ETAS Data Operator V1.4

User Guide

www.etas.com

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Contents

1 Introduction

1.1 Intended use

ETAS Data Operator software is designed to streamline the preprocessing of measurement files, ensuring consistency and uniformity in the data preparation process. The intuitive graphical user interface allows users to easily perform quality checks, conversions, resampling, and trimming of measurement data. This software is particularly beneficial when dealing with a large number of files that need to be processed uniformly, as it eliminates the risk of non-identical results that can occur when using different preprocessing tools. By validating and preparing data in a uniform manner, ETAS Data Operator facilitates efficient processing of measurement data recorded in different formats and unknown states.

1.2 Target group

This product is intended for trained and qualified personnel involved in the development and calibration of automotive ECUs. The content is tailored to meet the specific needs of individuals with expertise in handling measurement files in the automotive sector.

1.3 Classification of Safety Messages

Safety messages warn of dangers that can lead to personal injury or damage to property:

DANGER

DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation that, if not avoided, could result in damage to physical property.

ATTENTION

ATTENTION indicates a situation that, if not avoided, could result in damage to digital property like data loss, data corruption and system vulnerability.

1.4 Safety Advice

Adhere to the ETAS Safety Advice for Data Operator V1.4, which is available within the Data Operator product. ETAS GmbH cannot be made liable for damage that is caused by incorrect use and not adhering to the safety instructions. Take all information on environmental conditions into consideration before setup and operation (see the documentation of your computer, hardware, etc.).

1.5 Data protection

If the product contains functions that process personal data, legal requirements of data protection and data privacy laws shall be complied with by the customer. As the data controller, the customer usually designs subsequent processing. Therefore, he must check if the protective measures are sufficient.

1.6 Data and information security

To securely handle data in the context of this product, see the next sections about data and storage locations as well as technical and organizational measures.

1.6.1 Data and storage locations

The following sections give information about data and their respective storage locations for various use cases.

1.6.1.1 License management

When using the ETAS License Manager in combination with user-based licenses that are managed on the FNP license server within the customer's network, the following data are stored for license management purposes:

Data

- Communication data: IP address
- User data: Windows user ID

Storage location

- FNP license server log files on the customer network

When using the ETAS License Manager in combination with host-based licenses that are provided as FNE machine-based licenses, the following data are stored for license management purposes:

Data

- Activation data: Activation ID
  - Used only for license activation, but not continuously during license usage

Storage location

- FNE trusted storage

  `C:\ProgramData\ETAS\FlexNet\fne\license\ts`

1.6.2 Technical and organizational measures

We recommend that your IT department takes appropriate technical and organizational measures, such as classic theft protection and access protection to hardware and software.

1.7 Licensing

A valid license is required to use the software. You can obtain a license in one of the following ways:

- from your tool coordinator
- via the self-service portal on the ETAS website at www.etas.-com/support/licensing
- via the ETAS License Manager

To activate the license, you must enter the Activation ID that you received from ETAS during the ordering process.

For more information about ETAS license management, see the ETAS License Management FAQ or the ETAS License Manager help.

To open the ETAS License Manager help

The ETAS License Manager is available on your computer after the installation of any ETAS software.

1. From the Windows Start menu, select **E** > **ETAS** > **ETAS License Manager**.

   The ETAS License Manager opens.
2. Click in the ETAS License Manager window and press F1.

   The ETAS License Manager help opens.

1.7.1 License Variants

Each license has its own purchase number and must be ordered separately.

DATAOPERATOR_GUI

Allows you to start and use the Data Operator graphic user interface (GUI).

DATAOPERATOR_WORKER

Required for the background process used for data conversion. Each job that is run binds one worker license. If you want to run multiple jobs at the same time, multiple worker licenses are required.

2 Installation

2.1 System requirements

The following minimum system prerequisites have to be met:

Required hardware	1,0 GHz PC 4 GB RAM Graphics with a resolution of at least 1024 x 768, 32 MB RAM
Required operating system	Windows® 10, Windows® 11
Required free disk space	1 GB (not including the size for application data)

The following system prerequisites are recommended:

Required hardware	2,0 GHz Dual-Core PC or equivalent 32 GB RAM Graphics with a resolution of 1680 x 1050, 128 MB RAM
Required operating system	Windows® 10, Windows® 11
Required free disk space	>2,0 GB

Note

The number of parallel processing tasks used by Data Operator can be controlled via the environment variable **`DATAOP_CONCURRENT_TASKS_LIMIT`**.

This option can be useful to reduce memory usage on low-resource systems or to optimize performance on high-performance systems.

For instructions on how to apply the setting, refer to "Configuring task concurrency" on page 20.

2.2 Installing

1. Navigate to the location of the `Data Operator X.X x64.exe` and double-click it.

   The installation wizard opens.
2. Select the **Destination Folder** for the Data Operator installation.

   Click **Browse** to browse for the destination folder.
3. Click **Install**.
4. After the installation is finished, select whether to directly run Data Operator by activating/deactivating the **Run Data Operator** checkbox.
5. Click **Finish**.

⇨ The installation is completed. You can now use Data Operator:

2.3 Uninstalling

1. Navigate to the Data Operator installation folder.
2. Double-click `Uninstall DataOperatorX.X.exe`.

   The uninstall wizard opens.
3. Click **Uninstall**.
4. After the uninstallation is finished, click **Finish**.

⇨ The uninstallation is completed.

3 Quick start guide

Start a job

1. In the **Sources** step of the **Create job** tab, add files or add a folder to the job.
2. (Optional) "Add operations to the job" on page 13 you want to perform to the measurement files
3. In the **Destination** step, select the destination format and folder and click **Start job**.

