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# Configuring Logging for SIMATIC WinCC Unified Systems

Unified Comfort Panel / WinCC Unified Runtime PC /  
V17 / Logging

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# Table of Contents

<b>Legal information</b> .....	<b>2</b>
<b>1 Introduction</b> .....	<b>5</b>
1.1 Overview .....	5
1.2 Principle of Operation .....	6
1.2.1 Available Database Types .....	6
1.2.1.1 Overview .....	6
1.2.1.2 Database Types in the WinCC Unified System .....	6
1.2.2 Log Types .....	7
1.2.2.1 Overview .....	7
1.2.2.2 Tag Log .....	7
1.2.2.3 Alarm Log .....	7
1.2.2.4 Log Properties .....	8
1.2.3 Log Storage Device/Directory .....	9
1.2.4 Storage Structure of Logs .....	10
1.2.5 Tool "WinCC Unified Configuration" .....	11
1.2.6 Interaction Between Runtime Settings & WinCC Unified Configuration .....	12
1.2.7 Log Tag .....	18
1.2.7.1 Properties .....	18
1.2.7.2 Logging Modes .....	21
1.2.8 Log alarm .....	22
1.2.9 Show Logs .....	23
1.2.9.1 Control "Trend Control" .....	23
1.2.9.2 Control "Alarm Control" .....	24
1.2.10 Available System Functions .....	25
1.2.11 Scripts .....	25
1.2.12 Timestamp "pk_TimeStamp" Conversion .....	26
1.3 Components Used .....	27
<b>2 Engineering</b> .....	<b>29</b>
2.1 Project Engineering / Configuration .....	29
2.1.1 Configuring Runtime Settings .....	29
2.1.1.1 Enabling Logging Languages .....	29
2.1.1.2 Configuring a Database Type .....	31
2.1.1.3 Configuring Storage Locations for the Main Databases .....	32
2.1.2 Configuring Log Settings with "WinCC Unified Configuration" .....	36
2.1.3 Creating a Log .....	40
2.1.3.1 Configuring a Tag Log .....	40
2.1.3.2 Configuring an Alarm Log .....	43
2.1.3.3 Configuring a Log Backup .....	46
2.1.3.4 Integrating a Log Backup .....	47
2.1.4 Configuring a Log Tag/Alarm .....	49
2.1.4.1 Configuring a Log Tag .....	49
2.1.4.2 Configuring a Log Alarm .....	53
2.1.5 Displaying a Log in Runtime .....	55
2.1.5.1 Displaying a Tag Log .....	55
2.1.5.2 Displaying the Alarm Log .....	59
2.1.6 Exporting a Log as a *.csv File .....	64
2.1.6.1 Using Code Snippets .....	64
2.1.6.2 Automatic Export .....	68
2.1.6.3 Convert a Timestamp in Excel .....	70
2.2 Operation .....	73
2.2.1 Displaying/Analyzing Log Tags in Trend Control .....	73
2.2.2 Loading/Filtering Log Alarms in Alarm Display .....	75
2.3 Troubleshooting .....	77

2.3.1	Using RTIL Trace Viewer .....	77
2.3.2	Check necessary Permissions for the Log Directory.....	79
<b>3</b>	<b>Useful Information .....</b>	<b>82</b>
3.1	Fundamentals .....	82
3.1.1	Licensing.....	82
3.1.2	Log/Log Segment Size .....	83
	3.1.2.1 Overview .....	83
	3.1.2.2 Tag logging.....	84
	3.1.2.3 Alarm Logging .....	85
3.1.3	SQLite vs. Microsoft SQL Server.....	87
3.1.4	Performance Features .....	87
3.2	Tips & Tricks for Log Configuration .....	88
3.2.1	General .....	88
3.2.2	Configuration .....	89
3.2.3	Log/Log Segment Size .....	89
3.3	Access via "DB Browser for SQLite" .....	90
3.3.1	Overview .....	90
3.3.2	Download.....	90
3.3.3	Log Access .....	91
3.3.4	SQL Queries and Export of a *.csv File.....	95
3.3.5	Examples of SQL Queries .....	97
	3.3.5.1 SQL Query for Joining Tables "LoggedProcessValue" and "LoggingTag".....	97
	3.3.5.2 SQL Query to Display Readable Timestamp and Quality Code .....	99
3.4	Access via the "Microsoft SQL Server Management Studio" .....	101
3.4.1	Overview.....	101
3.4.2	Download.....	101
3.4.3	Log Access .....	102
<b>4</b>	<b>Appendix.....</b>	<b>103</b>
4.1	Service and support.....	103
4.2	Industry Mall .....	104
4.3	Links and literature .....	105
4.4	Change documentation .....	106



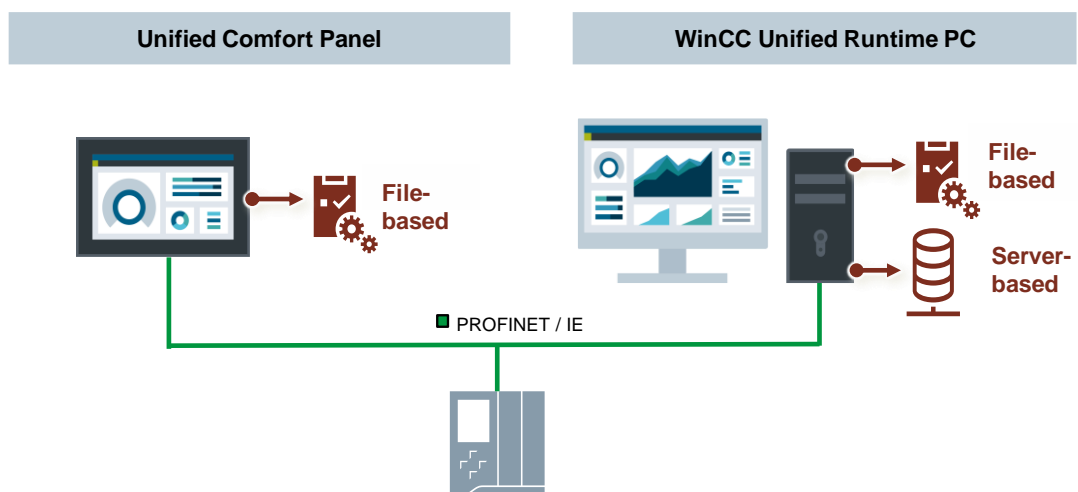
# 1 Introduction

## 1.1 Overview

SIMATIC WinCC Unified is the new visualization system with which you can successfully master the challenges of digitalization in machine and system engineering. State-of-the-art hardware and software technologies make this possible now and in the future. Tried and tested engineering in the TIA Portal, the latest web technology, and high performance reserves for the coming year combine with the freedom to implement your ideas how you want.

The SIMATIC WinCC Unified System offers the possibility to log tags and alarms in a file-based or server-based manner.

Figure 1-1



This application example shows you how logging works in WinCC Unified, when to use which type of logging, and how to configure the necessary settings.

### File-based logging

File-based logging is limited in performance and is generally used for logging small amounts of data over defined periods of time.

### Server-based logging

Server-based logging takes place in a high-performance database log and is used at the SCADA level to store and analyze a large number of tags and alarms über einen längeren Zeitraum .

This enables data logging in accordance with industrial requirements or legal specifications (e.g., for 10 years).

#### Note

For server-based logging, the fee-based SCADA option "WinCC Unified Database Option" with an associated license is required on the Unified Runtime server.

After installation, file-based logging is no longer possible.

## 1.2 Principle of Operation

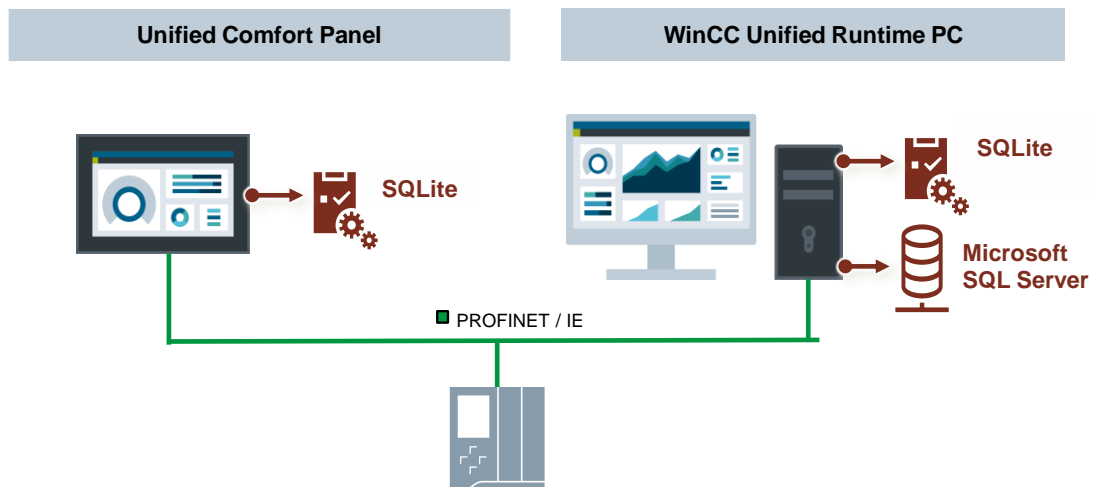
### 1.2.1 Available Database Types

#### 1.2.1.1 Overview

The logs are saved in log databases. The database types "SQLite" and "Microsoft SQL Server" are available for this:

- File-based: SQLite
- Server-based: Microsoft SQL Server

Figure 1-2



SQLite is for logging smaller amounts of data in the machine-oriented field. Microsoft SQL Server is used for logging and processing large amounts of data.

