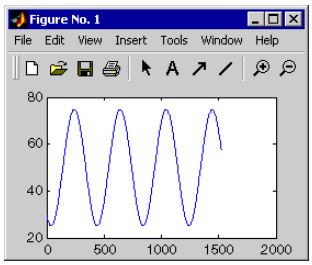
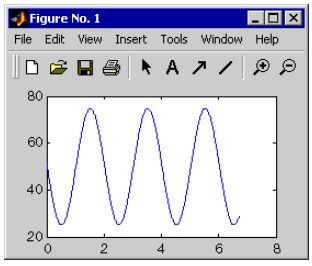
`rec002.X(1)`	Shows information on the x–data (time axis) with index number 1. The number of time axes depends on the number of different raster	`Name: ''`
		`Type: 4`
		`Data: [1x1524 double]`

In the MATLAB Command Window, type ...	Result	Output Example
	settings in the measurement configuration.	`Unit: ''` `Raster: '5ms'`

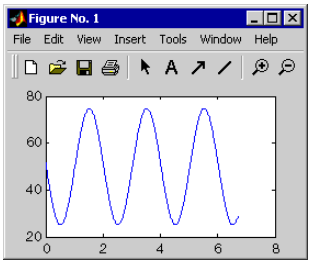
`rec002.Y(3)`	Shows information on the y–data (measurement variable) with index number 3.	`Name: 'SignalGenOutput'`
		`Type: 4`
		`Data: [1x1524 double]`
		`Unit: ' '`
		`Raster: '5ms'`
		`Device: 'XCP'`
		`XIndex: 1`
		`DownSampling: 1`
		`Description: 'Output of signal generator'`
		`DisplayIdentifier: 'S_GEN_OUTPUT'`
		`Path: ''`
		`Flags: 0`
		`Min: -256`
		`Max: 255.9922`
		`MinWeak: -256`
		`MaxWeak: 255.9922`

`rec002.Y(3).Name`	Shows information on the selected element of the y–data with index number 3.	`Name: 'SignalGenOutput'`

`rec002.Y(3).Data`	Shows the values of the y–data with index number 3.	`Columns 1 through 8`
		`29.6172 29.4141 29.2188 28.8125 \`
		`28.6094 28.4141 28.2734 28.0625`
		`Columns 9 through 16`
		`27.9531 27.8438 27.7422 27.5234 \`
		`27.4141 27.3125 27.2031 26.9922`

`plot(rec002.Y(3). Data)`	Shows a plot of the values of the y–data with index number 3.	
`plot(rec002.X(3). Data,` `rec002.Y(1). Data)`	Shows an xy plot containing the values of the x–data with index number 1 (time) and the y–data with index number 3 (measured values). X-data and y-data must have the same raster settings. Each y-data element has an XIndex attribute indicating the corresponding x-data (see next table row).	

In the MATLAB Command Window, type ...	Result	Output Example
`rec002.Y(1).XIndex`	Shows the index number of the x–data corresponding to the selected y–data. You can merge this command with the one above (see next table row).	`X-Index: 1`

`YIndex = 3`
`plot(rec002.X(rec002.Y(YIndex)`
`.XIndex).Data,`
`rec002.Y(YIndex).Data)`
	Shows an xy plot containing the values of the y–data with index number 3 (measured values) and the x–data with the corresponding index number.	

Tip

For an overview of all the x- and y-data in a MAT file, you can use `for` loops in an MATLAB script, for example:

```
% Load rec002.mat to the MATLAB workspace.
load rec002

% Read the number of X-Data vectors (indices)
% and print information for each
lenX=length(rec002.X)
for i=1:lenX
    sprintf ('Index: X %d', i)
    rec002.X(i)
end

% Read the number of Y-Data vectors (indices)
% and print information for each
lenY=length(rec002.Y)
for i=1:lenY
    sprintf ('Index: Y %d', i)
    rec002.Y(i)
end
```

Related topics

HowTos

How to Export Recorded Data to the MAT File Format 204
How to Use Exported Data in MATLAB 205

References

Structure of MAT Files Generated by Exporting Recorded Data 209

Structure of MAT Files Generated by Exporting Recorded Data

Introduction

If you generate a MAT file by exporting a measurement data file in ControlDesk, the file contains only one struct array. The struct array has the same name as the file. It consists of further struct arrays, which contain data and conditions of the corresponding recording.

Structs and substructs in the generated MAT file

The generated MAT file contains the following structs and substructs:

Struct	Substruct	Dimension	Data Type	Contents
X		1 x N	Struct array	
	Name	1 x N	Char array	Name of the signal
	Type	1 x 1	Int32 array	Type of the signal (used internally)
	Data	Depends on the signal type		Data of the signal
	Unit	1 x N	Char array	Unit of the signal
	Raster	1 x N	Char array	Name of the measurement raster
Y		1 x N	Struct array	
	Name	1 x N	Char array	Name of the signal
	Type	1 x 1	Int32 array	Type of the signal (used internally)
	Data	Depends on the signal type		Data of the signal
	Unit	1 x N	Char array	Unit of the signal
	Raster	1 x N	Char array	Name of the measurement raster
	Device	1 x N	Char array	Name of the device
	XIndex	1 x 1	Int32 array	Index number of the x-axis
	Downsampling	1 x 1	Int32 array	Downsampling factor
	Description	1 x N	Char array	Description text for the signal
	DisplayIdentifier	1 x N	Char array	Alias name of the signal
	Path	1 x N	Char array	Path of a hierarchical signal
	Flags	1 x 1	Int32 array	Additional coded information
	Min	1 x 1	Double array	Lower hard limit of the signal
	Max	1 x 1	Double array	Upper hard limit of the signal
	MinWeak	1 x 1	Double array	Lower weak limit of the signal
	MaxWeak	1 x 1	Double array	Upper weak limit of the signal
Info		1 x 1	Struct array	
	RevisionMajor	1 x 1	Int32 array	Major revision number of the generated MAT file
	RevisionMinor	1 x 1	Int32 array	Minor revision number of the generated MAT file
	Measurement ID	1 x 1	Int32 array	Identification number for the measurement
Description		1 x 1	Struct array	
	General	1 x 1	Struct array	
	– User	1 x N	Char array	User who created the file
	– DateTime	1 x N	Char array	Date and time of measurement (format: DD.MM.YYYY hh:mm:ss)
	– Origin	1 x N	Char array	Information on: variable description file, ECU Image file, device name, reference data set, working data set
	– Description	1 x N	Char array	Free text to describe the recording
	Recording	1 x 1	Struct array	
	– StartCondition	1 x N	Char array	Generated string that describes the start condition of the recording

Struct	Substruct	Dimension	Data Type	Contents
	– StopCondition	1 x N	Char array	Generated string that describes the stop condition of the recording
	Measurement	1 x 1	Struct array	
	– XAxisOffset	1 x 1	Double array	Offset for all x–axes (in seconds)
	– Length	1 x 1	Double array	Length of the recording (in seconds)
	– StartTimestamp	1 x 1	Double array	Time from the start of the measurement to the start of the recording (in seconds)
	– StopTimestamp	1 x 1	Double array	Time from the start of the measurement to the end of the recording (in seconds)

Related topics

Basics

Postprocessing Recorded Data With MATLAB..... 204

Measurement Rasters

Introduction

ControlDesk lets you select measurement rasters for each variable to be measured.

Where to go from here

Information in this section

Basics on Measurement Rasters.....212
A measurement raster specifies how often a value of a variable is acquired. ControlDesk offers an appropriate list for each platform/device.

Handling a Large Number of Measurement Rasters.....218
You can change the number of displayed measurement rasters in the **Measurement Configuration**.

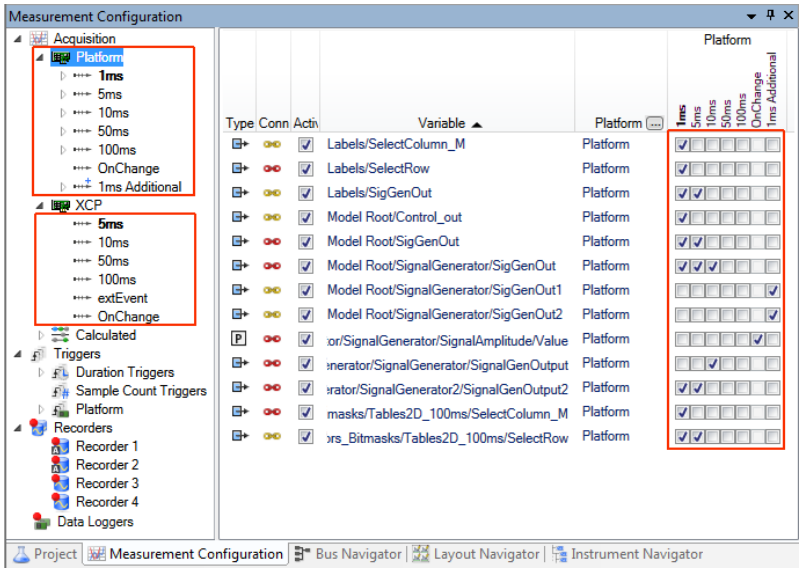
Measurement Rasters in MP/MC Applications.....220
ControlDesk's **Measurement Configuration** provides all the measurement rasters implemented in the different application processes of a multiprocessor/multicore (MP/MC) application and keeps the original raster names.

Basics on Measurement Rasters

Introduction

A measurement raster specifies how often a value of a variable is acquired. The **Measurement Configuration**'s navigation area displays all the measurement rasters available for a specific platform/device as shown in the following illustration.

The illustration also shows that the **Measurement Configuration**'s measurement signal list lets you select one or more measurement rasters separately for each variable to be measured.



Depending on the selected measurement raster, data is measured *synchronously* or *asynchronously* to a task of the related application.

Available rasters The number of measurement rasters available for a specific variable depends on, for example:

- The number of measurement rasters provided by the related application. These rasters are specified in the application's variable description file.
- The type of the variable (measurement variable, parameter, calculated variable, system variable); see Variable types and rasters on page 216.

Note

The list of displayed measurement rasters can be filtered. For more information, refer to Handling a Large Number of Measurement Rasters on page 218.

Synchronous measurement rasters

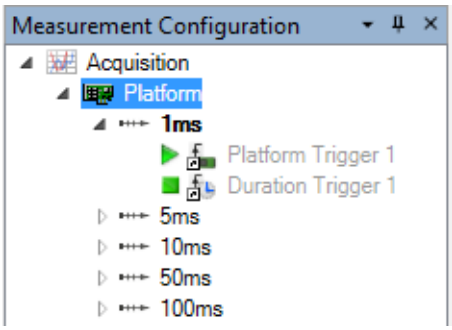
When you use synchronous measurement rasters, the times when data is acquired are determined by tasks of the application running on an ECU or real-time hardware or VPU. There is task-related consistency between the measurement values of different variables captured at the same point in time. All the values of one sample are captured in the same task.

Synchronous measurement rasters can either be *time-based* or *event-based*:

- Time-based measurement rasters have a cyclic sampling period such as `100 ms`.
- Event-based measurement rasters have a sampling period of `-1 s`.

Platform raster The real-time application running on a dSPACE platform provides one or more *platform rasters*. Each platform raster uses one measurement service in the platform's application.

The following illustration shows multiple time-based platform rasters that are implemented in a real-time application as an example.



Each platform raster provides a platform trigger and a duration trigger that allow you to perform triggered measurements on the related platform. Refer to Basics on Triggered Measurement on page 87.

Keep in mind the naming of platform rasters in multiprocessor/multicore (MP/MC) applications; refer to Measurement Rasters in MP/MC Applications on page 220.

Additional raster for platforms A measurement raster created by copying a platform raster. An additional raster lets you measure and record variables of a real-time or offline simulation application *with the sampling period of the original platform raster, but with different trigger conditions*.

You can work with additional rasters just like with a platform raster. In contrast to platform rasters, additional rasters are not stored in the variable description but in the experiment, and you can remove them.

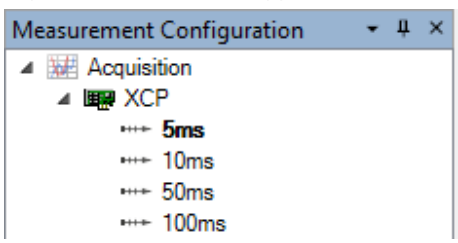
For details on adding additional rasters, refer to Add Additional Raster on page 259.

Note

The number of additional rasters with the same sampling period, i.e., copied from the same platform raster, is limited to seven.

Device rasters for ECUs The application running on an ECU provides one or more device rasters. Device rasters must be implemented in the ECU code and/or in the communication protocol. The implementation depends on the ECU service or communication protocol that is used. ControlDesk's calibration devices and platforms support device rasters.

The following illustration shows multiple time-based device rasters that are implemented in an ECU application as an example.



Using a device raster allows you, for example, to analyze ECU-internal processes accurately and is the first choice for many measurement and calibration tasks.

Asynchronous measurement rasters

When you use asynchronous measurement rasters, the times when data is acquired are determined by ControlDesk or the interface. Asynchronous measurement rasters do not correspond to a task running on an ECU or real-time hardware or VPU.

A consistency between measurement values of different variables of one sample is not guaranteed. The values might be captured in a sequence of tasks.

OnChange raster You can use the *OnChange raster* for parameters. Each time you change a parameter value, ControlDesk reads the values of all the parameters measured in this raster. ControlDesk also reads the value every three seconds, regardless of whether you have changed a parameter value or not, to ensure smooth visualization in the plotter instruments.

In both cases (on change, every three seconds), the values are not read from the hardware, but from the mirrored memory on the ControlDesk PC. No bandwidth of the interface is therefore allocated to these reading operations. On the other hand, undetected changes of a parameter value may occur, if more than one interface is connected to the same hardware or if the ECU, VPU, or hardware itself changes a parameter value (adaptive parameters).

Note

Time stamps of parameter value changes are only approximative. For accurate time stamps, select a measurement raster suitable for the rate of parameter value changes.

Tip

To update the parameter values in ControlDesk instruments, you can refresh the parameters. Refer to Refresh Values (ControlDesk Calibration and Data Set Management 🕮).

Hardware polling raster A measurement raster for platforms and devices. Hardware polling rasters are predefined by ControlDesk. They let you perform time-based measurement on ECUs, VPUs, and real-time hardware that have no synchronous measurement raster implemented. Hardware polling rasters represent time cycles when ControlDesk performs reading operations on the ECUs, VPUs, or real-time hardware periodically according to the selected raster.

Whether hardware polling rasters are supported depends on the specific real-time hardware, VPU, ECU and/or interface. Some of them do not support polling rasters at all, others do not provide full access to all parameters or measurement variables.

For details on adding hardware polling rasters, refer to Add Hardware Polling Raster on page 261.

Note

- The number of hardware polling rasters for a platform is limited to six.
- For measurement and calibration via the ECU Diagnostics device, the value of hardware polling rasters must not exceed the range 500 … 5000 ms.
  However, it is recommended not to use hardware polling rasters for measurement and calibration via the ECU Diagnostics device. ControlDesk offers specific polling rasters for ECU Diagnostics devices (see below).

Polling rasters (for measuring variables via the ECU Diagnostics device) ControlDesk offers predefined polling rasters for measuring variables via the ECU diagnostics interface. When you select a certain polling raster, ControlDesk requests measurement data from the ECU according to the selected time interval. The ECU then sends the requested data back to ControlDesk.

ControlDesk provides polling rasters in the range 10 … 5000 ms. The default value is 500 ms. It is recommended to use a polling raster in the range 500 … 5000 ms.

Note

Keep in mind the difference between "hardware polling rasters" and "polling rasters". Polling rasters are available for the ECU Diagnostics device only. Polling rasters have higher performance than hardware polling rasters. It is recommended to use polling rasters for measuring variables via the ECU diagnostics interface. Do not use hardware polling rasters.

Polling rasters (for calculated variables) In addition to the "original" rasters of the input signals, ControlDesk provides predefined *calculated rasters for calculated variables*. These rasters are time cycles for calculating the values of the calculated variables. ControlDesk uses the currently available variable values for calculation.

If you select a raster for a calculated variable which is equal to a raster of one of the input variables, ControlDesk uses the time stamps of the raster of the input variable.

For details, refer to Basics of Computing Calculated Variables in ControlDesk (ControlDesk Variable Management 🕮).

Variable types and rasters

The following table shows the rasters available for the variable types.

Variable Type	Measurement Raster
Measurement variable	▪ All the measurement rasters provided by the related application ▪ Hardware polling raster on page 215[1), 2)]

Variable Type	Measurement Raster
Parameter	▪ Polling rasters (for measuring variables via the ECU Diagnostics device) on page 216 ▪ All the measurement rasters provided by the related application ▪ OnChange raster on page 215 ▪ Hardware polling raster on page 215[1)]
Calculated variable	▪ All the measurement rasters of the input signals ▪ Polling rasters (for calculated variables) on page 216

1) Whether hardware polling rasters are supported, and to what extent, depends on the specific ECU and/or interface.
2) Do not use hardware polling rasters for measuring variables via an ECU diagnostic interface.

Observing variables instead of measuring variables with measurement rasters

To reduce the bandwidth and memory requirement, you can *observe variables*. ControlDesk then reads the variables cyclically and displays each instantaneous value in a single-shot instrument so that you can see value changes. However, because no measurement buffer is used, there is no value history.

Observing variables allows you to get variable values even if no measurement is running, but as soon as online calibration is started.

For details on observing variables, refer to Observing Variables on page 224.

Related topics

Basics

Measurement Rasters in MP/MC Applications..... 220

HowTos

How to Activate Variables for Measurement..... 81

References

Add Additional Raster..... 259
Add Hardware Polling Raster..... 261
Add to Measurement Signal List (ControlDesk Variable Management 🕮)
Measurement Configuration..... 290
Raster Properties..... 244

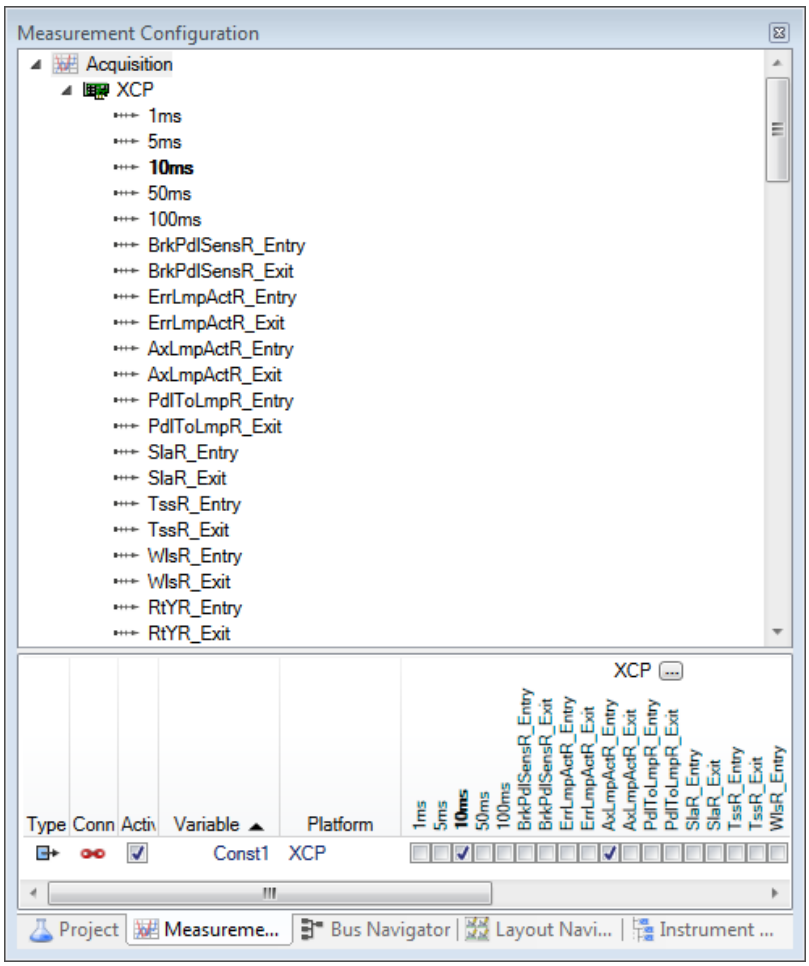
Handling a Large Number of Measurement Rasters

Introduction

You can change the number of displayed measurement rasters in the Measurement Configuration.

Number of displayed measurement rasters

In specific scenarios, such as bypassing or platform access via XIL API, your application might contain a large number of measurement rasters.



The number of measurement rasters that are displayed in the Measurement Configuration for a platform/device is limited to about 20 rasters by default. The limit makes the raster list easier to read and prevents you from being overwhelmed with a large amount of unused rasters.

Hidden measurement rasters

You can change the number of displayed rasters on the Measurement page of the ControlDesk Options dialog.

> **Note**
>
> Increasing the number of displayed measurement rasters might reduce the system performance.

If your application contains more rasters as configured to be visible, rasters above the limit are hidden in the Measurement Configuration.

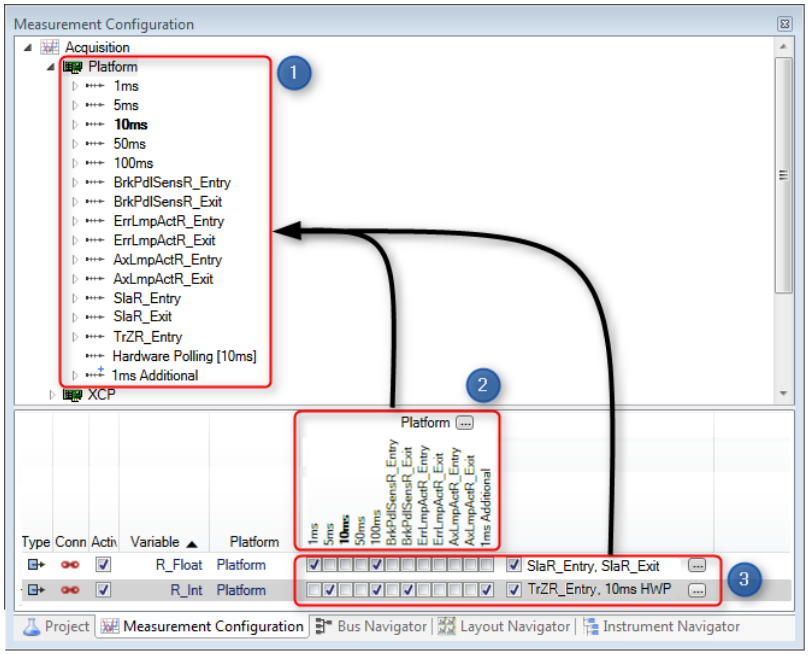
A hidden measurement raster keeps its functionality. The raster's trigger settings, for example, are valid even if the raster is hidden in the Measurement Configuration.

Used measurement rasters

Used measurement rasters are rasters that are selected for the measurement of a variable. The Measurement Configuration allows you to select measurement rasters from the visible and the hidden rasters (see below).

Displayed rasters

The measurement rasters of a platform/device are displayed in various regions of the Measurement Configuration controlbar.



Region	Displayed Rasters	Changing the Display
❶ Measurement configuration tree	▪ Measurement rasters that are displayed in the signal list (as shown in ❷)	▪ You can change the displayed measurement rasters via a dialog by clicking Select Displayed Rasters in the context menu of the platform/device node in the tree. ▪ You can display all measurement rasters for a platform/device by disabling Filtered Raster View in the context menu of the

Region	Displayed Rasters	Changing the Display
	▪ Measurement rasters that are selected for measurement (as shown in ❸) ▪ Hardware polling rasters that have been added to a platform/device ▪ Additional rasters that have been added to a platform/device	platform/device node in the tree. In this case, the limit that is specified for the displayed rasters in the ControlDesk Options dialog is ignored.
❷ Measurement signal list	Measurement rasters that are selected to be displayed in the signal list	▪ You can change the displayed measurement rasters in the Select Displayed Rasters dialog by clicking the Browse button: ... ▪ You can change the maximum number of displayed measurement rasters via the Measurement Configuration page in the Options dialog.
❸ Used measurement rasters	The measurement rasters that are used in measurements. Measurement rasters that are used but hidden are added to the right.	▪ You can change the used measurement rasters by clicking the selection box of a raster. Press `Ctrl` for multiple selection. ▪ You can add hidden measurement rasters via the Select Used Rasters dialog by clicking the Browse button: ... **Note** Selecting a measurement raster has an immediate effect. There is no OK or Cancel command. Press Ctrl to avoid loosing previous selections.

Related topics

HowTos

How to Activate Variables for Measurement 81

References

Add Hardware Polling Raster 261
Filtered Raster View 280
Measurement Configuration 290
Measurement Configuration Page 302
Select Displayed Rasters 317
Select Used Rasters 318

Measurement Rasters in MP/MC Applications

Rasters originally implemented in an MP/MC application

ControlDesk's Measurement Configuration provides all the measurement rasters implemented in the different application processes of a multiprocessor/multicore (MP/MC) application and keeps the original raster names.

Note

If two or more rasters with *different sampling periods* but with the *same raster name* are implemented in the application processes of an MP/MC application, ControlDesk's **Measurement Configuration** gives the raster its original name. The raster's sampling period is not unique and depends on the application process. See Example 3.

It is not ControlDesk's task to ensure that the name of a measurement raster implemented in an MP/MC application is uniquely related to a sampling period.

Rasters made available to other application processes by ControlDesk

In addition, when a measurement raster is not implemented in each application process, ControlDesk makes this raster available to other application processes *if possible*. If this raster is available, ControlDesk uses a measurement raster with the same or a faster sampling period.

This lets you:

- Measure variables from *any* application process using the same raster (provided that this raster is supported by each application process).
- Define conditions for triggering this raster using variables of application processes for which this raster is not implemented.

When ControlDesk makes a raster available for measuring variables of application processes that the raster was not implemented for, ControlDesk ensures that the raster name is uniquely related to a sampling period.

Examples The following examples show:

- When ControlDesk can make a raster available for measuring variables of application processes that the raster was not implemented for
- How ControlDesk names rasters in the **Measurement Configuration**

All the following examples are based on a real-time application with three application processes.

Example 1

- `Raster_A` is implemented in each application process and its sampling period is 1 ms.
- `Raster_B` and `Raster_C` are only implemented in the application processes #2 and #3, respectively.

  However, since the sampling periods of these rasters are integer multiples of the sampling period of `Raster_A`, which is implemented in each application process, ControlDesk makes `Raster_B` and `Raster_C` available *to all the three application processes*.

Rasters in the Application Process ...						Rasters in the Measurement Configuration		
#1		#2		#3				
Name	Period	Name	Period	Name	Period	Name	Period	Available in Application Process(es) ...
Raster_A	1 ms	Raster_A	1 ms	Raster_A	1 ms	Raster_A	1 ms	#1, 2, 3
		Raster_B	5 ms			Raster_B	▪ 1 ms ▪ 5 ms	▪ #1, 3 ▪ #2
				Raster_C	20 ms	Raster_C	▪ 1 ms ▪ 20 ms	▪ #1, 2 ▪ #3

Example 2

- `Raster_A` is only implemented in the application process #1. Since its sampling period of 1 ms is higher than the sampling periods of the rasters of the application processes #2 and #3, ControlDesk cannot make `Raster_A` available to the application processes #2 and #3.
- `Raster_B` is only implemented in the application process #2. `Raster_C` is only implemented in the application process #3.
- ControlDesk makes a raster with a sampling period of 5 ms also available to the application process #1 since this is an integer multiple of the sampling period of the application process #1's `Raster_A`.

  Since the 5 ms-rasters in the application processes #2 and #3 have different names, ControlDesk provides a common 5 ms-raster named `Common[5ms]`.

Rasters in the Application Process ...						Rasters in the Measurement Configuration		
#1		#2		#3				
Name	Period	Name	Period	Name	Period	Name	Period	Available in Application Process(es) ...
Raster_A	1 ms					Raster_A	1 ms	#1
		Raster_B	5 ms			Raster_B	5 ms	#2
				Raster_C	5 ms	Raster_C	5 ms	#3
						Common[5ms]	▪ 1 ms ▪ 5 ms	▪ #1 ▪ #2, 3

Example 3

- `Raster_A` is implemented in each application process, however, with two different sampling periods. The relation between the raster name and sampling period is therefore ambiguous.
- ControlDesk creates a raster named `Raster_A[1ms]` for application process #1 and #2, and a raster named `Raster_A[5ms]` for application process #3.
- ControlDesk creates a common raster with a sampling period of 5 ms.

  Since the `Raster_A` name is ambiguous, ControlDesk names the common raster `Common[5ms]`.

Rasters in the Application Process ...						Rasters in the Measurement Configuration		
#1		#2		#3				
Name	Period	Name	Period	Name	Period	Name	Period	Available in Application Process(es) ...
Raster_A	1 ms	Raster_A	1 ms	Raster_A	5 ms	Raster_A	▪ 1 ms ▪ 5 ms	▪ #1, 2 ▪ #3
						Raster_A[1ms]	1 ms	#1, 2
						Raster_A[5ms]	5 ms	#3
						Common[5ms]	▪ 1 ms ▪ 5 ms	▪ #1, 2 ▪ #3

Related topics

References

Raster Properties..... 244

Observing Variables

Introduction

ControlDesk lets you observe the variables of an application, even if no measurement is running.

Observing Variables

Introduction

ControlDesk lets you observe the variables of an application. Observing variables means reading their values cyclically and displaying the current values in ControlDesk, even if no measurement is running. For variable observation, it is sufficient to start online calibration.

Observing variables

Observing a variable means reading its value cyclically and displaying the instantaneous value of the observed variable in ControlDesk. Variable observation is performed without a measurement buffer, so if a new value is read, it replaces the previous value. No value history is kept.

Observing parameters and measurement variables Variable observation is performed for parameters and measurement variables that are visualized in an instrument on a layout, but that are not on the measurement signal list. If you visualize a measurement variable in a single-shot instrument (any measurement instrument except for the plotter instruments), the variable is not added to the measurement signal list. The variable is observed in ControlDesk, not measured.

Note

Visualizing a variable in a plotter always adds the variable to the measurement signal list, i.e., variables connected to a plotter are always measured.

Tip

You can change the default setting via the ControlDesk Options dialog. On the Measurement Configuration Page, select Add all visualized measurement signals of dSPACE platforms to measurement configuration to also add variables to the measurement signal list that are visualized only in a single-shot instrument but not in a plotter. Refer to Measurement Configuration Page on page 302.

ControlDesk starts observing variables if one of the following conditions is true:

- Online calibration is started for the platform/device.

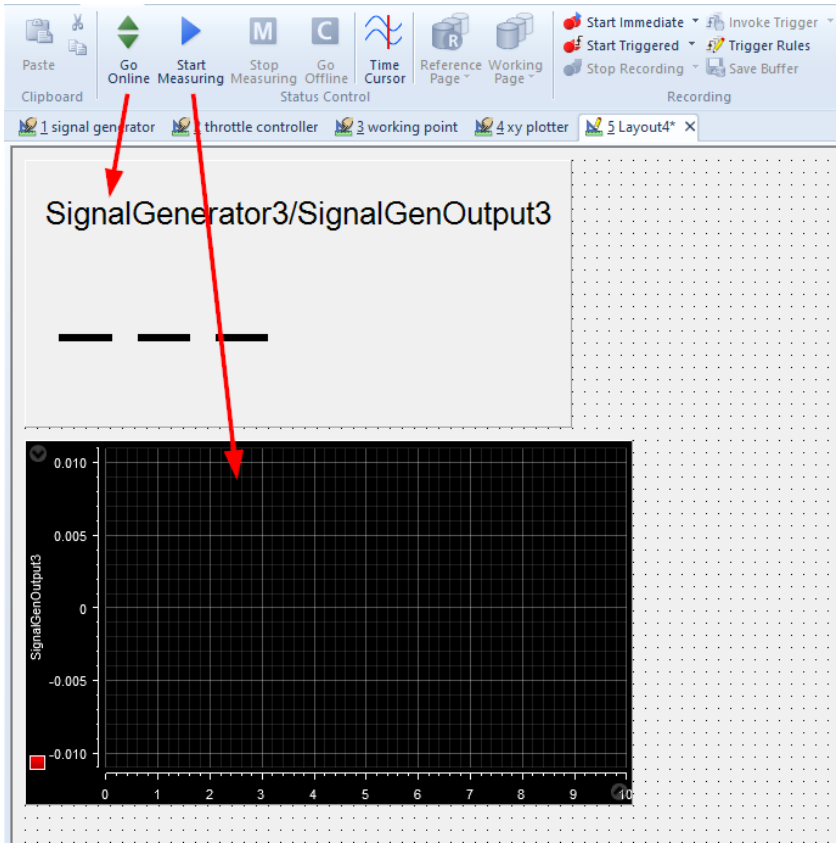
  All the parameters and measurement variables that are visualized in single-shot instruments are observed.

- Measurement is started for the platform/device.

  All the parameters and measurement variables that are visualized in single-shot instruments but are not activated for measurement in the measurement signal list are observed. Data on the activated parameters and measurement variables is acquired with measurement rasters.

The following illustration shows an example (for an animated graphic, refer to dSPACE Help).

- The `SignalGenOutput3`variable is observed via a Display instrument as soon as online calibration is started.
- The `SignalGenOutput3`variable is measured via a Time Plotter instrument as soon as measurement is started.



Note

- Variable observation can be enabled or disabled globally on the Data Acquisition page in the ControlDesk Options dialog.
- For platforms/devices that do not support the variable observer functionality, visualizing a variable in an instrument always adds the variable to the measurement signal list, regardless of the instrument type.

Specifying the variable observation period You can specify the period for variable observation. Refer to Data Acquisition Page on page 271.

Supported platforms/devices

ControlDesk's variable observer functionality is supported for the following platforms/devices:

- CAN Bus Monitoring
- DS1006 Processor Board
- DS1007 PPC Processor Board
- DS1104 R&D Controller Board
- Ethernet Bus Monitoring
- LIN Bus Monitoring
- MicroAutoBox II
- MicroAutoBox III
- MicroLabBox
- Multiprocessor System
- SCALEXIO
- VEOS

Observing variables versus using measurement rasters

The main aspects of using the variable observer functionality or measurement rasters are:

Aspect	Variable Observer	Measurement Rasters
Value history	No (instantaneous value only)	Yes
Recording of observed/measured variables	Not possible	Possible
Instruments for displaying observed/measured variables	Single-shot instruments[1)]	All instruments[2)]
Available with platform/device state	▪ Online calibration started ▪ Measuring/Recording	Measuring/Recording

1) All instruments except for a plotter.

2) If a variable is visualized in a plotter and in a single-shot instrument, the measured value is displayed in the plotter only. The single-shot instrument displays the observed variable value.

Use cases for observing variables

Below are possible use cases for using ControlDesk's variable observer functionality:

- Detecting parameter value changes of adaptive parameters
- Detecting parameter value changes caused from outside ControlDesk, for example, by using AutomationDesk

- Observing measurement variables without using a measurement raster to reduce bandwidth and measurement buffer size

Note

There is a limitation for the amount of data that can be observed. Refer to Limitation for the volume of data that can be observed and measured on page 378.

Related topics

References

Data Acquisition Page..... 271
Measurement Configuration Page..... 302

Synchronized Data Acquisition Across ECUs, RCP and HIL Systems, and Bus Systems

Introduction

Signals from different platform/device hardware usually are not synchronous. ControlDesk can synchronize these signals.

Where to go from here

Information in this section

Basics on Synchronized Data Acquisition.....228
ControlDesk supports synchronized data acquisition across ECUs, and RCP and HIL systems.

Synchronization Accuracy.....231
Time stamps of two platforms/devices differ slightly, *even if resynchronization is enabled*.

Improving Synchronization Accuracy.....234
There are several options to improve synchronization accuracy.

Using Simulation Time Groups.....235
ControlDesk provides simulation time groups to collect platforms/devices with synchronized simulation times. Simulation time groups can improve synchronization accuracy.

Basics on Synchronized Data Acquisition

Introduction

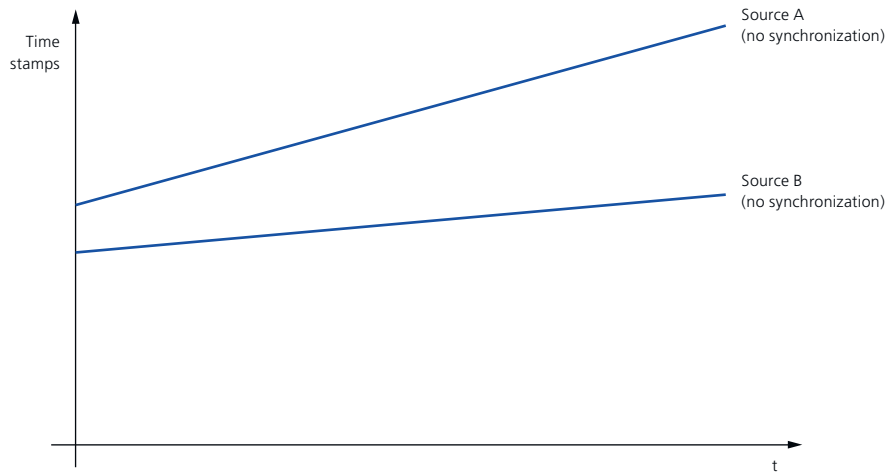
ControlDesk supports synchronized data acquisition across different signal sources such as ECUs, and RCP and HIL systems.