➪ The job starts. You can track its progress in the Jobs progress tab.

4 Working with Data Operator

This chapter describes the individual steps and operations available in the **Create job** view, where you define how your measurement data should be processed—from input selection to output configuration.

To import a previously saved configuration and restore all settings and operations, use the **Import configuration** button. See also, "Export a configuration" on page 24.

4.1 Add files

1. In the **Sources** step, click 

.
2. In the file selection dialog, select the measurement files you want to add to the job.

   The validity of MF4 files is automatically checked upon adding. The **Valid** column displays a green check mark for valid files and a red cross for corrupt ones.

   If a corrupt MF4 file is detected, you can enable the **Repair invalid files** checkbox to attempt a best-effort repair. Unreadable sections may be removed during the repair, so it is recommended to work on a copy of the original file.
3. Click **Open**.

   The selected files are added to the job.
4. Use the **Signal source** checkbox to enable or disable individual files for signal name autocompletion.

   By default, the first five added files are activated as signal sources.
5. To remove a file, click  .
6. To remove all added files and folders, click 

.

4.2 Add a folder

1. In the **Sources** step, click Add folder.
2. In the folder selection dialog, select the folder containing your measurement files and click **Select Folder**.

   The folder appears as an expandable entry in the sources list.
3. Use the **Signal source** checkbox to enable the folder as a source for signal name autocompletion.

   By default, no signals from folders are used for autocompletion. You can enable them manually.
4. To validate all MF4 files in the folder, click  .
5. To validate all MF4 files in the folder, click  .

   If corrupt MF4 files are found during validation, you can enable the **Repair invalid files** checkbox to attempt a best-effort repair. Unreadable sections may be removed during the repair, so it is recommended to work on copies of the original files.
6. To filter files inside the folder, expand it and use the **File selection filter** field. Wildcards (*, ?) or regular expressions can be used.
7. To refresh folder contents, click Refresh.

   If any files were modified externally, deselect and reselect them to reload their signals.
8. To remove the folder from the job, click  .
9. To clear all added files and folders, click Clear all.

4.3 Add operations to the job

1. In the **Add operation** step, select an operation from the drop-down list.
2. Click Add operation.

➪ The selected operation is added to the job.

The following operations can be added to the job:

4.3.1 Extract signals

Filtering signals requires a LAB file that lists the signals you want to keep.

To create such a file using Data Operator, see "Creating a LAB file for filtering signals" on page 22.

1. After adding the **Extract signals** operation, click Select file.
2. In the file selection dialog, select the LAB file you want to use for filtering.
3. Click **Open**.

4.3.2 Resample signals

You can define a new sampling rate, which can effectively reduce the file size.

1. After adding the **Resample Signals** operation, enter a positive value in the **Resampling period** input field.
2. Select the time unit from the drop-down list.

4.3.3 Trim files

Files can be trimmed at a single time step by using only one input field, or at two time steps by filling in both fields. If a field is left empty, the original start or end of the file is used by default.

1. After adding the **Trim files** operation, enter a positive value in the **Start** and/or **End** input field.

   The file is cut after the specified time step relative to the start time of the measurement file.
2. To select the unit, use the drop-down list.

4.3.4 Combine files

You can combine multiple files into a single output file.

There are two modes available:

Merge

Merge files based on their timestamps and align them on a common timeline.

1. After adding the **Combine files** operation, select **Merge**.
2. Select whether to **Keep** or to **Reduce** the gap between data.
3. If you select **Reduce**, you must define a **Fixed gap** and a **Gap threshold**. To select the unit, use the drop-down list.
   - **Gap threshold**: Gaps equal to or larger than this value will be reduced.
   - **Fixed gap**: Specifies the new gap size to apply to gaps that meet or exceed the threshold.

Append

Append files one after another into a single file.

1. After adding the **Combine files** operation, select **Append**.
2. Select the order in which files are combined:
   - **Creation time**: Based on the creation time of each file.
   - **Sequence**: Based on the order files were added in the **Source** step.
3. In the **Fixed gap** input field, enter the time gap to insert between files. To select the unit, use the drop-down list.

4.3.5 Slice files by duration

Files can be divided into time-based slices of a defined duration.

1. After adding the **Slice files by duration** operation, enter a positive value in the **Slice duration** input field to define the length of each slice.
2. To select the unit, use the drop-down list.

4.3.6 Slice files by condition

Files can be divided into rule-based slices with user-defined conditions. This lets you isolate specific events or time ranges in measurement data.

1. After adding the **Slice files by condition** operation, select a **Slice mode**: **Condition**, **One sided trigger**, or **Two sided trigger**.
2. Enter the condition or conditions using Python syntax. NumPy is available. Only a subset of Python features is supported. For details, see "Slice files by condition" on page 34.
   Multiple signals can be combined.
   - **Condition** mode keeps only the data points that satisfy the rule.
   - **One sided trigger** creates slices that start when the condition first becomes true, extend for the configured **Duration**, and are shifted by the **Offset**. Overlapping slices are merged into a single slice.

     Use this mode to inspect time spans around an event, such as a threshold being exceeded.
   - **Two sided trigger** creates slices between a **From** condition and an **Until** condition. Offsets are applied to both slice boundaries.

     Use this mode to inspect time spans between two events.

4.3.7 Add GPS-based signals

GPS data can be annotated with information retrieved form © OpenStreetMap.

1. In the **Longitude signal name** input field, enter the exact name of your longitude signal.
2. In the **Latitude signal name** input field, enter the exact name of your latitude signal.
3. Under **Signals to add**, select the annotations you want to add to your

data.

See also, "Add GPS-based signals" on page 35.

4.3.8 Shift signals by time

Apply a time offset to specific signals to align them with other data.