There are differences between the two database types in the availability for different WinCC Unified systems, number of possible logging tags, performance, and access possibilities.

#### 1.2.1.2 Database Types in the WinCC Unified System

##### Unified Comfort Panel

- Database types: SQLite (\*.db3 - SQLite Database)
- Max. number of logging tags: Max. 5000 logging tags (no license required)

##### WinCC Unified Runtime PC

- Database types: SQLite (\*.db3 - SQLite Database)  
Microsoft SQL Server (\*.mdf -SQL Server Database)
- Max. number of logging tags: Scalable up to max. number of PowerTags via the "WinCC Unified Logging Tags" license  
Additional license for MS SQL Server required

### 1.2.2 Log Types

#### 1.2.2.1 Overview

Logs are used to store and log process data and alarms.  
There are two types of logs:

- Tag Log  
Logging of process data according to defined triggers with a timestamp
- Alarm Log  
Logging of alarms according to alarm class and alarm status with a timestamp

#### Note

##### Availability of logs

Logs should also be saved when Runtime is terminated and the device is switched off (e.g., manually or via a script).

You can export logs to a storage device and, therefore, transfer them to a device of your choice. This means that they can still be read even in the event of a device failure.

#### 1.2.2.2 Tag Log

In a tag log, historical data records of log tags are stored, depending on the trigger set. A data record includes the following data:

- Name of the log tag
- Tag value at trigger time
- Timestamp of trigger time

Display a tag log via the "Trend control" Control in Runtime.

#### 1.2.2.3 Alarm Log

In an alarm log, historical data records of log alarms are stored based on the trigger set. A data record includes the following data:

- Message number
- Alarm class
- Message status
- Message text at trigger time
- Timestamp of trigger time

You can display an alarm log via the "Message display" Control in Runtime.

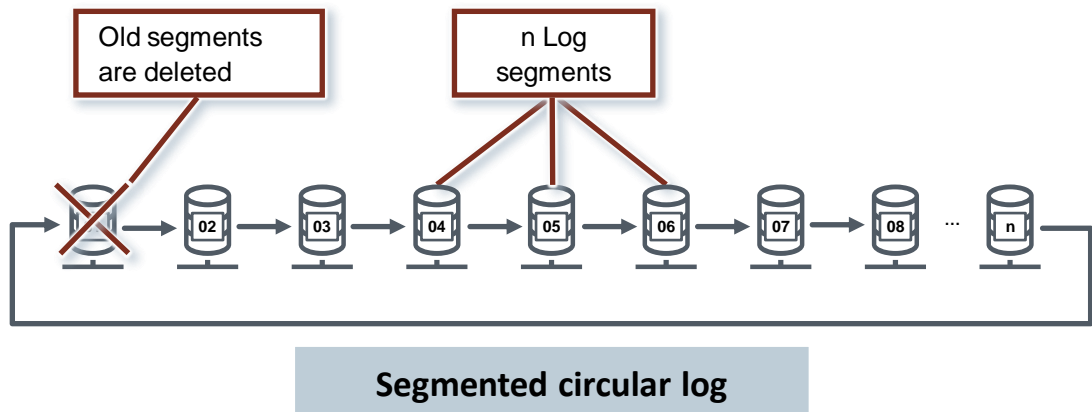
### Multilingual logged alarm texts

You can log the alarm texts for a log alarm in several languages.

By default, the WinCC Unified System logs only one language (start language) to save memory space. Enable the language under "Runtime Settings > Language & Font".

## 1.2.2.4 Log Properties

Figure 1-3



A tag/alarm log consists of several log segments described one after the other. If the segment size or segment time period is reached, the system writes to the next log segment. When the last segment of the log is reached, the 1st segment is deleted and rewritten.

In the log properties, you can define the parameters for the log, the log segment, and for the backup.

### Log parameter

You can define the following parameters:

- Name (must be unique throughout the project)
- Storage device/directory (see Section [1.2.3](#))  
→ may differ from storage device/directory main databases
- Time period log
- Maximum log size (MB) (depending on storage device)

### Log segment parameter

You can define the following parameters:

- Time period of individual segment
- Maximum segment size (MB) (depending on storage device)
- Start time segment

### Backup parameter

With the database type "Microsoft SQL Server", you have the possibility to activate an automatic backup of the database.

You can define the following parameters:

- Backup mode:
  - No backup: Backup disabled
  - Path: Backup enabled
- Path: Directory for backup

### Log/segment sizes

Hints for estimating log/segment sizes can be found in Section [3.1.2](#).



### 1.2.3 Log Storage Device/Directory

In the Runtime settings of the Operator Panel configuration, the storage location for the main database of the tag and alarm logs can be defined. You can define the storage locations for the individual databases of the tag and alarm logs via the associated log settings.

Depending on the WinCC Unified System, you can select different storage devices for the individual databases.

#### Unified Comfort Panel

The following storage devices/directories can be selected for the Unified Comfort Panel:

- Off: Logging disabled
- SD-X51: SD card inserted in SD card slot DATA "X51"
  - Folder: Storage directory on storage device
- USB-X61: USB storage device connected to USB interface "X61"
  - Folder: Storage directory on storage device
- USB-X62: USB storage device connected to USB interface "X62"
  - Folder: Storage directory on storage device

**Note**

**SIMATIC HMI SD card for logging**

For logging, it is recommended to use a SIMATIC HMI SD Card with  $\geq 2$ GB. This is designed for the logging cycles of WinCC Unified and features zero voltage protection in the event of a power failure.

#### WinCC Unified Runtime PC

The following storage devices/directories can be selected for the WinCC Unified Runtime PC:

- Off: Logging disabled
- Local: Locally defined storage device
  - Folder: Storage directory on storage device
- Default: Directory defined via WinCC Unified Configuration Manager
- Project folder: Storage location of the Runtime project

**Note**

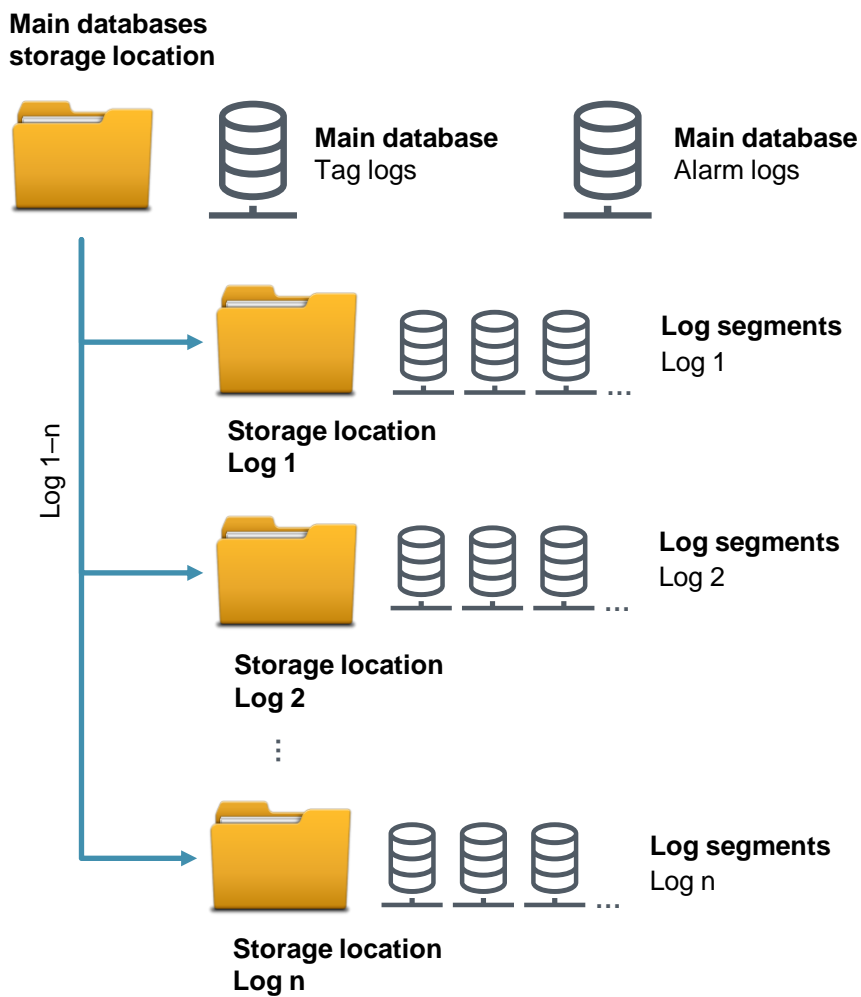
**Storage location of the Runtime project**

The Runtime project is stored in the directory "C:\ProgramData\SCADAProjects".