Drifting timers on platform/device hardware

During measurement and recording, each measurement signal is given time stamps by the corresponding signal source.

The illustration below shows that these time stamps differ by an offset and drift:

- The offset is due to the different points in time of the simulation start on the different signal sources.
- The drift is due to the different timers of the signal sources that generate the time stamps.



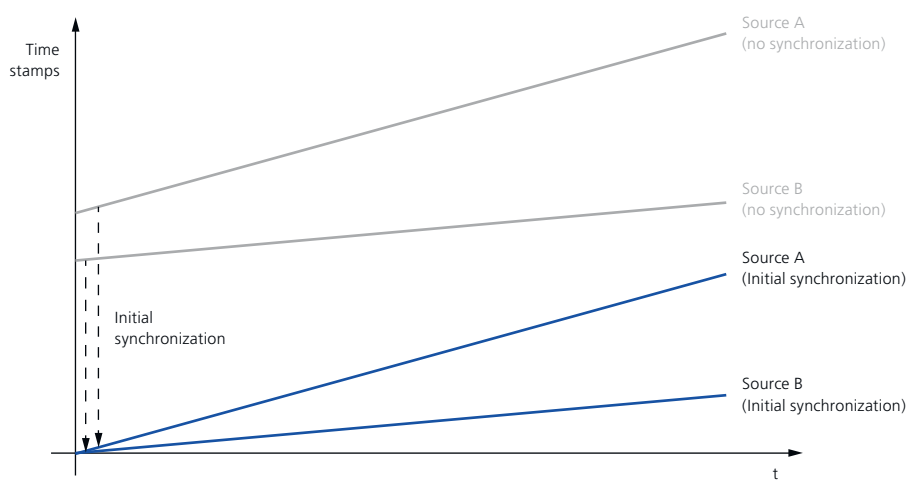
To make signals from different sources comparable in a measurement, ControlDesk provides the following mechanisms:

- Initial synchronization when online calibration is started, which compensates the offset of the signal sources.
- Periodic resynchronization, which periodically balances the drift effects.

Initial synchronization when online calibration is started

When online calibration is started globally for the first time, ControlDesk initially synchronizes the time stamps from each signal source to compensate the offset of the signal source's local simulation time.

The illustration below shows the initial synchronization of the time stamps from two signal sources. It also shows the time drifts of the two signal sources: The timer of signal source A is faster than the timer of signal source B.



Increasing the synchronization accuracy on measurement start You can increase the synchronization accuracy during the first minute of a measurement. If a high synchronization accuracy on measurement start is required, wait for about 20 s after going online globally before you start measuring.

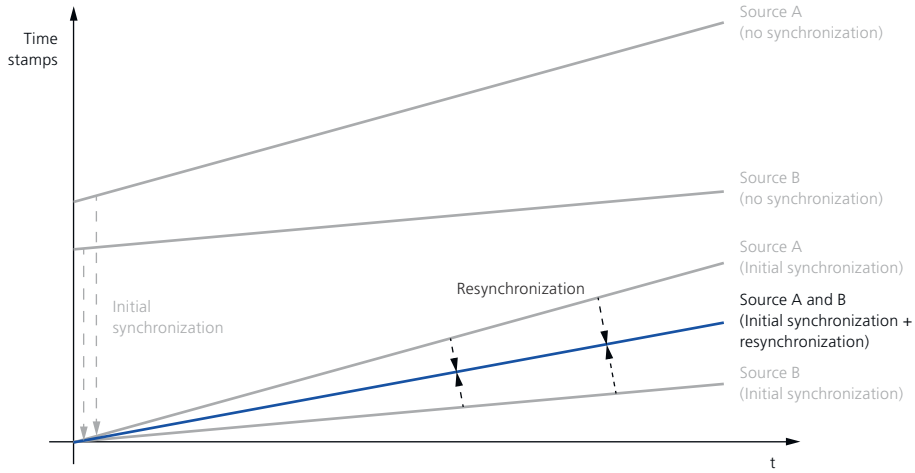
Periodic resynchronization

ControlDesk provides *periodic resynchronization* to handle the time drifts on the signal sources during measurement. Resynchronization means adjustment of measurement time stamps to a common time base.

Periodic resynchronization can be enabled:

- Globally for all platforms/devices. Refer to Data Acquisition Page on page 271.
- Individually for the platforms/devices in a specific experiment if resynchronization is enabled globally. Refer to General Settings Properties (ControlDesk Platform Management 🕮).

The illustration below shows the ideal synchronization: The time stamps of the signal sources A and B are resynchronized.



Synchronization accuracy

Time stamps of two platforms/devices differ slightly, *even if resynchronization is enabled*.

For details, refer to Synchronization Accuracy on page 231.

Related topics

Basics

Synchronization Accuracy 231

References

Data Acquisition Page 271
General Settings Properties (ControlDesk Platform Management 🕮)

Synchronization Accuracy

Introduction

Time stamps of two platforms/devices differ slightly, *even if resynchronization is enabled*.

Estimating synchronization accuracy

The time difference between the time stamps originating from two signal sources is ΔT.

ΔT can be estimated like this:

$\Delta T = T_1 - T_2$; T_n: time stamp from board #n

ΔT is the sum of two components:

$\Delta T = \Delta T_{Model} + \Delta T_{SYNC}$

- ΔT_{Model}:
  Difference between the points in time when data is captured on board #1 and #2. Since the simulation tasks on the two boards are not synchronized, the maximum value of ΔT_{Model} can be two sampling steps of the models simulated on the hardware. For this reason, this value cannot be influenced by ControlDesk.
  For information on the influence of ΔT_{Model} on synchronization accuracy, see Example setup 1a: DS1006 boards with independent tasks on page 231 and Example setup 1b: DS1006 boards with externally triggered data capturing on page 232.
- ΔT_{SYNC}:
  Inaccuracy of ControlDesk's resynchronization. It strongly depends on the connection type (bus or Ethernet connection).
  For information on the influence of ΔT_{SYNC} on synchronization accuracy, see Example setup 1b: DS1006 boards with externally triggered data capturing on page 232.

The example setups below help you understand and estimate synchronization accuracy. Refer to:

- Example setup 1a: DS1006 boards with independent tasks
- Example setup 1b: DS1006 boards with externally triggered data capturing
- Example setup 2: DS1006 board and SCALEXIO system with externally triggered timer tasks
- Example setup 3: SCALEXIO systems with externally triggered timer tasks

Example setup 1a: DS1006 boards with independent tasks

The following example setup illustrates how accurately signals can be captured by two processor boards running independently, i.e., when ΔT_{Model} is significant.

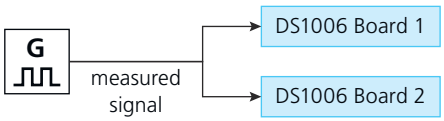
Setup description

- Two DS1006 boards measure the same signal at the same fixed sample period. The tasks of the two models are *not synchronized*.

In other words, neither additional hardware nor model modifications are required for this setup.

- The boards are connected to the host PC via *bus connection*.
- ControlDesk's resynchronization option is enabled for both platforms.

The illustration below shows the setup:



Experiment result The time stamps of the matching signal points measured by the two boards were compared. Below are the results:

Sampling Period	50 µs	1 ms
Mean difference	1.9 µs	54 µs
Max. absolute difference	100 µs	2100 µs
Standard deviation	17 µs	560 µs

Conclusion Synchronization accuracy is mostly determined by the sampling times of the two models.

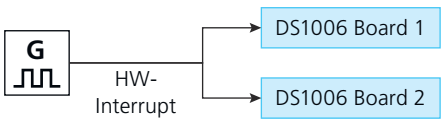
Example setup 1b: DS1006 boards with externally triggered data capturing

The following example setup illustrates the accuracy of ControlDesk's synchronization feature when ΔT_{Model} is minimized, i.e., when $\Delta T \approx \Delta T_{SYNC}$.

Setup description

- An external pulse signal generates hardware interrupts on two DS1006 boards. The interrupts trigger data capturing on the DS1006 boards (asynchronously to the models' timer tasks) so that the pulse signal is captured at practically the same time on both boards, i.e., $\Delta T_{Model} \approx 0$.
- The timers on the boards are not synchronized with each other.
- The boards are connected to the host PC via *bus connection*.
- ControlDesk's resynchronization option is enabled for both platforms.

The illustration below shows the setup:



Experiment result The time stamps of the matching signal points measured by the two boards were compared. Below are the results:

Sampling Period	(Triggered)[1)]
Mean difference	0.74 µs
Max. absolute difference	8.7 µs
Standard deviation	1.3 µs

[1)] Data capturing is asynchronous to the timer tasks of the models.

Conclusion ControlDesk's resynchronization compensates timer drifts satisfactorily.

Example setup 2: DS1006 board and SCALEXIO system with externally triggered timer tasks

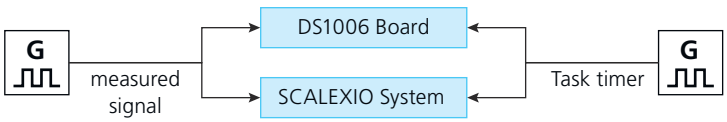
The following example setup illustrates how accurately signals can be measured by two processor boards whose application timer tasks are triggered externally.

Setup description

- A DS1006 board and a SCALEXIO system are connected to the same signal source to synchronize task triggering.
- Timer Task Assignment blocks are used in the Simulink models for the DS1006 and the SCALEXIO system to synchronize the models' timer tasks. The blocks are triggered externally (see Timer Task Assignment for details).
- The boards' timer tasks are also synchronized externally and measure the same external pulse signal.
- In ControlDesk, both platforms are added to a simulation time group (see Using Simulation Time Groups on page 235 for details on simulation time groups).

  ControlDesk's resynchronization option is enabled for that simulation time group.

The illustration below shows the setup:



Experiment result The time stamps of the matching signal points measured by the two boards were compared. Below are the results:

Sampling Period	**100 µs**
Mean difference	0.2 µs
Max. absolute difference	0.6 µs
Standard deviation	0.07 µs

Conclusion Measurements are very well synchronized.

Example setup 3: SCALEXIO systems with externally triggered timer tasks

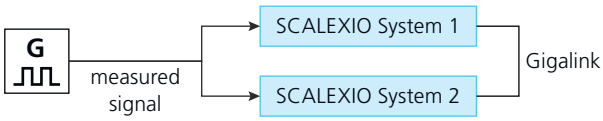
The following example setup illustrates how accurately signals can be measured using Gigalink communication for synchronization.

Setup description

- The model tasks of two SCALEXIO systems are synchronized via Gigalink communication (see How to Build the Signal Chain for Gigalink Communication (ConfigurationDesk Real-Time Implementation Guide 🕮) for details).

  This requires free Gigalink ports and further model adjustments.
- The boards' timer tasks are synchronized via Gigalink communication and measure the same external pulse signal.
- In ControlDesk, both platforms are added to a simulation time group (see Using Simulation Time Groups on page 235 for details on simulation time groups).

The illustration below shows the setup:



Experiment result The time stamps of the matching signal points measured by the two boards were compared. Below are the results:

Sampling Period	**100 µs**
Mean difference	0.003 ns
Max. absolute difference	600 ns
Standard deviation	5 ns

Conclusion Highly accurate synchronization is achieved, comparable to the synchronization in a multiprocessor system.

Related topics

Basics

Basics on Synchronized Data Acquisition..... 228

Improving Synchronization Accuracy

Introduction

Synchronization accuracy can be improved by reducing ΔT_{Model}. To reduce ΔT_{Model}, you can synchronize the model tasks on real-time hardware with one of the following methods:

- Use multiprocessor systems.
- Implement Gigalink communication between the real-time hardware.

  To do so, perform the following steps:

  1. In ConfigurationDesk, implement Gigalink communication between the real-time hardware for synchronization.

     Refer to How to Build the Signal Chain for Gigalink Communication (ConfigurationDesk Real-Time Implementation Guide 🕮).
  2. In ControlDesk, add the related platforms/devices to a simulation time group. Refer to Using Simulation Time Groups on page 235.

  Tip

  For information on synchronization accuracy when using Gigalink communication for synchronization, see Example setup 3: SCALEXIO systems with externally triggered timer tasks on page 233.

- Implement task triggering on the real-time hardware by an external timer.

To do so, perform the following steps:

1. Connect the boards to be synchronized to an external timer to be used as the interrupt source for task triggering.
2. Add an appropriate hardware interrupt block to the Simulink model of each board, and connect the hardware interrupt block to a Timer Task Assignment block as the trigger source for the model's timer task(s).
3. In ControlDesk, add the related platforms/devices to a simulation time group. Refer to Using Simulation Time Groups on page 235.

Tip

For information on synchronization accuracy when application timer tasks are triggered externally in connection with **Timer Task Assignment** blocks, see Example setup 2: DS1006 board and SCALEXIO system with externally triggered timer tasks on page 233.

Related topics

Basics

Basics on Synchronized Data Acquisition 228

Using Simulation Time Groups

Introduction

ControlDesk provides simulation time groups to collect platforms/devices with synchronized simulation times. Simulation time groups can improve synchronization accuracy.

Simulation time groups

Simulation time groups are used to collect platforms/devices in an experiment whose simulation times are synchronized with each other. The members of a simulation time group are handled as a whole during resynchronization, i.e., if periodic resynchronization is enabled, ControlDesk synchronizes the simulation time group as a whole, but not the individual platforms/devices belonging to the group.

When to use simulation time groups?

Simulation time groups are useful in various synchronization scenarios. The following platforms/devices should be collected in a simulation time group for synchronized data acquisition:

- Systems that are synchronized via Gigalink connection
- The platforms/devices of an offline simulation, i.e., the VEOS platform and/or the XCP on Ethernet devices representing the virtual ECUs.

Note

- Do not add an XCP on Ethernet device representing a virtual ECU to a simulation time group if a timer drift value and/or a timer offset value is specified for that V-ECU,
  Refer to VPU Properties (ControlDesk Platform Management 🕮).
- You also have to configure further offline simulation settings such as the **Model is executed in real time** property of each XCP on Ethernet device.
  Refer to General Settings Properties (ControlDesk Platform Management 🕮).

- Systems that are synchronized via an external timer and that use an appropriate Simulink model (see Improving Synchronization Accuracy on page 234)

Handling simulation time groups

Handling simulation time groups comprises the following steps:

1. Adding one or more empty simulation time groups to the experiment. Refer to Add Simulation Time Group on page 264.

   Tip

   When you insert a new VEOS platform into an experiment, ControlDesk also adds a simulation time group containing the new VEOS platform to the experiment.

2. If necessary, changing the names of the simulation time groups. Refer to Rename Simulation Time Group on page 309.
3. Specifying the members of the simulation time groups. Ensure that each simulation time group contains only platforms/devices whose simulation times are synchronized with each other. Refer to Configure Simulation Time Group on page 269.
4. Specifying the masters of the simulation time groups, if possible. A simulation time group master should have a low latency and a high synchronization accuracy. Refer to Configure Simulation Time Group on page 269.

Each platform/device can be assigned to one simulation time group only.

Related topics

Basics

Basics on Synchronized Data Acquisition..... 228

Reference Information

Where to go from here

Information in this section

Measurement/Recording-Related Properties.....240
Measurement/Recording-Related Commands.....254
DSSIGCONV.....347

Measurement/Recording-Related Properties

Introduction

You can configure the properties by means of the **Properties** controlbar. Refer to Properties (Controlbar) (ControlDesk User Interface Handling 🕮).

Note

In operator mode, all the properties related to measurement/recording are read-only and cannot be changed.

Where to go from here

Information in this section

Acquisition Properties.....241
To configure the settings for the measurement buffer and data storage settings in connection with the measurement buffer, displayed data, and the flight recorder.

Data Logger Properties.....242
To specify the name of a data logger.

Measurement Data Properties.....242
To display the measurement data properties.

Platform Properties.....244
To configure platform-related properties of the measurement configuration.

Raster Properties.....244
To display details of the raster currently selected in the **Measurement Configuration** controlbar.

Recorder Properties.....245
To specify start and stop conditions for recording, and the settings for storing recorded data.

Storage Information Properties.....247
To specify the settings for storing measured data.

Trigger Properties.....249
To configure the selected platform or duration trigger.

Triggered Raster Properties.....252
To specify settings for triggered measurement using the raster currently selected in the **Measurement Configuration** controlbar.

Acquisition Properties

Purpose

To configure the settings for the measurement buffer and data storage settings in connection with the measurement buffer, displayed data, and the flight recorder.

Properties

Measurement buffer size Lets you specify the time period in seconds for storing measurement data to the measurement buffer. As the buffer is a ring buffer, earlier values are overwritten by later values when the buffer capacity is exceeded.

Before ControlDesk starts a measurement, it estimates the required memory space. The required memory space depends on the specified **measurement buffer size** and on the measurement raster settings of the signals to be measured. The actual length of the saved measurement may therefore differ from the specified **measurement buffer size**.

- For a time-based raster, the length of the saved measurement is very close to the specified **measurement buffer size**.
- For an event-based raster, ControlDesk uses the **minimum sampling period** specified for that raster to estimate the required memory space. If the number of measured values differs from the specified **minimum sampling period**, the length of the saved measurement differs more or less from the specified **measurement buffer size**.
- For the OnChange raster, ControlDesk estimates one value change per second. Additionally, it measures the value every three seconds. If no value change occurs, the length of the saved measurement is three times longer than the specified **measurement buffer size** (plus a safety margin of one measured value).

Warn before buffer overflow Lets you specify whether ControlDesk outputs an acoustic signal before the buffer capacity is reached.

Save Displayed Data Lets you specify the settings for saving the data displayed in a plotter to a measurement data file. For details, refer to Storage Information Properties on page 247.

Save Flight Recorder Data Lets you specify the settings for saving measurement files created by the **Upload Flight Recorder Contents** command of a platform. For details, refer to Storage Information Properties on page 247.

Save Measurement Buffer Lets you specify the settings for storing the current data of the measurement buffer to a measurement data file. For details, refer to Storage Information Properties on page 247.

Warning time (Available only if "Warn before buffer overflow" is enabled) Lets you specify the warning time in seconds before the buffer overflow occurs.

Related topics

Basics

Basics on the Measurement Buffer..... 102

References

Storage Information Properties..... 247

Data Logger Properties

Purpose

To specify the name of a data logger.

Properties

Name Lets you specify the name of the data logger. The name must be unique within the experiment.

Related topics

Basics

Basics on Configuring Data Logging..... 154
Introduction to Data Logging..... 150

References

Add Data Logger..... 260
Load to Flash (Data Logger)..... 285
Remove (Data Logger)..... 311

Measurement Data Properties

Purpose

To display the measurement data properties.

Note

The available properties depend on the selected measurement data file. Depending on the selected measurement, you can change specific settings, such as the measurement description or the x-axis offset.

Common properties	**Name** Displays the name of the measurement.
File properties	**File date** Displays the modification time of the measurement file. **File name** Displays the full path of the measurement file. **File size** Displays the file size of the measurement file in MB.
General properties	**Description** Lets you specify the description of the measurement. **Origin** Displays a string that contains information about the origin of the measurement. **Recording date** Displays the date and time when the recording was started. **User** Displays the user who created the measurement data file.
MDF properties	**Department** Displays the Department MDF property (if available). **Measurement object** Displays the Measurement object MDF property (if available). **Project** Displays the Project MDF property (if available).
Measurement properties	**DST offset** Displays the daylight saving time offset in hours. **Length** Displays the length of the recording in seconds. **Reference time** Displays the date and time to which the time stamps of the measurement refer (start time of the measurement in local time). **Start time stamp** Displays the start time of the recording in seconds relative to the start of the measurement. **Stop time stamp** Displays the stop time of the recording in seconds relative to the start of the measurement. **Time zone offset** Displays the time zone offset in hours in relation to UTC (universal time coordinated). **x-axis offset** Lets you specify the offset of the time axis values in seconds.
Recording properties	**Start condition** Displays a string that describes the start condition of the measurement. **Stop condition** Displays a string that describes the stop condition of the measurement.

Related topics

HowTos

How to Configure the Storage Settings for Recording..... 131

Platform Properties

Purpose

To configure platform-related properties of the measurement configuration.

Properties

Use platform default raster for parameters Lets you specify whether to use the default measurement raster of the selected platform/device also as the default for parameters. If disabled, the **OnChange** raster is used.

For information on selecting a platform default raster, refer to Set as Default Raster on page 320.

Related topics

Basics

Basics on Configuring Measurement..... 78
Basics on Measurement Rasters..... 212

References

Set as Default Raster..... 320

Raster Properties

Purpose

To display details of the raster currently selected in the **Measurement Configuration** controlbar.

Properties

Minimum sampling period Displays the minimum sampling period expected for the selected raster.

For an event-based raster, you can specify the minimum expected sampling period. If the actual sampling period and the minimum sampling period differ too much, the data may not be displayed optimally in ControlDesk. For details,

refer to Problem When Displaying Signals Measured in an Event-Based Raster in the Time Plotter on page 367.

Name Displays the name of the selected raster.

Original raster (Available only for additional rasters) Displays the name of the raster that the selected additional raster is derived from.

Sampling period Displays the sample time of the selected raster. The value is specified in the variable description.

Related topics

Basics

Basics on Measurement Rasters..... 212

Recorder Properties

Purpose

To specify start and stop conditions for recording, and the settings for storing recorded data.

Properties

Active Lets you activate or deactivate the recorder. If deactivated, the recorder's toolbar is grayed out and the recorder's signal list is hidden. If any of its signals are not used by any other element, such as an instrument on a layout, you are asked whether you want to delete them from the measurement signal list, too. If you reactivate a recorder, all its signals are restored in the measurement signal list.

Automatic signal configuration Lets you specify whether a signal is added automatically to the recorder when it is added to the measurement signal list. If enabled, a signal is also removed from the recorder without a warning when it is removed from the measurement signal list.

The recorder symbol visualizes automatic signal configuration by adding an *A*:

Name Lets you specify the name of the recorder.

Start audio signal Lets you specify whether an acoustic signal is output at the start of a recording.

Stop audio signal Lets you specify whether an acoustic signal is output at the end of a recording.

Use measurement timestamps Lets you specify to calculate the time stamps from the beginning of the measurement in ControlDesk. If disabled, the time stamps are calculated from the beginning of the recording. Time stamps are measured in seconds.

Write to file Lets you specify to stream the measured data to the file specified in the Storage information properties. You can clear this option, for example, if you want to access the measured data via a tool automation script only.

If disabled, the recorder symbol is orange: .

Start Condition properties

To specify the start condition for recording.

Number of recording cycles (Available only if "Use start trigger" is enabled) Lets you specify the number of triggered recordings that are started in a sequence. After each recording, ControlDesk waits until the start trigger is invoked again.

Trigger delay (Available only if Use start trigger is enabled) Lets you specify a delay time in seconds when the start trigger is invoked.

- A positive delay value indicates a time period after the start trigger is invoked.
- A negative delay value indicates a time period before the start trigger is invoked.

If a time limit is enabled as stop condition for the recording, the time limit always starts when the trigger is invoked. A negative start trigger delay therefore enlarges the recording time, a positive start trigger delay reduces it. Refer to Basics on Triggered Recording on page 125.

Trigger rule (Available only if Use start trigger is enabled) Displays the trigger rule currently selected for the start trigger, or lets you open the Edit Trigger Rules dialog to specify a trigger rule. Refer to Trigger Rules on page 344.

Use start trigger Lets you specify whether a start trigger is used to delay the start of the recording.

Stop Condition properties

To specify the stop condition for recording.

Recording stop warning (Available only if Time Limit is selected at Stop condition - Type) Lets you specify whether ControlDesk outputs an acoustic signal before the recording stops.

Recording stop warning time (Available only if Time Limit is selected at Stop condition - Type) Lets you specify the warning time in seconds before the recording stops.

Type Lets you specify how ControlDesk stops a recording. The following options are available:

- None: The recording runs without a stop trigger or time limit. The recording must be stopped manually or via automation.
- Time limit: The recording stops after a defined time period.
- Trigger: The recording is stopped by a stop trigger.

Time limit (Available only if Time Limit is selected at Stop condition - Type) Lets you specify a time period in seconds after which ControlDesk stops the recording.

If a start trigger is enabled, the time limit always starts when the trigger is invoked. A negative start trigger delay therefore enlarges the recording time, a positive start trigger delay reduces it. Refer to Basics on Triggered Recording on page 125.

Trigger delay (Available only if Trigger is selected at Stop condition - Type) Lets you specify a time period in seconds for which recording continues after the stop trigger is invoked. A negative delay reduces the recording time by the specified time period.

Trigger rule (Available only if Trigger is selected at Stop condition - Type) Displays the trigger rule currently selected for the stop trigger, or lets you open the Edit Trigger Rules dialog to specify a trigger rule. Refer to Trigger Rules on page 344.

Storage Information properties

To specify the settings for storing recorded data. For details, refer to Storage Information Properties on page 247.

Related topics

Basics

Basics on Triggered Recording..... 125

HowTos

How to Configure the Storage Settings for Recording..... 131
How to Configure Trigger Conditions for Triggered Recording..... 127
How to Define a Trigger Rule for Triggered Recording..... 129

Storage Information Properties

Purpose

To specify the settings for storing measured data.

Properties

Add to experiment Lets you specify whether the measurement data file is added automatically to the current experiment.

Automatic export Lets you specify whether the measured data is exported automatically.

Automatic export: file name prefix (Available only if Automatic export is enabled) Lets you specify a prefix for the export file name. If "Automatic naming" is enabled, the number that is used for the measurement data file name is used for the export file name, too.

Automatic export: file name preview (Available only if Automatic export is enabled) Displays the preview of the export file name of the next recording.

Automatic export: folder (Available only if Automatic export is enabled) Lets you enter a folder to which ControlDesk exports the measurement data file. You can also click the "Browse" button to select an existing folder. If you do not specify a folder, the recording is saved in the `Measurement Data` folder in the *Documents* folder.

Automatic export: file type (Available only if Automatic export is enabled) Lets you select one of the following export file formats:

- ASAM MDF 4.1 file (file name extension: MF4)

  File format for binary files containing measurement data in ASAM MDF format version 4.x. MDF 4.x is ControlDesk's standard file format for measurement data files. ControlDesk includes *reduction data* when measurement data is saved/exported to the ASAM MDF 4.x file format.
- Comma Separated Values file (CSV)
- MATLAB file (MAT)

  MATLAB® binary file format.

  For details on the structure of MAT files generated by exporting recorded data, refer to Structure of MAT Files Generated by Exporting Recorded Data on page 209.

If you want to export recorded maps, curves, and axes, make sure that the ASAM MDF 4.x file format is selected. Recorded maps, curves and axes are omitted when you select any other export file format.

Automatic naming Lets you specify whether measurement data files are named automatically. If enabled, ControlDesk automatically adds a number to the file name. This number is increased by 1 after each new recording. If Automatic export is enabled, the number is also used for the export file.

Automatic naming: minimum digits (Available only if Automatic naming is enabled) Lets you specify the minimum number of digits that are used for the automatic naming number.

Automatic naming: start index (Available only if Automatic naming is enabled) Lets you specify a start number for automatic naming. This number is used for the next recording.

Automatic save dialog Lets you specify whether ControlDesk prompts for the storage settings whenever a recording is stopped.

Description Lets you specify a default text for the file description. You can change this text via the properties dialog of the measurement data file later on. The description is also displayed in the Description column of the Measurement Data Pool.

Tip

You can store a template for the default description of recordings. Open a text editor and enter the text you want to use as a template. Then save the text file as `Recording_Default_Description.txt` in the *Local Program Data folder*. ControlDesk uses the new default description for recordings when you create a new experiment.

File name prefix Lets you enter a prefix for the measurement data file name. If Automatic naming is enabled, ControlDesk automatically adds a number to the file name prefix. The measurement data file is automatically stored in the file system after recording.

File name preview Displays the preview of the file name of the next recording.

Open in measurement data pool Lets you specify whether a recorded measurement is added to the Measurement Data Pool.

Recording file type Lets you select the file type for recording.

Use measurement timestamps Lets you specify to calculate the time stamps from the beginning of the measurement in ControlDesk. If disabled, the time stamps are calculated from the beginning of the recording. Time stamps are measured in seconds.

Related topics

Basics

Basics on Configuring Recording..... 119
Performing Data Recording..... 135

Trigger Properties

Purpose

To configure the selected platform or duration trigger.

Properties

Condition (Available only for platform triggers) Displays the trigger condition specified for the selected trigger. If Enabled is selected, you can create or modify the trigger condition in the Measurement Configuration controlbar. Refer to Measurement Configuration on page 290.

If the trigger is assigned to a platform on which a DsDAQ service is running, you can edit the trigger condition string in the edit field. The trigger condition must contain one or more symbol names from the Variable Mappings list. The syntax must be XIL API conform (regular expressions, subset of the ASAM General Expression Syntax). The trigger condition is checked during editing. If the entered

string does not meet the requirements, the trigger is disabled and must be enabled explicitly.

The following tables show the functions and operators you can use.

Operator	Syntax	Meaning
posedge	`posedge(Expr1, Expr2)`[1]	Returns true when the value of `Expr1` changes from a value lower than `Expr2` to a value greater than or equal to `Expr2` (positive edge detection).
negedge	`negedge(Expr1, Expr2)`[1]	Returns true when the value of `Expr1` changes from a value greater than `Expr2` to a value lower than or equal to `Expr2` (negative edge detection).
changed	`changed(Expr1, Expr2)`[1]	Returns true when the difference between the current value of `Expr1` and its direct successor is greater or equal to `Expr2` (value change detection).
changedpos	`changedpos(Expr1, Expr2)`[1]	Returns true when the current value of `Expr1` is greater than its predecessor at least by `Expr2` (positive value change detection).
changedneg	`changedneg(Expr1, Expr2)`[1]	Returns true when the current value of `Expr1` is smaller than its predecessor at least by `Expr2` (negative value change detection).
sin	`sin(Expr)`[2]	Returns the sine of `Expr`.
cos	`cos(Expr)`[2]	Returns the cosine of `Expr`.
abs	`abs(Expr)`	Returns the absolute value of `Expr`.
pow	`pow(Expr1, Expr2)`	Returns the value of `Expr1` to the power of `Expr2`.
min	`min(Expr1, Expr2)`	Returns the value of the smaller expression.
max	`max(Expr1, Expr2)`	Returns the value of the greater expression.

[1] Where `Expr1` defines a signal and `Expr2` defines a number.
[2] Where Expr is specified in radian.

Operator	Meaning
&&	Logical *and* of the left and right operands.
||	Logical *or* of the left and right operands.
^^	Logical *exclusive or* of the left and right operands.
!	Logical *not* of the right operand.
&>	Logical *and then* of the left and right operands.
<	The left operand is smaller than the right operand.
<=	The left operand is smaller than or equal to the right operand.
>	The left operand is greater than the right operand.
>=	The left operand is greater than or equal to the right operand.
==	The left operand is equal to the right operand.
!=	The left operand is not equal to the right operand.
+	The sign of the right operand or the sum of the right and left operands.
-	The sign of the right operand or the difference of the right and left operands.

Operator	Meaning
*	The product of the right and left operands.
/	The ratio of the right and left operands.
**	The left operand to the power of the right operand.

Delay (Available only for platform triggers, and only if "Enabled" is selected) Lets you specify a time period in seconds after which the trigger is invoked. For example, if the platform trigger is used as the start trigger for a measurement raster, data capture is not started until the specified trigger delay time has elapsed.

Duration (Available only for duration triggers, and only if "Enabled" is selected) Lets you specify the time period in seconds after which the trigger is invoked. A duration trigger can be used as a stop trigger only, so the duration value specifies the length of a capture using the selected measurement raster.

Enabled Lets you enable or disable the selected trigger. A disabled trigger is not evaluated, and the trigger event will never occur. For example, if you disable a platform trigger which is specified as the start trigger for a measurement raster, the measurement raster starts without trigger as soon as measurement is started or you click the Start button in the Measurement Configuration controlbar.

Note

When you measure large amounts of data on dSPACE platforms, for example, when you perform *continuous (untriggered)* measurements using high-frequency measurement rasters, the operability of ControlDesk might be reduced.

Name Lets you specify the name of the selected trigger.

Sample Count (Available only for sample count triggers, and only if Enabled is selected) Lets you specify the number of samples to be captured until the trigger is invoked. A sample count trigger can be used as a stop trigger, so the count value specifies the length of a capture.

Timeout (Available only for platform triggers, and only if "Use Timeout" is enabled) Lets you specify a timeout value in seconds for the selected trigger.

Use timeout (Available only for platform triggers, and only if "Enabled" is enabled) Lets you specify whether a timeout is used for the trigger. If enabled, the trigger is invoked after the timeout period even if the trigger condition has not been fulfilled within the specified timeout. For example, if the platform trigger is used as a start trigger for a measurement raster, the capture is started after the timeout period, regardless of whether or not the start trigger has been invoked during the specified time period.

Related topics

Basics

Basics on Triggered Measurement 87

Workflow for Configuring Triggered Measurement.....91

Triggered Raster Properties

Purpose

To specify settings for triggered measurement using the raster currently selected in the **Measurement Configuration** controlbar.

Properties

Auto repeat Lets you specify whether the triggered measurement is repeated automatically. If enabled, the trigger is armed. The raster waits for the next start trigger event after a stop trigger occurred.

Auto repeat behavior (Available only if the application on the real-time hardware contains the DsDAQ service. For host services, **Delayed** is selected and cannot be changed.) Lets you specify whether to re-arm the start trigger for the next capture in an automatically repeated measurement immediately or after a delay for data upload. This property is relevant only if a start trigger is enabled for the raster.

Value	Description
Delayed	If **Auto repeat** is enabled for a raster, the subsequent capture is re-armed after the signal data of the preceding one is uploaded to the host PC. ▪ Advantage: ControlDesk schedules the subsequent measurements. This avoids exceeding the bandwidth of the measurement raster. ▪ Disadvantage: If you measure a large amount of signals, gaps between the measurements become larger and not all trigger occurrences are measured.
Immediate	If **Auto repeat** is enabled for a raster, the subsequent capture is re-armed immediately after the end of the preceding capture. ▪ Advantage: All trigger occurrences are measured. ▪ Disadvantage: If you measure a large amount of signals, the measurement stops if the bandwidth of the measurement raster is exceeded.

Tip

You can specify the default Auto repeat behavior setting for newly added rasters in the ControlDesk Options dialog. Refer to Measurement Configuration Page on page 302.

Capture state Displays the current capture state of the selected raster. The value applies only when the raster is used on dSPACE real-time platforms.

Downsampling Lets you specify a DAQ downsampling factor for the data capture to reduce the amount of measurement data. For example, a downsampling factor of 2 means that only every second data sample according to the data acquisition rate is transferred to the ControlDesk PC. All data samples in between are ignored.

Multi-capture history (Available only if no measurement is running) Lets you enable or disable the multi-capture history. If enabled, all the captures of a triggered measurement using the selected raster are stored in the measurement buffer until the buffer is full. The measurement buffer is a ring buffer, so earlier values will be overwritten by later values when the buffer capacity is exceeded.

Related topics

Basics

Basics on Triggered Measurement 87

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Not available in operator mode.

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Not available in operator mode.

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Add Additional Raster

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – raster of a platform node in the measurement configuration tree
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new raster to the selected platform.

Description

A measurement raster created by copying a platform raster. An additional raster lets you measure and record variables of a real-time or offline simulation application *with the sampling period of the original platform raster, but with different trigger conditions*.

You can work with additional rasters just like with a platform raster. In contrast to platform rasters, additional rasters are not stored in the variable description but in the experiment, and you can remove them.

Note

The number of additional rasters with the same sampling period, i.e., copied from the same platform raster, is limited to seven.

Result

The additional raster is made available for variables of the selected platform. You can select it in the measurement signal list. Refer to Measurement Configuration on page 290.

Related topics

Basics

Basics on Measurement Rasters..... 212

References

Measurement/Recording-Related Commands..... 254
Remove Additional Raster..... 312

Add Data Logger

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration – Data Loggers** - Platform node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new data logger.

Result

ControlDesk adds a new data logger to the selected platform below the **Data Loggers** node in the measurement configuration tree.

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Activate Variables for Data Logging..... 157

References

Data Logger Properties..... 242
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Add Hardware Polling Raster

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – platform/device nodes in the measurement configuration tree (subnodes of the **Acquisition** element)
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a hardware polling raster to the selected platform/device.

Description

A measurement raster for platforms and devices. Hardware polling rasters are predefined by ControlDesk. They let you perform time-based measurement on ECUs, VPUs, and real-time hardware that have no synchronous measurement raster implemented. Hardware polling rasters represent time cycles when ControlDesk performs reading operations on the ECUs, VPUs, or real-time hardware periodically according to the selected raster.