1. In the **Signal list** input field of the **Shift signals by time** operation, enter the names of the signals to shift.

   Separate multiple signal names with semicolons (**;**).
2. In the **Time offset** input field, enter the time value to shift the signals.

   Use a positive value to delay the signals or a negative value to shift them earlier.
3. To select the unit, use the drop-down list.

4.3.9 Map signal names

Create a new signal using values from a list of candidate signals, selected in order of priority.

The original signals remain in the output file. The mapped signals are added in addition to the existing ones.

1. In the **Mapped signal name** input field of the **Map signal names** operation, enter a name for the new signal.
2. In the **Candidate signal** section, define one or more source signals:
   i. In the **Signal name** input field, enter the name of the original signal to map from.
   ii. (Optional) In the **Device** input field, enter the name of the device the signal belongs to.

   The first matching signal from the list is used.
3. Click 

to add additional signals to the priority list.

   Signals are evaluated from top to bottom.
4. To remove a candidate signal entry, click  .
5. To define additional mapped signals, each with its own candidate list, click 

.

4.3.10 Add calculated signal

Add a new signal by defining a formula based on existing signal data.

1. In the **Output signal name** input field of the **Add calculated signal** step, enter a name for the new signal to be created.
2. In the **Formula** input field, enter a formula using existing signal names:

- The formula uses Python syntax. NumPy is available.
- Only a subset of Python features is supported. For details, see "Add calculated signal" on page 38.

  Example: `np.sqrt(signal_name)`

> **Note**
>
> The result of the formula must have the same length as the input signals.
>
> Modifying time values or sampling is not supported within formulas.

3. To define another calculated signal, click + Add calculated signal.

4.3.11 Execute Python script

Use this operation to execute a custom Python script on the measurement data.

1. In the **Python script path** input field of the **Execute Python script** operation, select or enter the path to your Python script file.
2. (Optional) Activate the **Execute individually per measurement file** checkbox to control how the script is executed:
   - **Checked**: The script is triggered once per measurement file, allowing parallel execution. This is faster but cannot access data from other measurement files.
   - **Unchecked**: The script is triggered once for all files together, which allows operations combining data across multiple files. This mode is slower but supports data aggregation scenarios.

> **Note**
>
> Refer to the **Python scripting guide** for detailed instructions on writing custom operations.
>
> Make sure that all script dependencies are installed and accessible in the Python environment used by Data Operator.

4.4 Start the job

When you are satisfied with all the settings made in the **Operations** steps, you can start the job.

1. In the **Destination** step, select a **Format family** from the drop-down list.
2. Select a **Format** the corresponding drop-down list.

   The available formats depend on the format family.

3. To select the destination folder, click Select folder.
4. In the folder selection dialog, select the destination folder.
5. Click **Select Folder**.
6. Select an option to handle naming conflicts in the destination folder:
   - **Keep both files (resolve conflicts)**: Keeps all files by appending a numeric suffix (e.g., _1, _2, etc.) to the new file name. The number increases automatically to avoid overwriting existing files.
   - **Overwrite existing files**: Overwrites existing files with the same name.
7. (Optional) In the **Output file prefix** and/or **suffix** input fields, enter custom text to add to the output file names.
8. (Optional) Activate any of the following checkboxes:
   - **Copy MDF4 events**: Only relevant if both the source and destination file formats are MDF4. Copies the events from the source to the target MDF4 file.
   - **Detect duplicates**: Detects duplicate signals in measurement files. The results of this operation can be found in the job log.
   - **Export job configuration**: Saves the configuration with all settings as JSON file to the destination folder. It can be used with the Data Operator CLI or imported back into Data Operator, see "Import a configuration" on page 24.
9. Click Start job.

➪ The job starts. You can track its progress in the Jobs progress tab.

5 CLI guide

The Command Line Interface (CLI) allows automated data processing with Data Operator.

It is especially useful for incorporating tasks such as automatic filtering and resampling of measurement data into CI/CD pipelines or other automation workflows.

> **Note**
>
> A valid **DATAOPERATOR_WORKER** license is required during processing when using the CLI functionality of Data Operator.

5.1 Working with the CLI

> The commands available in the Data OperatorCLI are described in the section "Commands" on page 21.

To use the CLI, you must first create a configuration using the Data Operator GUI application.

Generate a workflow

1. In Data Operator make your desired settings as described in "Working with Data Operator" on page 12.
2. In the **Destination** step, activate the **Export configuration** checkbox.
3. Click **Start job**.

⇨ The configuration is saved as JSON file to the destination folder.

Open Data Operator with PowerShell

1. Open the Data Operator installation folder.
2. Click in the address bar at the top of the file explorer.
3. Type `powershell` and press ENTER.

   PowerShell opens in the current directory.
4. To start Data Operator CLI, enter:

   ```
   .\DataOperatorCLI.exe
   ```

⇨ You can now use Data Operator CLI.

Open Data Operator with Command Prompt (cmd)

1. Open the Data Operator installation folder.
2. Click in the address bar at the top of the file explorer.
3. Type `cmd` and press ENTER.

Cmd opens in the current directory.

4. To start Data Operator CLI, enter:

   `DataOperatorCLI.exe`

➪ You can now use Data Operator CLI.

Run commands with PowerShell

```
.\DataOperatorCLI.exe run [command]
```

EXAMPLE

```
.\DataOperatorCLI.exe run --help
```

Run commands with cmd

```
DataOperatorCLI.exe run [command]
```

EXAMPLE

```
DataOperatorCLI.exe run --help
```

5.2 Configuring task concurrency

Data Operator executes certain operations in parallel to reduce processing time.