The "ProgramData" directory is hidden by default. You can display this permanently via the menu "View > Hidden items" in the File Explorer.

## 1.2.4 Storage Structure of Logs

Figure 1-4



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### Structure

The structure of the WinCC Unified Log consists of the two main databases for tag and alarm logs as well as the individual, configured logs consisting of the log segments.

### Main databases

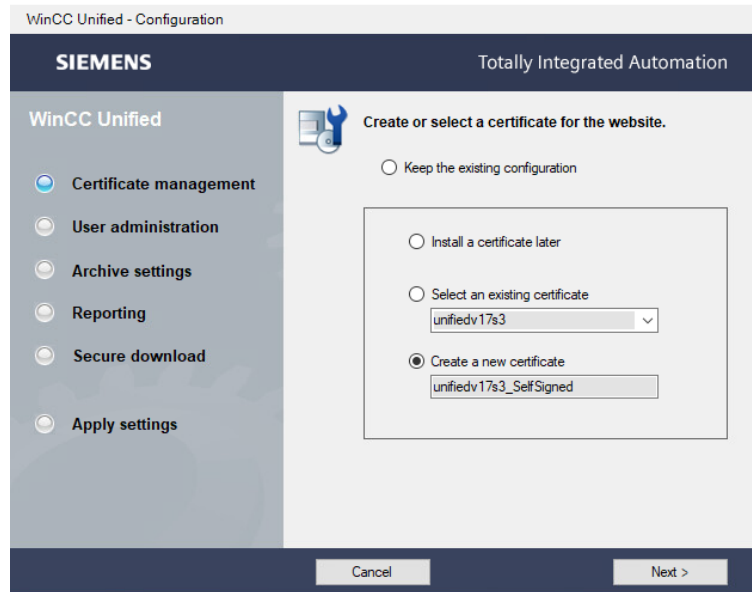
The main databases contain the configuration data for all created tag/alarm logs. The storage location for the main databases is defined in the Runtime settings of the Operator Panel configuration.

### Logs/log segments

A log contains the actual log data and consists of several segments. You can define the number and size of a log/segment via the configuration of the respective log/segment.

### 1.2.5 Tool "WinCC Unified Configuration"

Figure 1-5



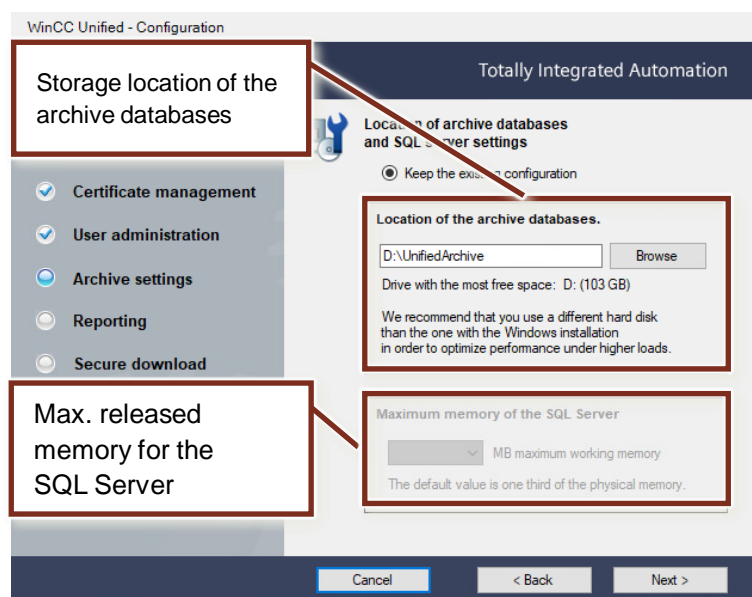
The "WinCC Unified Configuration" tool is used to parameterize central properties of the WinCC Unified Runtime Simulation/PC. You can configure settings for the following subjects:

- Certificate management
- User Administration
- Log Settings
- Secure download

The tool appears at the beginning of the installation of WinCC Unified Runtime Simulation/PC. It can be opened and run at any time after installation.

### Log Settings

Figure 1-6



## 1.2.6 Interaction Between Runtime Settings & WinCC Unified Configuration

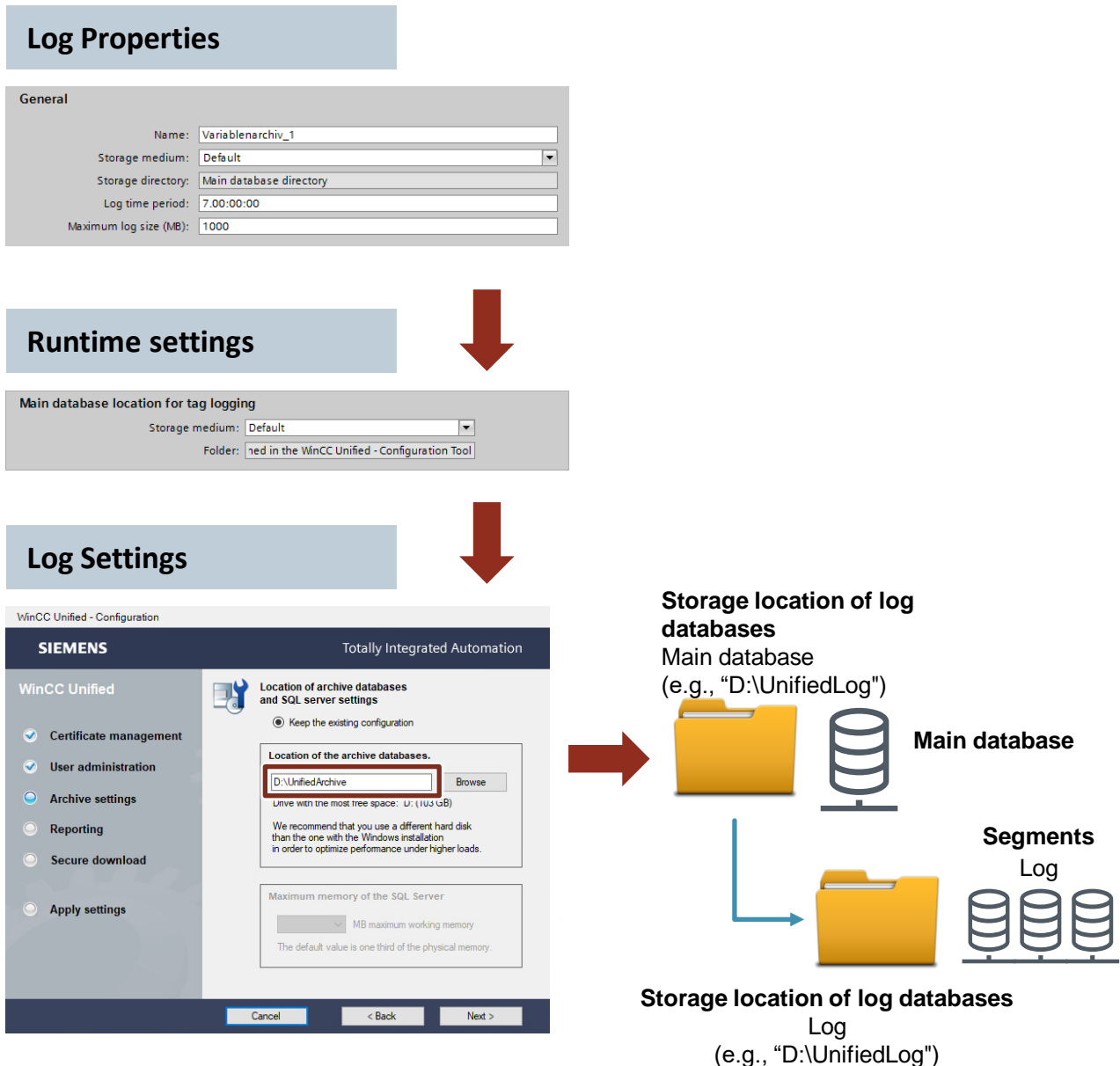
Via the tool "WinCC Unified Configuration" and the Runtime settings during configuration, you can define the storage directories for the main databases of the logs and the log databases of the WinCC Unified Runtime Simulation/PC.