Whether hardware polling rasters are supported depends on the specific real-time hardware, VPU, ECU and/or interface. Some of them do not support polling rasters at all, others do not provide full access to all parameters or measurement variables.

Note

- The number of hardware polling rasters for a platform is limited to six.
- For measurement and calibration via the ECU Diagnostics device, the value of hardware polling rasters must not exceed the range 500 … 5000 ms.
  However, it is recommended not to use hardware polling rasters for measurement and calibration via the ECU Diagnostics device. ControlDesk offers specific polling rasters for ECU Diagnostics devices (see below).

Result

The hardware polling raster is made available for variables of the selected platform/device. You can select it in the measurement signal list. Refer to Measurement Configuration on page 290.

Related topics

Basics

Basics on Measurement Rasters..... 212

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Add New Duration Trigger

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Duration Triggers node in the measurement configuration tree
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new duration trigger.

Result

ControlDesk adds a new duration trigger to the **Duration Triggers** element in the measurement configuration tree. The new duration trigger can be assigned to a raster later on.

You can configure the duration trigger in the configuration area of the **Measurement Configuration** controlbar or via the **Properties** controlbar.

Related topics

HowTos

How to Change the Assignment of Triggers to Measurement Rasters..... 98

References

Measurement/Recording-Related Commands..... 254

Add New Platform Trigger

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Platform nodes in the measurement configuration tree (subnodes of the **Triggers** element)
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new platform trigger.

Result

ControlDesk adds a new platform trigger to the selected platform element in the measurement configuration tree. The new platform trigger can be assigned to a raster later on.

You can configure the platform trigger in the configuration area of the **Measurement Configuration** controlbar or via the **Properties** controlbar.

Related topics

HowTos

How to Change the Assignment of Triggers to Measurement Rasters..... 98

References

Measurement/Recording-Related Commands..... 254

Add New Sample Count Trigger

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Platform nodes in the measurement configuration tree (subnodes of the **Triggers** element)

Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new sample count trigger.

Result

ControlDesk adds a new sample count trigger to the selected platform element in the measurement configuration tree. The new sample count trigger can be assigned to a measurement raster later on.

You can configure the platform trigger in the configuration area of the **Measurement Configuration** controlbar or via the **Properties** controlbar.

Related topics

HowTos

How to Change the Assignment of Triggers to Measurement Rasters..... 98

References

Measurement/Recording-Related Commands..... 254

Add Simulation Time Group

Access

You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – **Hardware Configurations** folder
Shortcut key	None
Icon	None

Purpose

To add a new simulation time group to an experiment.

Result

A new empty simulation time group is added to the active experiment and displayed in the **Project** controlbar.

The simulation time group can be used as a container for collecting platforms/devices of the active experiment that have synchronized simulation times. When performing synchronized data acquisition, ControlDesk does not synchronize the time stamps of the measurement values for the individual platforms/devices belonging to the simulation time group, but uses one time stamp for the simulation time group as a whole. Resynchronization is performed across simulation time groups and platforms/devices that do not belong to any simulation time group, but not within the simulation time groups.

Related topics

Basics

Synchronized Data Acquisition Across ECUs, RCP and HIL Systems, and Bus Systems..... 228

References

Configure Simulation Time Group..... 269
Rename Simulation Time Group..... 309

Add to Experiment (Measurement Data Pool)

Access

This command is available only if no measurement with the same name exists in the **Project** controlbar. You can access this command via:

Ribbon	None
Context menu of	**Measurement Data Pool** – measurement data file
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add the measurement data file to the experiment.

Tip

If you want recorded measurements to be added to experiments automatically, you can activate this via the **Properties** controlbar. Refer to Recorder Properties on page 245.

Related topics

HowTos

How to Open a Measurement Data File in the Measurement Data Pool..... 189

References

Measurement/Recording-Related Commands..... 254
Recorder Properties..... 245

Add to Recorder

Access

You can access this command via:

Ribbon	None
Context menu of	Measurement Configuration – measurement signal list – variable
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add the selected variable(s) to the recorder signal list.

Result

The selected variables are added to the Recorder, so they are included in subsequent recordings.

Description

You can also add the variable(s) by dragging them to the Recorder.

Related topics

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Auto Repeat

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – measurement raster node in the measurement configuration tree (subnode of the **Acquisition** element)
Shortcut key	None
Icon	None

Purpose

To specify whether triggered measurement with the selected measurement raster is performed once or repeatedly.

Result

If the **Auto repeat** option is enabled, triggered measurement is repeated automatically for the selected measurement raster. After a stop trigger occurs, the measurement raster waits until the start trigger is invoked again, and then ControlDesk performs triggered measurement again. If no start trigger is defined, ControlDesk resumes triggered measurement immediately.

If the **Auto repeat** option is disabled, triggered measurement using the selected measurement raster is performed only once. Triggered measurement with the raster is not repeated after the stop trigger occurs.

Description

ControlDesk provides further ways to enable or disable the **Auto repeat** option for a measurement raster:

- Via the **Properties** controlbar of the measurement raster, refer to Triggered Raster Properties on page 252.
- In the configuration settings of the start and stop triggers assigned to the measurement raster, refer to Measurement Configuration on page 290.

Related topics

References

Measurement/Recording-Related Commands 254
Start/Stop 335

Bookmarks

Access

You can access this command via:

Ribbon	None
Context menu of	Measurement Data Pool
Shortcut key	None
Icon	None

Purpose

To open or close the bookmark list.

Description

In the Measurement Data Pool, you can list bookmarks recorded in the measurement data files. ControlDesk displays the bookmarks depending on the selected item. If you select the root node, ControlDesk displays all recorded bookmarks. If you select a measurement data file, ControlDesk displays the bookmarks recorded in this file.

You can sort the listed bookmarks in ascending or descending order by clicking the selected column.

Double-clicking a bookmark opens the Edit Bookmarks dialog. The specific bookmark is selected in the bookmark list of the Edit Bookmarks dialog. Refer to Edit Bookmarks on page 273.

Related topics

References

Edit Bookmarks..... 273

Close (Measurement Data File)

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Project controlbar – measurement data file ▪ Measurement Data Pool – measurement data file
Shortcut key	None
Icon	None

Purpose

To remove a measurement from the **Measurement Data Pool**.

Related topics

References

Measurement/Recording-Related Commands..... 254

Close All (Measurement Data Files)

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Data Pool**
Shortcut key	None
Icon	None

Purpose

To remove all the measurements from the **Measurement Data Pool**.

Related topics

References

Measurement/Recording-Related Commands..... 254

Configure Simulation Time Group

Access

You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – simulation time group
Shortcut key	None
Icon	None

Purpose

To manage the members of the selected simulation time group.

Result

A Simulation time group dialog opens for you to specify the platforms/devices belonging to the selected simulation time group.

Simulation time group dialog

To add members to and remove members from the selected simulation time group.

Preferred Master Lets you specify a master for the simulation time group. The master should have a low latency and a high synchronization accuracy. The list contains all the current members of the simulation time group for selection. If there is a simulation time group member that has a lower latency and a higher synchronization accuracy than the other members, select it as the master. Otherwise, select <automatic> to let ControlDesk assign the master.

Available platforms Lists all the platforms/devices contained in the active experiment that support the *simulation time group* feature and that are not yet assigned to any simulation time group. You can select one or more of these platforms/devices to add to the simulation time group. Then click Add.

Note

A VEOS platform can only be grouped together with platforms/devices that can inherit from a VEOS platform within a simulation time group. Examples are XCP on Ethernet devices, XCP on CAN devices, and LIN Bus Monitoring devices.

Current members Lists all the current members of the simulation time group. You can select one or more of the listed platforms/devices to remove from the simulation time group. Then click Remove.

Add Lets you add the platforms/devices currently selected in the Available platforms list to the simulation time group as new members. After you click OK to confirm your settings, the Project controlbar displays the simulation time group with references to all the platforms/devices that are assigned to the group.

Remove Lets you remove the platforms/devices currently selected in the Current members list from the simulation time group. After you click OK to confirm your settings, the simulation time group no longer contains references to the removed platforms/devices.

Related topics

Basics

Synchronized Data Acquisition Across ECUs, RCP and HIL Systems, and Bus Systems..... 228

References

Add Simulation Time Group..... 264
Rename Simulation Time Group..... 309

Create New Recorder

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Recorders
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To add a new recorder to the **Measurement Configuration**.

Result

A new recorder with an empty recorder signal list is added to the **Measurement Configuration**.

Related topics

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Data Acquisition Page

Access

This page is part of the **ControlDesk Options** dialog.

The dialog can be opened via the **Options Command** (ControlDesk User Interface Handling 🕮).

Purpose

To enable or disable periodic timer resynchronization, to specify how to include parameters located outside the memory segments in checks when online calibration is started, and to specify a refresh rate for variable observation.

Dialog settings

Enable resynchronization Lets you enable or disable timer resynchronization globally for all platforms/devices. Timer resynchronization is enabled by default. Within an experiment, you can disable timer

resynchronization for platforms/devices individually. Refer to General Settings Properties (ControlDesk Platform Management 🕮).

Note

- To use ControlDesk's timer resynchronization in connection with bus interfaces from Vector Informatik, perform the following steps:
  1. Enable the **Software time synchronization** option in Vector Informatik's hardware configuration tool. The tool is accessible via the **Control Panel**.
  2. Restart the interface driver.

  For details, refer to Vector Informatik's user documentation.
- A VEOS platform is always enabled for periodic timer resynchronization regardless of this property setting.

Synchronization time in ms Lets you specify the synchronization time in ms. The synchronization time must be in the range 100 ms ... 60,000 ms, and must be divisible by 100. The platforms/devices will be resynchronized periodically at the specified time interval.

Note

Timer resynchronization is not possible for CAN-based devices using Kvaser CAN interfaces if the measurement time exceeds 11 hours 55 minutes. The individual timers of these devices can drift apart during long-term measurements.

Ignores unconnected parameters outside of memory segments (Relevant for devices, not for platforms) Lets you specify which of the parameters that are *located outside the defined calibration memory segments* are to be included in an upload or download when online calibration is started.

- If the checkbox is selected, only the connected parameters (i.e., the parameters that are connected to an instrument on a layout) are uploaded or downloaded when online calibration is started. Unconnected parameters are ignored.
- If the checkbox is cleared, the connected and unconnected parameters are uploaded or downloaded when online calibration is started.

For more information, refer to ECU Parameter Values After Online Calibration Start (ControlDesk Calibration and Data Set Management 🕮).

Enable Variable Observer Lets you enable or disable variable observation globally for all platforms and devices. Variable observation is enabled by default. If enabled, you can specify a time period for the Variable Observer.

Variable Observer period [ms] Lets you specify a refresh rate for variable observation. ControlDesk reads the values of the variables of an application periodically every specified time period.

Related topics

Basics

Basics on Synchronized Data Acquisition..... 228
ECU Parameter Values After Online Calibration Start (ControlDesk Calibration and Data Set Management 🕮)
Observing Variables..... 224

References

Options Command (ControlDesk User Interface Handling 🕮)

Edit Bookmarks

Access

You can access this command via:

Ribbon	Home - Bookmark
Context menu of	None
Shortcut key	None
Icon	
Mouse	Double-click a bookmark in a Time Plotter or in the Measurement Data Pool

Purpose

To edit bookmarks.

Description

Bookmarks can be edited in the Edit Bookmarks dialog on page 273.

Edit Bookmarks dialog

Lets you specify the settings of bookmarks.

In the following description, the list at top left and the list at top right of the dialog are called the measurement file list and the bookmark list, respectively.

Measurement list Contains a list of all measurement files currently open in the measurement data pool. If a new measurement exists in the measurement buffer, it is displayed in the first row with the name current measurement. A specific color is assigned to every measurement file. All the bookmarks of a measurement file are displayed in the same color in the Time Plotter. If the checkbox in the first column is selected, all the bookmarks of the measurement file are shown in the bookmark list.

Bookmark list Contains all the bookmarks of measurement files whose checkboxes are selected in the measurement file list. By default, the bookmarks

are sorted in time ascending order. The measurement file, the time when the bookmark was set, and the name are indicated for each bookmark. You can sort the listed bookmarks by clicking any of the columns of the bookmark list.

The bookmark list contains the following columns:

Column	Description
Type	Displays the bookmark type. Bookmarks of the type **user event** are those that are set manually. For a description of bookmarks that ControlDesk sets automatically, refer to Bookmark Types dialog on page 275.
File	Displays the name of the measurement file the bookmarks belongs to.
Time [s]	Displays the time stamp of the bookmark.
Title	Displays the title of the selected bookmark.
Description	Displays the description of the selected bookmark.

You can select several bookmarks at once. Apart from selecting the desired bookmark by using the mouse, you can use one of the following buttons to move between bookmarks.

Button	Description
|<	Selects the first bookmark in the bookmark list.
<	Selects the bookmark above the currently selected bookmark.
>	Selects the bookmark below the currently selected bookmark.
>|	Selects the last bookmark in the bookmark list.

In recorded files, bookmarks that belong to the same recording are the same color.

Time [s] Lets you edit the time stamp of the selected bookmark.This edit field is activated only if exactly one bookmark is selected in the bookmark list.

Title Lets you edit the title of the selected bookmark. This edit field is activated only if exactly one bookmark is selected in the bookmark list.

Description Lets you enter or edit additional information on the selected bookmark. This edit field is activated only if exactly one bookmark is selected in the bookmark list.

Apply Accepts all changes. The dialog remains open after you click this button.

New Creates a new bookmark. This button is activated only if a measurement file is selected in the measurement file list.

Delete Deletes all selected bookmarks.

Sync Changes the x-axis offset of measurements. This button is activated only if at least two bookmarks are selected in the bookmark list and if these bookmarks belong to different measurements. The bookmark that was selected

first (not necessarily the first bookmark in the list) is taken as a reference. The offset of the measurement file containing the selected bookmark is not changed. The x-axis offsets of all other files involved are changed, however, in such a way that the times of all selected bookmarks are made synchronous.

Search Lets you search for bookmarks.

Related topics

Basics

Basics on Bookmarks..... 178

References

Edit Bookmark Settings..... 275

Edit Bookmark Settings

Access

You can access this command via:

Ribbon	Home - Bookmark
Context menu of	None
Shortcut key	None
Icon	

Purpose

To specify whether automatic bookmarks are recorded or visualized for selected events.

Bookmark Types dialog

Bookmark Type Displays the events on which ControlDesk can automatically set bookmarks during a measurement or recording.

The following bookmark types are available:

Bookmark Type	Description
Calculated variable error	Bookmark is set when a calculation error occurs
Data set activation	Bookmark is set when a memory page is activated (for example, by switching between working and reference page)
Data set download	Bookmark is set when a data set is written to a memory page of the platform/device

Bookmark Type	Description
Diagnostic trouble code	Bookmark is set when the number or contents of DTC entries for a logical link change in one of the following groups in a Fault Memory Instrument: ▪ New DTCs ▪ Remaining DTCs ▪ Removed DTCs
Platform data loss detected	Bookmark is set when a data loss is detected, for example, when a buffer overflow on the real-time hardware or ECU occurs. The number of these bookmarks is limited to approx. 1 per second to avoid affecting system performance.
Platform plugged	Bookmark is set when the platform a measured variable is assigned to is plugged again. The bookmark is set to the first measured value after plugging occurs.
Platform unplugged	Bookmark is set when the platform a measured variable is assigned to is unplugged. The bookmark is set to the last measured value before unplugging occurs.
Start recording	Bookmark is set when a recording starts
Stop recording	Bookmark is set when a recording stops
Trigger	Bookmark is set when a trigger is invoked (activated in the Trigger Rules on page 344 dialog).
XIL API EESPort Manual Trigger	Bookmark is set when an XIL API EESPort manual trigger is invoked via the Trigger (Error Configuration) (ControlDesk Electrical Error Simulation via XIL API EESPort 🕮) command.

Recording Lets you specify whether bookmarks for the selected event are recorded when they occur. If you disable this option, the bookmarks are not recorded in the measurement data file.

You cannot change this setting during a running recording.

Visualization Lets you specify whether bookmarks for the selected event are visualized during measurement and recording.

Related topics

Basics

Basics on Bookmarks..... 178

References

Edit Bookmarks..... 273

Export (Measurement Data File)

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Project controlbar – measurement data file ▪ Measurement Data Pool – measurement data file (only single file selection)
Shortcut key	None
Icon	None

Purpose

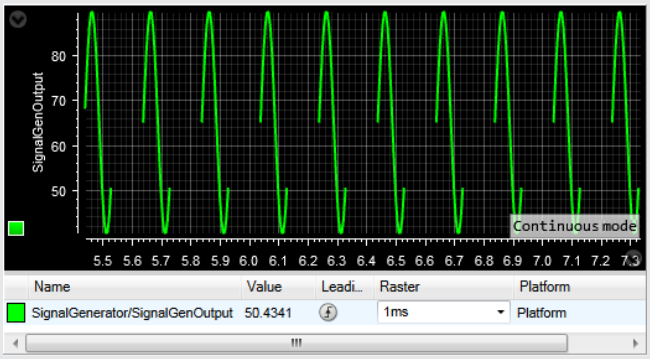
To export recorded data.

Description

If you select more than one file to export, the Export Measurement Files dialog opens to configure the export settings.

Note

When you perform triggered measurements on dSPACE real-time hardware or on VEOS, there are gaps in the measurement.



Measurement gaps are supported by the MF4 file format. When you export recorded data with measurement gaps to other file formats such as MAT or CSV, the gaps are lost. When you visualize such a file in a Time Plotter, the last data point of a triggered measurement period is connected with the first data point of the following period as a consequence.

Export Measurement Files dialog

This dialog opens if you have selected more than one file to export. Before the export of the first file starts, ControlDesk checks if one of the desired target files already exists.

Tip

- If you select only one file to export, the **Save as** dialog (see below) opens.
- For the ASAM MDF file format, you can specify whether to export variables with or without path and block group information. Refer to Measurement Files Page on page 303.

Select format of exported files Lets you select one of the following file formats for the file to be exported.

- ASAM MDF 4.1 file (file name extension: MF4)

  File format for binary files containing measurement data in ASAM MDF format version 4.x. MDF 4.x is ControlDesk's standard file format for measurement data files. ControlDesk includes *reduction data* when measurement data is saved/exported to the ASAM MDF 4.x file format.
- Comma Separated Values file (CSV)
- MATLAB file (MAT)

  MATLAB® binary file format.

  For details on the structure of MAT files generated by exporting recorded data, refer to Structure of MAT Files Generated by Exporting Recorded Data on page 209.

Select action if target file already exists The following options are available:

Option	Description
Overwriting existing file	An existing file is overwritten without a warning.
Ask	Opens a dialog which asks you whether to overwrite an existing file.
Skip	Skips the export for the file and continues with the next selected file.
Cancel Export of all Files	Cancels the whole export process. None of the selected files will be exported.

Save as dialog

This dialog opens if you have selected one file to export.

Save as type Lets you select one of the following file formats for the file to be exported.

- ASAM MDF 4.1 file (file name extension: MF4)

  File format for binary files containing measurement data in ASAM MDF format version 4.x. MDF 4.x is ControlDesk's standard file format for measurement data files. ControlDesk includes *reduction data* when measurement data is saved/exported to the ASAM MDF 4.x file format.
- Comma Separated Values file (CSV)
- MATLAB file (MAT)

  MATLAB® binary file format.

For details on the structure of MAT files generated by exporting recorded data, refer to Structure of MAT Files Generated by Exporting Recorded Data on page 209.

Include bookmarks (This option only affects MF4 files) Lets you specify whether to include bookmarks in the export file. This option is enabled by default.

Related topics

HowTos

How to Export Recorded Data 146

References

Measurement Files Page 303

Export (Recorder)

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Recorder
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To export a recorder with its signal list and its property settings.

Result

The recorder is exported to a file.

Description

The export file contains the signal list and the property settings of the recorder.

- To add the signals of the exported recorder to another recorder, refer to Import Signals on page 284.
- To import the complete recorder to a **Measurement Configuration**, refer to Import Recorder on page 283.

Related topics

References

Import Recorder 283
Import Signals 284
Measurement Configuration 290
Measurement/Recording-Related Commands 254

Filtered Raster View

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – platform/device nodes in the measurement configuration tree (subnodes of the **Acquisition** element)
Shortcut key	None
Icon	None

Purpose

To activate a filter for the measurement rasters that are displayed in the measurement configuration tree.

Description

You can filter the measurement rasters that are displayed for a platform/device in the measurement configuration tree.

If activated, only the following rasters are visible:

- The measurement rasters that are visible in the signal list
- The measurement rasters that are activated for a signal
- The hardware polling rasters that have been added to a variable
- The additional rasters that have been added to a variable

For an overview on the different display settings for measurement rasters, refer to Handling a Large Number of Measurement Rasters on page 218.

Result

The measurement rasters that are displayed for a platform/device in the measurement configuration tree are filtered.

Related topics

Basics

Basics on Measurement Rasters 212

Handling a Large Number of Measurement Rasters..... 218

References

Measurement/Recording-Related Commands..... 254

Find Bookmarks

Access

You can access this command via:

Ribbon	Home - Bookmark
Context menu of	None
Shortcut key	None
Icon	

Purpose

To find bookmarks.

Description

Different files are searched for bookmarks depending on how you access the Find Bookmarks dialog on page 282.

Access	Description
Via the Home ribbon	All loaded measurement data files and current measurements are searched for bookmarks.
Via the Edit Bookmarks dialog	All selected measurement data files in the measurement file list of the Edit Bookmarks dialog are searched for bookmarks.

Find Bookmarks dialog

Search for Lets you enter a search string. From the drop-down list, you can select a search string previously entered during your ControlDesk session. If no search string is entered, all existing bookmarks are searched for.

First Activates the first bookmark found.

Previous Activates the bookmark previously found.

Next Activates the next bookmark found.

Last Activates the last bookmark found.

Status bar Displays the number of the match, the total number of matches, the time stamp of the respective bookmark and the file name it is found in.

Related topics

References

Measurement/Recording-Related Commands..... 254

Import (Measurement Data File)

Access

You can access this command via:

Ribbon	None
Context menu of	Project controlbar – measurement data node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To import a measurement data file to the experiment and open it in the Measurement Data Pool.

Description

ControlDesk lets you import measurement data in the following formats:

- ASAM MDF 4.1.x file (MF4)
- Comma Separated Values file (CSV)
- MATLAB file (MAT)
- Binary file (BIN)
- GPX file (GPX)

Import of GPX files You can import a GPX file containing recorded tracks, routes, and waypoints. To use the positioning data, the GPX file must contain time stamps. Trackpoints, routepoints, and waypoints without a time stamp are ignored. ControlDesk creates a block group in the signal path for each track or route. Waypoints are displayed in a measurement as bookmarks.

- Mandatory signals: To create a signal, the GPX file must contain the following attributes for each trackpoint, routepoint, or waypoint.

Attribute	Signal Name
lat	Latitude
lon	Longitude

- Optional signals: The following optional signals are only created, if the GPX file contains the required element for each trackpoint, routepoint, or waypoint.

Element	Signal Name
ele	Altitude
geoidheight	Geoidal Separation
sat	Satellites

Result

Opens a standard **Open** dialog to select a measurement data file. The selected file is added to the experiment and opened in the **Measurement Data Pool**.

Related topics

HowTos

How to Import a Measurement Data File..... 200

References

File Types (ControlDesk User Interface Handling)

Import Recorder

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Recorders
Shortcut key	None
Icon	None

Purpose

To import a recorder with its signal list and property settings.

Result

A new recorder with the imported signal list is added to the **Measurement Configuration**. The recorder properties stored in the file are also imported.

If the recorder properties contain triggers, the names of the trigger rules are imported but not the rules themselves. If ControlDesk finds trigger rules with the same names in the active experiment of the importing PC these rules are used.

Related topics

References

Export (Recorder)..... 279
Import Signals..... 284
Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Import Signals

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Recorder
Shortcut key	None
Icon	None

Purpose

To import signals to a recorder.

Result

Opens a standard **Open** dialog to select a file containing an exported recorder signal list. All the signals in the file are added to the recorder signal list of the selected recorder, except for those that are already contained.

Related topics

References

Export (Recorder)..... 279
Import Recorder..... 283
Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Invoke Trigger

Access

You can access this command via:

Ribbon	Home – Recording
Context menu of	None
Shortcut key	**F10** (all recorders)
Icon	

Purpose

To invoke a start trigger manually for all recorders or for a selected recorder.

Description

This command is available if you have started a triggered recording including a start trigger. It enables you to start the triggered recording manually without waiting for the start trigger condition.

Related topics

References

Measurement/Recording-Related Commands..... 254

Load to Flash (Data Logger)

Access

You can access this command via:

Ribbon	None
Context menu of	Measurement Configuration – Data logger node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To load the data logging configuration of a data logger to the flash memory of the real-time hardware.

Result

ControlDesk loads the data logging configuration to the flash memory of the real-time hardware. Data logging is started after a restart of the real-time hardware or via **Start** in the data logger's context menu. The data is written to a new MF4 measurement data file on the connected USB device.

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Load a Data Logging Configuration to the Real-Time Hardware..... 161

References

Add Data Logger..... 260
Data Logger Properties..... 242
Remove (Data Logger)..... 311

Measure All Continuously (Disables Triggers)

Access

This command is available only for dSPACE real-time platforms. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – platform nodes in the measurement configuration tree (subnodes of the **Acquisition** element)
Shortcut key	None
Icon	None

Purpose

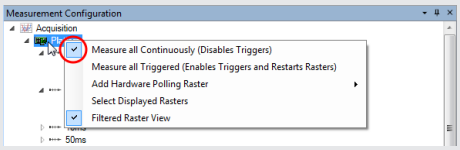
To disable the triggers of all the rasters of the selected platform.

Result

The measurement rasters of the selected platform are in continuous mode, i.e., data flow between the dSPACE real-time hardware or VEOS and the host PC is continuous for the measurement rasters.

Tip

A check symbol in the context menu of the measurement raster indicates that all triggers are disabled for all the measurement rasters of a platform and measuring is performed continuously.



Description

ControlDesk disables the assigned start and stop triggers of the measurement rasters in one step. The measurement rasters change from triggered mode to continuous mode. The disabled triggers are not evaluated on the real-time hardware or VEOS, and data is captured continuously for the measurement rasters.

Related topics

References

Measure All Triggered (Enables Triggers and Restarts Rasters)..... 287
Measure Continuously (Disables Triggers)..... 288
Measure Triggered (Enables Triggers and Restarts Rasters)..... 289
Measurement/Recording-Related Commands..... 254

Measure All Triggered (Enables Triggers and Restarts Rasters)

Access

This command is available only for of dSPACE real-time platforms. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – platform nodes in the measurement configuration tree (subnodes of the **Acquisition** element)
Shortcut key	None
Icon	None

Purpose

To enable the triggers of all the measurement rasters of the selected platform and restart measurement for the measurement rasters.

Result

The measurement rasters of the selected platform are in triggered mode. Data flows from the dSPACE real-time hardware or VEOS to the host PC only if the raster's trigger conditions are fulfilled.

Description

ControlDesk enables the assigned start and stop triggers of the measurement raster and then restarts it in triggered mode to make the changes available. The triggers are evaluated on the real-time hardware or VEOS, and data is transferred to the host PC only if the trigger conditions are met.

If no trigger condition is defined for a trigger, the data is transferred as fast as possible for the defined duration/sample count ("free running").

Related topics

References

Measure All Continuously (Disables Triggers)..... 286
Measure Continuously (Disables Triggers)..... 288
Measure Triggered (Enables Triggers and Restarts Rasters)..... 289
Measurement/Recording-Related Commands..... 254

Measure Continuously (Disables Triggers)

Access

This command is available only for measurement rasters of dSPACE real-time platforms. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – measurement raster nodes
Shortcut key	None
Icon	None

Purpose

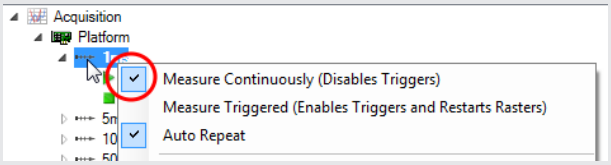
To disable the triggers of the selected raster.

Result

The measurement raster is in continuous mode, i.e., data flow between the dSPACE real-time hardware or VEOS and the host PC is continuous for the measurement raster.

Tip

A check symbol in the context menu of the measurement raster indicates that all triggers are disabled and measuring is performed continuously.



Description

ControlDesk disables the assigned start and stop triggers of the selected measurement raster in one step. The measurement raster changes from triggered mode to continuous mode. The disabled triggers are not evaluated on the real-time hardware or VEOS, and data is captured continuously for the selected measurement raster.

Related topics

References

Measure All Continuously (Disables Triggers)..... 286
Measure All Triggered (Enables Triggers and Restarts Rasters)..... 287
Measure Triggered (Enables Triggers and Restarts Rasters)..... 289
Measurement/Recording-Related Commands..... 254

Measure Triggered (Enables Triggers and Restarts Rasters)

Access

This command is available only for measurement rasters of dSPACE real-time platforms. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – measurement raster nodes in the measurement configuration tree
Shortcut key	None
Icon	None

Purpose

To enable the triggers of the selected measurement raster and restart measurement for the measurement raster.

Result

The measurement raster is in triggered mode. Data flows from the dSPACE real-time hardware or VEOS to the host PC only if the raster's trigger conditions are fulfilled.

Description

ControlDesk enables the assigned start and stop triggers of the selected measurement raster and then restarts the measurement raster in triggered mode. The restart is necessary to make the changes available to ControlDesk. The triggers are evaluated on the real-time hardware or VEOS, and data is transferred to the host PC only if the trigger conditions are met.

If ControlDesk cannot enable an assigned start or stop trigger, for example, because no condition is defined for it, the trigger remains disabled.

Related topics

References

Measure All Continuously (Disables Triggers)..... 286
Measure All Triggered (Enables Triggers and Restarts Rasters)..... 287
Measure Continuously (Disables Triggers)..... 288
Measurement/Recording-Related Commands..... 254

Measurement Configuration

Access

You can access this command via:

Ribbon	View – Controlbar – Switch Controlbars
Context menu of	None
Shortcut key	`Ctrl+M`
Icon	

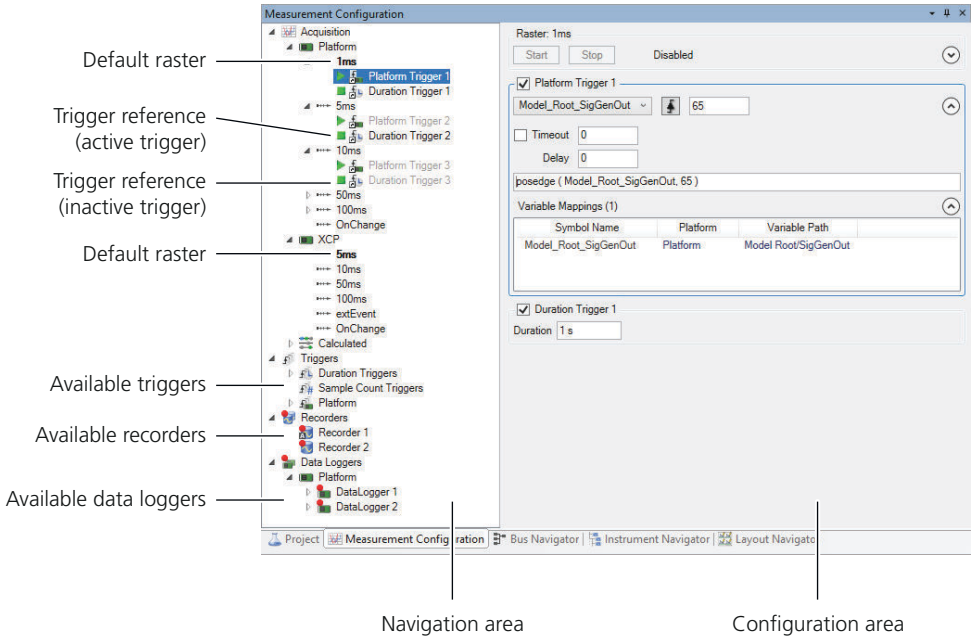
Purpose

To show the **Measurement Configuration** controlbar.

Description

Measurement Configuration A controlbar that allows you to configure measurement, recording and data logging.

The Measurement Configuration controlbar consists of the following areas:



Tip

You can configure the size of the two controlbar areas by dragging the splitter. You can double-click the splitter to toggle its direction (horizontal – vertical).

Navigation area The navigation area contains the following main elements:

The navigation area contains the following main elements:

- Acquisition
- Triggers
- Recorders
- Data Loggers

Refer to Measurement Configuration - Navigation Area on page 300.

Configuration area The configuration area provides the following information and settings:

- Measurement signal list
- Recorder signal list
- Recorder toolbar
- Configuration settings for a platform trigger
- Configuration settings for a duration trigger

Refer to Measurement Configuration - Configuration Area on page 293.

Positioning the controlbar By default, the Measurement Configuration controlbar is located on the left.

You can shift controlbars to any position inside the working area or dock them at the border of the working area. For instructions on positioning controlbars, refer to How to Customize the Screen Arrangement (ControlDesk User Interface Handling 🕮).

Related commands

The Measurement Configuration controlbar provides the following commands:

Purpose	Refer to
To add a hardware polling raster to the selected platform/device.	Add Hardware Polling Raster on page 261
To add a new duration trigger.	Add New Duration Trigger on page 262
To add a new platform trigger.	Add New Platform Trigger on page 263
To add the selected variable(s) to the recorder signal list.	Add to Recorder on page 266
To specify whether triggered measurement with the selected measurement raster is performed once or repeatedly.	Auto Repeat on page 267
To disable the triggers of all the rasters of the selected platform.	Measure All Continuously (Disables Triggers) on page 286
To enable the triggers of all the measurement rasters of the selected platform and restart measurement for the measurement rasters.	Measure All Triggered (Enables Triggers and Restarts Rasters) on page 287
To disable the triggers of the selected raster.	Measure Continuously (Disables Triggers) on page 288
To enable the triggers of the selected measurement raster and restart measurement for the measurement raster.	Measure Triggered (Enables Triggers and Restarts Rasters) on page 289
To view and edit the properties of the selected element.	Properties (Controlbar) (ControlDesk User Interface Handling 🕮)
To remove the selected duration trigger, platform trigger, or sample count trigger.	Remove (Trigger) on page 310
To delete the selected variable(s) from the measurement signal list.	Remove (Variable) on page 311
To delete the selected variable(s) from the recorder signal list.	Remove from Recorder on page 313
To delete the selected recorder from the recorder list.	Remove Recorder on page 314
To specify a measurement raster as the default raster for all the variables of a device.	Set as Default Raster on page 320
To manually start or stop data capture for the selected measurement raster.	Start/Stop on page 335

Related topics

Basics

Basics on Configuring Measurement.....78
Basics on Configuring Recording.....119

Measurement Configuration - Configuration Area

Purpose

To configure the settings of a selected element in the **Measurement Configuration** controlbar.

Description

Configuration area The configuration area provides the following information and settings:

- Measurement signal list (see Signal list for measurements on page 293)
- Recorder signal list (see Signal list for recordings on page 294)
- Data logger signal list (see Signal list for data loggings on page 295)
- Recorder toolbar (see Recorder toolbar on page 295)
- Configuration settings for a platform trigger (see Platform trigger configuration on page 297)
- Configuration settings for a duration trigger (see Duration trigger configuration on page 296)

The contents of the configuration area depend on the item currently selected in the navigation area.

Signal list for measurements

Displays the measurement signal list (completely or filtered by a platform/device, according to the item currently selected in the navigation area of the **Measurement Configuration** controlbar). You can define and configure the signals to be included in measurements and recordings. Multiple selection of signals is possible.

Type Displays the type of the variable.

Connected Shows the connection status of the variable.

Symbol	Description
	A red chain indicates that the variable is visualized in an instrument.
	A yellow chain indicates that the variable is not visualized in an instrument, but is on the measurement signal list.

Active Lets you specify to include the signal in measurements (and recordings).

Variable Displays the name of the variable and the variable path. The elements of the path can be blocks in the real-time model, identifiers of CAN messages, and so on.

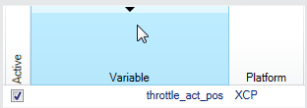
Platform Displays the platform/device on which the variable is measured.

Rasters Displays the available measurement rasters and lets you select the raster to be used for measurement and recording.

The number of measurement rasters available for a variable depends on the variable type, the number of measurement rasters provided by the application interface or real-time system, and whether you added hardware polling rasters to the platform/device. For further information, refer to Basics on Measurement Rasters on page 212.

Tip

You can sort the signal list in ascending or descending order by clicking the header of a column.
Sorting is synchronized in all signal lists (if the selected column is contained in the list).



Signal list for recordings

Displays the signal list of the selected Recorder showing all the signals selected for recording. Lets you configure the recorder.

Type Displays the type of the variable.

Connected Shows the connection status of the variable.

Symbol	Description
	A red chain indicates that the variable is visualized in an instrument.
	A yellow chain indicates that the variable is not visualized in an instrument, but is on the measurement signal list.