By default, up to **three concurrent tasks** are executed.

The number of concurrent tasks can be configured by setting the environment variable **`DATAOP_CONCURRENT_TASKS_LIMIT`**.

Adjusting this value allows you to balance performance and memory usage:

- **Lower values** reduce memory consumption and help avoid out-of-memory errors.
- **Higher values** can improve processing speed on systems with sufficient CPU performance and available RAM.

If the environment variable is not set, Data Operator uses the default limit of three concurrent tasks.

Setting the environment variable with Command Prompt (cmd)

1. Open the **Start** menu.
2. Type `cmd` and press ENTER.
3. In the **Command Prompt** window, enter the following command:

   `setx DATAOP_CONCURRENT_TASKS_LIMIT <value>`

   Replace **`<value>`** with the desired number of concurrent tasks.

4. Press ENTER to execute the command.
5. Close the **Command Prompt** window.
6. Restart any open **Command Prompt** or **Data Operator** sessions so that the new environment variable is applied.

EXAMPLE
To limit processing to a single concurrent task:

```
setx DATAOP_CONCURRENT_TASKS_LIMIT 1
```

To **verify the setting** in a new Command Prompt, execute: **`echo %DATAOP_CONCURRENT_TASKS_LIMIT%`**

5.3 Commands

`-h/--help`

Displays all available commands along with their descriptions.

`-v/--version`

Outputs the current version number of Data Operator.

`-d/--destination <path>`

Sets the output path where the processed data will be saved.

`-s/--source <path>`

Specifies the path to the source file or folder to be processed.

`-w/--workflow <path>`

Specifies the path to the configuration file (`*.json`) you want to use.

Note

If a path contains spaces, enclose it in double quotation marks.

EXAMPLE

```
DataOperatorCLI.exe run -w C:\your\path\example.js -s
"C:\your\source\file or folder" -d C:\y-
our\destination\path
```

6 Use cases

6.1 Creating a LAB file for filtering signals

If you want to filter signals from a measurement file, you need a LAB file containing only the signals you want to keep (see "Extract signals" on page 13).

To create such a LAB file with Data Operator, follow the steps below.

1. In the **Sources** step of the **Create job** tab, add the measurement files whose signals you want to filter later.
2. In the **Destination** step, select **LabFile** from the **Format family** drop-down list.
3. From the **Format** drop-down list, select any LAB file format.
4. Select the destination folder with Select folder.
5. Click Start job.
   The LAB file is saved to the selected folder.
6. In the Jobs progress tab, click Open destination folder for the respective job.
7. Open the LAB file in a text editor of your choice (e.g., Notepad++).
8. Delete the signals you want to remove from the measurement file later.
9. Save the LAB file.

➪ You can now use the created LAB file to filter the signals from your measurement files using the Filter signals operation.

6.2 Validating MF4 files

Check the validity of single MF4 files

1. In the **Sources** step, click Add files.
2. In the file selection dialog, choose the MF4 files you want to check.

➪ Each file is automatically validated upon upload. The result is shown in the **Valid** column. A green check mark indicates a valid file, while a red cross indicates a corrupt one.

Check the validity of MF4 files of a whole folder

1. In the **Sources** step, click Add folder.
2. In the folder selection dialog, choose the folder containing the MF4 files you want to check.

> **Note**
>
> If a filter is applied, only the visible (filtered) files in the folder are validated.

3. To validate all files in the folder, click / Validate files.

➪ The files are validated. The results are shown in the **Valid** column. A green check mark indicates a valid file, while a red cross indicates a corrupt one.

6.3 Working with signals with device names

Signals that include a device name are not supported in most processing steps. To work with such signals, you must first create a mapped signal without the device reference using the **Signal Mapping** step.

1. In the **Sources** step of the **Create job** tab, add the measurement file that contains the signals with device names.
2. In the **Add operation** step, select **Signal mapping** from the drop-down list and click + Add operation.
3. In the **Signal mapping** step, go to the **Mapped signal name** input field and enter a name for the new signal.
4. In the **Candidate signal** section:
   i. In the **Signal name** input field, enter the name of the original signal.
   ii. In the **Device** input field, enter the name of the device the signal belongs to.
5. (Optional) To add another mapping, click + Add mapped signal and repeat from step 2.
6. In the **Destination** step, select the destination format and folder, then click **Start job**.

➪ The file containing the mapped signals without device names is saved to the destination folder. Add this file to a new job to use the signals in subsequent processing steps.

6.4 Exporting and importing a configuration

You can export a job configuration to reuse the same processing setup later or import an existing configuration to restore all job settings and operations.

An exported configuration file is also required to work with the Data Operator CLI.

Export a configuration

1. In the **Sources** step of the **Create job** tab, add a file to the job.
2. "Add operations to the job" on page 13 that you want to export to the configuration file.
3. Set the destination format and folder.
4. At the top of the **Create job** tab, click 

.

Or

5. In the **Destination** step, activate the **Export configuration** checkbox and click **Start job**.

➪ The configuration file is saved as JSON file in the selected destination folder.

Import a configuration

1. At the top of the **Create job** tab, click 

.
2. In the file selection dialog, select a previously saved configuration file (`*.json`).

➪ All operations and settings defined in the configuration are restored.

6.5 Searching for events using rule-based slicing

If you want to search for specific events or conditions in your measurement data, you can use the **Rule based slice** operation.

This allows you to define logical expressions that isolate only the relevant parts of your data.

1. In the **Sources** step of the **Create job** tab, add the measurement files that contain the data you want to search.
2. In the **Add operation** step, select **Rule based slice** from the drop-down list and click 

.
3. In the **Condition** field, enter a Python expression that evaluates to true for rows that match your desired condition.