Depending on the settings, the main databases and the log databases are stored in different storage locations. The different possibilities are listed below.

### Option 1

- Storage device log: Standard
- Storage directory: Main database directory
- Main database storage device: Standard
- Folder: Storage for the log databases as defined in the WinCC Unified Configuration Manager

Figure 1-7

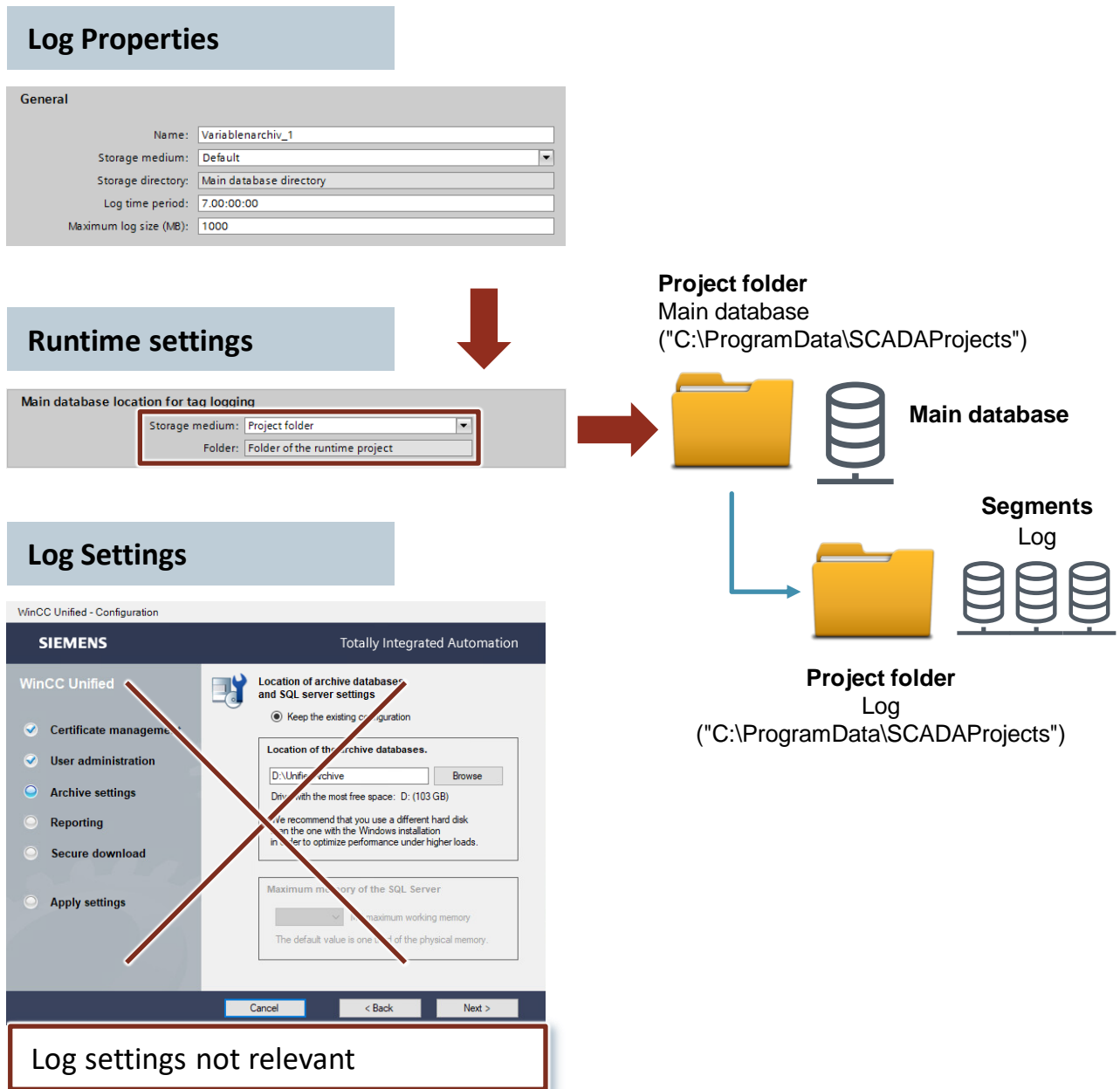


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**Option 2**

- Storage device log: Standard
- Storage directory: Main database directory
- Main database storage device: Project folder
- Project folder: "C:\ProgramData\SCADAProjects"

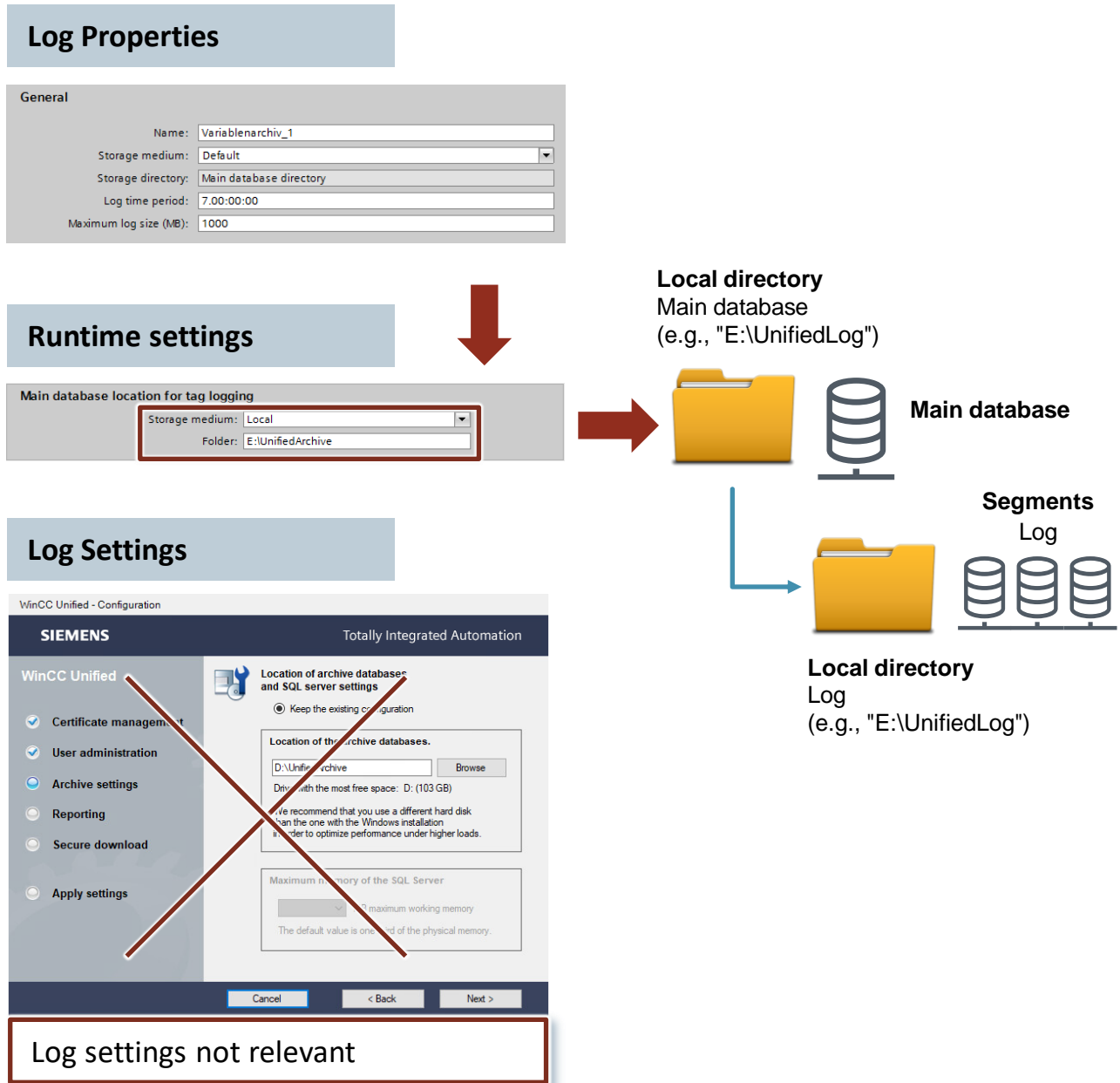
Figure 1-8



**Option 3**

- Storage device log: Standard
  - Storage directory: Main database directory
- Main database storage device: Local
  - Folder: Local directory (e.g., "E:\UnifiedLog")