Active Displays whether the variable is selected for inclusion in subsequent measurements and lets you change the setting. Recordings can be performed only for variables with measurement activated.

Recorded Displays whether the variable is selected for inclusion in subsequent recordings and lest you change the setting. Recordings can be performed only for variables with measurement activated.

If you want a signal to be excluded from subsequent recording but not from subsequent measurement, you must remove it from the recorder signal list.

Variable Displays the name of the variable and the variable path. The elements of the path can be blocks of the real-time model, identifiers of CAN messages, and so on.

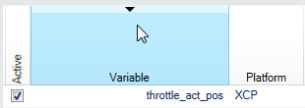
Platform Displays the platform/device on which the variable is measured.

Rasters Displays the measurement raster specified for the variable in the measurement signal list. You cannot change the measurement raster setting in the recorder signal list, since a variable is always measured and recorded in the same measurement raster.

You can clear the measurement raster selection for a variable to exclude it temporarily from subsequent recordings. However, do not change the focus to update the display, as this will remove the variables with cleared measurement raster selection from the signal list.

Tip

You can sort the signal list in ascending or descending order by clicking the header of a column.
Sorting is synchronized in all signal lists (if the selected column is contained in the list).



Signal list for data loggings

Displays the signal list of the selected Data logger. You can define and configure the signals to be included in data loggings. Multiple selection of signals is possible.

Type Displays the type of the variable.

Active Lets you specify to include the signal in data loggings.

Variable Displays the name of the variable and the variable path. The elements of the path can be blocks in the real-time model, identifiers of CAN messages, and so on.

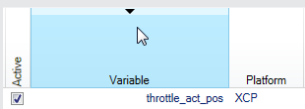
Platform Displays the platform/device on which the variable is measured.

Rasters Displays the available measurement rasters and lets you select the raster to be used for data logging.

The number of measurement rasters available for a variable depends on the variable type, the number of measurement rasters provided by the application interface or real-time system. For further information, refer to Basics on Measurement Rasters on page 212.

Tip

You can sort the signal list in ascending or descending order by clicking the header of a column.
Sorting is synchronized in all signal lists (if the selected column is contained in the list).



Recorder toolbar

Recorder toolbars are displayed above each recorder signal list.

If you select the **Recorders** node in the Navigation area, toolbars for all the single recorders are listed for you to control the recordings. Additionally a special toolbar is displayed to control all recordings together (for example, to start or stop all activated recorders in one go).

Symbol	Description
Recorder 1	Lets you activate or deactivate the recorder. If deactivated, the recorder's toolbar is grayed out and the recorder's signal list is hidden. If any of its signals are not used by any other element, such as an instrument on a layout, you are asked whether you want to delete them from the measurement signal list, too. If you reactivate a recorder, all its signals are restored in the measurement signal list.
/	To ignore start and stop triggers and start recording measurement data immediately for all recorders or for a selected recorder.
/	To stop the recording of measurement data for all recorders or for a selected recorder.
/	To activate a trigger and start recording measurement data when the trigger is invoked for all recorders or for a selected recorder.
/	To invoke a start trigger manually for all recorders or for a selected recorder.

Duration trigger configuration

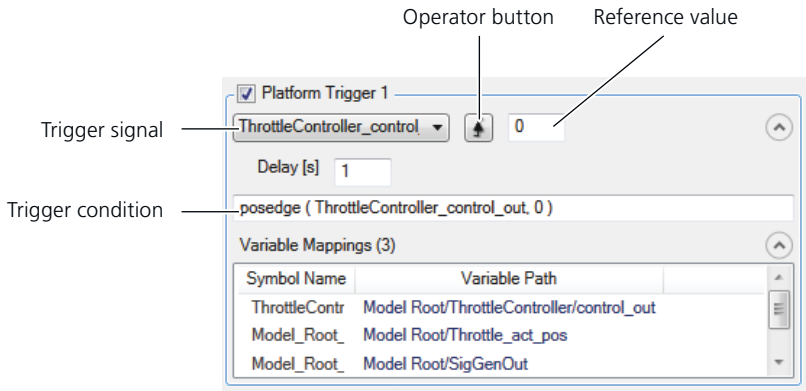
Lets you configure a duration trigger to specify the duration of data captures for a measurement raster. Duration triggers are stop triggers.

<Duration trigger name> Lets you enable or disable the selected duration trigger. An enabled trigger is activated and is evaluated during a running measurement. A disabled trigger is not evaluated, and the trigger event never occurs. If you disable a duration trigger which is specified as the stop trigger for a measurement raster, the measurement raster does not stop until you stop it manually (via the **Stop measuring** command or the **Stop** button in the **Measurement Configuration** controlbar).

Duration (Available only if the duration trigger is enabled) Lets you specify the time period in seconds after which the trigger is invoked. A duration trigger is always a stop trigger, and its value specifies the length of a capture using the selected measurement raster.

Platform trigger configuration

Lets you configure a platform trigger to specify the start condition for data captures for a measurement raster.



<Platform trigger name> Lets you enable or disable the selected platform trigger. An enabled trigger is activated and is evaluated when a measurement is started and during a running measurement. A disabled trigger is not evaluated, and the trigger event never occurs. For example, if you disable a platform trigger which is specified as the start trigger for a measurement raster, the measurement raster starts without a trigger as soon as measurement is started or you click the Start button in the Measurement Configuration controlbar.

Trigger signal Lets you specify the trigger signal. The drop-down list contains all the signals (with their symbol names) you previously added to the Variable Mappings list.

Operator button Lets you specify whether to trigger on the rising or falling edge of the trigger signal. You can switch between falling and rising edge by clicking the operator button.

Reference value Lets you specify the reference value of the trigger condition. The trigger event occurs when the values of the trigger signal cross the value (both rising and falling edges).

Delay [s] Lets you specify a trigger delay in seconds for the platform trigger. A positive delay value defines a posttrigger time (period of seconds for which data capture is delayed after the start trigger is invoked), a negative delay value defines a pretrigger time (period of seconds to be captured before the start condition is met).

Trigger condition Displays the specified trigger condition as a string.

If the trigger is assigned to a platform on which a DsDAQ service is running, you can edit the trigger condition string in the trigger condition edit field. If you do so, the trigger signal, operator button, and reference value are grayed out. The trigger condition must contain one or more symbol names from the Variable Mappings list. The syntax must be XIL API-compliant. The trigger condition is checked during editing. If the entered string does not meet these requirements (visualized by a red frame) the trigger is disabled and must be enabled explicitly.

The following tables show the functions and operators you can use.

Operator	Syntax	Meaning
posedge	`posedge(Expr1, Expr2)`[1]	Returns true when the value of `Expr1` changes from a value lower than `Expr2` to a value greater than or equal to `Expr2` (positive edge detection).
negedge	`negedge(Expr1, Expr2)`[1]	Returns true when the value of `Expr1` changes from a value greater than `Expr2` to a value lower than or equal to `Expr2` (negative edge detection).
changed	`changed(Expr1, Expr2)`[1]	Returns true when the difference between the current value of `Expr1` and its direct successor is greater or equal to `Expr2` (value change detection).
changedpos	`changedpos(Expr1, Expr2)`[1]	Returns true when the current value of `Expr1` is greater than its predecessor at least by `Expr2` (positive value change detection).
changedneg	`changedneg(Expr1, Expr2)`[1]	Returns true when the current value of `Expr1` is smaller than its predecessor at least by `Expr2` (negative value change detection).
sin	`sin(Expr)`[2]	Returns the sine of `Expr`.
cos	`cos(Expr)`[2]	Returns the cosine of `Expr`.
abs	`abs(Expr)`	Returns the absolute value of `Expr`.
pow	`pow(Expr1, Expr2)`	Returns the value of `Expr1` to the power of `Expr2`.
min	`min(Expr1, Expr2)`	Returns the value of the smaller expression.
max	`max(Expr1, Expr2)`	Returns the value of the greater expression.

[1] Where `Expr1` defines a signal and `Expr2` defines a number.
[2] Where Expr is specified in radian.

Operator	Meaning
&&	Logical *and* of the left and right operands.
||	Logical *or* of the left and right operands.
^^	Logical *exclusive or* of the left and right operands.
!	Logical *not* of the right operand.
&>	Logical *and then* of the left and right operands.
<	The left operand is smaller than the right operand.
<=	The left operand is smaller than or equal to the right operand.
>	The left operand is greater than the right operand.
>=	The left operand is greater than or equal to the right operand.
==	The left operand is equal to the right operand.
!=	The left operand is not equal to the right operand.
+	The sign of the right operand or the sum of the right and left operands.
-	The sign of the right operand or the difference of the right and left operands.
*	The product of the right and left operands.
/	The ratio of the right and left operands.

Operator	Meaning
**	The left operand to the power of the right operand.

Variable Mappings Lists the variables selected as possible trigger signals. The following values are displayed for each element in list:

- Symbol Name: Lets you edit the variable's symbol name that was generated by ControlDesk. The symbol name is used in the trigger condition.
- Variable Path: Displays the name of the variable including its variable path.

All the variables on the list are displayed (with their symbol names) in the trigger signal drop-down list. To specify a further trigger signal, select a variable in the Variables controlbar and drag it onto the Variable Mappings list.

Raster configuration

If a measurement raster is associated to the selected platform or duration trigger, the following properties of the raster are available in the configuration area.

Start (Available only if a measurement is running and triggered measurement is stopped for the measurement raster) Lets you start measuring for the current measurement raster manually. When you click Start, measurement is started for the measurement raster. If a start trigger is enabled for the measurement raster, the raster waits until the start condition is reached, and then starts measuring. The current capture state is displayed on the right.

Stop (Available only if a measurement is running and measurement is started for the measurement raster) Lets you stop measuring for the current measurement raster manually. When you click Stop, measurement is stopped immediately for the measurement raster without waiting for a stop trigger condition. The current capture state is displayed on the right.

Auto Repeat Lets you specify to automatically repeat triggered measurement with the current measurement raster. With the Auto Repeat checkbox selected, triggered measurement is repeated automatically for the current measurement raster. After a stop trigger occurs, the measurement raster waits until the start trigger is invoked again, then ControlDesk performs triggered measurement again. If no start trigger is defined, ControlDesk immediately resumes triggered measurement with the raster. If the Auto Repeat checkbox is cleared, measurement with the current measurement raster is performed only once. Triggered measurement using the raster is not repeated after the stop trigger occurs.

Multi Capture History (Available only if no measurement is running) Lets you enable or disable the multi-capture history. If enabled, all the captures of a triggered measurement using the selected raster are stored in the measurement buffer until the buffer is full. The measurement buffer is a ring buffer, so earlier values will be overwritten by later values when the buffer capacity is exceeded.

Downsampling Lets you specify a DAQ downsampling factor for the data capture to reduce the amount of measurement data. For example, a downsampling factor of 2 means that only every second data sample according to the data acquisition rate is transferred to the ControlDesk PC. All data samples in between are ignored.

Related commands

The Measurement Configuration controlbar provides the following commands:

Purpose	Refer to
To add a hardware polling raster to the selected platform/device.	Add Hardware Polling Raster on page 261
To add a new duration trigger.	Add New Duration Trigger on page 262
To add a new platform trigger.	Add New Platform Trigger on page 263
To add the selected variable(s) to the recorder signal list.	Add to Recorder on page 266
To specify whether triggered measurement with the selected measurement raster is performed once or repeatedly.	Auto Repeat on page 267
To disable the triggers of all the rasters of the selected platform.	Measure All Continuously (Disables Triggers) on page 286
To enable the triggers of all the measurement rasters of the selected platform and restart measurement for the measurement rasters.	Measure All Triggered (Enables Triggers and Restarts Rasters) on page 287
To disable the triggers of the selected raster.	Measure Continuously (Disables Triggers) on page 288
To enable the triggers of the selected measurement raster and restart measurement for the measurement raster.	Measure Triggered (Enables Triggers and Restarts Rasters) on page 289
To view and edit the properties of the selected element.	Properties (Controlbar) (ControlDesk User Interface Handling 🕮)
To remove the selected duration trigger, platform trigger, or sample count trigger.	Remove (Trigger) on page 310
To delete the selected variable(s) from the measurement signal list.	Remove (Variable) on page 311
To delete the selected variable(s) from the recorder signal list.	Remove from Recorder on page 313
To manually start or stop data capture for the selected measurement raster.	Start/Stop on page 335

Related topics

Basics

Basics on Configuring Measurement.....78
Basics on Configuring Recording.....119

References

Measurement Configuration.....290
Measurement Configuration - Navigation Area.....300

Measurement Configuration - Navigation Area

Purpose

To navigate through the elements in the Measurement Configuration controlbar.

Description

Navigation area The navigation area of the **Measurement Configuration** controlbar contains the following main elements:

Element	Description
Acquisition	Lets you configure measurements. The **Acquisition** element provides the measurement signal list of all the platforms and devices in the active experiment. You can select the measurement raster for each variable individually from the list. The **Acquisition** element provides one subnode for each platform/device in the active experiment, and one subnode for calculated variables. A platform/device subnode displays the rasters of the platform's/device's application. You can configure the raster settings and the raster triggerings for platforms.
Triggers	Lets you manage and configure duration and platform triggers. When you add a platform to the experiment, ControlDesk automatically adds one duration trigger and one platform trigger for each raster in the platform's real-time application to the **Triggers** element. You can also add duration and platform triggers manually.
Recorders	Lets you manage and configure recordings. The **Recorders** element provides one subnode for each recorder that is available in the experiment. You can add and remove recorders via its context menu. A **Recorder** subnode provides the recorder's signal list for all the platforms and devices in the active experiment. All the signals selected for subsequent recording are displayed in the list.
Data Loggers	Lets you manage and configure data loggings. The **Data Loggers** element provides one subnode for each platform in the experiment that supports data logging. You can add data loggers via the platform's context menu. A **Data Logger** subnode provides the data logger's signal list. All the signals selected for a data logging are displayed in the list.

Related topics

Basics

Measuring Data.....77
Recording Data.....118

Measurement Configuration Page

Access

This page is part of the ControlDesk Options dialog.

The dialog can be opened via the **Options Command** (ControlDesk User Interface Handling 🕮).

Purpose

To specify general settings used in the measurement configuration.

Dialog settings

Measure continuously on new rasters Lets you specify to perform untriggered measurements on newly added measurement rasters instead of triggered measurements. If enabled, ControlDesk assigns disabled triggers to the new measurement rasters. You can later enable the triggers to switch to a triggered measurement.

New measurement rasters are added when you add a new platform with a variable description or when you add, reload, or replace a variable description, for example.

For information on potential problems with continuous (untriggered) measurements, refer to Problem When Measuring Large Amounts of Data on dSPACE Platforms on page 366.

Add all visualized measurement signals of dSPACE platforms to measurement configuration Lets you specify to also add measurement signals to the measurement signal list that are not connected to a plotter. If disabled, these variables are only observed and not added to the measurement configuration. For details, refer to Observing Variables on page 224.

Platforms that do not support the observer functionality are not affected by this option. For them, visualizing a variable in an instrument always adds the variable to the measurement signal list.

When a variable is added to the measurement configuration: Automatically restart a running measurement Lets you specify to automatically restart the measurement if you add a currently unmeasured variable to an instrument during a running measurement.

If Always ask before restarting is activated, it lets you specify to preselect the Continue or the Restart button in the dialog.

When a variable is added to the measurement configuration: Always ask before restarting Lets you specify to display a confirmation prompt for measurement restart each time you add a currently unmeasured variable to an instrument during a running measurement.

Default auto repeat behavior Lets you specify whether the subsequent capture is re-armed delayed or immediately (if possible) by default. This setting affects only newly added dSPACE platforms. For details, refer to Triggered Raster Properties on page 252.

Maximum number of displayed rasters Lets you specify the maximum number of measurement rasters that are displayed for a platform/device in the measurement signal list. Refer to Handling a Large Number of Measurement Rasters on page 218.

Note

Increasing the number of displayed measurement rasters might reduce the system performance.

Related topics

References

Options Command (ControlDesk User Interface Handling 🕮)

Measurement Files Page

Access

This page is part of the ControlDesk Options dialog.

The dialog can be opened via the **Options Command** (ControlDesk User Interface Handling 🕮).

Purpose

To specify general settings for measurement files.

Dialog settings

ASAM Measurement Data Format variable name storage Lets you configure the storage of variable names in MF4 files.

This option is useful only if you use the exported MF4 in an external program that does not require path and/or block group information.

During MF4 export or storage, ControlDesk adds path and/or block group information as meta data to the MF4 file so that you experience no difference when you go on working with these MF4 files in ControlDesk.

Storage Option	Description
Full path and name	The full path and the name of the variable are stored. For example: `Platform/Model Root/SignalGenerator/SignalGenerator/SignalGenOutput`.

Storage Option	Description
Block group and variable name	Only the block group and the name of the variable are stored. For example: `SignalGenerator/SignalGenOutput`.[1]
Variable name only	Only the name of the variable is stored. For example: `SignalGenOutput`.[1]

[1] If this option results in identical strings for different variables, ControlDesk adds a consecutive number to the string, for example, `SignalGenOutput(2)`.

Related topics

HowTos

How to Export Recorded Data..... 146

References

Options Command (ControlDesk User Interface Handling 🕮)

Measurement Data Pool

Access

You can access this command via:

Ribbon	View – Controlbar – Switch Controlbars
Context menu of	None
Shortcut key	**`Alt+Shift+4`**
Icon	

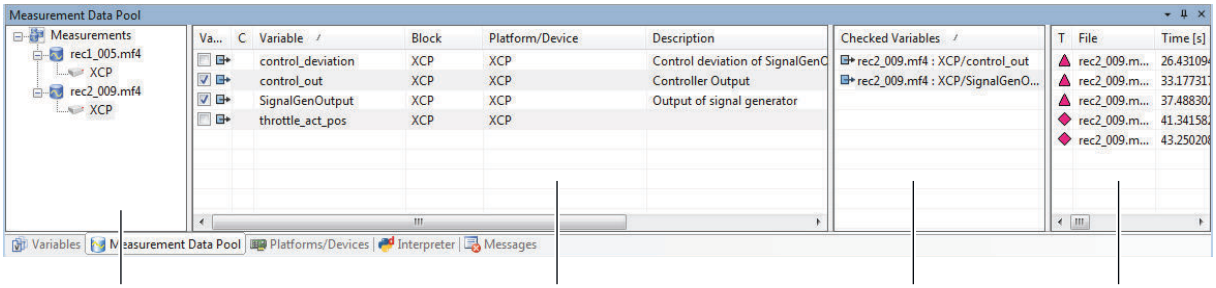
Purpose

To show or hide the Measurement Data Pool.

Description

Measurement Data Pool A controlbar that provides access to measurement data recorded in measurement data files.

The Measurement Data Pool consists of the following areas:



Measurement data file list | Variable list | Checked variables list | Bookmark list (hidden by default)

Measurement data file list Lists the currently opened measurement data files, and the platforms/devices on which the recording was performed.

Variable list The *variable list* is available if a platform/device is selected in the measurement data file list. It lists the variables of the selected measurement data file. Using the Customize Columns (Variable List) (ControlDesk Variable Management 🕮) command from the list column header lets you add further columns to the variable list.

Checked variables list Lists the variables checked in the *Variable list*.

Bookmark list (Available only if the list is opened via the Bookmarks on page 268 command) Lists the bookmarks in the selected measurement data file.

Opening measurement data files in the Measurement Data Pool You can open a measurement data file using the Open (Measurement Data File) on page 307 command.

In the Recorder properties, you can specify to let a measurement data file be opened in the Measurement Data Pool automatically after creation.

Visualizing recorded data You can visualize recorded data on a layout. To do so, it must be opened in the Measurement Data Pool. For instructions, refer to Visualizing Recorded Data on page 188.

Positioning the controlbar You can shift controlbars to any position inside the working area or dock them at the border of the working area. For instructions on positioning controlbars, refer to How to Customize the Screen Arrangement (ControlDesk User Interface Handling 🕮).

Related commands

The Measurement Data Pool provides the following commands:

Purpose	Refer to
To add the measurement data file to the experiment.	Add to Experiment (Measurement Data Pool) on page 265
To open or close the bookmark list.	Bookmarks on page 268

Purpose	Refer to
To enable differentiation between upper and lower case letters for search operations.	Case-Sensitive Search (ControlDesk Variable Management 🕮)
To remove a measurement from the **Measurement Data Pool**.	Close (Measurement Data File) on page 268
To copy the selected instruments to the Clipboard.	Copy (ControlDesk User Interface Handling 🕮)
To add columns to or remove them from the variable list.	Customize Columns (Variable List) (ControlDesk Variable Management 🕮)
To export recorded data.	Export (Measurement Data File) on page 277
To disable all filters.	No Filter (ControlDesk Variable Management 🕮)
To add a measurement to the **Measurement Data Pool**.	Open (Measurement Data File) on page 307
To open the Properties controlbar.	Properties on page 308
To save supplementary changes to measurement properties.	Save (Measurement Data File) on page 315
To sort rows alphabetically in ascending order by the selected column.	Sort Ascending (ControlDesk User Interface Handling 🕮)
To sort rows alphabetically in descending order by the selected column.	Sort Descending (ControlDesk User Interface Handling 🕮)
To filter the variable list using filter strings that contain wildcards.	Wildcard Filter (ControlDesk Variable Management 🕮)

Related topics

Basics

Basics on the Measurement Data Pool..... 186

More Recorders

Access

This command is available only if more than ten recorders are defined. You can access this command via:

Ribbon	▪ **Home - Recording - Start Immediate** ▪ **Home - Recording - Start Triggered** ▪ **Home - Recording - Stop Recording**
Context menu of	None
Shortcut key	None
Icon	None

Purpose

To open the **Measurement Configuration** controlbar and display all the recorders. Refer to Measurement Configuration on page 290.

Related topics

Basics

Basics on Configuring Recording..... 119

Open (Measurement Data File)

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Project controlbar – measurement data file ▪ Measurement Data Pool
Shortcut key	None
Icon	None

Purpose

To add a measurement to the Measurement Data Pool.

Description

A measurement data file must be added to the Measurement Data Pool to use it on a layout.

Result

If selected from the context menu of the Measurement Data Pool, a standard file dialog is opened to select a file. The file does not need to be within an experiment and can be stored in various file formats, such as the ASAM MDF 4.1.x (MF4) , MAT, and CSV file formats. To open a GPX file, it must contain time stamps.

The file loading scheme depends on the file format:

File Format	File Loading Scheme
ASAM MDF 4.1.x (MF4)	ControlDesk loads the signals stored in an MF4 file *partially*, i.e., it does not load complete signals but only the signal parts to be visualized, for example, in a Time Plotter. This reduces the loading time and the required memory.
All other measurement file formats	All other measurement data files are always loaded completely.

Related topics

HowTos

How to Open a Measurement Data File in the Measurement Data Pool..... 189

References

File Types (ControlDesk User Interface Handling 🕮)
Measurement/Recording-Related Commands..... 254

Properties

Access

You can access this command via:

Ribbon	None
Context menu of	▪ **Project** controlbar – measurement data file ▪ **Measurement Data Pool** – measurement data file
Shortcut key	None
Icon	

Purpose

To open the Properties controlbar.

Related topics

References

Measurement/Recording-Related Properties..... 240
Properties (Controlbar) (ControlDesk User Interface Handling 🕮)

Rename (Measurement Data File)

Access

This command is available only if the measurement data file is not opened in the **measurement data pool**. You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – measurement data file
Shortcut key	None
Icon	None

Purpose

To change the name of a measurement data file.

Result

The measurement data file is renamed.

Related topics

References

Measurement/Recording-Related Commands..... 254

Rename Simulation Time Group

Access

You can access this command via:

Ribbon	None
Context menu of	Project controlbar – simulation time group
Shortcut key	**F2**
Icon	None

Purpose

To rename the selected simulation time group.

Result

Opens the Rename Simulation Time Group dialog for you to rename the selected simulation time group.

Rename Simulation Time Group dialog

To specify another name for the selected simulation time group.

New name Lets you enter another simulation time group name. The name must be unique for each experiment.

The OK button to confirm the new name is enabled only if the new simulation time group name is valid.

Related topics

Basics

Synchronized Data Acquisition Across ECUs, RCP and HIL Systems, and Bus Systems..... 228

References

Add Simulation Time Group..... 264
Configure Simulation Time Group..... 269

Remove (Trigger)

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** - duration trigger, platform trigger, or sample count trigger node in the measurement configuration tree (subnodes of the **Triggers** element)
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To remove the selected duration trigger, platform trigger, or sample count trigger.

Result

The selected trigger is removed from the measurement configuration. All the references to this trigger are also removed.

Related topics

References

Measurement/Recording-Related Commands..... 254

Remove (Variable)

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – measurement signal list – variable
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To delete the selected variable(s) from the measurement signal list.

Result

The selection is removed from the measurement signal list and from the Recorder. The variables are not included in subsequent measurements and recordings.

Description

You can also delete the selected variable(s) from the measurement signal list via the **Variables** controlbar´s context menu, refer to Remove from Measurement Signal List (ControlDesk Variable Management 🕮).

Related topics

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Remove (Data Logger)

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Data logger node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To remove the data logger.

Result

ControlDesk removes the data logger from the measurement configuration.

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Activate Variables for Data Logging..... 157

References

Add Data Logger..... 260
Data Logger Properties..... 242
Load to Flash (Data Logger)..... 285

Remove Additional Raster

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – additional raster of a platform node in the measurement configuration tree
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To remove an additional raster from the measurement configuration.

Description

To remove an additional raster it must be unselected in the measurement signal list.

Result

The additional raster is removed from the measurement configuration.

Related topics

Basics

Basics on Measurement Rasters..... 212

References

Add Additional Raster..... 259
Measurement/Recording-Related Commands..... 254

Remove from Recorder

Access

This command is available only if no recording is running. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – recorder signal list – variable
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To delete the selected variable(s) from the recorder signal list.

Result

The selected signals are removed from the recorder signal list, so they are not included in subsequent recordings. However, they remain in the measurement signal list.

Description

To include a removed variable in recordings again, you can add it to the Recorder via the variable's context menu in the measurement signal list. Refer to Add to Recorder on page 266.

Related topics

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

Remove Recorder

Access

This command is available only if no recording is running for the selected recorder.You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – recorder list – recorder
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To delete the selected recorder from the recorder list.

Result

The selected recorder is removed from the recorder list.

Related topics

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254
Remove from Recorder..... 313

Remove Variables

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Data Pool**

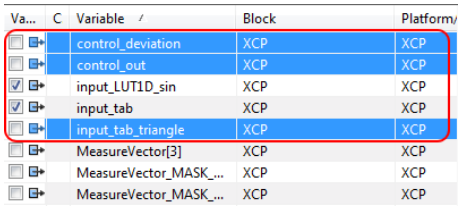
Shortcut key	`Del`
Icon	None

Purpose

To remove one or more variables from a measurement data file opened in the Measurement Data Pool.

Result

All variables that are selected or checked are removed from the measurement data file when you save it.



Va...	C	Variable	Block	Platform/
		control_deviation	XCP	XCP
		control_out	XCP	XCP
		input_LUT1D_sin	XCP	XCP
		input_tab	XCP	XCP
		input_tab_triangle	XCP	XCP
		MeasureVector[3]	XCP	XCP
		MeasureVector_MASK_...	XCP	XCP
		MeasureVector_MASK_...	XCP	XCP

Note

Removing variables from a measurement data file cannot be undone.

Related topics

Basics

Basics on the Measurement Data Pool..... 186

Save (Measurement Data File)

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Project controlbar – measurement data file ▪ Measurement Data Pool – measurement data file
Shortcut key	`Ctrl+S`
Icon	None

Purpose

To save supplementary changes to measurement properties.

Description

You can change the measurement properties via the **Properties** controlbar. Refer to Measurement Data Properties on page 242.

Related topics

References

Measurement/Recording-Related Commands..... 254

Save Buffer

Access

You can access this command via:

Ribbon	**Home – Recording**
Context menu of	None
Shortcut key	**`Alt+F3`**
Icon	

Purpose

To save the current data of the measurement buffer to a measurement data file.

Description

Before ControlDesk starts a measurement, it estimates the required memory space. The required memory space depends on the specified **measurement buffer size** and on the measurement raster settings of the signals to be measured. The actual length of the saved measurement may therefore differ from the specified **measurement buffer size**.

- For a time-based raster, the length of the saved measurement is very close to the specified **measurement buffer size**.
- For an event-based raster, ControlDesk uses the **minimum sampling period** specified for that raster to estimate the required memory space. If the number of measured values differs from the specified **minimum sampling period**, the length of the saved measurement differs more or less from the specified **measurement buffer size**.
- For the OnChange raster, ControlDesk estimates one value change per second. Additionally, it measures the value every three seconds. If no value change occurs, the length of the saved measurement is three times longer than the specified **measurement buffer size** (plus a safety margin of one measured value).

Result

The data is saved to a measurement data file using the storage settings defined via the properties of the **Acquisition** element on the **Measurement Configuration** controlbar. Refer to Acquisition Properties on page 241.

Related topics

HowTos

How to Save the Measurement Buffer as a Recording..... 143

References

Measurement/Recording-Related Commands..... 254

Select Displayed Rasters

Access

You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – platform/device nodes in the measurement configuration tree (subnodes of the **Acquisition** element)
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To select the measurement rasters that are displayed for a platform/device in the measurement signal list.

Description

You can select the measurement rasters that are displayed for a platform/device in the measurement signal list.

For an overview on the different display settings for measurement rasters, refer to Handling a Large Number of Measurement Rasters on page 218.

Result

Opens the **Select Displayed Rasters for <Platform/Device>** dialog to select the measurement rasters that are displayed for a platform/device in the measurement signal list.

Select Displayed Rasters for <Platform/Device> dialog

Lets you select the measurement rasters that are displayed in the measurement signal list.

Available Rasters Displays all the measurement rasters that are available for the selected platform/device. You can filter the list by typing a text string into the text field above the list.

Displayed Rasters Displays the measurement rasters that are shown in the measurement signal list.

Show (Available only if the number of selected elements in the Available Rasters list does not exceed the number of free places in the Displayed Rasters list) Moves the selected measurement rasters from the Available Rasters list to the Displayed Rasters list.

Multiple selection is possible by pressing **`Ctrl`** or **`Shift`** when clicking a measurement raster.

Hide Moves the selected measurement rasters from the Available Rasters list to the Displayed Rasters list.

Multiple selection is possible by pressing **`Ctrl`** or **`Shift`** when clicking a measurement raster.

Up Moves the selected measurement raster up in the Displayed Rasters list.

Down Moves the selected measurement raster down in the Displayed Rasters list.

Related topics

Basics

Basics on Measurement Rasters..... 212
Handling a Large Number of Measurement Rasters..... 218

References

Measurement/Recording-Related Commands..... 254

Select Used Rasters

Access

This command is available only if the measurement signal list does not show all measurement rasters that are available for a platform/device. You can access this command via:

Ribbon	None
Context menu of	None
Shortcut key	None
Button	Browse button in the measurement signal list

Note

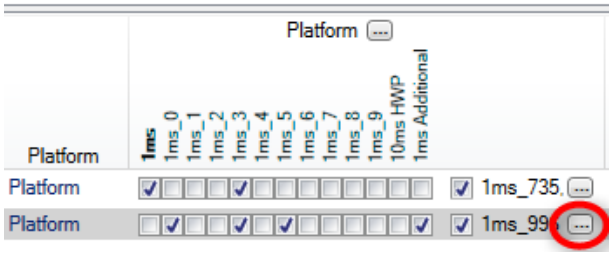
This command is not available in operator mode.

Purpose

To select measurement rasters for measurement or recording.

Description

If the measurement signal list in the Measurement Configuration does not show all measurement rasters that are available for a platform/device, a Browse button is displayed to the right of the displayed rasters.



For an overview on the different display settings for measurement rasters, refer to Handling a Large Number of Measurement Rasters on page 218.

Result

Opens the Select Used Rasters for <Variable> dialog to select measurement rasters for measurement and recording.

Select Used Rasters for <Variable> dialog

Lets you select measurement rasters for measurement and recording.

Select Rasters for <variable> list Displays all the measurement rasters that are available for the selected variable. You can filter the list by typing a text string into the text field above the list.

The checkboxes let you select one or more rasters for measurement or recording.

Multiple selection is possible by pressing **`Ctrl`** or **`Shift`** when clicking a measurement raster.

Note

Selecting a measurement raster has an immediate effect. There is no Ok or Cancel command. Press Ctrl to avoid loosing previous selections.

Only show selected Filters the rasters in the dialog by the selected rasters.

Related topics

Basics

Handling a Large Number of Measurement Rasters..... 218

References

Measurement/Recording-Related Commands..... 254

Set as Default Raster

Access

This command is available only for measurement rasters of dSPACE real-time platforms and calibration devices. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – measurement raster nodes in the measurement configuration tree
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To specify a measurement raster as the default raster for all the variables of a device.

Result

The measurement raster is set as the *default raster* for the variables of the device. It is displayed in bold letters. The next time you initially connect a variable of this device to a plotter or a recorder, for example, the default raster is used.

Description

Default raster A platform-/device-specific measurement raster that is used when a variable of the platform/device is connected to a plotter or a recorder, for example.

For some devices, you can also specify default rasters for specific variables in the IF_DATA section of an A2L file. For more information on these variable-specific

default rasters and how to activate their settings in ControlDesk, refer to Variables Page (ControlDesk Variable Management 🕮).

Related topics

Basics

Basics on Measurement Rasters..... 212

Set Bookmark

Access

You can access this command via:

Ribbon	Home - Bookmark
Context menu of	None
Shortcut key	**Spacebar**
Icon	

Purpose

To set a bookmark during measurement and/ or recording.

Result

A Set Bookmark dialog opens and a bookmark is set.

Tip

You can let ControlDesk set bookmarks automatically on various events, such as a memory page activation. For details, refer to Edit Bookmark Settings on page 275.

Description

The title bar of the Set Bookmark dialog indicates the time when the bookmark was set. It is possible to open several instances of this dialog simultaneously. A new Set Bookmark dialog always opens at the position of the Set Bookmark dialog last opened or moved.

In a Time Plotter, bookmarks are represented by little triangles on the x-axis. All the bookmarks belonging to the same measurement are the same color. If two bookmarks are too close to each other, they are shifted vertically. The currently active bookmark is always on top so that it is fully visible. Bookmarks are only displayed in the Time Plotter when they belong to measurement files that are connected to that plotter. If the mouse is placed on a bookmark, a tooltip displays information on it, for example, its title or time stamp. Clicking a bookmark activates it.

Set Bookmark dialog

Lets you define a bookmark created during measurement or recording.

Title Lets you enter a title for a bookmark.

Description Lets you enter additional information on a bookmark.

Related topics

References

Bookmarks 268
Edit Bookmarks 273
Measurement/Recording-Related Commands 254

Show Measurement

Access

This command is available only if the measurement data file is opened in the **Measurement Data Pool**. You can access this command via:

Ribbon	None
Context menu of	Project controlbar – measurement data file
Shortcut key	None
Icon	None

Purpose

To switch to the **Measurement Data Pool** and select the corresponding file.

Related topics

References

Measurement/Recording-Related Commands 254

Show Measurement Links

Access

You can access this command via:

Ribbon	None
Context menu of	▪ Project controlbar – measurement data node ▪ Project controlbar – measurement data file ▪ Project controlbar – measurement links (if visible)

Shortcut key	None
Icon	None

Purpose

To show or hide links to measurement data files in the **Project** controlbar.

Description

All the opened and closed measurement data files are visible under the measurement data node of the **Project** controlbar. Links to these files can be shown under the variable description references.

Related topics

References

Measurement/Recording-Related Commands..... 254

Start Calibration & Measurement (for Single Platform/Device)

Access

This command is available only if online calibration and measurement have been started globally, but online calibration was not started for the selected platform/device. You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – platform/device
Shortcut key	None
Icon	None

Purpose

To start online calibration and measurement for the currently selected platform/device.

Description

If there is a platform/device that was not available when online calibration and measuring was started globally for ControlDesk, or whose online calibration has been stopped, you can start online calibration and measurement for it later on by a single click, without having to stop and restart global online calibration and global measuring for ControlDesk. The statuses of the other platforms/devices in the current experiment and the measurements already running on the other platforms/devices in the experiment are not affected by this.

Tip

Alternatively, you can start online calibration and measurement for the selected platform/device in two separate steps. Refer to Start Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮) and Start Measurement (for Single Platform/Device) on page 328.

You can stop measurement and online calibration for single platforms/devices. Refer to

- Stop Calibration & Measurement (for Single Platform/Device) on page 336
- Stop Measurement (for Single Platform/Device) on page 339
- Stop Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮)

Result

ControlDesk connects itself to the platform/device hardware or VPU, starts online calibration for the selected platform/device according to the configured start online calibration behavior (for further information, refer to Start Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮)), and then starts measurement for the platform/device.

Related topics

References

Measurement/Recording-Related Commands..... 254
Start Measurement (for Single Platform/Device)..... 328
Start Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮)
Stop Calibration & Measurement (for Single Platform/Device)..... 336

Start (Data Logger)

Access

This command is available only for a data logger if its configuration is loaded to a connected platform. Online calibration must be started. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Data logger node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To start data logging on a connected platform.