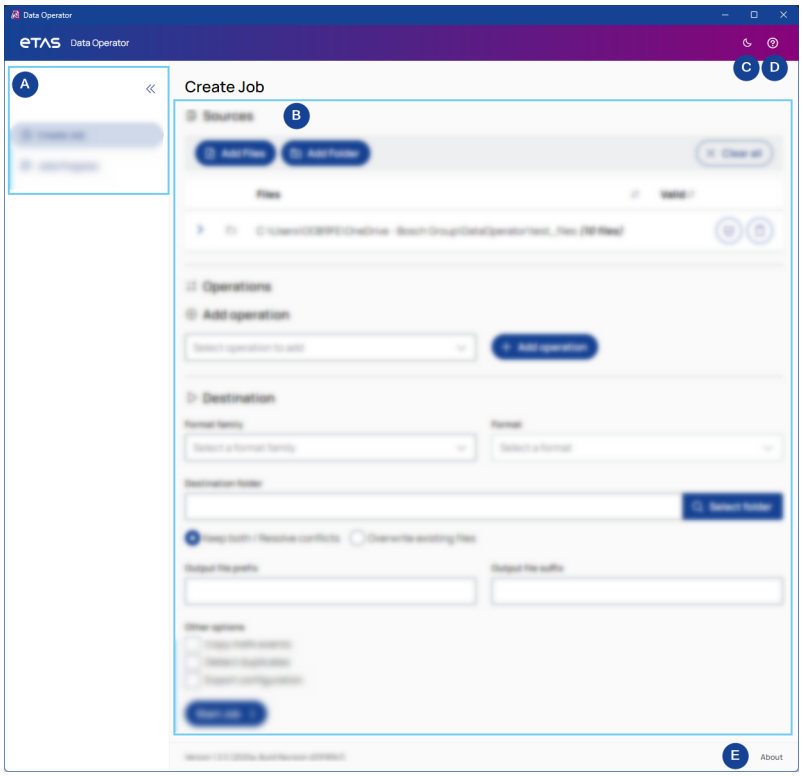
   Example: `vehicleSpeed > 50 and brakePressure > 0`
4. In the **Destination** step, select the destination format and folder, then click **Start job**.

5. Once the job is finished, got to the **Jobs progress** tab.
6. On the respective job card, click **Open destination folder**.

⇨ You can now review only the data segments where the defined condition was met — for example, to analyze specific events such as braking during high-speed driving.

7 User interface

7.1 Main window



A. **Navigation sidebar**

   Use the navigation sidebar to switch between job creation and job progress tabs.

   To expand or collapse the sidebar, click the arrows in the top-right corner.

B. **Content**

   Displays the main content, depending on the selected view.

C. **Dark/Light mode**

   To toggle between light and dark mode, click the sun/moon in the top right corner.

D. **Help**

Opens the PDF User Guide.

E. **About**

Shows the meta data of the app.

7.2 Create job

The **Create job** view provides a centralized interface for adding sources, selecting operations, and configuring destination settings such as file format and output folder.

Import job

Import a previously saved configuration to restore all settings and operations. See also, "Export a configuration" on page 24.

Export job

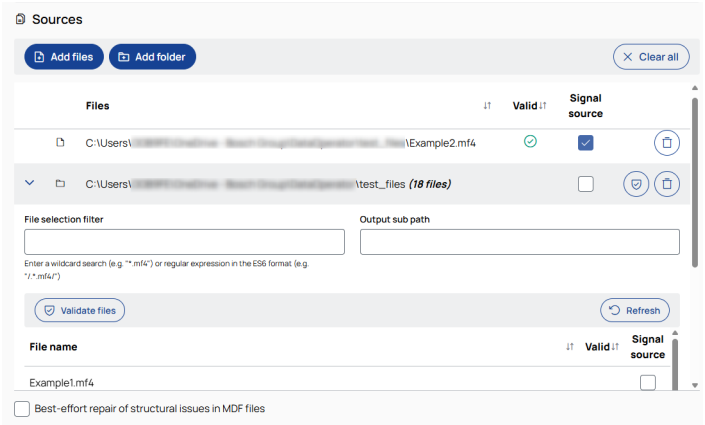
Export a configuration to save all settings and operations.

Reset job

Resets the current job. All settings are cleared, and all added files and folders are removed.

The following settings can be made to the job:

7.2.1 Sources



Add files

Opens a file selection dialog to choose files to add to the job.

See also, "Add files" on page 12.

Add folder

Opens a folder selection dialog to choose a folder to add to the job.

See also, "Add a folder" on page 13.

Clear all

Removes all added files and folders from the job.

Files

Lists all files in the job, sorted by most recently added.

To sort the list alphabetically, ascending or descending, click the column header.

Valid

This column shows whether an MF4 file is valid or corrupt.

A green check mark indicates a valid file, while a red cross indicates a corrupt one.

Signal source

Enables or disables a file or folder as a source for signal name auto-completion in operations such as **Shift signals by time** and **Calculated signals**.

- When you select individual files, the first five files are automatically enabled as signal sources.
- When you select a folder, no files are preselected as signal sources.

– You can manually enable or disable any files or folders for signal auto-completion.

If a file has changed after the signals were loaded, deselect and reselect it to refresh the signal database.

Validates all MF4 files in the folder.

A green check mark indicates a valid file, while a red cross indicates a corrupt one.

Single files are validated during upload.

When a filter is applied, only the visible (filtered) files are validated.

Repair invalid files (Best-effort repair of structural issues in MDF files)

Scans MDF files for structural issues and attempts a best-effort repair.

Unreadable or damaged sections may be removed to restore file integrity, which can lead to partial data loss.