Figure 1-9

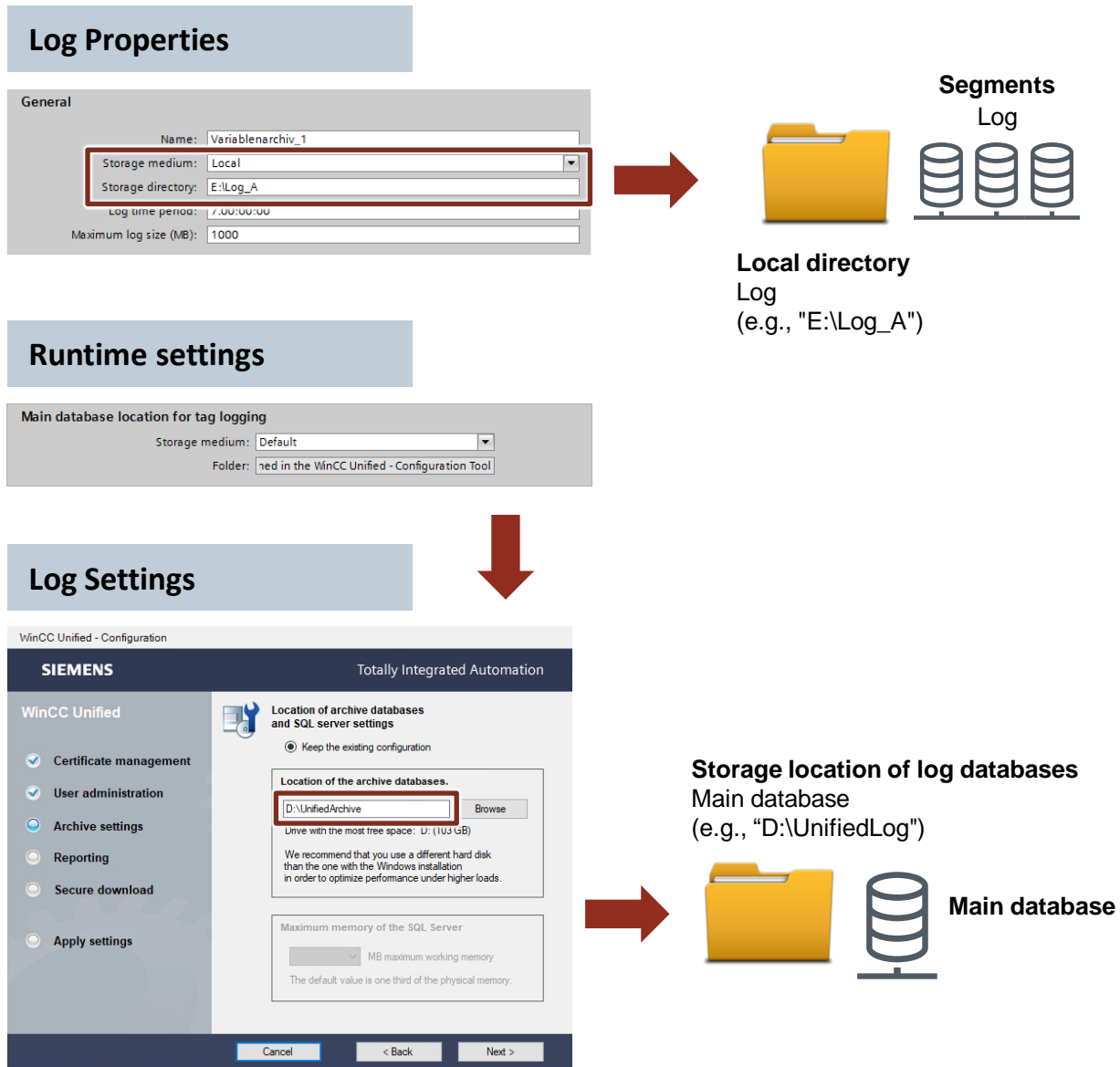




**Option 4**

- Log storage device: Local
  - Storage directory: Local directory (e.g., "E:\Log\_A")
- Main database storage device: Standard
  - Folder: Storage for the log databases as defined in the WinCC Unified Configuration Manager

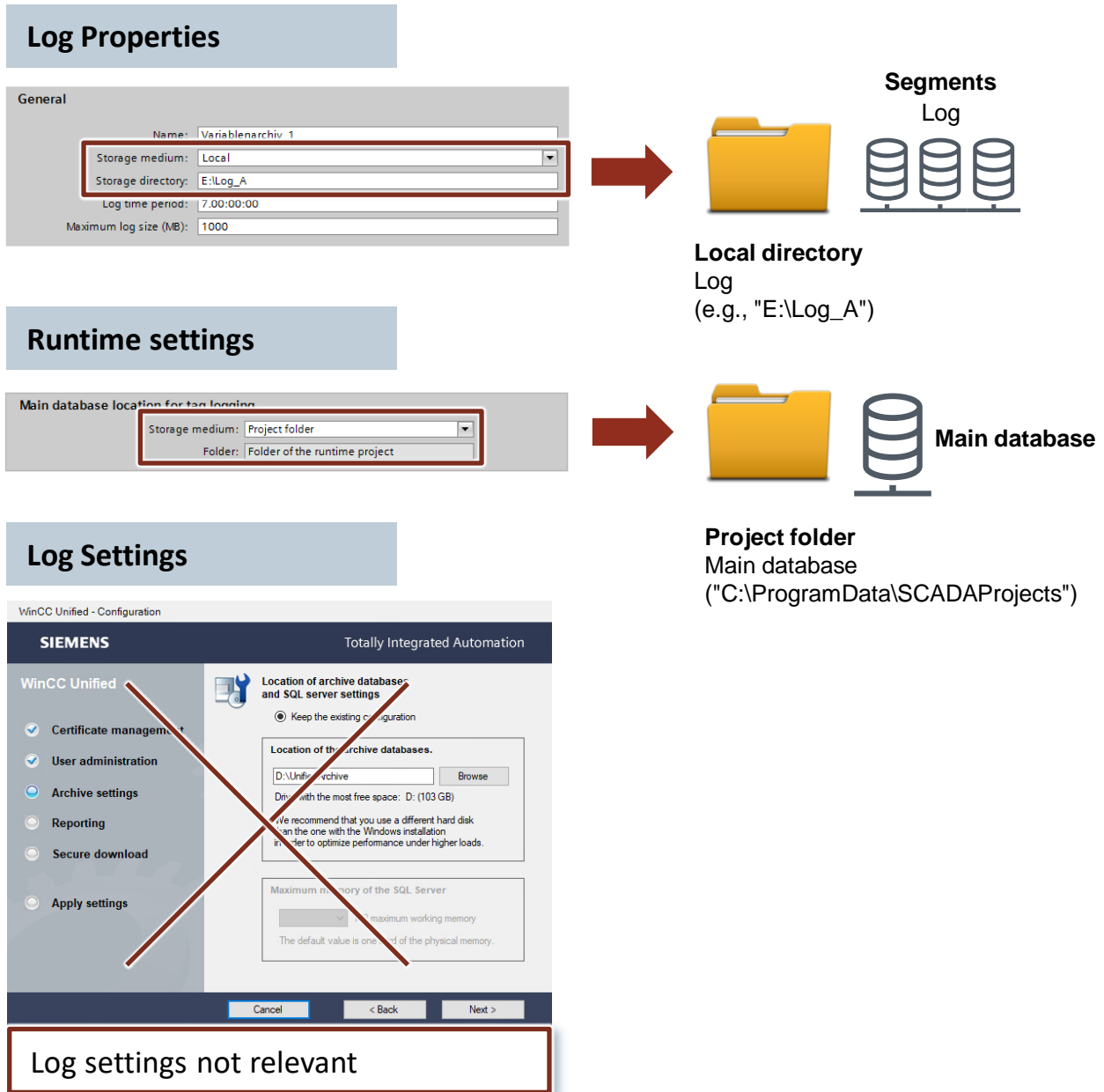
Figure 1-10



**Option 5**

- Log storage device:
  - Storage directory: Local
  - Project folder: Local directory (e.g., "E:\Log\_A")
- Main database storage device:
  - Project folder: Project folder
  - Storage directory: "C:\ProgramData\SCADAProjects"