Result

ControlDesk starts data logging with the configuration that is currently loaded on the connected platform.

Note

The data logger with the loaded configuration is displayed in bold.
If you have reconfigured an existing data logger, you must first download its configuration to the platform to make it the loaded data logging configuration.

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Start Data Logging..... 163
How to Stop Data Logging..... 165

References

Data Logger Properties..... 242
Load to Flash (Data Logger)..... 285
Remove (Data Logger)..... 311
Stop (Data Logger)..... 338

Start Immediate (Recording)

Access

You can access this command via:

Ribbon	Home – Recording
Context menu of	None
Shortcut key	**F11** (all recorders)
Icon	

Purpose

To ignore start and stop triggers and start recording measurement data immediately for all recorders or for a selected recorder.

Description

The recording is started and stopped without delay, without having to meet a trigger condition.

The illustration below shows immediate recording.

ControlDesk initially synchronizes the time stamps of different platforms/devices when online calibration is started globally for the first time. If a high synchronization accuracy on measurement start is required, wait for about 20 s after going online before you start measuring. For more information, refer to Basics on Synchronized Data Acquisition on page 228.

The color of the status bar changes to red.

Result

The recording of measurement data is started immediately. If measurement is not running, it is started if ControlDesk is online.

If ControlDesk is not online, online calibration is started according to the configured start online calibration behavior. For further information, refer to Basics on Starting Online Calibration (ControlDesk Calibration and Data Set Management 🕮).

If switching to the online mode is not possible for at least one platform/device, ControlDesk displays the **Platform/Device State Overview** dialog (unless you disable the display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog).

Note

You must stop the recording manually. A stop trigger will be ignored.

Calibration Memory dialog

To get identical parameter values in ControlDesk's mirrored memory and on the platform/device.

Platform/Device/Page Lists the platforms/devices (and their memory pages) whose parameter values on the connected dSPACE real-time hardware or ECU differ from those in ControlDesk's mirrored memory.

Data Set CRC Lists the CRC checksum values of the memory pages in the mirrored memory of ControlDesk (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

ECU CRC Lists the CRC checksum values of the memory pages on the connected dSPACE real-time hardware or ECU (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

Command Lets you specify for each platform/device and memory page whether to upload parameter values from the connected hardware to ControlDesk, or download them from ControlDesk to the hardware. The available commands depend on the selected platform/device type and the ECU's memory page concept.

Command	Description
Upload[1]	ControlDesk uploads the parameter values from the hardware to ControlDesk.
Download	ControlDesk downloads the parameter values from ControlDesk to the hardware.
Upload connected variables[1]	ControlDesk uploads the values of all the parameters and writable measurements that are currently selected for calibration from the hardware to the host PC. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol. **Note** For a platform/device without a working data set, selecting the 'upload connected variables' option the first time online calibration is started prevents ControlDesk from creating a working and a reference data set. However, ControlDesk needs a working data set to save calibration data in ControlDesk. Use the 'upload' option for the first online transition instead.
Download connected variables	ControlDesk downloads the values of all the parameters and writable measurements that are currently selected for calibration from ControlDesk to the hardware. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol.

[1] If data sets are selected for downloading on calibration start, their parameter values are always downloaded. Refer to How to Select Additional Data Sets for Downloading on Online Calibration Start (ControlDesk Calibration and Data Set Management 🕮).

Measurement Only Leaves the parameter values in ControlDesk's mirrored memory and on the hardware inconsistent, and closes the **Calibration Memory** dialog. As a result,

- ControlDesk connects to the hardware.
- Online calibration is not started.
- Measuring variables is possible.

Platform/Device State Overview dialog

To get details on the configuration and connection state for platforms/devices in the active experiment.

State Displays a symbol representing the current configuration and connection state individually for each platform/device. The symbols have the following meanings:

Symbol	Description
	The platform/device hardware or VEOS is connected and configured correctly. Starting online calibration for the platform/device is possible. [1]
	The platform/device hardware or VEOS is either not connected or not configured correctly. Starting online calibration for the platform/device will fail. [2]

[1] For an ECU Diagnostics device containing more than one logical link selected for use this means that at least one of the logical links is connected and configured correctly, and that online calibration is possible for these logical links. The **Project** controlbar displays status information individually for each logical link.

[2] For an ECU Diagnostics device this means that none of the contained logical links selected for use is connected or configured correctly, and that starting online calibration will fail for each logical link.

Platform/Device Lists all the platforms/devices in the currently active experiment.

Description Displays the current state.

Details Lets you get a complete list of error messages for the platforms/devices for which starting online calibration currently is not possible.

Cancel Lets you close the dialog without starting online calibration. This lets you reconfigure the platforms/devices of your experiment or connect missing hardware to the host PC, for example, before you try to start online calibration again.

Related topics

HowTos

How to Perform an Immediate Recording..... 136

References

Measurement/Recording-Related Commands..... 254
Refresh Platform Configuration (ControlDesk Platform Management 🕮)

Start Measurement (for Single Platform/Device)

Access

This command is available only if measurement has been started globally for ControlDesk. Online calibration must have been started for the selected platform/device, but no measurement is running for it. You can access this command via:

Ribbon	None
Context menu of	Project controlbar – platform/device
Shortcut key	None
Icon	None

Purpose

To start measurement for the selected platform/device.

Description

You can start measurement for a single platform/device without having to stop and restart global measuring for ControlDesk. Measurements already running on the other platforms/devices in the experiment are not affected by this.

To stop measurement for single platforms/devices, refer to Stop Measurement (for Single Platform/Device) on page 339.

Related topics

HowTos

How to Start Measuring 103

References

Measurement/Recording-Related Commands 254
Refresh Platform Configuration (ControlDesk Platform Management)
Start Calibration & Measurement (for Single Platform/Device) 323
Start Measuring 329

Start Measuring

Access

You can access this command via:

Ribbon	Home – Status Control
Context menu of	None
Shortcut key	**F5**
Icon	

Purpose

To start measurement globally for ControlDesk.

Description

The color of the status bar changes to blue.

ControlDesk initially synchronizes the time stamps of different platforms/devices when online calibration is started globally for the first time. If a high synchronization accuracy on measurement start is required, wait for about 20 s after going online before you start measuring. For more information, refer to Basics on Synchronized Data Acquisition on page 228.

Tip

After measuring was started globally for ControlDesk, you can start or stop measurements for single platforms/devices belonging to the current experiment. Refer to Start Measurement (for Single Platform/Device) on page 328 and Stop Measurement (for Single Platform/Device) on page 339.

Result

If ControlDesk is online, it globally starts measurement for all platforms/devices in the current experiment.

If ControlDesk is not online, online calibration is started according to the configured start online calibration behavior. For further information, refer to Basics on Starting Online Calibration (ControlDesk Calibration and Data Set Management 🕮).

If switching to the online mode is not possible for at least one platform/device, ControlDesk displays the **Platform/Device State Overview** dialog (unless you disable the display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog).

Calibration Memory dialog

To get identical parameter values in ControlDesk's mirrored memory and on the platform/device.

Platform/Device/Page Lists the platforms/devices (and their memory pages) whose parameter values on the connected dSPACE real-time hardware or ECU differ from those in ControlDesk's mirrored memory.

Data Set CRC Lists the CRC checksum values of the memory pages in the mirrored memory of ControlDesk (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

ECU CRC Lists the CRC checksum values of the memory pages on the connected dSPACE real-time hardware or ECU (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

Command Lets you specify for each platform/device and memory page whether to upload parameter values from the connected hardware to ControlDesk, or download them from ControlDesk to the hardware. The available commands depend on the selected platform/device type and the ECU's memory page concept.

Command	Description
Upload[1)]	ControlDesk uploads the parameter values from the hardware to ControlDesk.
Download	ControlDesk downloads the parameter values from ControlDesk to the hardware.
Upload connected variables[1)]	ControlDesk uploads the values of all the parameters and writable measurements that are currently selected for calibration from the hardware to the host PC. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol. **Note** For a platform/device without a working data set, selecting the 'upload connected variables' option the first time online calibration is started prevents ControlDesk from creating a working and a reference data set. However, ControlDesk needs a working data set to save calibration data in ControlDesk. Use the 'upload' option for the first online transition instead.
Download connected variables	ControlDesk downloads the values of all the parameters and writable measurements that are currently selected for calibration from ControlDesk to the hardware. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol.

1) If data sets are selected for downloading on calibration start, their parameter values are always downloaded. Refer to How to Select Additional Data Sets for Downloading on Online Calibration Start (ControlDesk Calibration and Data Set Management 🕮).

Measurement Only Leaves the parameter values in ControlDesk's mirrored memory and on the hardware inconsistent, and closes the **Calibration Memory** dialog. As a result,

- ControlDesk connects to the hardware.
- Online calibration is not started.
- Measuring variables is possible.

Platform/Device State Overview dialog

To get details on the configuration and connection state for platforms/devices in the active experiment.

State Displays a symbol representing the current configuration and connection state individually for each platform/device. The symbols have the following meanings:

Symbol	Description
	The platform/device hardware or VEOS is connected and configured correctly. Starting online calibration for the platform/device is possible. [1)]

Symbol	Description
	The platform/device hardware or VEOS is either not connected or not configured correctly. Starting online calibration for the platform/device will fail. [2]

[1] For an ECU Diagnostics device containing more than one logical link selected for use this means that at least one of the logical links is connected and configured correctly, and that online calibration is possible for these logical links. The Project controlbar displays status information individually for each logical link.

[2] For an ECU Diagnostics device this means that none of the contained logical links selected for use is connected or configured correctly, and that starting online calibration will fail for each logical link.

Platform/Device Lists all the platforms/devices in the currently active experiment.

Description Displays the current state.

Details Lets you get a complete list of error messages for the platforms/devices for which starting online calibration currently is not possible.

Cancel Lets you close the dialog without starting online calibration. This lets you reconfigure the platforms/devices of your experiment or connect missing hardware to the host PC, for example, before you try to start online calibration again.

Related topics

Basics

Basics of Platform/Device States (ControlDesk Platform Management 🕮)

HowTos

How to Start Measuring..... 103

References

Measurement/Recording-Related Commands..... 254
Refresh Platform Configuration (ControlDesk Platform Management 🕮)
Start Measurement (for Single Platform/Device)..... 328

Start Triggered (Recording)

Access

You can access this command via:

Ribbon	Home – Recording
Context menu of	None

Shortcut key	**F9** (all recorders)
Icon	

Purpose

To activate a trigger and start recording measurement data when the trigger is invoked for all recorders or for a selected recorder.

Description

The status bar is yellow until the trigger is invoked. When the trigger is invoked, the status bar changes from yellow to red.

Result

If ControlDesk is online, it starts measurement.

If ControlDesk is not online, online calibration is started according to the configured start online calibration behavior. For further information, refer to Basics on Starting Online Calibration (ControlDesk Calibration and Data Set Management 🕮).

If switching to the online mode is not possible for at least one platform/device, ControlDesk displays the **Platform/Device State Overview** dialog (unless you disable the display of that dialog on the **Platform Management** page of the **ControlDesk Options** dialog).

Calibration Memory dialog

To get identical parameter values in ControlDesk's mirrored memory and on the platform/device.

Platform/Device/Page Lists the platforms/devices (and their memory pages) whose parameter values on the connected dSPACE real-time hardware or ECU differ from those in ControlDesk's mirrored memory.

Data Set CRC Lists the CRC checksum values of the memory pages in the mirrored memory of ControlDesk (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

ECU CRC Lists the CRC checksum values of the memory pages on the connected dSPACE real-time hardware or ECU (if possible). For more information, refer to How to Customize Calibration Memory Segments (ControlDesk Platform Management 🕮).

Command Lets you specify for each platform/device and memory page whether to upload parameter values from the connected hardware to ControlDesk, or download them from ControlDesk to the hardware. The available commands depend on the selected platform/device type and the ECU's memory page concept.

Command	Description
Upload[1)]	ControlDesk uploads the parameter values from the hardware to ControlDesk.
Download	ControlDesk downloads the parameter values from ControlDesk to the hardware.

Command	Description
Upload connected variables[1]	ControlDesk uploads the values of all the parameters and writable measurements that are currently selected for calibration from the hardware to the host PC. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol. **Note** For a platform/device without a working data set, selecting the 'upload connected variables' option the first time online calibration is started prevents ControlDesk from creating a working and a reference data set. However, ControlDesk needs a working data set to save calibration data in ControlDesk. Use the 'upload' option for the first online transition instead.
Download connected variables	ControlDesk downloads the values of all the parameters and writable measurements that are currently selected for calibration from ControlDesk to the hardware. These are the parameters and writable measurements that are currently connected to an instrument and visualized on a layout. They are shown in the **Variables** controlbar with a red chain symbol.

[1] If data sets are selected for downloading on calibration start, their parameter values are always downloaded. Refer to How to Select Additional Data Sets for Downloading on Online Calibration Start (ControlDesk Calibration and Data Set Management 🕮).

Measurement Only Leaves the parameter values in ControlDesk's mirrored memory and on the hardware inconsistent, and closes the **Calibration Memory** dialog. As a result,

- ControlDesk connects to the hardware.
- Online calibration is not started.
- Measuring variables is possible.

Platform/Device State Overview dialog

To get details on the configuration and connection state for platforms/devices in the active experiment.

State Displays a symbol representing the current configuration and connection state individually for each platform/device. The symbols have the following meanings:

Symbol	Description
	The platform/device hardware or VEOS is connected and configured correctly. Starting online calibration for the platform/device is possible. [1]
	The platform/device hardware or VEOS is either not connected or not configured correctly. Starting online calibration for the platform/device will fail. [2]

[1] For an ECU Diagnostics device containing more than one logical link selected for use this means that at least one of the logical links is connected and configured correctly, and that online calibration is possible for these logical links. The **Project** controlbar displays status information individually for each logical link.

Symbol	Description
[2]	For an ECU Diagnostics device this means that none of the contained logical links selected for use is connected or configured correctly, and that starting online calibration will fail for each logical link.

Platform/Device Lists all the platforms/devices in the currently active experiment.

Description Displays the current state.

Details Lets you get a complete list of error messages for the platforms/devices for which starting online calibration currently is not possible.

Cancel Lets you close the dialog without starting online calibration. This lets you reconfigure the platforms/devices of your experiment or connect missing hardware to the host PC, for example, before you try to start online calibration again.

Related topics

Basics

Basics on Triggered Recording..... 125

HowTos

How to Configure Trigger Conditions for Triggered Recording..... 127
How to Define a Trigger Rule for Triggered Recording..... 129
How to Perform a Triggered Recording..... 139

References

Measurement/Recording-Related Commands..... 254
Refresh Platform Configuration (ControlDesk Platform Management 🕮)

Start/Stop

Access

This command is available only for measurement rasters of dSPACE real-time platforms, and only if a measurement is running. You can access this command via:

Ribbon	None
Context menu of	Measurement Configuration – measurement raster node in the measurement configuration tree (subnode of the Acquisition element)
Shortcut key	None
Icon	None

Purpose

To manually start or stop data capture for the selected measurement raster.

Result

Data capture with the selected measurement raster is started or stopped.

Description

The **Start** command enables you to start triggered measurement using the selected measurement raster manually. If a start trigger is enabled for the measurement raster, the raster waits until the start condition is reached, and then starts capturing data.

The **Stop** command enables you to stop triggered measurement manually. The triggered measurement is stopped immediately for the selected measurement raster, without waiting for the stop trigger condition.

Tip

Alternatively, you can start and stop triggered measurement of a measurement raster via buttons in the configuration settings of the assigned start and stop triggers, refer to Measurement Configuration on page 290.

Related topics

References

Auto Repeat..... 267
Measurement/Recording-Related Commands..... 254

Stop Calibration & Measurement (for Single Platform/Device)

Access

This command is available only if online calibration and measurement have been started globally, and if a measurement is running for the selected platform. You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – platform/device
Shortcut key	None
Icon	None

Purpose

To stop measurement and online calibration for the currently selected platform/device.

Description

You can stop a running measurement and online calibration for a single platform/device in a single step. The statuses of the other platforms/devices in the current experiment are not affected.

Tip

Alternatively, you can stop measurement and online calibration for the selected platform/device in two separate steps. Refer to Stop Measurement (for Single Platform/Device) on page 339 and Stop Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮).

You can restart online calibration and measurement for this platform/device later on. Refer to

- Start Calibration & Measurement (for Single Platform/Device) on page 323
- Start Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮)
- Start Measurement (for Single Platform/Device) on page 328

Result

Measurement is stopped for the selected platform/device, and ControlDesk stops communication with the selected platform/device hardware or VPU. The status of the platform/device changes to "connected". The global status of ControlDesk does not change.

Tip

To stop measuring and online calibration globally for all platforms/devices in the current experiment, you have to stop measurement globally for ControlDesk (refer to Stop Measuring on page 340) and then stop online calibration globally for ControlDesk (refer to Go Offline (ControlDesk Calibration and Data Set Management 🕮)).

Related topics

HowTos

How to Stop Measuring..... 106

References

Measurement/Recording-Related Commands..... 254
Start Calibration & Measurement (for Single Platform/Device)..... 323
Stop Measurement (for Single Platform/Device)..... 339
Stop Online Calibration (for Single Platform/Device) (ControlDesk Calibration and Data Set Management 🕮)

Stop (Data Logger)

Access

This command is available only for a data logger if its configuration is loaded to a connected platform. Online calibration must be started. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** – Data logger node
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To stop data logging on a connected platform.

Result

The running data logging is stopped and its data is stored to an MF4 file on the USB mass storage device.

Related topics

Basics

Introduction to Data Logging..... 150

HowTos

How to Activate Variables for Data Logging..... 157
How to Stop Data Logging..... 165

References

Data Logger Properties..... 242
Load to Flash (Data Logger)..... 285
Remove (Data Logger)..... 311
Start (Data Logger)..... 324

Stop Measurement (for Single Platform/Device)

Access

This command is available only if measurement has been started globally, and if a measurement is running for the selected platform. You can access this command via:

Ribbon	None
Context menu of	**Project** controlbar – platform/device
Shortcut key	None
Icon	None

Purpose

To stop measurement for the currently selected platform/device.

Description

You can stop a running measurement for a single platform/device, while measurement continues for the other platforms/devices of the current experiment.

To restart measurement for this platform/device later on, refer to Start Measurement (for Single Platform/Device) on page 328.

Result

Measurement is stopped for the selected platform/device, and the status of the platform/device changes to "online calibration started". The global status of ControlDesk does not change.

If a recording is running, it no longer collects data from variables on the selected platform/device.

Tip

To stop measuring globally for all platforms/devices in the current experiment in one step, refer to Stop Measuring on page 340.

Related topics

HowTos

How to Stop Measuring 106

References

Measurement/Recording-Related Commands 254
Stop Calibration & Measurement (for Single Platform/Device) 336
Stop Measuring 340

Stop Measuring

Access

You can access this command via:

Ribbon	Home – Status Control
Context menu of	None
Shortcut key	**F6**
Icon	

Purpose

To stop measurement globally for ControlDesk.

Result

Measurement is stopped for all platforms/devices of the current experiment. If a recording is running, it is stopped, too.

Tip

ControlDesk lets you stop measurement for single platforms/devices, while measurement continues for the other platforms/devices. Refer to Stop Measurement (for Single Platform/Device) on page 339.

Related topics

Basics

Basics of Platform/Device States (ControlDesk Platform Management 📖)

HowTos

How to Stop Measuring..... 106

References

Stop Measurement (for Single Platform/Device)..... 339

Stop Recording

Access

You can access this command via:

Ribbon	Home – Recording
Context menu of	None

Shortcut key	**F12** (all recorders)
Icon	

Purpose

To stop the recording of measurement data for all recorders or for a selected recorder.

Result

Recording is stopped, measuring continues.

Description

Depending on the settings in the Recorder properties, the recorded data is saved to a file and visible in the Measurement Data Pool.

Save Measurement Data dialog

This dialog opens only if you have activated 'Automatic save dialog' in the Recorder properties.

File name Enter a file name. The file will be saved in the measurement data folder of the project.

Open in measurement data pool Indicates whether a recorded measurement is added to the Measurement Data Pool.

Add to experiment Indicates whether the recorded measurement is added to the experiment.

Auto export to Indicates whether the recorded measurement is exported automatically. Enter a path and file name or click the Browse button to select an existing path. If you enter a file name without a path the recording is saved in the measurement data folder.

Description Shows the default text for the file description. You can edit this text here or via the properties dialog of the measurement data files later on.

Discard Discards the recording.

Related topics

HowTos

How to Perform a Triggered Recording..... 139
How to Perform an Immediate Recording..... 136

References

Measurement/Recording-Related Commands..... 254
Recorder Properties..... 245

Switch Trigger

Access

This command is available only if an unassigned trigger is available in the measurement configuration. You can access this command via:

Ribbon	None
Context menu of	**Measurement Configuration** - start or stop trigger of a platform's measurement raster in the measurement configuration tree
Shortcut key	None
Icon	None

Note

This command is not available in operator mode.

Purpose

To replace a start or stop trigger of a measurement raster.

Description

You cannot assign a trigger which is currently assigned to a measurement raster. All corresponding unassigned triggers that are available in the measurement configuration are displayed in the context menu.

Result

The selected selected start or stop trigger is replaced.

Related topics

HowTos

How to Change the Assignment of Triggers to Measurement Rasters..... 98

References

Measurement/Recording-Related Commands..... 254

Time Cursor

Access

You can access this command via:

Ribbon	**Home – Status Control**
Context menu of	None

Shortcut key	`Ctrl+F11`
Icon	

Purpose

To view variable values at a specific point in time.

Description

The time cursor is a cursor which is visible at the same time position in the following instruments:

- In all Time Plotters
- In all XY Plotters
- In all bus monitoring lists

If you move the time cursor, all instruments and bus monitoring lists show their values at the new time position. For example, an Alphanumeric Input shows the parameter settings according to the selected time position.

Time cursor changes made in one layout affect the settings of all the other layouts.

To use the time cursor during a running measurement, pause the visualization by moving or zooming the chart.

Time cursor settings for the Time Plotter

For the Time Plotter, you can specify various time cursor settings in the Properties controlbar. Refer to Time Cursor Properties (ControlDesk Instrument Handling 🕮).

Tip

Via the instrument's toolbar, you can easily change frequently used Time cursor settings. Refer to Show Toolbar (ControlDesk Instrument Handling 🕮).

Related topics

HowTos

How to View Values at a Specific Point in Time (Time Cursor)..... 194

References

Show Toolbar (ControlDesk Instrument Handling 🕮)
Time Cursor Properties (ControlDesk Instrument Handling 🕮)

Trigger Rules

Access

You can access this command via:

Ribbon	Home – Recording
Context menu of	None
Shortcut key	`Ctrl+T`
Icon	

Purpose

To create and edit trigger conditions for triggered recording, bookmarks and acoustic signals.

Result

You can define conditions for a Start, Stop and Audio trigger.

The defined trigger rules can be selected in the Recorder properties.

Edit Trigger Rules dialog

Lists all available trigger rules and lets you configure their settings.

Available rules – Rule Lets you enter a name for a trigger rule. A checkbox lets you enable or disable a trigger rule. If an input signal of the trigger rule is deleted from the variable description, the trigger rule is disabled automatically.

Available rules – Used for Displays whether the trigger is used as a start, stop, or audio trigger.

Available rules – Add Lets you add a new trigger rule to the list and define its name.

Available rules – Remove Lets you delete the selected trigger rule from the list.

Available rules – Import Lets you import a trigger rule from a trigger rule file.

Available rules – Export Lets you export the selected trigger rule to a trigger rule file.

Rule definition – Predefined condition Lets you select the occurrence of a manual or automatic bookmark as a rule condition. For details on the available bookmark types, refer to Edit Bookmark Settings on page 275.

Rule definition – Custom condition – Left edit field Lets you enter a value or a variable name. Click the Browse button to select a name from a variable list

via the Select Variables dialog. For more information on the dialog settings, refer to Select Variable Dialog (ControlDesk Variable Management 🕮).

Rule definition – Custom condition – Operator field Lets you select an operator for a rule condition.

Operator Syntax	Meaning
=	The left operand is equal to the right operand.
<>	The left operand is not equal to the right operand.
<	The left operand is smaller than the right operand.
<=	The left operand is smaller than or equal to the right operand.
>	The left operand is greater than the right operand.
>=	The left operand is greater than or equal to the right operand.
BIT HIGH <x>	Returns true when bit number x is set (zero based index).
BIT LOW <x>	Returns true when bit number x is cleared (zero based index).
POS EDGE <x>	Returns true when the signal value changes from a value lower than x to a value greater than or equal to x (positive edge detection).
NEG EDGE <x>	Returns true when the signal value changes from a value greater than x to a value lower than or equal to x (negative edge detection).
BIT POS EDGE <x>	Returns true when bit number x changes from cleared to set (positive edge detection).
BIT NEG EDGE <x>	Returns true when bit number x changes from set to cleared (negative edge detection).
CHANGE <x>	Returns true when the difference between the current signal value and its direct successor is greater or equal to x.

Rule definition – Custom condition – Right edit field Lets you enter a value or a variable name. Click the Browse button to select a name from a variable list via the Select Variables dialog. For more information on the dialog settings, refer to Select Variable Dialog (ControlDesk Variable Management 🕮).

Rule definition – Up Exchanges the selected rule condition with the one listed above it.

Rule definition – Down Exchanges the selected rule condition with the one listed below it.

Rule definition – Remove Removes the selected rule condition from the list.

Rule definition – Set Replaces the selected rule condition with a new one taken from the Rule definition – two edit fields and the operator field.

Rule definition – Add Creates a new entry in the trigger condition list. The values are taken from the two edit fields and the operator field.

Rule definition – Logic Lets you select a logic operator (OR, AND) between two trigger conditions in the list. The precedence of the logic operators determines how the different trigger conditions are evaluated. For example, A, B and C are three trigger conditions which are shown in the following order in the list:

```
        A
OR      B
AND     C
```

This order equals A OR (B AND C), because the AND operator has precedence.

In the list shown below, three trigger conditions are grouped with the logical operators.

```
        A
AND     C
OR      B
AND     C
```

This order equals (A AND C) OR (B AND C) = (A OR B) AND C. All the trigger rules combined via an AND define a trigger block. They are linked via OR.

Rule definition – Condition Lists all conditions for a trigger rule.

Trigger action – Audio signal Lets you specify whether ControlDesk generates an acoustic signal for the selected rule. You can specify the frequency (pitch) in hertz and the duration in ms in edit fields. If enabled, you can hear the acoustic signal each time the trigger is invoked.

Trigger action – Set bookmark Lets you specify whether ControlDesk can set a bookmark when the selected trigger is invoked. By default, trigger bookmarks are enabled in the **Edit Bookmark Settings** dialog (see Edit Bookmark Settings on page 275). If not, you also have to enable trigger events there, to let ControlDesk set a bookmark on the occurrence of a trigger.

Note

If you specify an acoustic signal or bookmark setting for a trigger rule that contains at least one state trigger (operators: =, <>,<, <=, >, >=, BIT HIGH, BIT LOW, CHANGE), a dead time of 5 seconds is used to avoid performance problems. No acoustic signals or bookmarks are generated during the dead time.

Related topics

Basics

Automating Measurement and Recording..... 350

HowTos

How to Define a Trigger Rule for Triggered Recording..... 129
How to Define an Acoustic Signal..... 184

References

Measurement Configuration..... 290
Measurement/Recording-Related Commands..... 254

DSSIGCONV

Using DSSIGCONV

Introduction

The *DSSIGCONV* tool lets you do the following:

- Convert MF4 files to other file formats.
- Reduce the file content by selecting specific parts or specific signals to be stored in the destination file.
- Add reduction data to an MF4 file.

Command line

The *DSSIGCONV* tool is a DOS command line tool. You have to start it in a Command Prompt window. The `DSSIGCONV.EXE` file is located in the `.\Main\Bin` folder of your ControlDesk installation.

Syntax

```
dssigconv source [/i] [destination] [/s:list] [/sl:filename]
    [/t:time1,time2] [/p:parts] [/d:factor] [/1] [/rd] [/h]
```

Parameters You can use the following parameters:

Parameter	Description
`source`	Lets you specify the source measurement file to be converted. The file format must be MF4.
`/i`	Lets you display information on the source file. **Note** All the other parameters are ignored when you use the `/i` parameter.
`destination`[1)]	Lets you specify the destination file. You can export the file to one of the following formats: ▪ ASAM MDF 4.1 file (file name extension: MF4) File format for binary files containing measurement data in ASAM MDF format version 4.x. MDF 4.x is ControlDesk's standard file format for measurement data files. ControlDesk includes *reduction data* when measurement data is saved/exported to the ASAM MDF 4.x file format. ▪ Comma Separated Values file (CSV) ▪ MATLAB file (MAT) MATLAB® binary file format.

Parameter	Description
	For details on the structure of MAT files generated by exporting recorded data, refer to Structure of MAT Files Generated by Exporting Recorded Data on page 209. Example: `Measurement.mf4`
`/s:list`[1), 2)]	Lets you specify a comma-separated list of the names of the signals to be extracted. Example: `/s:Signal1,Signal2`
`/sl:filename`[1), 2)]	Lets you specify a label list (LAB) file that contains the signals to be extracted. Example:`/sl:d:\lablelists\siglist01.lab`
`/t:time1,time2`[1), 2)]	Lets you specify a time section to be extracted by defining the start and the end of the section in seconds. Example: `/t:2.4,16.9`
`/p:parts`[1), 2)]	Lets you split the destination file into the specified number of parts. The destination files get a suffix with the number of the part: `_%part%`. Example: `/p:5`
`/1`[1), 2)]	Lets you create one separate destination file for each signal in the source file. The destination file names get a suffix with the signal name: `_%signal%`.
`/d:factor`[1), 2)]	Lets you specify a downsampling factor. Example: `/d:3` (reads only each third value)
/rd	Lets you copy the source file to the destination and add reduction data to it. ▪ Source and destination must be MF4 files. ▪ Source and destination can be identical to modify the source file. ▪ All the other parameters are ignored. Refer to How to Add Reduction Data to a Measurement Data File on page 202.
`/?` or `/h`	Lets you display a help screen that lists all parameters with a short description.

[1)] The parameter is ignored when you use it in connection with the `/i` parameter.
[2)] You can combine the parameters `/s`, `/sl`, `/t`, `/p`, `/1` and `/d`.

Related topics

HowTos

How to Add Reduction Data to a Measurement Data File..... 202
How to Extract Data from a Measurement Data File..... 201

Automation

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Programming ControlDesk Automation

Where to go from here

Information in this section

Automating Measurement and Recording 350
In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Information in other sections

Tool Automation Demos (ControlDesk Automation 🕮)
Demonstrate how to automate ControlDesk and use ControlDesk events.

Automating Measurement and Recording

Introduction

In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Unless otherwise indicated, the program listings below consist of excerpts from the `MeasuringAndRecording.py` demo script.

Configuring measurement and recording

The following listing shows how to configure a measurement, for example:

- Adding a measurement variable and a parameter to ControlDesk's measurement signal list.
- Configuring the measurement data buffer

Then a measurement is started and stopped.

Note

ControlDesk initially synchronizes the time stamps of different platforms/devices when online calibration is started globally for the first time. If a high synchronization accuracy on measurement start is required, wait for about 20 s after going online before you start measuring. For more information, refer to Basics on Synchronized Data Acquisition on page 228.

```
# Import: from the demo utilities demo functions.
# These are described in the DemoUtilities library.
from DemoUtilities import Wait
(...)
# Get the root path
SCRIPTPATH = os.path.abspath(os.path.curdir)
if len(sys.argv) > 0:
    SCRIPTPATH = os.path.dirname(sys.argv[0])
# Define CalDemo .a2l image path.
A2LIMAGEPATH = os.path.abspath(os.path.join(SCRIPTPATH, "..\..\..\CalDemo\CalDemo.a2l"))
# Define CalDemo .mot image path.
MOTIMAGEPATH = os.path.abspath(os.path.join(SCRIPTPATH, "..\..\..\CalDemo\CalDemo.mot"))
# Path of the CalDemo exe.
CALDEMOPATH = os.path.abspath(os.path.join(SCRIPTPATH, "..\..\..\CalDemo\CalDemo.exe"))
(...)
# Connection paths of variables used in the demo.
CONTROL_VARIABLE_CONNECTION_PATH_TEMPLATE = "%s(5ms)://control_out"
FKI_VARIABLE_CONNECTION_PATH_TEMPLATE = "%s(OnChange)://f_Ki_1"
(...)
class MainDemoController(object):
    (...)
    def Initialize(self):
        (...)
        # Set MeasurementDataManagement.
        self.MeasurementDataManagement = DispatchWithEvents(self.ControlDeskApplication.\
                                         MeasurementDataManagement, MeasurementDataManagementEvents)
        (...)
        # Create the enums object.
        self.Enums = Enums(self.ControlDeskApplication)
        (...)
        # Add XCPonCAN platform.
        self.DemoPlatform = self.ControlDeskApplication.ActiveExperiment.Platforms.Add(
            self.Enums.PlatformType.XCPonCAN)
        (...)
        # Add variable description.
        self.DemoPlatform.VariableDescriptions.AddWithImage(A2LIMAGEPATH, MOTIMAGEPATH)
        # Add Time Plotter instrument.
        PlotterInstrument = self.ControlDeskApplication.LayoutManagement.ActiveLayout.\
                            Instruments.Add("Time Plotter", PLOTTERINSTRUMENTNAME,\
                                            5, 5, 700, 300)
        (...)
        # Add new y axis.
        newYAxis = PlotterInstrument.ActivePlot.YAxes.Add()
        # Add new signal.
        newSignal = newYAxis.Signals.Add()
        # Connect variable to signal.
        newSignal.MainVariable = CONTROL_VARIABLE_CONNECTION_PATH_TEMPLATE % self.DemoPlatform.Name
        (...)
```

```
    def ConfigureMeasurement(self):
        # Start CalDemo platform
        os.startfile(CALDEMOPATH)
        (...)
        # Add variable 'f_Ki_1'.
        # Syntax: PlatformName(RasterName):://UniqueVariableName
        self.MeasurementDataManagement.MeasurementConfiguration.Signals.Add(
            FKI_VARIABLE_CONNECTION_PATH_TEMPLATE % self.DemoPlatform.Name)
        # Configure measurement buffer: Get buffer object.
        measurementBuffer = self.MeasurementDataManagement.MeasurementConfiguration.Buffer
        # Configure measurement buffer: Set buffer size.
        measurementBuffer.Size = 10.0
        # Configure measurement buffer: Enable buffer overflow warning.
        measurementBuffer.WarningEnabled = True
        # Configure measurement buffer: Set warning time.
        measurementBuffer.WarningTime = 3.0
        # Start measurement.
        Wait(1)
        self.MeasurementDataManagement.Start()
        # Duration: 3 seconds
        Wait(3)
        # Stop measurement.
        self.MeasurementDataManagement.Stop()
        # Stop online calibration.
        self.ControlDeskApplication.CalibrationManagement.StopOnlineCalibration()
```

Tip

To prevent run-time errors, you can check whether a variable can be assigned to a measurement raster. See the following example:

```
raster5ms = self.MeasurementDataManagement.
            MeasurementConfiguration.Platforms[0].Rasters.
            Item('5ms')
raster5ms.IsVariableSupported('Platform():://Model Root/
            ThrottleController/PID/f_Ki/Out1')
```

Recording with a time limit

The following listing shows how to configure recording settings and to start a recording.

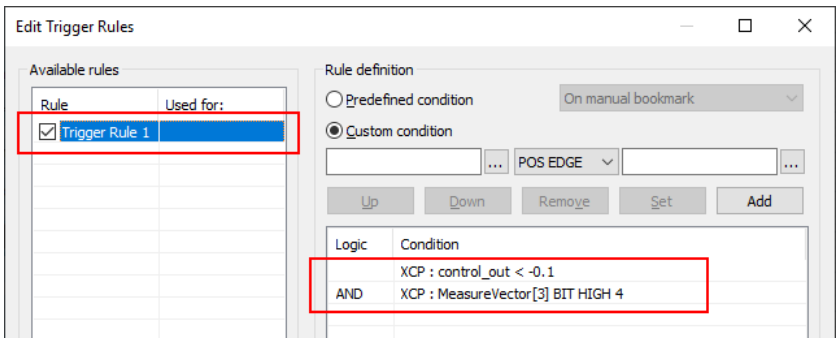
```
class MainDemoController(object):
    def Initialize(self):
        (...)
        # Set MeasurementDataManagement.
        self.MeasurementDataManagement = DispatchWithEvents(self.ControlDeskApplication.\
                                         MeasurementDataManagement, MeasurementDataManagementEvents)
        (...)
    def configureAndStartRegularRecording(self):
        # Get recorder object.
        mainRecorder = self.MeasurementDataManagement.MainRecorder
        # Set output file name.
        mainRecorder.BaseFileName = "NewRecording.mf4"
        # Set to automatic file naming.
        mainRecorder.AutomaticNamingEnabled = True
        # Add measurement to experiment.
        mainRecorder.AddToExperimentEnabled = True
        (...)
```

```
        # Add record to measurement data pool.
        mainRecorder.OpenInMeasurementDataPoolEnabled = True
        # Activate all signals in the measurement signal list.
        # Iterate over the signals.
        for signalObject in self.MeasurementDataManagement.MeasurementConfiguration.Signals:
            # Activate signal.
            signalObject.Active = True
        # Get f_Ki_1 signal.
        fkiSignal = self.MeasurementDataManagement.MeasurementConfiguration.Signals.Item(
            FKI_VARIABLE_CONNECTION_PATH_TEMPLATE % (self.DemoPlatform.Name, ON_CHANGE_RASTER_NAME))
        # Disable recording for f_Ki_1 signal.
        mainRecorder.Signals.Remove(fkiSignal)
        # Define stop condition.
        # Get stop condition object.
        stopCondition = mainRecorder.StopCondition
        # Enable stop condition.
        stopCondition.Enabled = True
        # Set stop condition to type time limit.
        stopCondition.Type = StopConditionType.TimeLimit
        # Set time limit to 2 seconds.
        stopCondition.TimeLimit = 2
        # Start recording. (first parameter: with trigger, second parameter: overwrite existing)
        mainRecorder.Start(False, True)
        (...)
        # Stop online calibration.
        self.ControlDeskApplication.CalibrationManagement.StopOnlineCalibration()
```

Triggered recording

The following illustration shows a trigger rule with two input signals.