It is recommended to repair a copy of the original file.

Behavior when executed in a job:

Repair only

If the **Repair invalid files** option is enabled and the job is executed without any additional operations, all input MDF files are scanned, files with structural issues are repaired, and the repaired versions are saved to the destination folder.

Repair before operations

If the **Repair invalid files** option is enabled and the job contains one or more operations, all input files are repaired first. After this repair step, the configured operations are applied to all resulting (initially valid and repaired) files.

This ensures that all subsequent processing is performed on structurally valid MDF files.

Removes the file from the job.

Refreshes the folder. Updates changes made to the folder outside the application.

7.2.2 Operations

Add operation

To select a processing step (operation) to include in the job, use the drop-down list.

After selecting an operation, click the Add operation button to add it to the job.

The following operations can be added to the job:

7.2.2.1 Extract signals

Opens a file selection dialog where you can select the LAB file to be used for filtering the signals.

Alternatively, you can type the path in the input field.

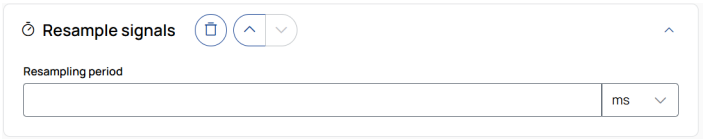
To create a LAB file for filtering signals with Data Operator, see "Creating a LAB file for filtering signals" on page 22.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.2 Resample signals



Resampling period

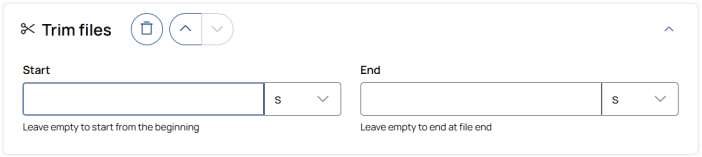
Enter a positive integer to define the resampling period. To select the unit, use the drop-down list.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.3 Trim files



Note

Files can be trimmed at a single time step by using only one input field, or at two time steps by filling in both fields. If a field is left empty, the original start or end of the file is used by default.

Start

Enter a positive value to define the start point of the trimmed file. To select the unit, use the drop-down list.

End

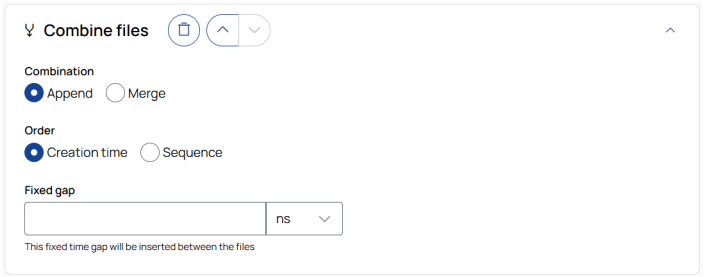
Enter a positive value to define the end point of the trimmed file. To select the unit, use the drop-down list.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.4 Combine files



Combination

Append

Appends all files in the job sequentially into a single output file.

Order

Creation time: Appends files based on the creation time of the measurement files.

Sequence: Appends files in the order they were added in the **Source** step.

Fixed gap

Inserts a fixed time gap between the appended files. To select the unit, use the drop-down list.

Merge

Merges the data from the job's files into a single file based on their timestamps on a shared timeline.

Gap

Keep: Keeps the original gaps between files unchanged.

Reduce: Reduces gaps based on the following settings.

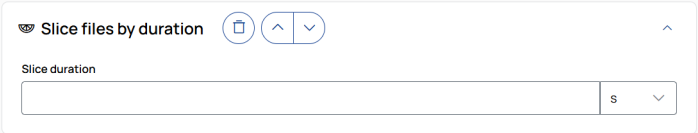
- **Gap threshold**: Gaps equal to or larger than this value will be reduced. To select the unit, use the drop-down list.
- **Fixed gap**: Specifies the new gap size to apply to gaps that meet or exceed the threshold. To select the unit, use the drop-down list.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.5 Slice files by duration



Slice duration

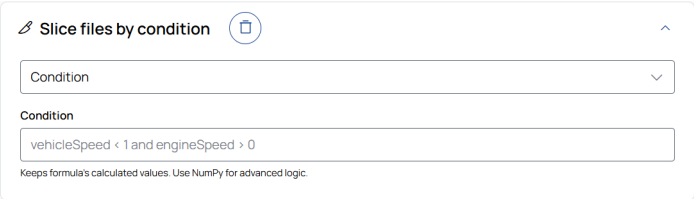
Enter a positive integer to define the duration of each data slice. To select the unit, use the drop-down list.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.6 Slice files by condition



Slices a measurement file into smaller segments based on a user-defined rule. You can select different slice modes depending on how the slice boundaries should be detected.

Slice mode

Select how the slice boundaries are calculated:

- **Condition**: Keeps only the values that meet the condition.
- **One sided trigger**: Creates slices with a defined duration after a condition becomes true. Overlapping slices are merged into one slice.
- **Two sided trigger**: Creates slices between a start condition (**From**) and an end condition (**Until**).

Condition

Enter a condition using Python syntax, but with limited supported features. NumPy is available.

Only data points that satisfy the condition remain. Multiple signals can be combined in the expression.

Example: `vehicleSpeed > 50`

> **Note**
>
> Only the following Python keywords are supported: **`and`**, **`elif`**, **`else`**, **`if`**, **`in`**, **`is`**, **`not`**, **`or`**, **`return`**, **`time`**.
>
> Formulas are not validated during editing. Errors only appear during job execution.
>
> Signal names must be valid Python identifiers:
>
> - Start with a letter or underscore.
> - Contain only letters, digits, underscores.
> - No spaces or special characters (e.g., @, #, !, \, etc., except underscore).
> - No Python reserved keywords (e.g., `if`, `else`, `while`, `def`, `true`, `false`, etc.).