Figure 1-11

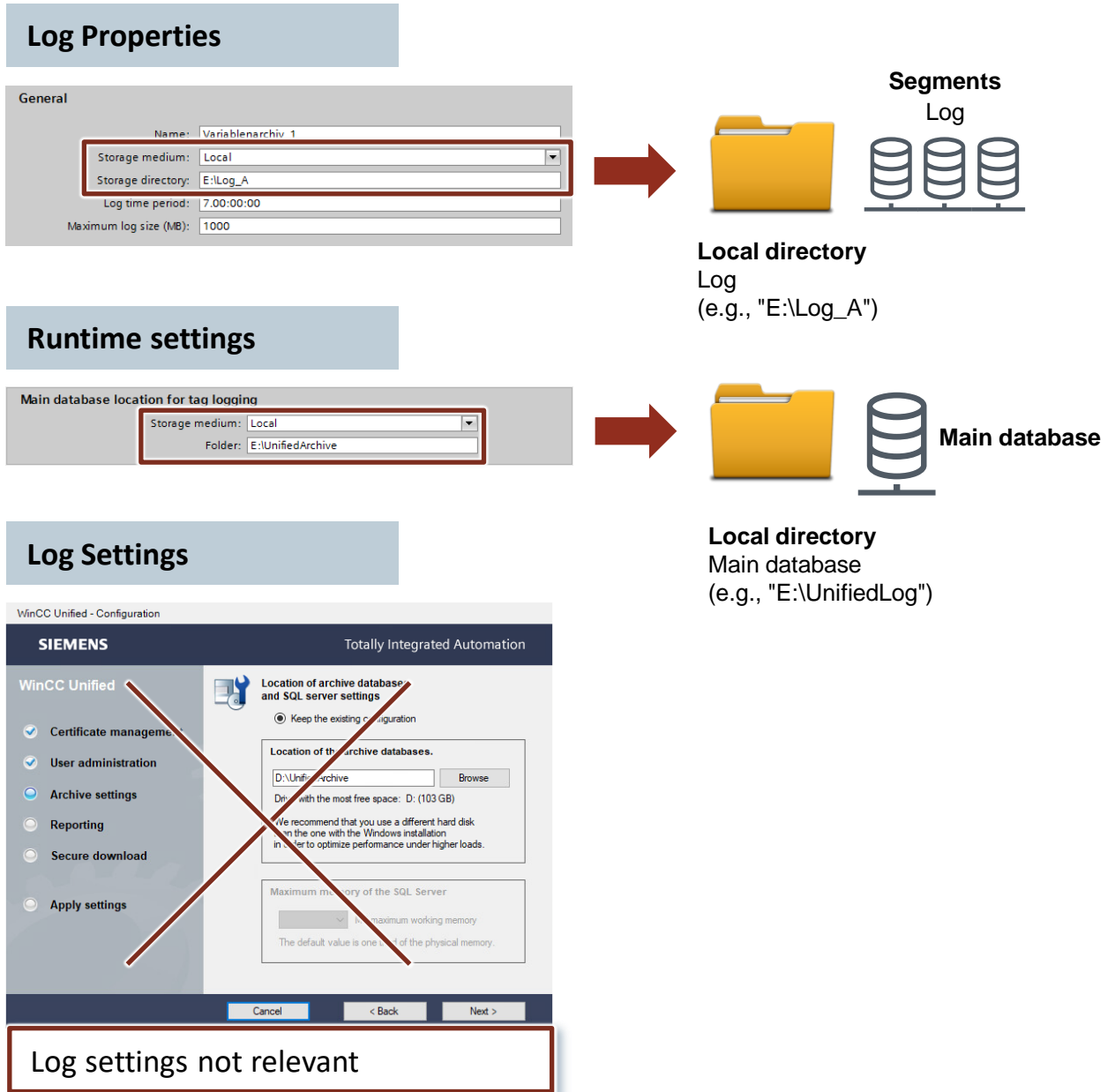


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**Option 6**

- Log storage device: Local
  - Storage directory: Local directory (e.g., "E:\Log\_A")
- Main database storage device: Local
  - Project folder: Local directory (e.g., "E:\UnifiedLog")

Figure 1-12



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## 1.2.7 Log Tag

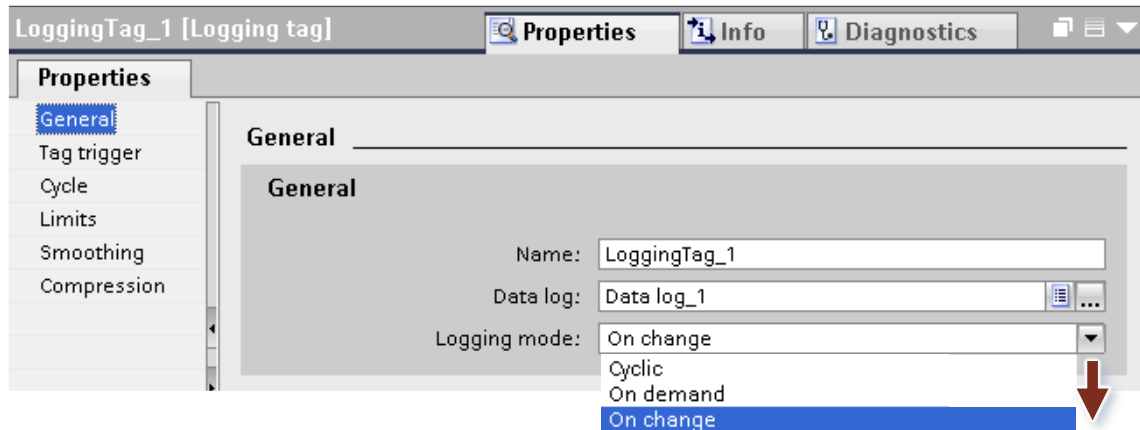
A log tag is created via the editor "HMI tags > Log tag".

### 1.2.7.1 Properties

#### General

In the general properties of the log tag, you can specify the name, tag log, and logging mode of the log tag.

Figure 1-13

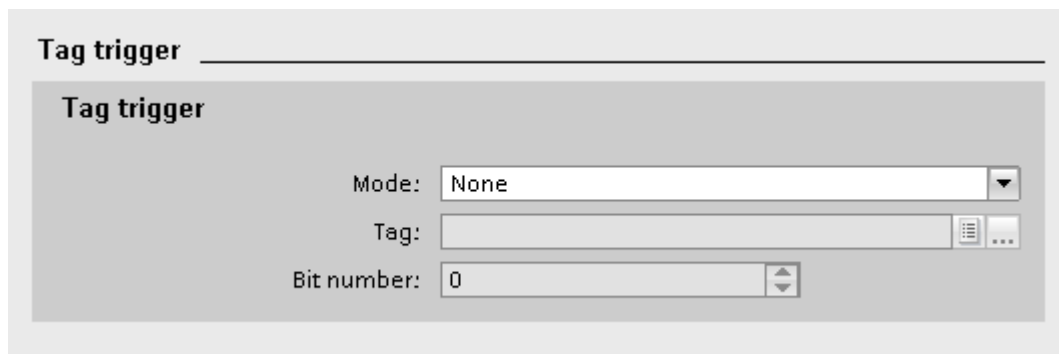


The following logging modes are available for a log tag:

- Name: Name of the log tag
- Tag log: Tag log of the log tag
- Logging mode: Logging mode of the log tag
  - Cyclic
  - On change
  - On demand

#### Tag trigger

Figure 1-14



The tag trigger is required for the logging modes "On demand" and "On change". You use it to specify when the value of the tag is logged (HMI trigger tag and mode).

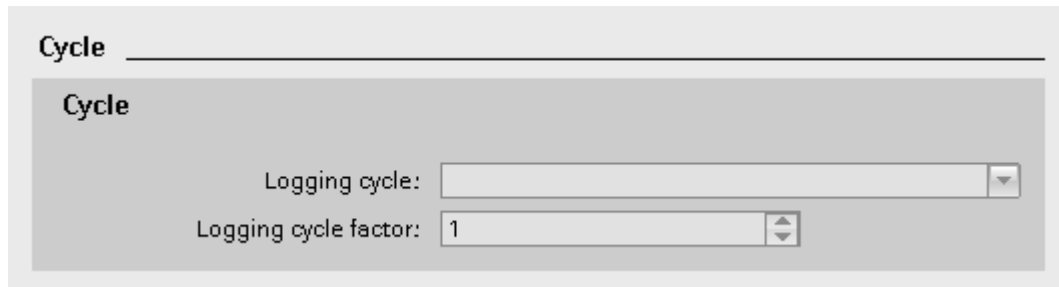
You can configure the following modes:

- None
- Rising edge
- Falling edge
- Rising and falling edge

## Cycle

You need to specify a logging cycle for the "Cyclical" logging mode. Runtime logs the tag values depending on the defined logging cycle.