The trigger rule is displayed in the **Edit Trigger Rules** dialog of ControlDesk's graphical user interface:



The following workflow shows the steps for defining this trigger rule via automation.

1. Add a new trigger rule to the trigger rules collection.

```
triggerRule1 = self.MeasurementDataManagement.TriggerRules.Add(\
               "Trigger Rule 1")
```

2. Create a signal object for each signal that is used in the trigger rule. The selected signals must be measured, i.e. they must be included in the `MeasurementSignals` collection.

```
InputSignal1 = self.MeasurementDataManagement.MeasurementConfiguration.\
               Signals.Item("XCP(5ms)://control_out")
InputSignal2 = self.MeasurementDataManagement.MeasurementConfiguration.\
               Signals.Item("XCP(5ms)://MeasureVector[3]")
```

3. Add a signal mapping object to the signal mappings collection for each signal that is used in the trigger rule.

```
triggerRule1.Mappings.Add("control_out", InputSignal1)
triggerRule1.Mappings.Add("measure_vector_3", InputSignal2)
```

4. Add the trigger conditions to the trigger rule definition (as a string).

```
triggerRule1.Definition = "control_out < -0.1 AND \
                           measure_vector_3 BIT HIGH 4"
```

You can use the following operators:

Operator Syntax	Meaning
=	The left operand is equal to the right operand.
<>	The left operand is not equal to the right operand.
<	The left operand is smaller than the right operand.
<=	The left operand is smaller than or equal to the right operand.
>	The left operand is greater than the right operand.
>=	The left operand is greater than or equal to the right operand.
BIT HIGH <x>	Returns true when bit number x is set (zero based index).
BIT LOW <x>	Returns true when bit number x is cleared (zero based index).
POS EDGE <x>	Returns true when the signal value changes from a value lower than x to a value greater than or equal to x (positive edge detection).
NEG EDGE <x>	Returns true when the signal value changes from a value greater than x to a value lower than or equal to x (negative edge detection).
BIT POS EDGE <x>	Returns true when bit number x changes from cleared to set (positive edge detection).
BIT NEG EDGE <x>	Returns true when bit number x changes from set to cleared (negative edge detection).
CHANGE <x>	Returns true when the difference between the current signal value and its direct successor is greater or equal to x.

You can combine conditions using the following logical operators:

Operator	Meaning
AND	Logical and of the left and right operands.
OR	Logical or of the left and right operands.

The following listing shows how to configure recording settings for a triggered recording (start and stop trigger) and to start the recording.

```
# Name of the variable used in the demo.
CONTROLVARIABLENAME = "control_out"
(...)
# Connection path of a variable used in the demo.
CONTROL_VARIABLE_CONNECTION_PATH_TEMPLATE = "%s(5ms):://control_out"
(...)
class MainDemoController(object):
    (...)
    def Initialize(self):
        # Add XCPonCAN platform.
        self.DemoPlatform = self.ControlDeskApplication.ActiveExperiment.Platforms.Add(
```

```
            self.Enums.PlatformType.XCPonCAN)
    (...)
    def ConfigureAndStartRecording(self):
        # For this example we use the second recorder.
        self.SecondRecorder = self.MeasurementDataManagement.MainRecorders.Add("Second recorder")
        (...)
        # Configure trigger.
        # Create start trigger rule
        startTriggerRule = self.MeasurementDataManagement.TriggerRules.Add("NewStartCondition")
        # Enable rule.
        startTriggerRule.Enabled = True
        # Set trigger rule.
        # Get signal used in the trigger rule.
        triggerInputSignal = self.MeasurementDataManagement.MeasurementConfiguration.Signals.Item(
            CONTROL_VARIABLE_CONNECTION_PATH_TEMPLATE % self.DemoPlatform.Name)
        # Add signal to trigger rule mapping.
        startTriggerRule.Mappings.Add(CONTROLVARIABLENAME, triggerInputSignal)
        # Define trigger rule.
        startTriggerRule.Definition = "%s < -0.1" % CONTROLVARIABLENAME
        # Define start condition.
        # Triggered recording.
        startCondition = self.SecondRecorder.StartCondition
        # Enable start condition.
        startCondition.Enabled = True
        (...)
        # Set start condition trigger rule.
        startCondition.Trigger = startTriggerRule
        # Configure stop trigger.
        # Create stop trigger rule.
        stopTriggerRule = self.MeasurementDataManagement.TriggerRules.Add("NewStopCondition")
        # Enable rule.
        stopTriggerRule.Enabled = True
        # Set trigger rule.
        # Add signal to trigger rule mapping.
        stopTriggerRule.Mappings.Add(CONTROLVARIABLENAME, triggerInputSignal)
        # Define trigger rule.
        stopTriggerRule.Definition = "%s > 0.6" % CONTROLVARIABLENAME
        # Define stop condition.
        # Get stop condition object.
        stopCondition = self.SecondRecorder.StopCondition
        # Enable stop condition.
        stopCondition.Enabled = True
        # Set stop condition to type trigger.
        stopCondition.Type = StopConditionType.Trigger
        # Set stop condition trigger rule.
        stopCondition.Trigger = stopTriggerRule
        (...)
        # Start recording. (first parameter: with trigger, second parameter: overwrite existing)
        self.SecondRecorder.Start(True, True)
```

Event-based recording

The following listing shows how to configure and start a recording that uses the result ready event of a recorder. The method `OnResultReady` is called when results for a recorder buffer are ready for fetching.

Each measurement raster has its own recording buffer (in this script excerpt: 5 ms and 100 ms). The recorded data is not stored in a file (`mainRecorder.WriteToFileEnabled = False`) but logged and displayed by the automation system.

Each buffer row begins with a time stamp followed by the related measurement values.

```
#The signal name list for the 5 ms raster buffer.
FIVE_MILLISECOND_RASTER_SIGNAL_NAMES = None;
# The signal name list for the 100 ms raster buffer.
HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES = None;
(...)
# Function : LogRecorderData
def LogRecorderData(data, buffer, recorder):
    # The first entry in each row is the timestamp.
    timeStamp = newestValues[0];
    # Format string for value logging.
    loggingString = ""
    if buffer.RasterName == FIVE_MILLISECOND_RASTER_NAME and\
        len(FIVE_MILLISECOND_RASTER_SIGNAL_NAMES) == (len(newestValues) - 1):
        for Index in range(len(FIVE_MILLISECOND_RASTER_SIGNAL_NAMES)):
            loggingString += "%s: %s\n" % (FIVE_MILLISECOND_RASTER_SIGNAL_NAMES[Index],\
                                str(newestValues[Index + 1]).strip("()[]"))
    elif buffer.RasterName == HUNDRED_MILLISECOND_RASTER_NAME and\
        len(HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES) == (len(newestValues) - 1):
        for Index in range(len(HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES)):
            loggingString += "%s: %s\n" % (HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES[Index],\
                                str(newestValues[Index + 1]).strip("()()"))
    loggingString = loggingString[:len(loggingString) - 2]
    # Log the event.
    print Resources.MainRecorderResultReadyEvent % (buffer.RasterName, recorder.Name, len(Data), timeStamp,\
          loggingString)
(...)
class MainRecorderEvents(object):
    def OnResultReady(self, clientID, buffer, recorder):
        buffer = Dispatch(buffer)
        recorder = Dispatch(recorder)
        data = buffer.FetchConverted(clientID, 1)
        LogRecorderData(data, buffer, recorder)
        (...)
        # Register the events.
        recorderEventInstance = DispatchWithEvents(self.SecondRecorder, MainRecorderEvents)
        # Start recording. (first parameter: with trigger set to false, second parameter:
                overwrite existing set to true)
        self.SecondRecorder.Start(True, True)
        (...)
        # Release the event instance.
        recorderEventInstance = None
        # Stop Measurement.
        self.MeasurementDataManagement.Stop()
        # Stop online calibration.
        self.ControlDeskApplication.CalibrationManagement.StopOnlineCalibration()
```

```
class MainDemoController(object):
    (...)
    def ConfigAndStartEventRecording(self):
        # Disable writing to file.
        self.SecondRecorder.WriteToFileEnabled = False
        # Add additional signals.
        # Add variable MeasureVector in default raster.
        newSignal = self.MeasurementDataManagement.MeasurementConfiguration.Signals.Add(
                                    MeasureVectorConnectionPath % (self.DemoPlatform.Name));
        # Add the new signal to the second recorder
        self.SecondRecorder.Signals.Insert(newSignal)
        # Add variable 'f_Ki_1' in 100 ms raster.
        newSignal = self.MeasurementDataManagement.MeasurementConfiguration.Signals.Add(
             FKI_VARIABLE_CONNECTION_PATH_TEMPLATE % (self.DemoPlatform.Name, HUNDRED_MILLISECOND_RASTER_NAME));
        # Add the new signal to the second recorder
        self.SecondRecorder.Signals.Insert(newSignal)
        # Configure the buffers.
        # Configure the buffer for the 5 ms raster.
        buffer5ms = self.SecondRecorder.Buffers.Find(self.DemoPlatform.Name, FIVE_MILLISECOND_RASTER_NAME)
        buffer5ms.NumberOfSamplesForEventTrigger = 100
        buffer5ms.Size = 1000
        # Configure the buffer for the 100 ms raster.
        buffer100ms = self.SecondRecorder.Buffers.Find(self.DemoPlatform.Name, HUNDRED_MILLISECOND_RASTER_NAME)
        buffer100ms.NumberOfSamplesForEventTrigger = 5
        buffer100ms.Size = 200
        # Get the signal configuration of the recorder.
        global FIVE_MILLISECOND_RASTER_SIGNAL_NAMES
        global HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES
        FIVE_MILLISECOND_RASTER_SIGNAL_NAMES = []
        HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES = []
        for currentSignal in self.SecondRecorder.Signals:
             if currentSignal.Identifier.RasterName == FIVE_MILLISECOND_RASTER_NAME:
                FIVE_MILLISECOND_RASTER_SIGNAL_NAMES.append(currentSignal.Identifier.UniqueName)
             elif currentSignal.Identifier.RasterName == HUNDRED_MILLISECOND_RASTER_NAME:
                HUNDRED_MILLISECOND_RASTER_SIGNAL_NAMES.append(currentSignal.Identifier.UniqueName)
        (...)
```

Polling recording

The following listing shows how to configure and start a recording that polls data from a recorder.

Each measurement raster has its own recording buffer (in this script excerpt: 5 ms). The recorded data is logged and displayed by the automation system. Each buffer row begins with a timestamp followed by the related measurement values.

In contrast to event-based recording, you must create a client ID for polling data (`clientID = mainRecorder.CreateClientID()`).

Tip

Polling recording involves the risk of losing data. A recorder buffer overflow occurs if the data is fetched too late. You should therefore use event-based recording whenever possible.
If you must use polling recording, you can optimize your script by including the recorder's buffer overflow event. The polling parameters can then be adjusted in your script until all buffer overflows are eliminated.

```
class MainRecorderEvents(object):
   def OnBufferOverflow(self, clientID, buffer, recorder):
      print("--- Buffer overflow for ClientID %d happens. ---" \
            % (clientID))
```

```
# The signal name list for the 5 ms raster buffer.
FIVE_MILLISECOND_RASTER_SIGNAL_NAMES = None;
(...)
# Function: LogRecorderData
def LogRecorderData(data, buffer, recorder):
    # The first entry in each row is the timestamp.
    timeStamp = newestValues[0];
    # Format string for value logging.
    loggingString = ""
    if Buffer.RasterName == FIVE_MILLISECOND_RASTER_NAME and\
        len(FIVE_MILLISECOND_RASTER_SIGNAL_NAMES) == (len(newestValues) - 1):
        for Index in range(len(FIVE_MILLISECOND_RASTER_SIGNAL_NAMES)):
            loggingString += "%s: %s\n" % (FIVE_MILLISECOND_RASTER_SIGNAL_NAMES[Index],\
                              str(newestValues[Index + 1]).strip("()[]"))
    (...)
    loggingString = loggingString[:len(loggingString) - 2]
    # Log the event.
    print Resources.MainRecorderResultReadyEvent % (Buffer.RasterName, Recorder.Name, len(Data),\
                                                    timeStamp, loggingString)
(...)
```

```
class MainDemoController(object):
    (...)
    def ConfigureAndStartPollRecording(self):
        # Get the buffers.
        buffer5ms = self.SecondRecorder.Buffers.Find(self.DemoPlatform.Name, FIVE_MILLISECOND_RASTER_NAME)
        (...)
        # Create the client ID for polling.
        clientID = selfSecondRecorder.CreateClientID()
        # Start recording. (first parameter: with trigger set to false, second parameter: overwrite
                            existing set to true)
        selfSecondRecorder.Start(False, True)
        # Counter to continue the demo after 8 seconds.
        count = 20
        # Calculate polling time.
        nextTime = time.time() + 0.2
        # Check if the recording is still running.
        while self.SecondRecorder.State == self.Enums.RecordingState.Running and count > 0:
            # Wait remaining time.
            currentTime = time.time()
            if nextTime - currentTime > 0:
                Wait(NextTime - time.time())
            nextTime = time.time() + 0.2
            # Poll the data.
            Data = buffer5ms.FetchConverted(clientID, self.Enums.FetchDataMode.All)
            LogRecorderData(data, buffer5ms, self.SecondRecorder)
            (...)
            # Decrement the counter.
            count -= 1
        (...)
        # Stop Measurement.
        self.MeasurementDataManagement.Stop()
        # Release the client ID.
        self.SecondRecorder.ReleaseClientID(clientID)
        # Stop online calibration.
        self.ControlDeskApplication.CalibrationManagement.StopOnlineCalibration()
```

Accessing a measurement data file

You can access measurement data files in different ways:

Accessing an open measurement data file You can access a currently open measurement data file via the `Measurements / IXaMeasurements <<Collection>>` collection property of the `MeasurementDataManagement / IXaMeasurementDataManagement <<Interface>>` interface.

Closed measurement data files are *not* included in the `Measurements / IXaMeasurements <<Collection>>` collection.

Accessing a closed measurement data file You can access a currently closed measurement data file via the `Files / IXaFiles <<Collection>>` collection property of the following interfaces:

- `MeasurementDataManagement / IXaMeasurementDataManagement <<Interface>>`
- `ActiveExperiment / IXaActiveExperiment <<Interface>>`

Note

When you use the `Files / IXaFiles <<Collection>>` collection property of the `ActiveExperiment / IXaActiveExperiment <<Interface>>` interface, you have access to *all the files of the currently active experiment*, not only to measurement data files.

Visualizing recorded data

The following listing shows how to create a new layout with a Time Plotter and connect a recorded signal to the Time Plotter. Then the measurement data file is exported and imported.

```
# Create export path.
EXPORTPATH = os.path.join(PROJECTROOTPATH,"ExportedMeasurement.mf4")
(...)
# Name of the Plotter instrument.
PLOTTERINSTRUMENTNAME = "TestPlotter"
(...)
class MainDemoController(object):
(...)
    def AccessRecordedData(self):
            (...)
            # Get the measurement object of the first measurement.
            measurement = self.MeasurementDataManagement.Measurements.Item(0)
            # Create new layout.
            self.ControlDeskApplication.LayoutManagement.Layouts.Add("Recorded Data Layout")
            # Add Plotter instrument.
            PlotterInstrument = self.ControlDeskApplication.LayoutManagement.ActiveLayout.\
                                Instruments.Add("Time Plotter", PLOTTERINSTRUMENTNAME,\
                                                5, 5, 700, 300)
            # Add new y-axis.
            newYAxis = PlotterInstrument.ActivePlot.YAxes.Add()
            # Add new signal.
            newSignal = newYAxis.Signals.Add()
            # Connect variable to the second signal of the measurement.
            newSignal.MainVariable = "NewRecording010.mf4:XCP(5ms):/XCP/SignalGenOutput_2";
            # Export measurement.
            measurement.Export(EXPORTPATH, True)
            # Import measurement.
            self.MeasurementDataManagement.Measurements.Load(EXPORTPATH)
```

Related topics

Basics

Basics on Configuring Measurement.....78
Basics on Configuring Recording.....119
Tool Automation Demos (ControlDesk Automation 🕮)

References

Trigger Rules.....344

Measurement and Recording Handling

Where to go from here

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In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

General Measurement- and Recording-Related Interfaces.....362
In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Recording-Related Interfaces.....363
In ControlDesk you can record to a file and/or get the recording results event based.

Measurement and Recording Handling Interfaces

Introduction

In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

General Measurement- and Recording-Related Interfaces

Introduction

In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Description

The Measurement Data Management object implements the *IXaMeasurementDataManagement* interface. The properties of the *IXaMeasurementDataManagement* interface can be used to manipulate the settings of the Measurement Data Management.

Related interfaces

Interface	Description
IXaMeasurementDataManagement (refer to MeasurementDataManagement / IXaMeasurementDataManagement <<Interface>> (ControlDesk Automation 🕮))	This interface is to access all measurement features inside the active experiment.
IXaMeasurementConfiguration (refer to MeasurementConfiguration / IXaMeasurementConfiguration <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the configuration of the current measurement.
IXaMeasurements (refer to Measurements / IXaMeasurements <<Collection>> (ControlDesk Automation 🕮))	This interface is to access the collection of all measurements opened in the measurement data pool.

Related documentation

Topic	Description
Automating Measurement and Recording on page 350	In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Recording-Related Interfaces

Introduction

In ControlDesk you can record to a file and/or get the recording results event based.

Description

For the event based recording you can get the event source object implementing the interface *IXaMainRecorderEvents* from the object implementing the interface *IXaMainRecorder*.

- The *ResultReady* event is triggered if the specified buffer filling level is reached.

- The *BufferOverflow* event is triggered if the no data was fetched and the ring buffer is overwritten.

Related interfaces

Interface	Description
IXaMainRecorderEvents (refer to MainRecorderEvents / IXaMainRecorderEvents <<EventInterface>> (ControlDesk Automation 🕮))	This interface is to access the events of the main recorder.
IXaMainRecorder (refer to MainRecorder / IXaMainRecorder <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the main recorder functions.
IXaRecorders (refer to Recorders / IXaRecorders <<Collection>> (ControlDesk Automation 🕮))	This interface provides access to the list of recorders.
IXaStopCondition (refer to StopCondition / IXaStopCondition <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the stop condition options.
IXaStartCondition (refer to StartCondition / IXaStartCondition <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the start condition options.
IXaRecordingSignals (refer to RecordingSignals / IXaRecordingSignals <<Collection>> (ControlDesk Automation 🕮))	This interface is to access the list of signals configured for recording.
IXaDataEventBuffer (refer to DataEventBuffer / IXaDataEventBuffer <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the data event buffer of a recorder for a specific raster.
IXaDataEventBuffers (refer to DataEventBuffers / IXaDataEventBuffers <<Collection>> (ControlDesk Automation 🕮))	This interface is to access the buffers collection.
IXaDataEventBufferSignals (refer to DataEventBufferSignals / IXaDataEventBufferSignals <<Collection>> (ControlDesk Automation 🕮))	This interface is to access the collection of signals in the buffer.
IXaMeasurementSignal (refer to MeasurementSignal / IXaMeasurementSignal <<Interface>> (ControlDesk Automation 🕮))	This interface is to access the properties of a measurement signal.

Related documentation

Topic	Description
Automating Measurement and Recording on page 350	In ControlDesk, you can select the variables to be measured and recorded by adding them to the measurement signal list. You can apply a number of default settings for measurements and recordings.

Troubleshooting

Where to go from here

Information in this section

Problem When Measuring Large Amounts of Data on dSPACE Platforms.....366
When you measure large amounts of data on dSPACE platforms, for example, when you perform *continuous (untriggered)* measurements using high-frequency measurement rasters, the operability of ControlDesk might be reduced.

Problem When Displaying Signals Measured in an Event-Based Raster in the Time Plotter.....367
When a signal is measured in an event-based measurement raster, it might be displayed incompletely if ControlDesk does not create enough draw buffer space for it.

Problem with Measurement Raster Names in MP/MC Applications.....369
Why does the name of a measurement raster of a multiprocessor/multicore (MP/MC) application have a suffix `[1ms]` or similar in ControlDesk's Measurement Configuration controlbar?

Synchronizing Bus Monitoring Data with Recorded Data.....370
If you compare the measurement values of a recording with the measurement values of a bus monitoring, the measured values at the same measurement time stamp might be different.

Problem with Unavailable Measurement Rasters in Handcoded Applications.....372
This problem may occur if there are no sampling periods defined in the TRC file for the measurement rasters of a handcoded application.

Problem for Time-Stamped Measurement in Handcoded Applications.....373
This problem may occur if no host service is contained in a handcoded application.

Problem When Measuring Large Amounts of Data on dSPACE Platforms

Problem

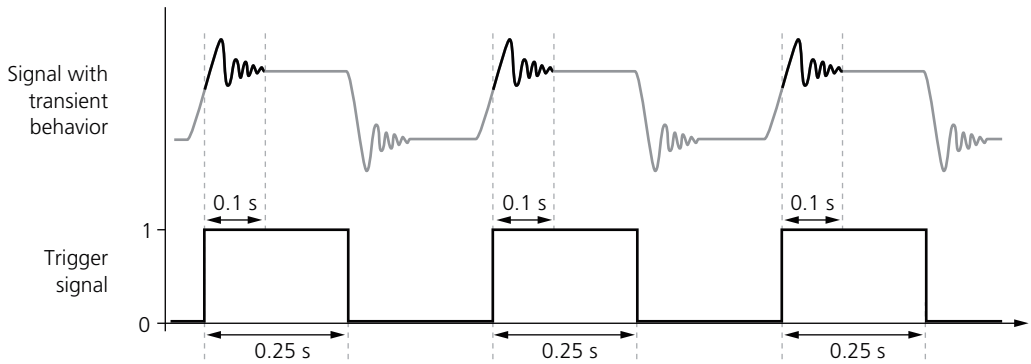
When you measure large amounts of data on dSPACE platforms, for example, when you perform *continuous (untriggered)* measurements using high-frequency measurement rasters, the operability of ControlDesk might be reduced.

Solution

The following example shows a measurement that is triggered by a start and a stop trigger. Using triggers has the advantage of reducing the data throughput between dSPACE real-time hardware and the ControlDesk PC, and enhances the operability of ControlDesk.

The illustration below shows two signals:

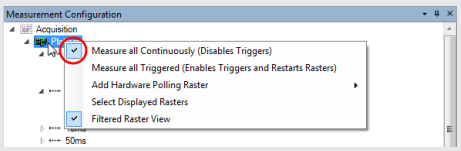
- The *trigger signal* is used to start triggered measurement: Measurement is started with each rising edge of the signal.
- The upper signal has transient behavior that you want to analyze. Only a part of the signal needs to be measured for this. To analyze the transient behavior in the example below, the duration of each data capture is set to 0.1 s.



To reduce the measurement data throughput and enhance the operability of ControlDesk, configure triggered measurement for the high-frequency measurement rasters of your real-time application.

Tip

Via the context menu of a platform or a measurement raster in the **Measurement Configuration**, you can easily check whether continuous measuring is enabled for a selected measurement raster or for all the measurement rasters of a platform. A check symbol indicates that measuring is performed continuously.



To reduce the data throughput, you can specify the following settings:

- Enable appropriate start and stop triggers (duration or sample count triggers). Decrease the **Duration** values for duration triggers and/or the **Sample Count** values for sample count triggers.
- You can also reduce the data throughput by specifying a downsampling factor for the measurement raster.

For instructions, refer to Configuring Triggered Measurement on dSPACE Platforms on page 86.

Related topics

Basics

Basics on Configuring Measurement.....78
Basics on Triggered Measurement.....87
Handling a Large Number of Measurement Rasters.....218

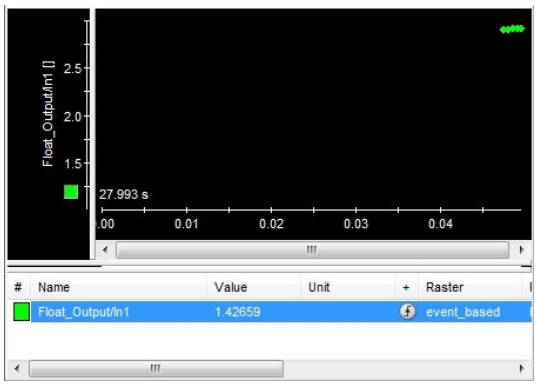
Problem When Displaying Signals Measured in an Event-Based Raster in the Time Plotter

Problem

When a signal is measured in an event-based measurement raster, it might be displayed incompletely if ControlDesk does not create enough draw buffer space for it.

Description

If the Time Plotter displays a signal that is measured in an event-based raster, the signal might be displayed only on the right side of the Time Plotter, see the following example:



The Time Plotter in the example displays a running measurement with events occurring at a high frequency. Since the frequency of the events is unknown, ControlDesk assumes a sample time of 1 ms. If the sample time is much shorter, ControlDesk does not display the data accurately.

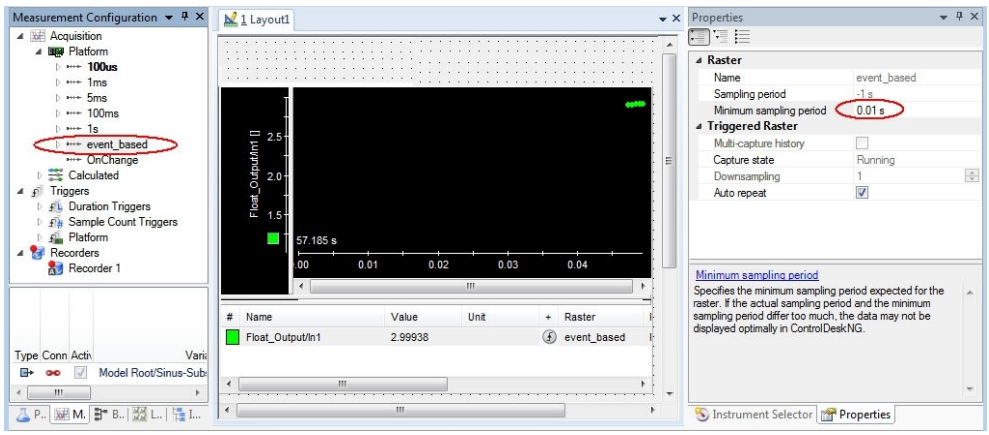
The reason for this problem is the buffer space that ControlDesk creates for a measurement when an experiment is loaded. ControlDesk has to calculate the buffer space for each raster. The default for event-based rasters is 0.001 s. If this is too low, the data buffer is too small and measurement values are not displayed accurately.

Solution

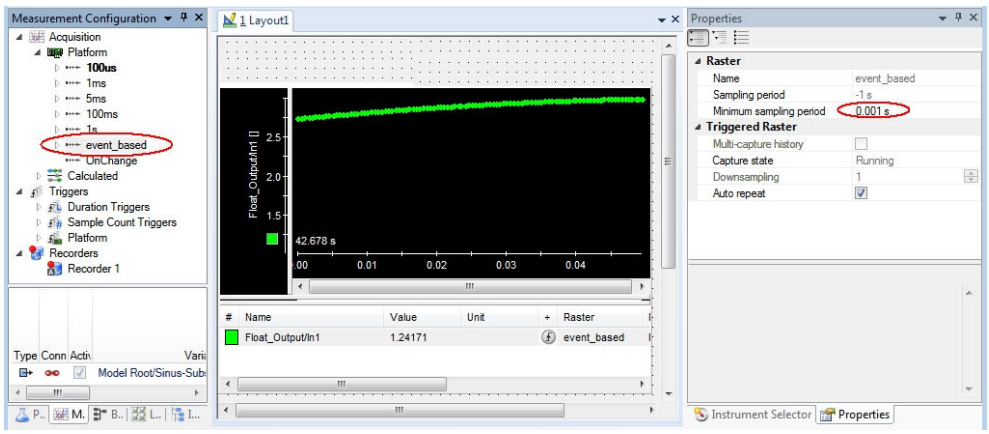
In the property list of the event-based raster, change the minimum sampling period value. ControlDesk uses the value the next time the experiment is loaded and creates more buffer space.

The following examples show the results of different minimum sampling period values, after the experiment has been reloaded.

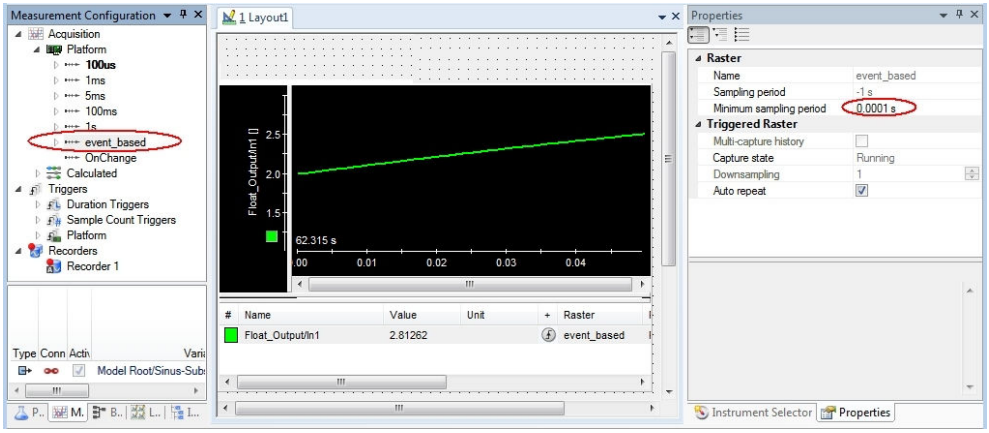
- Minimum sampling period 0.01 s: The signal is displayed only on the right side of the Time Plotter.



- Minimum sampling period 0.001 s: Single measurement values are visible without zooming.



- Minimum sampling period 0.0001 s: Single measurement values are not visible without zooming:



Note

Increasing the minimum sampling period enlarges the memory consumption of all the signals that are measured in this raster.

Related topics

References

Raster Properties..... 244

Problem with Measurement Raster Names in MP/MC Applications

Problem

Why does the name of a measurement raster of a multiprocessor/multicore (MP/MC) application have a suffix `[1ms]` or similar in ControlDesk's **Measurement Configuration** controlbar?

Solution

For details and examples on the rasters of an MP/MC application available in ControlDesk's **Measurement Configuration** controlbar, refer to Measurement Rasters in MP/MC Applications on page 220.

Related topics

Basics

Measurement Rasters in MP/MC Applications..... 220

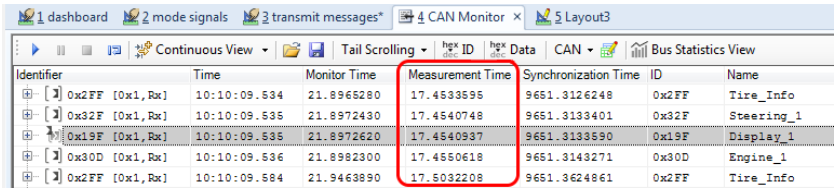
Synchronizing Bus Monitoring Data with Recorded Data

Problem

If you compare the measurement values of a recording with the measurement values of a bus monitoring, the measured values at the same measurement time stamp might be different.

Description

If you have monitored bus data simultaneously to a running measurement, the monitoring list can display the measurement time for each measured value. If the time cursor is enabled in ControlDesk, the row that is related to the selected time position is highlighted. The following illustration shows this for CAN bus monitoring.

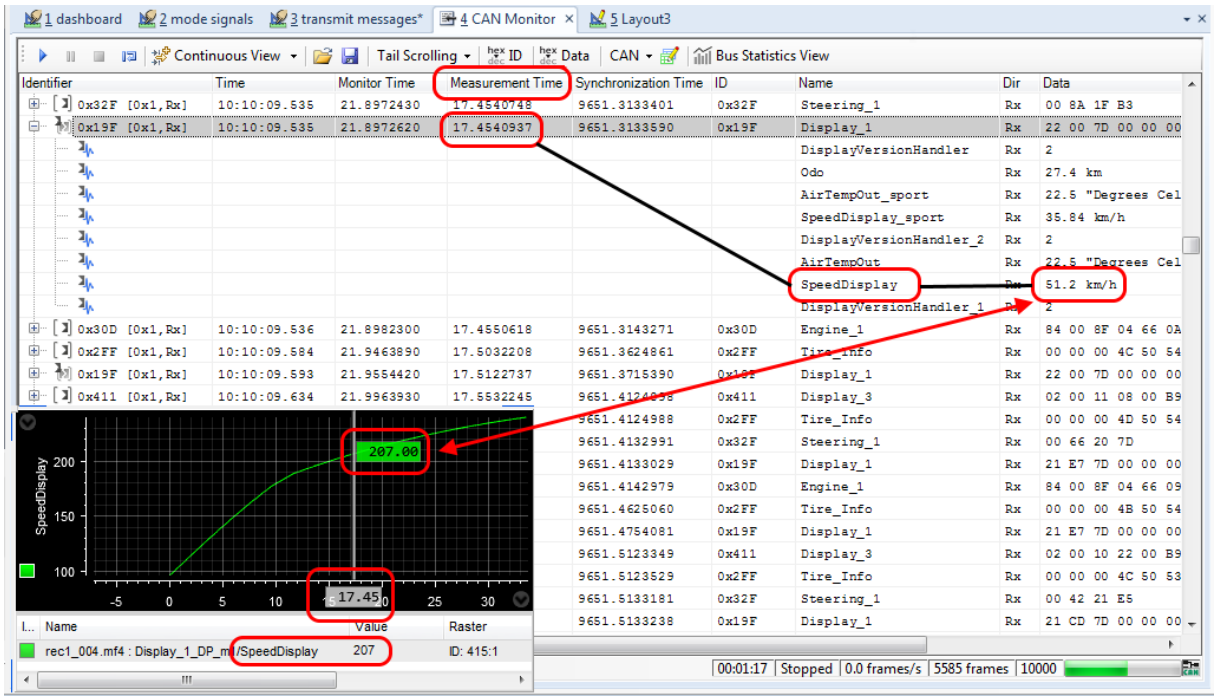


Identifier	Time	Monitor Time	Measurement Time	Synchronization Time	ID	Name
0x2FF [0x1,Rx]	10:10:09.534	21.8965280	17.4533595	9651.3126248	0x2FF	Tire_Info
0x32F [0x1,Rx]	10:10:09.535	21.8972430	17.4540748	9651.3133401	0x32F	Steering_1
0x19F [0x1,Rx]	10:10:09.535	21.8972620	17.4540937	9651.3133590	0x19F	Display_1
0x30D [0x1,Rx]	10:10:09.536	21.8982300	17.4550618	9651.3143271	0x30D	Engine_1
0x2FF [0x1,Rx]	10:10:09.584	21.9463890	17.5032208	9651.3624861	0x2FF	Tire_Info

If the **Measurement Time** column is not visible in the monitoring list, click to activate it via the **Configure Column Sets** dialog.

Suppose you have performed a recording after the measurement was running for a while. If you now open the measurement data file and compare signals that were simultaneously recorded and monitored, you might see different values at the same time stamps.

The following illustration shows an example. The recorded value is visible in a Time Plotter, the monitored value in the **CAN Monitor** monitoring list:



At time stamp 17.45 s, the recorded value for the `SpeedDisplay` signal (207.0 km/h) differs from the monitored value (51.2 km/h). This shows that monitoring and recording measurement times are not synchronized.

The problem occurs because the measurement time stamps in the recording start with 0 at the start of the recording, whereas the monitoring list uses the measurement time stamps from the running measurement that was started earlier.

There are two solutions for this problem.