One sided trigger

Creates a slice whenever the condition becomes true.

The slice starts when the condition first becomes true, is extended by the configured **Duration**, and is shifted by the **Offset**. To select the unit, use the drop-down list.

Overlapping slices are automatically merged into a single slice.

Example: A rule such as `vehicleSpeed > 50` creates a slice from the time the speed first exceeds 50, extended by the configured duration and shifted by the offset.

Two sided trigger

Creates a slice between two independent conditions.

The **From** condition defines when the slice starts; the **Until** condition defines when the slice ends. Offsets are applied to both slice boundaries. To select the unit, use the drop-down list.

Each valid pair of conditions results in a slice.

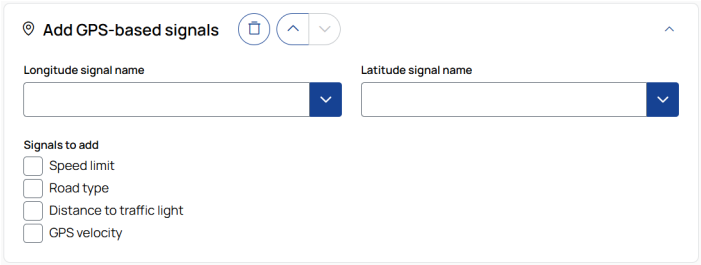
Example: For `vehicleSpeed < 50` until `vehicleSpeed > 100`, a slice is created for the time span where the vehicle is between these thresholds.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.7 Add GPS-based signals



Longitude signal name

Enter the exact name of the longitude signal.

Latitude signal name

Enter the exact name of the latitude signal.

Signals to add

Select the types of annotations to add to your GPS data. The information used is obtained from © OpenStreetMap.

Speed limit: Maximum speed limits for road sections.

Road type: The classification of the road segment. The mapping is as follows:

> Motorway: 1
> Trunk: 2
> Primary: 3
> Secondary: 4
> Tertiary: 5
> Unclassified: 6
> Residential: 7
> Service: 8
> Motorway link: 9
> Trunk link: 10
> Primary link: 11
> Secondary link: 12
> Tertiary link: 13

Distance to traffic light: Distance from the GPS position to the nearest traffic light.

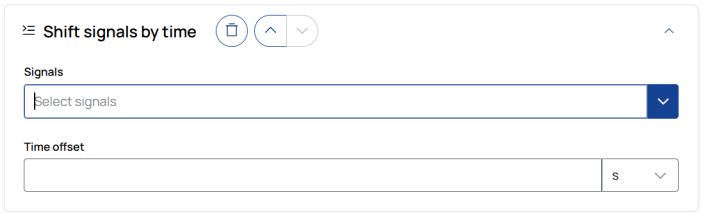
GPS velocity: Instantaneous velocity calculated from changes in GPS position over time.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.8 Shift signals by time



Applies a time offset to the specified signals to align them with other data.

Signals

Type the names of the signals to shift and use ENTER to confirm. The supported autocompletion is based on the signal sources defined in the **Sources** step.

Time offset

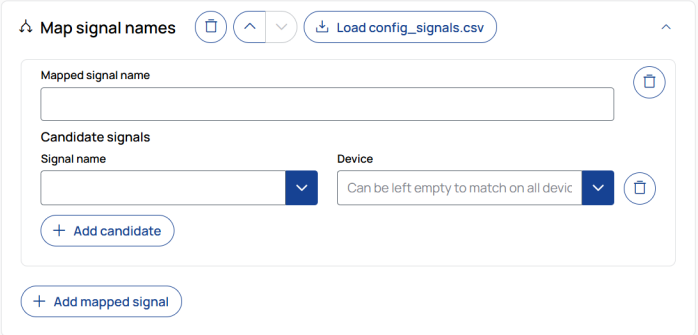
Enter the amount of time to shift the signals. Use a positive value to delay the signal or a negative value to shift it earlier. To select the unit, use the drop-down list.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.9 Map signal names



Creates a new signal using values from a list of candidate signals, selected in order of priority. The new signals are created in the output file but the original signals are not removed from the measurement data.

Mapped signal name

Enter the name for the new, mapped signal.

Candidate signals

Provide the original signal names to pull data from. The first available match (from top to bottom) is used.

This can be used as a fallback or priority list for multiple sensors.

Signal name: The original name of the signal to match.

Device: Optionally specify the device the signal belongs to. Leave empty to apply the mapping across all devices.

Load config_signals.csv

You can import a configuration file named `config_signals.csv` to define multiple signal mappings at once.

The file follows the same structure used in ETAS EATB.

Example files can be found in the installation folder.

You can remove any entry using the trash can icon.

Adds another signal to the list of candidates.

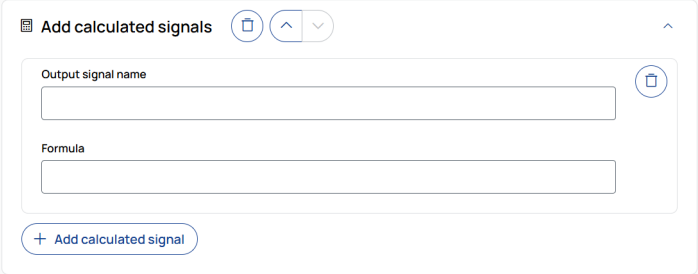
Adds a new mapped signal entry, each with its own list of candidate signals.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.10 Add calculated signal



Adds a new calculated signal with its own formula and name.