Figure 1-15



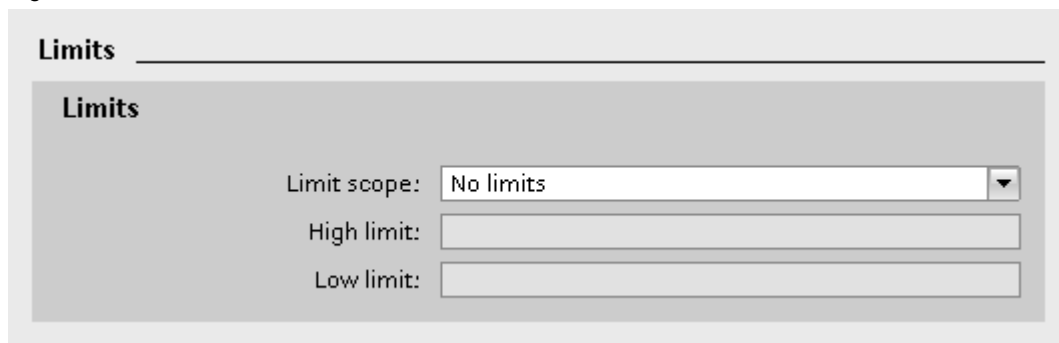
This can be set as desired. The shortest possible cycle is 100ms.

In the project navigation, you will find the predefined cycles in the "Cycles" editor. With the editor, it is also possible to define your own cycles.

## Limit values

Define threshold values and conditions when you want to log/not log values.

Figure 1-16



The following options are available:

- Limit range
  - No bounds
  - Higher
  - Lower
  - Higher or equal to
  - Lower or equal to
  - Within the limits
  - Within or equal to
  - Out of limits
  - Outside or equal to
- Upper control limit
- Lower control limit
- Use tag limits

## Smoothing

Figure 1-17

There are different types of smoothing. Regardless of the type, the aim is to compress the data volume of the logged data and thus to reduce the storage space. Process values are thereby logged only in accordance with certain pre-defined criteria.

The following smoothing modes are available:

- No smoothing
- Compare values
- Value
- Relative value
- Swinging door

### "Swinging door" example

Values are evaluated based on the defined rate of change and only logged when the subsequent value falls outside the calculated range.

## Compression

Figure 1-18

Summarization is only possible in the logging mode "Cyclical". The system combines data points with the same values.



1.2.7.2 Logging Modes

**Project planning possibilities**

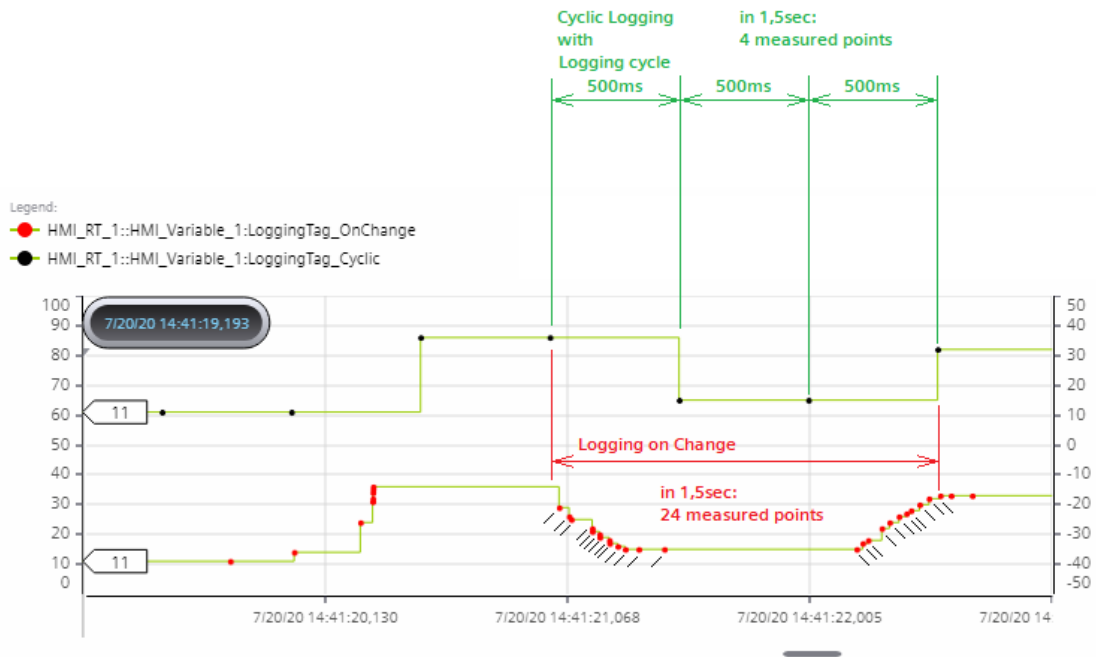
The table shows the different configuration possibilities as a function of logging mode. For example, compression is only possible with "Cyclic".

Table 1-1

Logging mode	Cyclic	On demand	On change (default)
Tag trigger	-	None, rising edge, falling edge or both from a trigger tag	Possible
Cycle	OK (e.g., 1s)	-	-
Limit values	OK	OK	OK
Smoothing	OK	OK	OK
Compression	OK	-	-

**"Cyclic" vs. "On change"**

Figure 1-19



In the example, the HMI tag "HMI\_Tag\_1" is logged with the trigger "Cyclic" as well as with the trigger "On change".

The comparison between the measured values shows that with the trigger "On change", all changes are logged (24 measurement points in 1.5s). However, important information is lost with a "Cyclic" trigger (4 measurement points in 1.5s with one cycle = 500ms).

Therefore, you should consider how detailed you want to log in order not to lose any information and not to let the logs become unnecessarily large.

### 1.2.8 Log alarm

Figure 1-20

Name	State machine	Priority	Log	Backgro...	Text col...	Backgro...	Text col...	Backgro...
SystemAlarmWithoutCle...	Alarm without outgoing ...	12		255...	255...	255...	255...	255...
SystemNotification	Alarm without acknowle...	4		173...	0, 0...	173...	0, 0...	173...
SystemInformation	Alarm without outgoing ...	1		220...	0, 0...	220...	0, 0...	220...
SystemWarningWithoutC...	Alarm without outgoing ...	8		255...	0, 0...	255...	0, 0...	255...
SystemAlarm	Alarm with single-mode ...	12		255...	255...	255...	255...	255...
SystemWarning	Alarm with single-mode ...	8		255...	0, 0...	255...	0, 0...	255...
Information	Alarm without outgoing ...	1		220...	0, 0...	220...	0, 0...	220...
Alarm	Alarm with single-mode ...	12	Alarm log_1	...	...	...	...	...
Notification	Alarm without acknowle...	4		173...	0, 0...	173...	0, 0...	173...
WarningWithReset	Alarm with acknowledg...	8		255...	0, 0...	255...	0, 0...	255...
Warning	Alarm with single-mode ...	8		255...	0, 0...	255...	0, 0...	255...
AlarmWithReset	Alarm with acknowledg...	12		255...	255...	255...	255...	255...
CriticalWithReset	Alarm with acknowledg...	16		139...	255...	139...	255...	139...

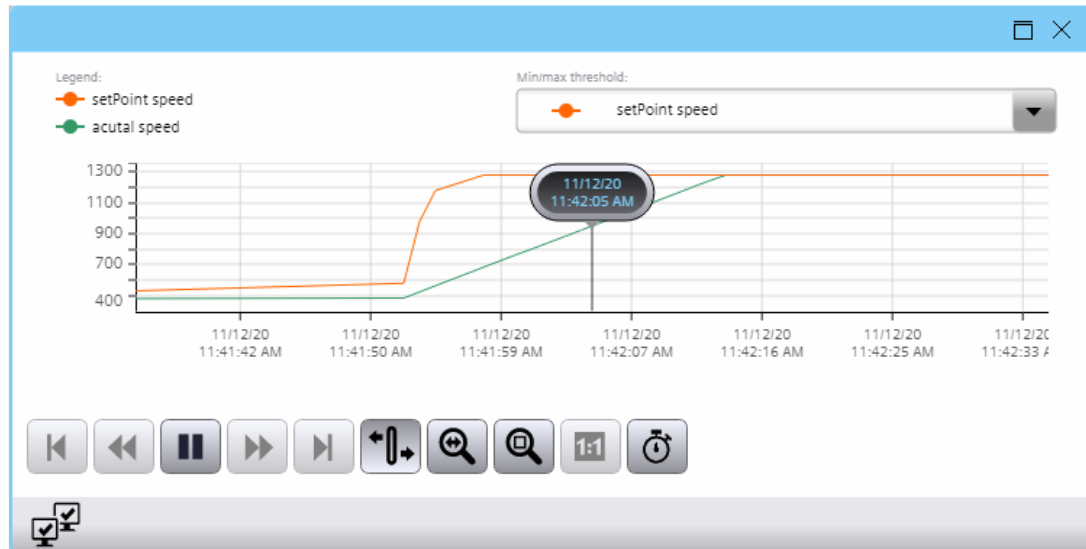
You can configure a log alarm by assigning a configured alarm log to the alarm class of the alarm. If an alarm of this alarm class occurs, the alarm is stored in the assigned alarm log.

You can define the languages in which a log alarm is logged using the Runtime settings (Section [2.1.1.1](#)).