- Solution 1: Saving the recording with the original measurement time stamps
- Solution 2: Adding an offset to the time stamps in the recorded data

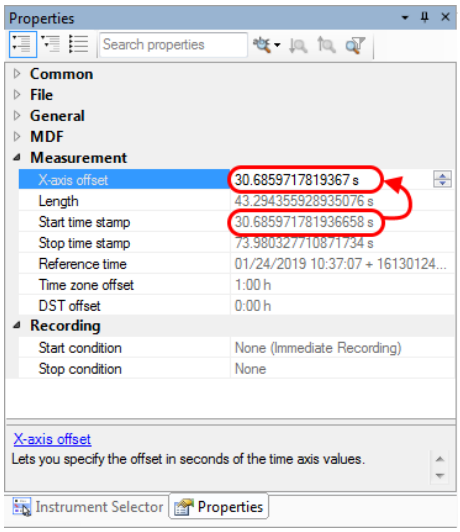
Solution 1: Saving the recording with the original measurement time stamps

Before you start the recording, activate **Use measurement time stamps** in the property list of the recorder. The recorder then uses the original time stamps of the running measurement.

Solution 2: Adding an offset to the time stamps in the recorded data

In the **Project** controlbar or in the **Measurement Data Pool**, right-click the measurement data file and select **Properties** to open the **Properties** controlbar.

Open the **Measurement** category, right-click the value of the **Start time stamp** property and copy it to the **X-axis offset** property.



Related topics

Basics

Basics on Monitoring, Logging, and Filtering Bus Communication (ControlDesk Bus Navigator 🕮)

Problem with Unavailable Measurement Rasters in Handcoded Applications

Problem

ControlDesk's **Measurement Configuration** controlbar displays measurement rasters of a real-time application only if they are defined in the application's TRC file. Otherwise, measurement rasters are not available in the controlbar.

Solution

Add the sampling period(s) of the application's measurement raster(s) to the application's TRC file.

The listing below is an example definition of a time-based measurement raster with a sampling period of 0.005 s and the `5ms` alias.

```
sampling_period[1]
{
  value:       0.005
  alias:       "5ms"
}
```

The listing below is an example definition of an event-based measurement raster with the `Engine` alias.

```
sampling_period[2]
{
  value:       0.0
  alias:       "Engine"
}
```

Related topics

Basics

Basics on Measurement Rasters..... 212

Problem for Time-Stamped Measurement in Handcoded Applications

Problem

A handcoded application must contain a host service if it is to be used with ControlDesk. Measuring and calibrating are not possible without one.

To display and analyze measurement signals in ControlDesk's plotter instruments, *time-stamped data* has to be sent to ControlDesk. This requires some additional code before you call the host service.

If you load a handcoded application that does not contain this additional code, the application running on the dSPACE real-time hardware does not send time stamps to ControlDesk.

Solution

Add the additional code to your handcoded application. The sample code below shows the additional code (in emphasis):

```
void isr_func()
{
   ts_timestamp_type ts;
   /* sample step calculation */
   …
   ts_timestamp_read(&ts);
   host_service(1,&ts);
}
```

For details on implementing a host service, refer to:

- DS1006: host_service (DS1006 RTLib Reference 🕮)
- DS1104: host_service (DS1104 RTLib Reference 🕮)
- MicroAutoBox II: host_service (MicroAutoBox II RTLib Reference 🕮)

Related topics

Basics

Basics on Configuring Measurement..... 78

Limitations

Where to go from here

Information in this section

General Limitations for Measurement and Recording.....375
There are some general limitations for measuring and recording with ControlDesk.

Limitations for Measuring and Data Logging on Platforms.....378
There are some limitations for measuring and data logging on platforms with ControlDesk.

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General Limitations for Measurement and Recording

Introduction

There are some general limitations for measuring and recording with ControlDesk.

Measurement configuration

You can add variables to the measurement signal list during a running measurement. Place the variables on a layout or choose **Add to Measurement Signal List** from the variable's context menu in the **Variables** controlbar. The added variables will be measured the next time measurement starts.

Some items of the measurement configuration are not available during a running measurement.

To make changes to these items of your measurement configuration (for example, to change the measurement raster or the start/stop trigger conditions for recording), you have to perform the following steps:

1. Stop the measurement. For instructions, refer to How to Stop Measuring on page 106.
2. Modify the measurement configuration. For more information, refer to Configuring Measurement on page 77.
3. Restart the measurement. For instructions, refer to How to Start Measuring on page 103.

No measurement and recording of structs and struct arrays

Structs and struct arrays cannot be measured and recorded.

Workaround However, you can measure and record the individual variables of a struct.

No recording of string variables

With this version of ControlDesk, you cannot record string variables.

Limitation for recording calculated variables

When a calculated variable is recorded, only the variable values are written. Information on the computation formula and the input signals of the calculated variable is lost.

As a result, when you load a recorded measurement data file, the variable type of calculated variables is changed to *measurement*.

Loss of original variable type information

All the variables in a measurement data file have the *measurement* variable type, independent of the original variable type.

This limitation applies to the following file formats:

- CSV
- MAT
- BIN

Exporting recorded maps, curves, and axes supported only by MF4 file format

Exporting recorded maps, curves, and axes is supported only by the MF4 file format. Recorded maps, curves and axes are omitted when you select any other export file format.

No support for parameters with a dynamic number of axis points

Parameters with a dynamic number of axis points (A2L keyword: `NO_AXIS_PTS_X`) are not supported:

- You cannot add such parameters to the **Measurement Configuration**.
- When you import a measurement data file that contains such parameters, these are ignored during import.

Limitation for variables with a verbal or multiscaling conversion table

When you export measurement data to the CSV or MAT file format, variables with a verbal or multiscaling conversion table are stored in source format, not in converted format.

Limitation for variables with a numerical tabular conversion

No default values for variables with numerical tabular conversion are stored when you use the following file formats:

- MAT
- CSV

Limitation for measuring/recording with more than one raster

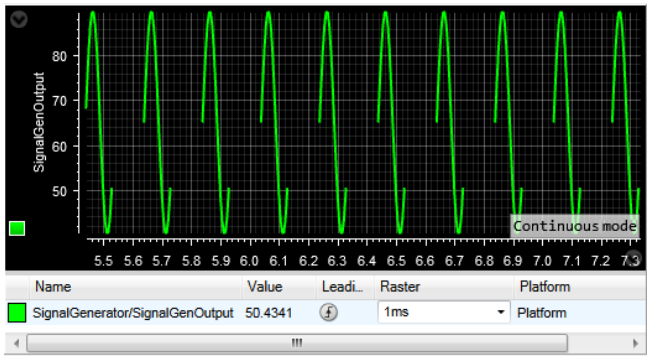
When you select more than one measurement raster for a variable, you can select the raster to be visualized in a Time Plotter or an Index Plotter. However, merging rasters is not supported by ControlDesk. To display a variable in different rasters in a plotter, you have to place it in the plotter several times (once for each raster).

No bandwidth check

ControlDesk does not check whether the bandwidth of the measurement raster allows correct transmission of measurement data to the host PC.

No support for measurement gaps in some file formats

When you perform triggered measurements on dSPACE real-time hardware or on VEOS, there are gaps in the measurement.



Measurement gaps are supported by the MF4 file format. When you export recorded data with measurement gaps to other file formats such as MAT or CSV, the gaps are lost. When you visualize such a file in a Time Plotter, the last data point of a triggered measurement period is connected with the first data point of the following period as a consequence.

Hardware polling rasters and OnChange raster not useful in SIL testing scenarios

Using hardware polling rasters and the OnChange raster is not useful in SIL testing scenarios involving the VEOS platform and/or XCP on Ethernet devices accessing V-ECUs since there is no time reference between the values measured with these rasters and values measured with other measurement rasters.

Related topics

Basics

Basics on Configuring Measurement.....78
Basics on Configuring Recording.....119

Limitations for Measuring and Data Logging on Platforms

Introduction

There are some limitations for measuring and data logging on platforms with ControlDesk.

Limitation for the volume of data that can be observed and measured

There is a limitation for the volume of data that can be observed and measured on platforms that support applications with integrated DsDAQ service, such as SCALEXIO:

- The amount of *data that can be observed* on these platforms is limited to approx. 1 MB.

  For example, when you observe variables of the `double` data type, this results in a limit of approx. 125,000 variables. Observing more variables is not possible.

  For details on variable observation, refer to Observing Variables on page 224.
- The volume of *data that can be measured in one measurement raster* is limited to approx. 1 MB per sampling step.

  For example, when you measure variables of the `double` data type, this results in a limit of approx. 125,000 variables. Measuring more variables in one measurement raster is not possible.

  Tip

  As a workaround, you can reduce the number of variables to be measured in one measurement raster by assigning some of them to other measurement rasters of the real-time application, if possible.

Limited number of additional rasters for platforms

The number of additional rasters with the same sampling period, i.e., copied from the same platform raster, is limited to seven.

Limited number of hardware polling rasters

The number of hardware polling rasters for a platform is limited to six.

Duration trigger

When you use a duration trigger as the stop trigger for triggered measurement, measurement might not start correctly for great duration values depending on the number of signals to be measured. This is due to memory allocation constraints.

Start trigger evaluation only if stop trigger is enabled

If you perform triggered measurement on a platform, ControlDesk does not evaluate the start trigger of a raster if the raster's stop trigger is not enabled. The raster will not be triggered.

Limitations for data logging

There are some limitations for data logging.

Limitation for multiclient access If you access dSPACE real-time hardware with several instances of ControlDesk at the same time (multiclient access), all the instances have unrestricted access to the data logging configuration. As a result, the data logging behavior is undefined in multiclient scenarios.

Limitation for the volume of data that can be logged The volume of data that can be logged in one measurement raster is limited to approx. 256 kB per sampling step.

For example, when you log variables of the `double` data type, this results in a limit of approx. 31,250 variables. Logging more variables in one measurement raster is not possible.

Tip

As a workaround, you can reduce the number of variables to be logged in one measurement raster by assigning some of them to other measurement rasters of the real-time application, if possible.

Limitation for data logging on multiprocessor systems Data logging is not supported for SCALEXIO multiprocessor systems.

SCALEXIO: Trigger condition

If you perform triggered measurement on a SCALEXIO multicore (MC) system, all the trigger signals used in a trigger condition for a platform trigger must come from the same MC system member.

Drift of simulation time and actual hardware time

In rapid control prototyping (RCP) scenarios, the simulation time based on fixed sample time intervals is normally used for generating time stamps. The simulation time is calculated by the real-time operating system, which causes rounding errors and inaccuracies. As a consequence, the simulation time and the actual hardware time drift apart.

Workaround As a workaround, you have the time stamps generated by the hardware time, which avoids rounding errors. You have to implement this workaround via additional User-Code in your Simulink model, as follows:

1. Generate a User-Code template C file for the model. Refer to How to Generate a Template for the User-Code (RTI and RTI-MP Implementation Guide 🕮).

   Once you have built your model, you will find the `<model>_usr.c` template file in the model's working folder. It contains a set of empty C functions into which you can incorporate your custom code.

2. Incorporate the following code into the template C file:

```
/* Includes */
#include <rtkernel.h>
/* Defines */
#define USR_RTK_INITIALIZE
static void usr_rtk_initialize(void)
{
   /* Local variables */
   rtk_p_task_control_block pTask = rtk_task_list;
   /* Loop over all tasks in the task list and
   set the time stamping method to rtk_tt_aperiodic */
   while (pTask != NULL)
   {
      if (pTask->tm_task_type == rtk_tt_periodic)
      {
         /* This is a timer task.
         Reset the tm_task_type to rtk_tt_aperiodic */
         pTask->tm_task_type = rtk_tt_aperiodic;
         msg_info_printf(MSG_SM_USER, 10,
         "Time-stamping for task \"%s\"
         set to rtk_tt_aperiodic.", pTask->task_name);
      }
      pTask = pTask->next;
   }
}
```

   For information on implementing User-Code, refer to How to Implement the User-Code (RTI and RTI-MP Implementation Guide 🕮).

3. Start a build process for the model. Refer to How to Start the Build and Download (RTI and RTI-MP Implementation Guide 🕮).

   The User-Code will be included in the build process.

As a result, all time stamps will be generated by the hardware time. This avoids rounding errors.

Related topics

References

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Limitations for ASAM MDF Files (Version 4.x)

Introduction	ControlDesk supports the export and import of measurement data in ASAM MDF file format (ASAM Common MDF Version 4.1 for export and 4.1.x for import, file name extension: MF4). However, there are a few limitations in connection with ASAM MDF 4.x files in ControlDesk.
No support for attachments	Attachments are not supported.
No support for invalidation bits	Invalidation bits are not supported.
Limitation for 'synchronization domains'	Only *timestamps in seconds* are supported as `synchronization domains`.
Limitation for MDF channel conversion blocks	MDF channel conversion blocks (`CCBLOCKS`) are not supported for the following tables: ▪ Value to scale tables ▪ Text to value tables ▪ Text to text tables
Unsupported channel types	The channel types *Virtual Master Channel* and *Synchronization Channel* are not supported.
No support for reading unsorted MDF files	Reading unsorted ASAM MDF 4.x files is not supported.
Unsupported variable types	The following variable types are not supported: ▪ Cuboids ▪ Strings ▪ Struct ▪ Struct array
No support for nested maps and curves	*Nested* maps and curves in an ASAM MDF 4.x file are not loaded to ControlDesk.

Limitation for coefficients of rational functions containing square polynomials

ControlDesk uses scaling coefficients of rational functions *to transform converted values into source values*. When you export measurement data to the MF4 file format, such coefficients are inverted before being written to the measurement data file so that they can be used *to transform source values into converted values* as required by the ASAM MDF 4.x specification.

However, this applies only to rational functions *without square polynomials*. If the rational function has square polynomials, no conversion is performed at all, i.e., source values and converted values are equal. In addition, a warning is added to the Log file.

Limitation for the definition of hierarchies

ControlDesk does not support the definition of hierarchies via channel hierarchy blocks (`CHBLOCKs`). `CHBLOCK`s can neither be read nor written.

No storage of the original data type of bit signals

The original data type of bit signals is not stored in MF4 files.

If, for example, only the first 4 bits of a 32-bit integer variable are actually used by a measurement signal, the signal is stored in the MF4 file as a 4-bit integer signal. The original data type is not stored in the MF4 file.

When you load the MF4 file, the data type is transformed to the smallest possible data type with regard to the number of bytes. In the example, above the data type would be 8-bit integer.

Long loading times for MF4 files with many high-frequent captures

Opening an MF4 file may take a long loading time if the file contains many high-frequent captures.

Limitations in connection with reduction data

- ControlDesk supports reduction data in MF4 files only for time-based measurement data, not for index-based measurement data. As a consequence, ControlDesk's Index Plotter does not use reduction data.
- When you add reduction data to an MF4 file using the `DSSIGCONV` command line tool, the following restrictions apply:
  - If the MF4 file contains a signal whose variable type is not supported, the `DSSIGCONV` tool generates no reduction data for the measurement raster the signal is measured with.
  - The `DSSIGCONV` tool does not support MF4 files with unsorted data. No reduction data is generated for such MF4 files.
  - The `DSSIGCONV` tool lets you add reduction data only to time-based measurement data only.

Related topics

References

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Glossary

Introduction

Briefly explains the most important expressions and naming conventions used in the ControlDesk documentation.

Where to go from here

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Numerics

3-D Viewer An instrument for displaying items in a 3-D environment.

A

A2L file A file that contains all the relevant information on measurement and calibration variables in an ECU application and the ECU's communication interface(s). This includes information on the variables' memory addresses and conversion methods, the memory layout and data structures in the ECU as well as interface description data (IF_DATA).

Acquisition An object in the Measurement Configuration controlbar that specifies the variables to be measured and their measurement configuration.

Active variable description The variable description that is currently active for a platform/device. Multiple variable descriptions can be assigned to one platform/device, but only one of them can be active at a time.

Additional write variable A scalar parameter or writable measurement variable that can be connected to an instrument in addition to the main variable. When the value of the main variable changes, the changed value is also applied to all the additional write variables connected to the instrument.

Airspeed Indicator An instrument for displaying the airspeed of a simulated aircraft.

Altimeter An instrument for displaying the altitude of a simulated aircraft.

Animated Needle An instrument for displaying the value of a connected variable by a needle deflection.

Application image An image file that contains all the files that are created when the user builds a real-time application. It particularly includes the variable

description (SDF) file. To extend a real-time application, ControlDesk lets the user create an updated application image from a data set. The updated application image then contains a real-time application with an additional set of parameter values.

Artificial Horizon An instrument displaying the rotation on both the lateral and the longitudinal axis to indicate the angle of pitch and roll of a simulated aircraft. The Artificial Horizon has a pitch scale and a roll scale.

Automatic Reconnect Feature for automatically reconnecting to platform/device hardware, for example, when the ignition is turned off and on, or when the physical connection between the ControlDesk PC and the ECU is temporarily interrupted.

If the feature is enabled for a platform/device and if the platform/device is in the 'unplugged' state, ControlDesk tries to re-establish the logical connection to the platform/device hardware. After the logical connection is re-established, the platform/device has the same state as before the unplugged state was detected. A measurement started before the unplugged state was detected is resumed.

Automation A communication mechanism that can be used by various programming languages. A client can use it to control a server by calling methods and properties of the server's automation interface.

Automation script A script that uses automation to control an automation server.

Axis point object Common axis

B

Bar An instrument (or a value cell type of the Variable Array) for displaying a numerical value as a bar deflection on a horizontal or vertical scale.

Bitfield A value cell type of the Variable Array for displaying and editing the source value of a parameter as a bit string.

Bookmark A marker for a certain event during a measurement or recording.

Browser An instrument for displaying HTML and TXT files. It also supports Microsoft Internet Explorer© plug-ins that are installed on your system.

Bus communication replay A feature of the Bus Navigator that lets you replay logged bus communication data from a log file. You can add replay nodes

to the Bus Navigator tree for this purpose. You can specify filters to replay selected parts of the logged bus communication.

Bus configuration A configuration of all the controllers, communication matrices, and messages/frames/PDUs of a specific communication bus such as CAN. ControlDesk lets you display and experiment with bus configurations in the Bus Navigator.

Bus connection A mode for connecting dSPACE real-time hardware to the host PC via bus. The list below shows the possible bus connections:

- dSPACE real-time hardware installed directly in the host PC
- dSPACE real-time hardware installed in an expansion box connected to the host PC via dSPACE link board

Bus Instrument An instrument available for the Bus Navigator. It can be configured for different purposes, for example, to display information on received messages (RX messages) or to manipulate and transmit messages (TX messages). The instrument is tailor-made and displays only the message- and signal-specific settings which are enabled for display and/or manipulation by ControlDesk during run time.

Bus logging A feature of the Bus Navigator that lets you log raw bus communication data. You can add logger nodes on different hierarchy levels of the Bus Navigator tree for this purpose. You can specify filters to log filtered bus communication. The logged bus communication can be replayed.

Bus monitoring A feature of the Bus Navigator that lets you observe bus communication. You can open monitoring lists and add monitor nodes on different hierarchy levels of the Bus Navigator tree for this purpose. You can specify filters to monitor filtered bus communication.

Bus Navigator A controlbar for handling bus messages, such as CAN messages, LIN frames, and Ethernet packets.

Bus statistics A feature of the Bus Navigator that lets you display and log statistical information on the bus load during bus monitoring.

Bypassing A method for replacing an existing ECU function by running a new function.

C

Calculated variable A scalar variable that can be measured and recorded, and that is derived from one or more *input variables*.

The following input variable types are supported:

- Measurement variables
- Single elements of measurement arrays or value blocks
- Scalar parameters, or existing calculated variables

The value of a calculated variable is calculated via a user-defined *computation formula* that uses one or more input variables.

Calculated variables are represented by the symbol.

CalDemo ECU A demo program that runs on the same PC as ControlDesk. It simulates an ECU on which the Universal Measurement and Calibration (XCP) protocol and the Unified Diagnostic Services (UDS) protocol are implemented.

The CalDemo ECU allows you to perform parameter calibration, variable measurement, and ECU diagnostics with ControlDesk under realistic conditions, but without having to have a real ECU connected to the PC. Communication between the CalDemo ECU and ControlDesk can be established via XCP on CAN or XCP on Ethernet, and UDS on CAN.

Tip

If communication is established via XCP on Ethernet, the CalDemo ECU can also run on a PC different from the PC on which ControlDesk is running.

The memory of the CalDemo ECU consists of two areas called memory page. Each page contains a complete set of parameters, but only one page is accessible by the CalDemo ECU at a time. You can easily switch the memory pages of the CalDemo ECU to change from one parameter to another in a single step.

Two ECU tasks run on the CalDemo ECU:

- ECU task #1 runs at a fixed sample time of 5 ms. In ControlDesk's **Measurement Configuration**, ECU task #1 is related to the time-based **5 ms**, **10 ms**, **50 ms** and **100 ms** measurement rasters of the CalDemo ECU.
- ECU task #2 has a variable sample time. Whenever the CalDemo ECU program is started, the initial sample time is 5 ms. This can then be increased or decreased by using the **dSPACE CalDemo** dialog.

  ECU task #2 is related to the **extEvent** measurement raster of the CalDemo ECU.

The CalDemo ECU can also be used to execute diagnostic services and jobs, handle DTCs and perform measurement and calibration via ECU diagnostics.

The CalDemo ECU program is run by invoking `CalDemo.exe`. The file is located in the `.\Demos\CalDemo` folder of the ControlDesk installation.

Calibration Changing the parameter values of real-time application s or ECU application s.

Calibration memory segment Part of the memory of an ECU containing the calibratable parameters. Memory segments can be defined as `MEMORY_SEGMENT` in the A2L file. ControlDesk can use the segments to evaluate the memory pages of the ECU.

ControlDesk lets you perform the calibration of:

- Parameters inside memory segments
- Parameters outside memory segments
- Parameters even if no memory segments are defined in the A2L file.

CAN Bus Monitoring device A device that monitors the data stream on a CAN bus connected to the ControlDesk PC.

The CAN Bus Monitoring device works, for example, with PC-based CAN interfaces such as the DCI-CAN2 or the DCI-CAN/LIN1.

The device supports the following variable description file types:

- DBC
- FIBEX
- AUTOSAR system description (ARXML)

CANGenerator A demo program that simulates a CAN system, that is, it generates signals that can be measured and recorded with ControlDesk. The program runs on the same PC as ControlDesk.

The CANGenerator allows you to use the CAN Bus Monitoring device under realistic conditions, but without having to have any device hardware connected to the PC.

The CAN (Controller Area Network) protocol is used for communication between the CANGenerator and ControlDesk. However, since the CANGenerator runs on the same PC as ControlDesk, ControlDesk does not communicate with the device via a real CAN channel, but via a *virtual CAN channel* implemented on the host PC.

You can start the CAN generator program by running `CANGenerator.exe`. The file is located in the `.\Demos\CANGenerator` folder of the ControlDesk installation.

Capture A data packet of all the measurement variables assigned to a measurement raster. The packet comprises the data that results from a single triggering of the raster.

CCP Abbreviation of CAN Calibration Protocol. This protocol can be implemented on electronic control units (ECUs) and allows users to access ECUs with measurement and calibration systems (MCS) such as ControlDesk.

The basic features of CCP are:

- Read and write access to the ECU memory, i.e., providing access for calibration
- Synchronous data acquisition
- Flash programming for ECU development purposes

The CCP protocol was developed by ASAM e.V. (Association for Standardization of Automation and Measuring Systems e.V.). For the protocol specification, refer to http://www.asam.net.

The following device supports ECUs with an integrated CCP service:

- CCP device

CCP device A device that provides access to an ECU with CCP connected to the ControlDesk PC via CAN, for example, for measurement and calibration purposes via CCP (CAN Calibration Protocol).

Check Button An instrument (or a cell type of the Variable Array) for displaying whether the value of a connected variable matches predefined values or for writing a predefined value to a connected variable.

cmdloader A command line tool for handling applications without using the user interface of an experiment software.

Common axis A parameter that consists of a 1-dimensional array containing axis points. A common axis can be referenced by one or more curves and/or maps. Calibrating the data points of a common axis affects all the curves and/or maps referencing the axis.

Common axes are represented by the symbol.

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

```
%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>
```

or

```
%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>
```

Computation method A formula or a table that defines the transformation of a source value into a converted value (and vice versa). In addition to the computation methods defined in the variable description file, ControlDesk provides the *__Identity* computation method which means the converted and the source value are equal.

Connected A platform/device state defined by the following characteristics:

- A continuous logical connection is established between ControlDesk and the platform/device hardware.
- A platform/device must be in the 'connected' state before it can change to the 'measuring/recording' or 'online calibration started' state.
- Online calibration is impossible. ControlDesk did not yet adjust the memory segments containing calibration data in the platform/device and on the corresponding hardware. Offline calibration is possible.
- Platform/device configuration is not possible. However, you can invoke platform/device configuration for a platform/device that is in the connected state. ControlDesk temporarily sets the platform/device to the disconnected state.

The 'connected' platform/device state is indicated by the icon.

Connection mode dSPACE real-time systems can be installed within the host PC or connected to the host via a bus interface and/or via Ethernet. When the Ethernet is being used, different network clients might exist. The connection type being used and, in the case of Ethernet, the network client being used, determine the dSPACE systems that can be accessed.

Control primitive A special diagnostic communication object for changing communication states or protocol parameters, or for identifying (ECU) variants.

Controlbar A window or pane outside the working area. Can be docked to an edge of the main window or float in front of it. A controlbar can contain a

document, such as a layout, or a tool, such as the Bus Navigator. It can be grouped with other controlbars in a window with tabbed pages.

ControlDesk The main version of ControlDesk for creating and running experiments, and for accessing dSPACE real-time hardware and VEOS. The functionality can be extended by optional software modules.

ControlDesk - Operator Version A version of ControlDesk that provides only a subset of functionality for running existing experiments. The functionality can be extended by optional software modules.

ControlDesk Bus Navigator Module An optional software module for ControlDesk for handling bus messages, such as CAN, LIN, and FlexRay messages, frames, and PDUs and Ethernet packets.

ControlDesk ECU Diagnostics Module An optional software module for ControlDesk that facilitates the calibration and validation of ECU diagnostic functions.

ControlDesk ECU Interface Module An optional software module for ControlDesk for calibration and measurement access to electronic control units (ECUs). The module is also required for calibration and measurement access to virtual ECUs (V-ECUs) used in SIL testing scenarios.

ControlDesk Signal Editor Module An optional software module for ControlDesk for the graphical definition and execution of signal generators for stimulating model variables of real-time/offline simulation applications.

Controller board Single-board hardware computing the real-time application. Contains a real-time processor for fast calculation of the model and I/O interfaces for carrying out the control developments.

Conversion table A table that specifies the value conversion of a source value into a converted value. In the case of verbal conversion, the converted value is a string that represents one numerical value or a range of numerical values.

Conversion type The type of a computation method, for example a linear function or a verbal computation method.

Curve A parameter that consists of

- A 1-dimensional array containing the axis points for the x-axis. This array can also be specified by a reference to a common axis.
- Another 1-dimensional array containing data points. The curve assigns one data point to each axis point.

Curves are represented by the symbol.

D

DAQ module A hardware module for the acquisition of physical quantities

Data Cursor One or two cursors that are used to display the values of selected chart positions in a Time Plotter or an Index Plotter.

Data logger An object in the Measurement Configuration controlbar that lets you configure a data logging.

Data logger signal list A list that contains the variables to be included in subsequent data loggings on real-time hardware.

Data logging The recording of data on dSPACE real-time hardware that does not require a physical connection between the host PC and the real-time hardware. In contrast to flight recording, data logging is configured in ControlDesk.

Data set A set of the parameters and their values of a platform/device derived from the variable description of the platform/device. There are different types of data sets:

- Reference data set
- Sub data set
- Unassigned data set
- Working data set

DCI-CAN/LIN1 A dSPACE-specific interface between the host PC and the CAN/CAN FD bus and/or LIN bus. The DCI-CAN/LIN1 transfers messages between the CAN-/LIN-based devices and the host PC via the universal serial bus (USB).

DCI-CAN2 A dSPACE-specific interface between the host PC and the CAN bus. The DCI-CAN2 transfers CAN and CAN FD messages between the CAN-based devices and the host PC via the universal serial bus (USB).

DCI-GSI2 Abbreviation of *dSPACE Communication Interface - Generic Serial Interface 2*. A dSPACE-specific interface for ECU calibration, measurement and ECU interfacing.

DCI-GSI2 device A device that provides access to an ECU with DCI-GSI2 connected to the ControlDesk PC for measurement, calibration, and bypassing purposes via the ECU's debug interface.

DCI-KLine1 Abbreviation of *dSPACE Communication Interface - K-Line Interface*. A dSPACE-specific interface between the host PC and the diagnostics bus via K-Line.

Debug interface An ECU interface for diagnostics tasks and flashing.

Default raster A platform-/device-specific measurement raster that is used when a variable of the platform/device is connected to a plotter or a recorder, for example.

Deposition definition A definition specifying the sequence in which the axis point values of a curve or map are deposited in memory.

Device A software component for carrying out calibration and/or measurement, bypassing, ECU flash programming, or ECU diagnostics tasks.

ControlDesk provides the following devices:

- Bus devices:
  - CAN Bus Monitoring device
  - Ethernet Bus Monitoring device
  - LIN Bus Monitoring device
- ECU Diagnostics device
- GNSS device
- Measurement and calibration devices:
  - CCP device
  - DCI-GSI2 device
  - XCP on CAN device
  - XCP on Ethernet device

Each device usually has a variable description that specifies the device's variables to be calibrated and measured.

Diagnostic interface Interface for accessing the fault memory of an ECU.

Diagnostic job (often called Java job) Programmed sequence that is usually built from a sequence of the diagnostic service. A diagnostic job is either a single-ECU job or a multiple-ECU job, depending on whether it communicates with one ECU or multiple ECUs.

Diagnostic protocol A protocol that defines how an ECU communicates with a connected diagnostic tester. The protocol must be implemented on the ECU and on the tester. The diagnostics database specifies the diagnostic protocol(s) supported by a specific ECU.

ControlDesk's ECU Diagnostics device supports CAN and K-Line as the physical layers for communication with an ECU connected to the ControlDesk PC. For information on the supported diagnostic protocols with CAN and K-Line, refer to Basics of ECU Diagnostics with ControlDesk (ControlDesk ECU Diagnostics).

Diagnostic service A service implemented on the ECU as a basic diagnostic communication element. Communication is performed by selecting a service, configuring its parameters, executing it, and receiving the ECU results. When a service is executed, a defined request is sent to the ECU and the ECU answers with a specific response.

Diagnostic trouble code (DTC) A hexadecimal index for the identification of vehicle malfunctions. DTCs are stored in the fault memory of ECUs and can be read by diagnostic testers.

Diagnostics database A database that completely describes one or more ECUs with respect to diagnostics communication. ControlDesk supports the ASAM MCD-2 D ODX database format, which was standardized by ASAM e.V. (Association for Standardisation of Automation and Measuring Systems e.V.). For the format specification, refer to http://www.asam.net.

Proprietary diagnostics database formats are not supported by ControlDesk.

Diagnostics Instrument An instrument for communicating with an ECU via the diagnostic protocol using diagnostic services, diagnostic jobs, and control primitives.

Disabled A platform/device state defined by the following characteristics:

- No logical connection is established between ControlDesk and the platform/device hardware.
- When a platform/device is disabled, ControlDesk does not try to establish the logical connection for that platform/device. Any communication between the platform/device hardware and ControlDesk is rejected.
- Online calibration is impossible. Offline calibration is possible.
- Platform/device configuration is possible.

The 'disabled' platform/device state is indicated by the icon.

Disconnected A platform/device state defined by the following characteristics:

- No logical connection is established between ControlDesk and the platform/device hardware.
- When a platform/device is in the disconnected state, ControlDesk does not try to re-establish the logical connection for that platform/device.
- Online calibration is impossible. Offline calibration is possible.
- Platform/device configuration is possible.

The 'disconnected' platform/device state is indicated by the icon.

Display An instrument (or a value cell type of the Variable Array) for displaying the value of a scalar variable or the text content of an ASCII variable.

Documents folder A standard folder for user-specific documents.

```
%USERPROFILE%\Documents\dSPACE\<ProductName>\
<VersionNumber>
```

DS1006 Processor Board platform A platform that provides access to a DS1006 Processor Board connected to the host PC for HIL simulation and function prototyping purposes.

DS1007 PPC Processor Board platform A platform that provides access to a single multicore DS1007 PPC Processor Board or a DS1007 multiprocessor system consisting of two or more DS1007 PPC Processor Boards, connected to the host PC for HIL simulation and function prototyping purposes.

DS1104 R&D Controller Board platform A platform that provides access to a DS1104 R&D Controller Board installed in the host PC for function prototyping purposes.

DS1202 MicroLabBox platform A platform that provides access to a MicroLabBox connected to the host PC for function prototyping purposes.

DsDAQ service A service in a real-time application or offline simulation application (OSA) that provides measurement data from the application to the

host PC. Unlike the host service, the DsDAQ service lets you perform, for example, triggered measurements with complex trigger conditions.

The following platforms support applications that contain the DsDAQ service:

- DS1007 PPC Processor Board platform
- DS1202 MicroLabBox platform
- MicroAutoBox III platform
- SCALEXIO platform
- VEOS platform
- XIL API MAPort platform

dSPACE Calibration and Bypassing Service An ECU service for measurement, calibration, bypassing, and ECU flash programming. The dSPACE Calibration and Bypassing Service can be integrated on the ECU. It provides access to the ECU application and the ECU resources and is used to control communication between an ECU and a calibration and/or bypassing tool.

With the dSPACE Calibration and Bypassing Service, users can run measurement, calibration, bypassing, and flash programming tasks on an ECU via the DCI-GSI2. The service is also designed for bypassing ECU functions using dSPACE prototyping hardware by means of the RTI Bypass Blockset in connection with DPMEM PODs. The dSPACE Calibration and Bypassing Service allows measurement, calibration, and bypassing tasks to be performed in parallel.

dSPACE Internal Bypassing Service An ECU service for on-target prototyping. The dSPACE Internal Bypassing Service can be integrated in the ECU application. It lets you add additional functions to be executed in the context of the ECU application without the need for recompiling the ECU application.

dSPACE Log A collection of errors, warnings, information, questions, and advice issued by all dSPACE products and connected systems over more than one session.

dSPACE system A hardware system such as a MicroAutoBox III or SCALEXIO system on which the real-time application runs.

Duration trigger A trigger that defines a duration. Using a duration trigger, you can, for example, specify the duration of data acquisition for a measurement raster. A duration trigger can be used as a stop trigger.

E

ECU Abbreviation of *electronic control unit*.

ECU application A sequence of operations executed by an ECU. An ECU application is mostly represented by a group of files such as ECU Image files, MAP files, A2L files and/or software module description files.

ECU calibration interface Interface for accessing an ECU by either emulating the ECU's memory or using a communication protocol (for example, XCP on CAN).

ECU diagnostics Functions such as:

- Handling the ECU fault memory: Entries in the ECU´s fault memory can be read, cleared, and saved.
- Executing diagnostic services and jobs: Users can communicate with an ECU via a diagnostic protocol using diagnostic services, diagnostic jobs, and control primitives.

ControlDesk provides the ECU Diagnostics device device to access ECUs for diagnostic tasks. Communication is via diagnostic protocols implemented on the ECUs.

ECU diagnostics with ControlDesk are completely based on Open Diagnostic Data Exchange (ODX), the ASAM MCD-2 D diagnostics standard.

ControlDesk provides the Fault Memory Instrument and the Diagnostics Instrument for ECU diagnostics tasks.

ECU Diagnostics device A device that provides access to ECUs connected to the ControlDesk PC via CAN or K-Line for diagnostics or flash programming purposes.

ControlDesk provides the *ECU Diagnostics v2.0.2* device, which supports the ASAM MCD-3 D V2.0.2 standard.

ControlDesk supports the following ODX database standards:

- ASAM MCD-2 D V2.0.1
- ASAM MCD-2 D V2.2.0 (ISO 22901-1)

ECU flash programming A method by which new code or data is stored in ECU flash memory.

ECU Image file A binary file that is part of the ECU application. It usually contains the code of an ECU application and the data of the parameters within the application. It can be stored as an Intel Hex (HEX) or Motorola S-Record (MOT or S19) file.

EESPort Configurations controlbar A controlbar for configuring error configurations.

Electrical error simulation Simulating electrical errors such as loose contacts, broken cables, and short-circuits, in the wiring of an ECU. Electrical error simulation is performed by the failure simulation hardware of an HIL simulator.

Electrical Error Simulation port (EESPort) An *Electrical Error Simulation port* (EESPort) provides access to a failure simulation hardware for simulating electrical errors in an ECU wiring according to the ASAM AE XIL API standard.

The configuration of the EESPort is described by a hardware-dependent *port configuration* and one or more *error configurations*.

Environment model A model that represents a part or all of the ECU's environment in a simulation scenario.

The environment model is a part of the simulation system.

Environment VPU The executable of an environment model built for the VEOS platform. An environment VPU is part of an offline simulation application (OSA).

Error An electrical error that is specified by:

- An error category
- An error type
- A load type

Error category The error category defines how a signal is disturbed. Which errors you can create for a signal depends on the connected failure simulation hardware.