Output signal name

Enter a name for the new signal that will be created.

Formula

Enter a formula using existing signal names. Only signals without a device name are supported.

The supported autocompletion is based on the signal sources defined in the **Sources** step.

Formulas use Python syntax, but with limited supported features. NumPy is available via `np`.

The result of the formula must have the same length as the input signals.

Modifying time or sampling rate is not supported.

Example: `np.sqrt(signal_name)`

> **Note**
>
> Only the following Python keywords are supported: **`and`**, **`elif`**, **`else`**, **`if`**, **`in`**, **`is`**, **`not`**, **`or`**, **`return`**, **`time`**.
>
> Formulas are not validated during editing. Errors only appear during job execution.
>
> Signal names must be valid Python identifiers:
>
> - Start with a letter or underscore.
> - Contain only letters, digits, underscores.
> - No spaces or special characters (e.g., @, #, !, \, etc., except underscore).
> - No Python reserved keywords (e.g., `if`, `else`, `while`, `def`, `true`, `false`, etc.).

+ Add calculated signal

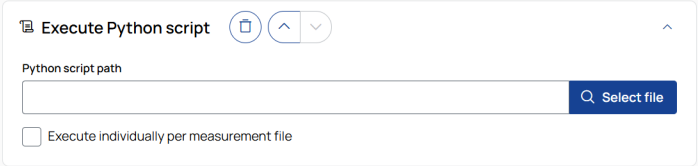
Adds a new calculated signal with its own formula definition.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.2.2.11 Execute Python script



Executes a custom Python script to perform user-defined processing on measurement data.

Python script path

Enter or browse to the path of the Python script file you want to execute. See the example scripts in the installation folder for reference.

Execute individually per measurement file

Defines how the Python script is executed:

- **Enabled** – The script runs once per measurement file, processing them in parallel. This is faster but cannot use data from other files.
- **Disabled** – The script runs once for all files together, allowing operations that combine data from multiple measurement files. This mode is slower.

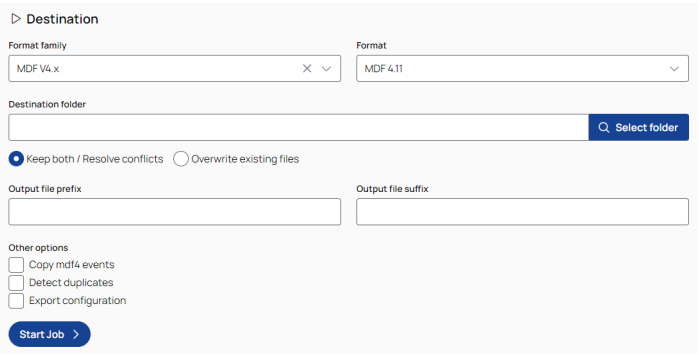
> **Note**
>
> Make sure the Python environment used by Data Operator includes all required dependencies for your script.
>
> Refer to the Python scripting guide for available interfaces and best practices.

To remove the operation from the job, click the trash can button.

To move the operation up or down in the job sequence, use the arrow buttons next to the trash can icon.

To expand or collapse the operation, click the arrow in the top-right corner of the operation panel.

7.3 Destination



Format family

To select the destination file format family, use the drop-down list.

Format

To select the destination file format based on the selected format family, use the drop-down list.

Destination folder

Select folder

Opens a folder selection dialog where you can choose the destination folder to save the destination file to. Alternatively, you can type the path in the input field.

Select an option to handle naming conflicts in the destination folder:

Keep both files (resolve conflicts): Keeps all files by appending a numeric suffix (e.g., _1, _2, etc.) to the new file name. The number increases automatically to avoid overwriting existing files.

Overwrite existing files: Overwrites existing files with the same name.

Output file prefix/suffix

In the input fields, enter a prefix/suffix you want to add to the file names.

Other options

Copy MDF4 events: Only relevant if both the source and destination file formats are MDF4. Copies the events from the source to the target MDF4 file.

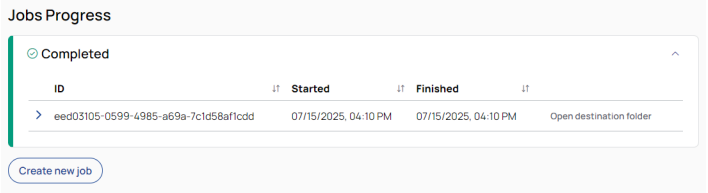
Detect duplicates: Detects duplicate signals in measurement files. The results of this operation can be found in the job log.

Export job configuration: Saves the configuration with all settings as JSON file to the destination folder. It can be used with the Data Operator CLI or imported back into Data Operator, see "Import a configuration" on page 24.

Start job

Starts the job with all the settings you made and opens the **Jobs progress** step, where you can see the status of the job's progress.

7.4 Jobs progress



Status panel

Shows the status and meta data of the jobs.

To expand or collapse the panel, click the arrow in the top-right corner.

Status

Running: The progress bar shows the progress status.

Completed: The **Open destination folder** button opens the destination folder for the job files.

Failed: The job failed.

ID

Displays the ID of the job.

To sort the list alphabetically, ascending or descending, click the column header.

To expand. click the arrow next to the ID:

Completed: The path of the destination folder is displayed. Click to open the folder.

Failed: The error message is displayed. To open the error log file, click Show log.

Started/Finished

Displays the time and date when the job was started and when it was finished.

To sort the list alphabetically, ascending or descending, click the column header.

Create new job

Jumps to the **Sources** step where you can start a new job.

8 Contact information

Technical Support

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

www.etas.com/hotlines

ETAS offers trainings for its products:

www.etas.com/academy

ETAS Headquarters

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