Error configuration An XML file that describes a sequence of errors you want to switch during electrical error simulation. Each error configuration comprises error sets with one or more errors.

Error set An error set is used to group errors (pin failures).

Error type The error type specifies the way an error category – i.e., an interruption or short circuit of signals – is provided. The error type defines the disturbance itself.

Ethernet Bus Monitoring device A device that monitors the data stream on an Ethernet network connected to the ControlDesk PC.

The device supports the following variable description file type:

- AUTOSAR system description (ARXML)

Ethernet connection A mode for connecting dSPACE real-time hardware to the host PC via Ethernet. The list below shows the possible Ethernet connections:

- dSPACE real-time hardware installed in an expansion box connected to the host PC via Ethernet.
- MicroAutoBox II/III and MicroLabBox connected via Ethernet.

Ethernet decoding A feature of the Bus Navigator that lets you view protocol data and raw data of an Ethernet frame.

Event An event that is triggered by an action performed in ControlDesk.

Event context The scope of validity of event source s and event s. There is one event handler code area for each event context.

Event handler Code that is executed when the related event occurs.

Event management Functionality for executing custom code according to actions triggered by ControlDesk.

Event source An object providing and triggering event s. *LayoutManagement* is an example of an event source.

Event state State of an event. ControlDesk provides the following event states:

- No event handler is defined
- Event handler is defined and enabled
- Event handler is defined and disabled
- Event handler is defined, but no Python code is available
- Event handler is deactivated because a run-time error occurred during the execution of the Python code

Expansion box A box that hosts dSPACE boards. It can be connected to the host PC via bus connection or via network.

Experiment A container for collecting and managing information and files required for a parameter calibration and/or measurement task. A number of experiments can be collected in a project but only one of them can be active.

Extension script A Python script (PY or PYC file) that is executed each time ControlDesk starts up. An extension script can be executed for all users or user-specifically.

F

Failure insertion unit Hardware unit used with dSPACE simulators to simulate failures in the wiring of an ECU, such as broken wire and short circuit to ground.

Fault memory Part of the ECU memory that stores diagnostic trouble code (DTC) entries with status and environment information.

Fault Memory Instrument An instrument for reading, clearing, and saving the content of the ECU's fault memory.

Firmware update An update for the firmware installed in the board's flash memory. Firmware should be updated if it is older than required by the real-time application to be downloaded.

Fixed axis An axis with data points that are not deposited in the ECU memory. Unlike a common axis, a fixed axis is specified within a curve or map. The parameters of a fixed axis cannot be calibrated.

Fixed parameter A parameter that has a fixed value during a running simulation. Changing the value of a fixed parameter does not immediately affect the simulation results. The affect occurs only after you stop the simulation and

start it again. A fixed parameter is represented by an added pin in its symbol, for example: .

Flash job A specific diagnostic job for flashing the ECU memory. A flash job implements the process control for flashing the ECU memory, such as initialization, security access, writing data blocks, etc.

Flight recording The recording of data on dSPACE real-time hardware that does not require a physical connection between the host PC and the real-time hardware. In contrast to data logging, flight recording is not configured in ControlDesk but via RTI and RTLib.

Frame An instrument for adding a background frame to a layout, for example, to visualize an instrument group.

G

Gauge An instrument for displaying the value of the connected variable by a needle deflection on a circular scale.

Gigalink module A dSPACE board for connecting several processor boards in a multiprocessor system. The board allows high-speed serial data transmission via fiber-optic cable.

GNSS data Positioning and timing data that is transmitted by a Global Navigation Satellite System (GNSS), such as GPS, GLONASS, or Galileo. GNSS receivers use this data to determine their location.

GNSS device A device that provides positioning data from a GNSS receiver (e.g., a serial GPS mouse) in ControlDesk.

ControlDesk provides the *GNSS (GPS, GLONASS, Galileo, ...)* device that supports various global navigation satellite systems.

GPX file An XML file that contains geodata, such as waypoints, routes, or tracks. In ControlDesk, you can import GPX files to visualize GNSS positioning data in a Map instrument.

Group A collection of variables that are grouped according to a certain criterion.

H

Heading Indicator An instrument displaying the heading direction of a simulated aircraft on a circular scale.

Host service A service in a real-time application that provides measurement data from the application to the host PC.

The following platforms support applications that contain the host service:

- DS1006 Processor Board platform
- DS1104 R&D Controller Board platform
- MicroAutoBox platform
- Multiprocessor System platform

I

Index Plotter A plotter instrument for displaying signals that are measured in an event-based raster (index plots).

Input quantity A measurement variable that is referenced by a common axis and that provides the input value of that axis.

Instrument An on-screen representation that is designed to monitor and/or control simulator variables interactively and to display data captures. Instruments can be arranged freely on layouts.

The following instruments can be used in ControlDesk:

- 3-D Viewer
- Airspeed Indicator
- Altimeter
- Animated Needle
- Artificial Horizon
- Bar
- Browser
- Bus Instrument
- Check Button
- Diagnostics Instrument
- Display
- Fault Memory Instrument
- Frame
- Gauge
- Heading Indicator
- Index Plotter
- Invisible Switch
- Knob
- Multistate Display
- Multiswitch
- Numeric Input
- On/Off Button

- Push Button
- Radio Button
- Selection Box
- Slider
- Sound Controller
- Static Text
- Steering Controller
- Table Editor
- Time Plotter
- Variable Array
- XY Plotter

Instrument Navigator A controlbar that displays a tree with all the instrument s of the active layout and all the variables that are connected to them. The Instrument Navigator's main function is easy selection of instruments in complex layouts.

Instrument script A Python script used to extend the functionality of an instrument .

Instrument Selector A controlbar that provides access to ControlDesk's instrument s. The instruments can be placed on a layout via double-click or drag & drop.

Interface description data (IF_DATA) An information structure, mostly provided by an A2L file , describing the type, features and configuration of an implemented ECU interface.

Internal Interpreter ControlDesk's built-in programming interface for editing, running and importing Python scripts. It contains an Interpreter controlbar where the user can enter Python commands interactively and which displays output and error messages of Python commands.

Interpreter controlbar A controlbar that can be used to execute line-based commands. It is used by the Internal Interpreter to print out Python standard error messages and standard output during the execution or import of Python scripts.

Invisible Switch An instrument for defining an area that is sensitive to mouse operations.

IOCNET IOCNET (I/O carrier network) is a dSPACE-specific high-speed serial communication bus that connects all the real-time hardware in a SCALEXIO system. IOCNET can also be used to build a multiprocessor system that consists of multiple SCALEXIO processor hardware components.

K

Knob An instrument for displaying and setting the value of the connected variable by means of a knob on a circular scale.

L

Label list A list of user-defined variables that can be used for saving connected variables, etc.

Layout A window with instrument s connected to variables of one or more simulation models.

Layout Navigator A controlbar that displays all opened layout s. It can be used for switching between layouts.

Layout script A Python script used to extend the functionality of a layout .

Leading raster The measurement raster that specifies the trigger settings for the Time Plotter display. The leading raster determines the time range that is visible in the plotter if a start and stop trigger is used for displaying the signals.

LIN Bus Monitoring device A device that monitors the data stream on a LIN bus connected to the ControlDesk PC.

The LIN Bus Monitoring device works, for example, with PC-based LIN interfaces.

The device supports the following variable description file types:

- LDF
- FIBEX
- AUTOSAR system description (ARXML)

Load type The load type specifies the option to disturb a signal with or without load rejection.

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

```
%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\
<ProductName>
```

Logical link A representation of an ECU specified in the diagnostics database. A logical link contains information on the ECU itself, and all the information required for accessing it, such as the diagnostic protocol used for

communication between the ECU and ControlDesk. Each logical link is represented by a unique short name in the ODX database.

Look-up table A look-up table maps one or more input values to one output value. You have to differentiate between the following look-up table types:

- A 1-D look-up table maps one input value to one output value.
- A 2-D look-up table maps two input values to one output value.
- An n-D look-up table maps multidimensional table data with 3 or more input values to one output value.

Look-up table is a generic term for curves and maps.

M

Main variable A scalar variable that is visualized in an instrument that can be used to change parameter values. In addition to the main variable, additional write variables can also be connected to (but not visualized in) the same instrument. When you change the value of the main variable in an instrument, the changed value is also applied to all the additional write variables connected to that instrument.

Map A parameter that consists of

- A 1-dimensional array containing the axis points for the x-axis. This array can also be specified by a reference to a common axis.
- A 1-dimensional array containing the axis points for the y-axis. This array can also be specified by a reference to a common axis.
- A 2–dimensional array containing data points. The map assigns one data point of the array to each pair of x-axis and y-axis points.

Maps are represented by the symbol.

Map file A file that contains symbols (symbolic names) and their physical addresses. It is generated during a build process of an ECU application.

Map instrument A customized Browser instrument. It uses an instrument script to open a web map and connect positioning data to the map. The Map instrument offers prepared connection nodes to connect variables with GNSS data.

Measurement Viewing and analyzing the time traces of variables, for example, to observe the effects of ECU parameter changes.

ControlDesk provides various instruments for measuring variables.

Measurement (variable type) A scalar variable that can be measured, including individual elements of a measurement array.

Measurement variables are represented by the symbol.

Measurement array A 1-, 2-, or 3-dimensional array of measurement variables. In variable lists, ControlDesk displays entries for the measurement array itself and for each array element.

Measurement arrays are represented by the symbol.

Measurement buffer A ring buffer that buffers measurement data at the start of a measurement. The measurement buffer size determines the amount of data that can be buffered. Earlier values are overwritten by later values when the buffer capacity is exceeded (buffer overflow).

Measurement Configuration A controlbar that allows you to configure measurement, recording and data logging.

Measurement Data API Application programming interface for accessing measurement data. The API lets the user access measurement data without having to use ControlDesk.

Measurement Data Pool A controlbar that provides access to measurement data recorded in measurement data files.

Measurement raster Specification of how often a value of a variable is updated during a measurement. A measurement raster can be derived from a measurement service.

Measurement service The generic term for the following services:

- CCP service
- DsDAQ service
- Host service
- XCP service

Measurement signal list A list containing the variables to be included in subsequent measurements and recording. The list is global for all platforms/devices of the current experiment. The measurement signal list is available in the configuration area of the **Measurement Configuration** controlbar.

Measurement variable Any variable type that can be measured but not calibrated.

Measuring/recording A platform/device state defined by the following characteristics:

- A continuous logical connection is established between ControlDesk and the platform/device hardware.
- Online calibration is possible. Parameter values can be changed directly on the platform/device hardware.
- A measurement (or recording) is running.
- Platform/device configuration is not possible.

The 'measuring' / 'recording' platform/device state is indicated by the icon.

Memory page An area of a calibration memory. Each page contains a complete set of parameters of the platform/device hardware, but only one of the pages is “visible” to the microcontroller of the ECU or the real-time processor (RTP) of the platform hardware at a time.

ControlDesk supports platform/device hardware with up to two memory pages. These are usually the working page and the reference page. The parameter values on the two memory pages usually are different. ControlDesk lets you switch from one page to the other, so that when parameters are changed on one page, the changes can be made available to the ECU or prototyping hardware via a single page switch.

Messages controlbar A controlbar displaying a history of all error and warning messages that occur during work with ControlDesk.

MicroAutoBox III platform A platform that provides access to a MicroAutoBox III connected to the host PC for function prototyping purposes such as Bypassing.

MicroAutoBox platform A platform that provides access to a MicroAutoBox II connected to the host PC for function prototyping purposes such as bypassing.

Mirrored memory A memory area created by ControlDesk on the host PC that mirrors the contents of the available memory pages of calibration and prototyping hardware. For hardware with two memory pages, the mirrored memory is divided into a reference and a working page, each of them containing a complete set of parameters. When a calibration or prototyping platform/device is added to an experiment, ControlDesk initially fills the available memory pages of the mirrored memory with the contents of the ECU Image file (initial filling for calibration devices) or with the contents of the SDF file (initial filling for platforms).

- Mirrored memory for offline calibration

  Parameter values can even be changed offline. Changes to parameter values that are made offline affect only the mirrored memory.
- Offline-to-online transition for online calibration

  For online calibration, an offline-to-online transition must be performed. During the transition, ControlDesk compares the memory pages of the hardware of each platform/device with the corresponding pages of the mirrored memory. If the pages differ, the user has to equalize them by uploading them from the hardware to the host PC, or downloading them from the host PC to the hardware.
- Mirrored memory for online calibration

  When ControlDesk is in the online mode, parameter value changes become effective synchronously on the memory pages of the hardware and in the mirrored memory. In other words, parameter values on the hardware and on the host PC are always the same while you are performing online calibration.

Modular system A dSPACE processor board and one or more I/O boards connected to it.

Multi-capture history The storage of all the captures acquired during a triggered measurement. The amount of stored data depends on the measurement buffer.

Multi-pin error A feature of the SCALEXIO concept for electrical error simulation that lets you simulate a short circuit between three or more signal

channels and/or bus channels. The channels can be located on the same or different boards or I/O units. You can simulate a short circuit between:

- Channels of the same signal category (e.g., four signal generation channels)
- Channels of different signal categories (e.g., three signal generation channels and two signal measurement channels)
- Signal channels and bus channels (e.g., two signal generation channels, one signal measurement channel, and one bus channel)

Multiple electrical errors A feature of the SCALEXIO concept for electrical error simulation that lets you switch electrical errors at the same time or in succession. For example, you can simulate an open circuit for one channel and a short circuit for another channel at the same time, without deactivating the first error.

Multiprocessor System platform A platform that provides access to:

- A multicore application running on a multicore DS1006 board
- A multiprocessor application on a multiprocessor system consisting of two or more DS1006 processor boards interconnected via Gigalink.

ControlDesk handles a multiprocessor/multicore system as a unit and uses one system description file (SDF file) to load the applications to all the processor boards/cores in the system.

Multistate Display An instrument for displaying the value of a variable as an LED state and/or as a message text.

Multistate LED A value cell type of the Variable Array for displaying the value of a variable as an LED state.

Multiswitch An instrument for changing variable values by clicking sensitive areas in the instrument and for visualizing different states depending on the current value of the connected variable.

N

Numeric Input An instrument (or a value cell type of the Variable Array) for displaying and setting the value of the connected variable numerically.

O

Observing variables Reading variable values cyclically from the dSPACE real-time hardware and displaying their current values in ControlDesk, even if no measurement is running. Variable observation is performed without using a measurement buffer, and no value history is kept.

For platforms that support variable observation, variable observation is available for parameters and measurement variables that are visualized in single-shot instruments (all instruments except for a plotter). If you visualize a variable in a single-shot instrument, the variable is not added to the measurement signal list. Visualizing a parameter or measurement variable in a plotter automatically adds the variable to the measurement signal list.

ControlDesk starts observing variables if one of the following conditions is true:

- Online Calibration is started for the platform.

  All the parameters and measurement variables that are visualized in single-shot instruments are observed.
- Measurement is started for the platform.

  All the visualized parameters and measurement variables that are not activated for measurement in the measurement signal list are observed. Data of the activated parameters and measurement variables is acquired using measurement rasters.

ODX database Abbreviation of Open Diagnostic Data Exchange, a diagnostics database that is the central ECU description for working with an ECU Diagnostics device in ControlDesk. The ODX database contains all the information required to perform diagnostic communication between ControlDesk and a specific ECU or set of ECUs in a vehicle network. ControlDesk expects the database to be compliant with ASAM MCD-2 D (ODX).

Offline State in which the parameter values of platform/device hardware in the current experiment cannot be changed. This applies regardless of whether or not the host PC is physically connected to the hardware.

The mirrored memory allows parameter values to be changed even offline.

Offline simulation A PC-based simulation in which the simulator is not connected to a physical system and is thus independent of the real time.

Offline simulation application (OSA) An offline simulation application (OSA) file is an executable file for VEOS. After the build process with a tool such as the VEOS Player, the OSA file can be downloaded to VEOS.

An OSA contains one or more VPUs, such as V-ECUs and/or environment VPUs.

On/Off Button An instrument (or a value cell type of the Variable Array) for setting the value of the connected parameter to a predefined value when the button is pressed (On value) and released (Off value).

Online calibration started A platform/device state defined by the following characteristics:

- A continuous logical connection is established between ControlDesk and the platform/device hardware.
- Online calibration is possible. Parameter values can be changed directly on the platform/device hardware.
- Platform/device configuration is not possible.

Before starting online calibration, ControlDesk lets you compare the memory pages on the platform/device hardware with the corresponding pages of the mirrored memory. If the parameter values on the pages differ, they must be

equalized by uploading the values from the hardware to ControlDesk, or downloading the values from ControlDesk to the hardware. However, a page cannot be downloaded if it is read-only.

The 'online calibration started' platform/device state is indicated by the symbol.

Operation signal A signal which represents the result of an arithmetical operation (such as addition or multiplication) between two other signals.

Operator mode A working mode of ControlDesk in which only a subset of the ControlDesk functionality is provided. You can work with existing experiments but not modify them, which protects them from unintentional changes.

Output parameter A parameter or writable measurement whose memory address is used to write the computed value of a calculated variable to.

P

Parameter Any variable type that can be calibrated.

Parameter (variable type) A scalar parameter, as well as the individual elements of a value block.

Scalar parameters are represented by the P symbol.

Parameter limits Limits within which parameters can be changed. Parameters have hard and weak limits.

- Hard limits

  Hard limits designate the value range of a parameter that you *cannot* cross during calibration.

  The hard limits of a parameter originate from the corresponding variable description and cannot be edited in ControlDesk.
- Weak limits

  Weak limits designate the value range of a parameter that you *should not* cross during calibration. When you cross the value range defined by the weak limits, ControlDesk warns you.

  In ControlDesk, you can edit the weak limits of a parameter within the value range given by the parameter's hard limits.

PHS (Peripheral High Speed) bus A dSPACE-specific bus for communication between a processor board and the I/O boards in a modular system. It allows direct I/O operations between the processor board (bus master) and I/O boards (bus slaves).

PHS-bus-based system A modular dSPACE system consisting of a processor board such as the DS1006 Processor Board and I/O boards. They communicate with each other via the PHS (Peripheral High Speed) bus.

Pitch variable A variable connected to the pitch scale of an Artificial Horizon.

Platform A software component representing a simulator where a simulation application is computed in real-time (on dSPACE real-time hardware) or in non-real-time (on VEOS).

ControlDesk provides the following platforms:

- DS1006 Processor Board platform
- DS1007 PPC Processor Board platform
- DS1104 R&D Controller Board platform
- DS1202 MicroLabBox platform
- MicroAutoBox platform
- MicroAutoBox III platform
- Multiprocessor System platform
- SCALEXIO platform
- VEOS platform
- XIL API MAPort platform

Each platform usually has a variable description that specifies its variables.

Platform trigger A trigger that is available for a platform and that is evaluated on the related dSPACE real-time hardware or VEOS.

Platforms/Devices controlbar A controlbar that provides functions to handle devices, platforms, and the applications assigned to the platforms.

Plotter instrument ControlDesk offers three plotter instruments with different main purposes:

- The Index Plotter displays signals in relation to events.
- The Time Plotter displays signals in relation to measurement time.
- The XY Plotter displays signals in relation to other signals.

Port configuration To interface the failure simulation hardware, an EESPort needs the hardware-dependent *port configuration file* (PORTCONFIG file). The file's contents must fit the connected HIL simulator architecture and its failure simulation hardware.

Postprocessing The handling of measured and recorded data by the following actions:

- Displaying measured or recorded data
- Zooming into measured or recorded signals with a plotter
- Displaying the values of measurement variables and parameters as they were at any specific point in time

Processor board A board that computes real-time applications. It has an operating system that controls all calculations and communication to other boards.

Project A container for collecting and managing the information and files required for experiment/calibration/modification tasks in a number of experiments. A project collects the experiments and manages their common data.

Project controlbar A controlbar that provides access to projects and experiments and all the files they contain.

Project root directory The directory on your file system to which ControlDesk saves all the experiments and documents of a project. Every project is associated with a project root directory, and several projects can use the same project root directory. The user can group projects by specifying several project root directories.

ControlDesk uses the Documents folder as the default project root directory unless a different one is specified.

Properties controlbar A controlbar providing access to the properties of, for example, platforms/devices, layouts/instruments, and measurement/recording configurations.

Proposed calibration A calibration mode in which the parameter value changes that the user makes do not become effective on the hardware until they are applied. This allows several parameter changes to be written to the hardware together. Being in proposed calibration mode is like being in the offline calibration mode temporarily.

Push Button An instrument (or a value cell type of the Variable Array) for setting the value of the connected parameter by push buttons.

Python Editor An editor for opening and editing PY files.

Q

Quick start measurement A type of measurement in which all the ECU variables configured for measurement are measured and recorded, starting with the first execution of an ECU task. ControlDesk supports quick start measurements on ECUs with DCI-GSI2, CCP, and XCP (except for XCP on Ethernet with the TCP transmission protocol).

Quick start measurement can be used to perform cold start measurements. Cold start means that the vehicle and/or the engine are cooled down to the temperature of the environment and then started. One reason for performing cold start measurements is to observe the behavior of an engine during the warm-up phase.

R

Radio Button An instrument for displaying and setting the value of the connected parameter by radio buttons.

Real-time application An application that can be executed in real time on dSPACE real-time hardware. A real-time application can be built from a Simulink model containing RTI blocks, for example.

Record layout A record layout is used to specify a data type and define the order of the data in the memory of the target system (ECU, for example). For scalar data types, a record layout allows you to add an address mode (direct or indirect). For structured (aggregated) data types, the record layout specifies all the structure elements and the order they appear in.

The `RECORD_LAYOUT` keyword in an A2L file is used to specify the various record layouts of the data types in the memory. The structural setup of the various data types must be described in such a way that a standard application system will be able to process all data types (reading, writing, operating point display etc.).

Record layout component A component of a record layout. A structured record layout consists of several components according to the ASAP2 specification. For example, the AXIS_PTS_X component specifies the x-axis points, and the FNC_VALUES component describes the function values of a map or a curve.

Recorder An object in the Measurement Configuration controlbar that specifies and executes the recording of variables according to a specific measurement configuration.

Recorder signal list A list that contains the variables to be included in subsequent recordings.

Recording Saving the time traces of variables to a file. Both measurement variables and parameters can be recorded. Recorded data can be postprocessed directly in ControlDesk.

A recording can be started and stopped immediately or via a trigger:

- Immediate recording

  The recording is started and stopped without delay, without having to meet a trigger condition.
- Triggered recording

  The recording is not started or stopped until certain trigger conditions are met. These conditions can be defined and edited in ControlDesk.

Reduction data Additional content in an MF4 file that allows for visualizing the MF4 file data depending on the visualization resolution. Reduction data therefore improves the performance of the visualization and postprocessing of measurement data.

Reference data set A read-only data set assigned to the reference page of a device that has two memory pages. There can be only one reference data set for each device. The reference data set is read-only.

Reference page Memory area containing the parameters of an ECU. The reference page contains the read-only reference data set.

Note

Some platforms/devices provide only a working page. You cannot switch to a reference page in this case.

Resynchronization Mechanism to periodically synchronize the drifting timers of the platform/device hardware ControlDesk is connected to. Resynchronization means adjustment to a common time base.

Roll variable A variable connected to the roll scale of an Artificial Horizon.

S

Sample count trigger A trigger that specifies the number of samples in a data capture.

A sample count trigger can be used as a stop trigger.

SCALEXIO platform A platform that provides access to a single-core, multicore or multiprocessor SCALEXIO system connected to the host PC for HIL simulation and function prototyping purposes.

SCALEXIO system A dSPACE hardware-in-the-loop (HIL) system consisting of at least one processing hardware component, I/O boards, and I/O units. They communicate with each other via the IOCNET. In a SCALEXIO system, two types of processing hardware can be used, a DS6001 Processor Board or a real-time industry PC as the SCALEXIO Processing Unit. The SCALEXIO system simulates the environment to test an ECU. It provides the sensor signals for the ECU, measures the signals of the ECU, and provides the power (battery voltage) for the ECU and a bus interface for restbus simulation.

SDF file The system description file that describes the files to be loaded to the individual processing units of a simulation platform. It also contains the variable description of the relevant simulation application.

The SDF file is generated automatically when the TRC file is built.

Segment The minimum part a segment signal can consist of.

There are different kinds of segments to be used in segment signals:

- Segments to form synthetic signal shapes (sine, sawtooth, ramp, etc.)
- Segments to perform arithmetical operations (addition, multiplication) with other segments
- Segments to represent numerical signal data (measured data)

Segment signal A signal consisting of one or more segments.

Selection Box An instrument for selecting a text-value entry and setting the respective numerical value for the connected variable.

Signal

- Representation of a variable measured in a specific measurement raster.
- Generic term for segment signals and operation signals.

  A signal is part of a signal description set which can be displayed and edited in the working area.

Signal description set A group of one or more signals.

A signal description set and its signals can be edited in the working area by means of the Signal Editor. Each signal description set is stored as an STZ file either in the **Signal Description Sets** folder or in the **Signal Generators** folder.

Signal Editor A software component to create, configure, display, and manage signals in signal description sets.

Signal file A file that contains the wiring information of a simulator and that is part of the standard dSPACE documentation of dSPACE Simulator Full-Size. Normally, dSPACE generates this file when designing the simulator. Before using a failure simulation system, users can adapt the signal file to their needs.

Signal generator An STZ file containing a signal description set and optional information about the signal mapping, the description of variables, and the real-time platform.

The file is located in the **Signal Generators** folder and used to generate, download, and control Real-Time Testing sequences, which are executed on the real-time platform to stimulate model variables in real time.

Signal Mapping A controlbar of the Signal Editor to map model variables to signals and variable aliases of a signal generator.

Signal Selector A controlbar of the Signal Editor. The Signal Selector provides signals and segments for arranging and configuring signal description sets in the working area.

SIL testing Abbreviation of *software-in-the-loop testing*.

Simulation and testing of individual software functions, complete virtual ECUs (V-ECUs), or even V-ECU networks on a local PC or highly parallel in the cloud independently of real-time constraints and real hardware.

Simulation application The generic term for offline simulation application (OSA) and real-time application.

Simulation system A description of the composition of V-ECU models, environment models, real ECUs, and their interconnections required for simulating the behavior of a system. A simulation system is the basis for the generation of a simulation application for a given simulator platform.

Simulation time group Group of platforms/devices in an experiment whose simulation times are synchronized with each other. If resynchronization is enabled, ControlDesk synchronizes a simulation time group as a whole, not the single members of the group individually.

Simulator A system that imitates the characteristics or behaviors of a selected physical or abstract system.

Single-processor system A system that is based on one dSPACE processor or controller board.

Single-shot instrument An instrument that displays an instantaneous value of a connected variable without keeping a value history. In ControlDesk, all instruments except for a plotter are single-shot instruments. For platforms that support the variable observer functionality, you can use single-shot instruments to observe variables.

Slave application An application assigned to the slave DSP of a controller or I/O board. It is usually loaded and started together with the real-time application running on the corresponding main board.

Slave DSP A DSP subsystem installed on a controller or I/O board. Its slave application can be loaded together with the real-time application or separately.

Slider An instrument (or a value cell type of the Variable Array) for displaying and setting the value of the connected variable by means of a slide.

Sound Controller An instrument for generating sounds to be played.

Standard axis An axis with data points that are deposited in the ECU memory. Unlike a common axis, a standard axis is specified within a curve or map. The parameters of a standard axis can be calibrated, which affects only the related curve or map.

Start trigger A trigger that is used, for example, to start a measurement raster. A platform trigger can be used as a start trigger.

Static Text An instrument for displaying explanations or inscriptions on the layout.

Steering Controller An instrument for changing variable values using a game controller device such as a joystick or a steering wheel.

Stimulation Writing signals to variables in real-time models during a simulation run.

Stop trigger A trigger that is used, for example, to stop a measurement raster.

String A text variable in ASCII format.

Strings are represented by the symbol.

Struct A variable with the struct data type. A struct contains a structured list of variables that can have various data types. In ControlDesk, a struct variable can contain either parameters and value blocks or measurement variables and measurement arrays. ControlDesk supports nested structs, i.e., structs that contain further structs and struct arrays as elements.

Structs are represented by the symbol.

Struct array An array of homogeneous struct variables.

Struct arrays are represented by the symbol.

STZ file A ZIP file containing signal descriptions in the STI format. The STZ file can also contain additional MAT files to describe numerical signal data.

Sub data set A data set that does not contain the complete set of the parameters of a platform/device.

Symbol A symbolic name of a physical address in a MAP file. A symbol can be associated to a variable in the Variable Editor, for example, to support an address updates.

System variable A type of variable that represents internal variables of the device or platform hardware and that can be used as measurement signals in ControlDesk to give feedback on the status of the related device or platform hardware. For example, an ECU's power supply status or the simulation state of a dSPACE board can be visualized via system variables.

T

Table Editor An instrument for displaying and setting values of a connected curve, map, value block, or axis in a 2-D, 3-D, and grid view. The Table Editor can also display the values of a measurement array.

The Table Editor can be used for the following variable types:

- Common axis ( )
- Curve ( )
- Map ( )
- Measurement array ( )
- Value block ( )

Time cursor A cursor which is visible at the same time position in the following instruments:

- In all Time Plotters
- In all XY Plotters
- In all bus monitoring lists

You can use the time cursor to view signal values at a specific point in time. If you move the time cursor, all measured signals and the respective parameters are

updated. Instruments and bus monitoring lists display the values that are available at the selected time position.

Time Plotter A plotter instrument for displaying signals that are measured in a time-based raster (time plots).

Topology A description of the processor boards belonging to a multiprocessor system and their interconnections via Gigalinks. The topology also contains information on which Gigalink port of each processor board is connected to the Gigalink ports of other processor boards in the multiprocessor system.

Topology information is contained in the real-time application (PPC/x86/RTA) files of the multiprocessor system's processor boards.

TRC file A variable description file with information on the variables available in an environment model running on a dSPACE platform.

Trigger A condition for executing an action such as starting and stopping a measurement raster or a recorder.

The generic term for the following trigger types:

- Duration trigger
- Platform trigger
- Sample count trigger

Trigger condition A formula that specifies the condition of a trigger mathematically.

Triggered measurement The measurement of a measurement raster started by a platform trigger. The data flow between the dSPACE real-time hardware or VEOS and the host PC is not continuous.

U

Unassigned data set A data set that is assigned neither to the working page nor to the reference page of a platform/device. An unassigned data set can be defined as the new working or reference data set. It then replaces the "old" working or reference data set and is written to the corresponding memory page, if one is available on the platform/device.

Unplugged A platform/device state defined by the following characteristics:

- The logical connection between ControlDesk and the hardware was interrupted, for example, because the ignition was turned off or the ControlDesk PC and the hardware were disconnected.
- Before the state of a platform/device changes to 'unplugged', the platform/device was in one of the following states:
  - 'Connected'
  - 'Online calibration started'
  - 'Measuring' / 'Recording'

Tip

A device for which the connection between ControlDesk and the device hardware currently is interrupted is also set to the 'unplugged' state when you start online calibration if both the following conditions are fulfilled:

- The device's **Start unplugged** property is enabled.
- The **Start online calibration behavior** property is set to 'Ignore differences'.

This is possible for CCP and XCP devices. For details on the two properties listed above, refer to General Settings Properties (ControlDesk Platform Management 📖).

- If the Automatic Reconnect feature is enabled for a platform/device and if the platform/device is in the 'unplugged' state, ControlDesk periodically tries to re-establish the logical connection for that platform/device.
- Online calibration is impossible. Offline calibration is possible.
- Platform/device configuration is possible.

The 'unplugged' platform/device state is indicated by the ⚠ icon.

Untriggered measurement The measurement of a measurement raster not started by a platform trigger. The data flow between the dSPACE real-time hardware or VEOS and the host PC is continuous.

User function An external function or program that is added to the ControlDesk user interface for quick and easy access during work with ControlDesk.

User Functions Output A controlbar that provides access to the output of external tools added to the **Automation** ribbon.

V

Value block A parameter that consists of a 1- or 2-dimensional array of scalar parameters.

In variable lists, ControlDesk displays entries for the value block itself and for each array element.

Value blocks are represented by the symbol.

Value conversion The conversion of the original *source values* of variables of an application running on an ECU or dSPACE real-time hardware into the corresponding scaled *converted values*.

Variable Any parameter or measurement variable defined in a variable description. ControlDesk provides various instrument s to visualize variables.

Variable alias An alias name that lets the user control the property of a segment by a model parameter of a real-time application.

Variable Array An instrument for calibrating parameters and displaying measurement variable values.

The Variable Array can be used for the following variable types:

- Measurement ( )
- Measurement array ( )
- String ( )
- Struct ( )
- Struct array ( )
- Value ( )
- Value block ( )

Variable connection The connection of a variable to an instrument. Via the variable connection, data is exchanged between a variable and the instrument used to measure or calibrate the variable. In other words, variable connections are required to visualize variables in instrument.

Variable description A file describing the variables in a simulation application, which are available for measurement, calibration, and stimulation.

Variable Editor A tool for viewing, editing, and creating variable descriptions in the ASAM MCD-2MC (A2L) file format. The Variable Editor allows you to create A2L files from scratch, or to import existing A2L files for modification.

Variable Filter A variable filter contains the filter configuration of a combined filter, which is used to filter the variable list in the **Variables** controlbar using a combination of filter conditions.

Variables controlbar A controlbar that provides access to the variables of the currently open experiment.

V-ECU Abbreviation of *virtual ECU*.

ECU software that can be executed in a software-in-the-loop (SIL) testing environment such as a local PC or highly parallel in the cloud independently of real-time constraints and real ECU hardware.

Vehicle information The ODX database can contain information for one or more vehicles. Vehicle information data is used for vehicle identification purposes and for access to vehicles. It references the access paths (logical links) to the ECUs.

VEOS A simulator which is part of the PC and allows the user to run an offline simulation application (OSA) without relation to real time.

VEOS Player is the graphical user interface for VEOS.

VEOS platform A platform that configures and controls the offline simulation application (OSA) running in VEOS and that also provides access to the application's environment VPU.

VEOS Player An application running on the host PC for editing, configuring and controlling an offline simulation application (OSA) running in VEOS.

Verbal conversion A conversion in which a conversion table is used to specify the computation of numerical values into strings. The verbal conversion table is used when you switch the value representation from source to converted mode and vice versa.

Verbal conversion range A conversion in which a conversion table is used to specify the computation of a range of numerical values into strings. The verbal conversion range table is used when you switch the value representation from source to converted mode and vice versa.

View set A named configuration of the controlbars of ControlDesk. A view set has a default state and a current state that can differ from the default state. The configuration includes the geometry, visibility, and docking or floating state of controlbars.

Visualization The representation of variables in instruments:

- Measurement variables are visualized in instruments to view and analyze their time traces.
- Calibration parameters are visualized in instruments to change their values.

VPU Abbreviation of *virtual processing unit*. A VPU is part of an offline simulation application in VEOS. Each VPU runs in a separate process of the PC.

VPU is also the generic term for:

- V-ECUs
- Environment VPUs
- Controller VPUs
- Bus VPUs

W

Working data set The data set currently residing in the memory of a platform/device hardware. There can be only one working data set for each calibration platform/device. The working data set is read/write.

Working page Memory area containing the parameters of an ECU or prototyping hardware (memory page). The working page contains the read/write working data set.

If the platform/device also provides a reference page, ControlDesk lets you switch between both pages.

Writable measurement A scalar variable that can be measured and calibrated.

X

XCP Abbreviation of *Universal Measurement and Calibration Protocol*. A protocol that is implemented on electronic control units (ECUs) and provides access to ECUs with measurement and calibration systems (MCS) such as ControlDesk.

XCP is based on the *master-slave principle*:

- The ECU is the slave.
- The measurement and calibration system is the master.

The "X" stands for the physical layers for communication between the ECU and the MCS, such as CAN (Controller Area Network) and Ethernet.

The basic features of XCP are:

- ECU parameter calibration (CAL)
- Synchronous data acquisition (DAQ)
- Synchronous data stimulation (STIM), i.e., for bypassing
- ECU flash programming (PGM)

The XCP protocol was developed by ASAM e.V. (Association for Standardisation of Automation and Measuring Systems e.V.). For the protocol specification, refer to http://www.asam.net.

The following ControlDesk devices support ECUs with an integrated XCP service:

- XCP on CAN device
- XCP on Ethernet device

XCP on CAN device A device that provides access to an ECU with XCP connected to the ControlDesk PC via CAN. Using the XCP on CAN device, you can access the ECU for measurement and calibration purposes via XCP (*Universal Measurement and Calibration Protocol*).

XCP on Ethernet device A device that provides access to an ECU or V-ECU with XCP connected to the ControlDesk PC via Ethernet. The XCP on Ethernet device provides access to the ECU/V-ECU via XCP (*Universal Measurement and Calibration Protocol*) for measurement and calibration purposes.

XIL API EESPort Electrical Error Simulation port (EESPort)

XIL API MAPort platform A platform that provides access to a simulation platform via the ASAM XIL API implementation that is installed on your host PC.

XY Plotter A plotter instrument for displaying signals as functions of other signals.

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