## 1.2.9 Show Logs

### 1.2.9.1 Control "Trend Control"

Figure 1-21



The "Trend Control" is used to visually display a value progression over time. It can be found in the task card "Tools" ("Tool").

These value sequences can be actual values of process tags. However, log values can also be displayed.

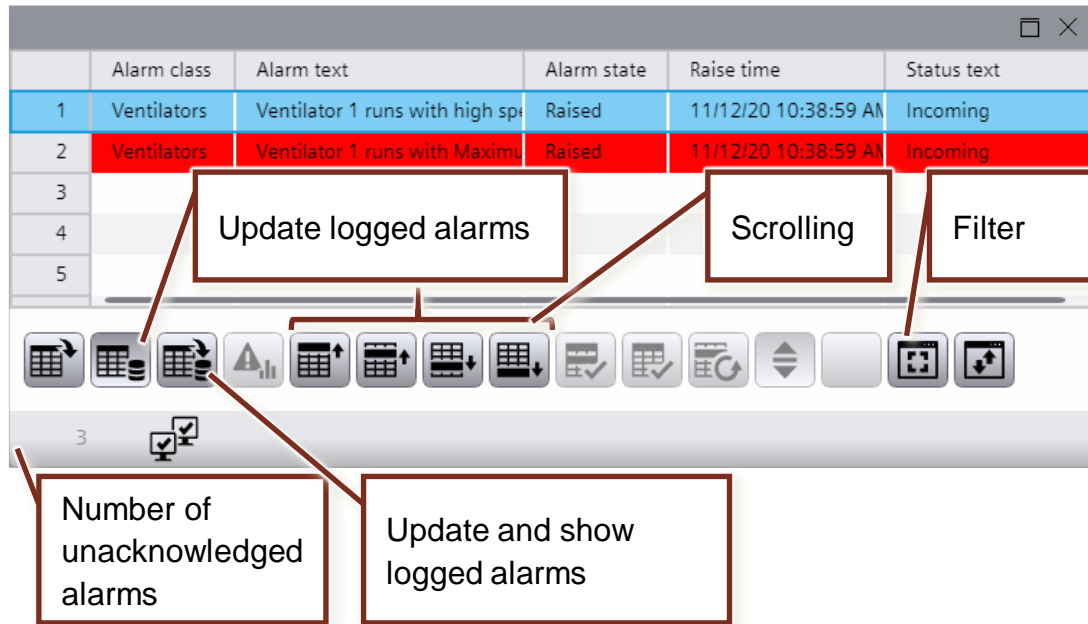
Several trends can be displayed within one Trend Control. It is also possible to divide a Trend Control into several Trend areas. Multiple trends can be displayed in a Trend area as well. The time range of the displayed trend is adjustable.

If actual values are displayed in the Trend Control, the Trend Control is initially empty when the screen is called up. If log tags are displayed, the values are read from the log and then displayed.

The process for configuring the Trend Control can be found in Section [2.1.5.1, Displaying a Tag Log](#).

1.2.9.2 Control "Alarm Control"

Figure 1-22



The "Alarm Control" is used for the visual display of currently pending alarms, the alarm buffer, and log alarms. You use the properties of the Control to set which type of alarms are displayed.

**Filter**

The alarm display has an integrated filter that you can configure during engineering. Alternatively, this can also be done dynamically in runtime using the button in the menu bar of the Control.

With one filter, several filters or a combination of different filters, you can search for specific items (e.g., alarm classes and fragments in alarm texts).

**Updating the Alarm Display**

If the alarm display is used to display log alarms, these are loaded into the Control when the screen is called up.

If other alarms that are logged occur in the background, they are not automatically displayed in the alarm display.

You can update the alarm display using the menu button "Update and display logged alarms" or by calling up the screen again.

The process for configuring the alarm display can be found in Section [2.1.5.2, Displaying the Alarm Log](#).

## 1.2.10 Available System Functions

WinCC Unified provides various system functions for logging, such as deleting logs and writing to logs manually.

- "ClearAlarmLog"
  - Parameter: "Log name"
  - Function: Deletes the alarm log that was passed via the parameter
- "ClearTagLog"
  - Parameter: "Log name"
  - Function: Deletes the tag log that was passed via the parameter
- "WriteManualValue"
  - Parameters: Name of log tag, value, timestamp ("Logging tag name", "Value", "TimeStamp")
  - Function: Writes a log entry for the passed log tag with the specified value and timestamp

You can execute system functions via trigger events of objects or via tasks in the task scheduler.

## 1.2.11 Scripts

If the functionality of a system function is not sufficient for you, you can write a script in the script language "JavaScript" (JS). You can execute JS scripts via trigger events of objects or via tasks in the task scheduler.

The WinCC Unified System provides various code snippets for different logging functions. Code snippets are predefined code modules that you need to customize to fit your needs. These are intended to assist you in creating your own scripts.

### Tag logging

The following code snippets are available for tag logging:

- Read log
  - Function: Read tag log
- Export tag log as CSV
  - Function: Export tag log as \*.csv file
- Add Comment to log tag
  - Function: Add log tags comment
- Correct logged tag values
  - Function: Overwrite value for log tag

### Message logging

The following code snippets are available for alarm logging:

- Read log
  - Function: Read log alarm log
- Export alarm log as CSV
  - Function: Export alarm log as \*.csv file

## 1.2.12 Timestamp "pk\_TimeStamp" Conversion

### Note

The shown conversion of the timestamp is valid for \*.csv files, which were exported from a log file with the help of the SQLite Browser (Section [3.3.4](#)).

The timestamp "pk\_TimeStamp" of a log tag or a log alarm is not stored in a log as "date & time" format, but as a decimal value (INT8) based on 100ns. The start date for the calculation is 01 January 1601.

### Conversion formulas

To convert the timestamp to a visually readable "date & time" format, proceed as follows:

$$pk\_TimeStamp_{d,since\ 01.01.1601} = \frac{pk\_TimeStamp * 100ns}{10000000 \frac{100ns}{s} * 60 \frac{s}{min} * 60 \frac{min}{h} * 24 \frac{h}{d}} = \frac{pk\_TimeStamp}{8.64 * 10^{11}} d$$

Excel calculates the date and time back to 31 December 1899. Therefore, the number of days from 01 January 1601 to 31 December 1899 must always be taken into account when converting in Excel and subtracted from the value.

$$DayDiff_{d, 01.01.1601-31.12.1899} = 109205d$$

$$pk\_TimeStamp_{d,from\ 31.12.1899} = \frac{pk\_TimeStamp}{8.64 * 10^{11}} d - DayDiff_{d, 01.01.1601-31.12.1899}$$

The integer value of the timestamp reflects the number of days, the comma value reflects the time. With the format function, these values can be converted into a date and time.

### Example

$$pk_{TimeStamp} = 1.32606 * 10^{17} * 100ns$$

$$pk\_TimeStamp_{d,from\ 31.12.1899} = \frac{1.32606 * 10^{17} * 100ns}{8.64 * 10^{11}} d - 109205 = 44274.56685d$$

This results in the following values:

$$Date = Date(44274d) = 19.03.2021$$

$$Time = Time(0.56685d) = 13:36:16$$

The process for configuring the conversion in Excel is described in the Section [2.1.6.3 Convert a Timestamp in Excel](#).



## 1.3 Components Used

The following hardware and software components were used to create this application example:

Table 1-2

Components	Quantity	Article number	Note
STEP 7 Professional V17 (Optional)	1	SIOS Download (Download) 6ES7822-1AA07-0YA7 (Package)	<b>Optional</b> Download the trial software under the entry ID <a href="#">109784440</a>
SIMATIC WinCC Unified Engineering V17	1	SIOS Download (Download) 6AV2102-0AA07-0AA7 (Package)	Download the trial software under the entry ID <a href="#">109784440</a>
MTP700 Unified Comfort	1	6AV2128-3GB06-0AX0	You can also use other sizes of the Unified Comfort Panel.
WinCC Unified PC Runtime V17	1	SIOS Download (Download)	Download the software under the entry ID <a href="#">109793105</a>
SIMATIC WinCC Unified V17 Database Storage	1	6AV2154-0BS01-7LA0 (Download) 6AV2154-0BS01-7AA0 (Package)	DVD and license for WinCC Unified Database Storage <b>Note</b> Only necessary for database logging with SQL Server
SIMATIC STEP 7 Professional V17 Floating license	1	6ES7822-1AE07-0YA5 (Download) 6ES7822-1AA07-0YA5 (Package)	<b>Optional</b> License for STEP 7 Professional V17
WinCC Unified PC (10k) ES V17	1	6AV2153-2FB01-7LA5 (Download) 6AV2153-2FB01-7AA5 (Package)	License for WinCC Unified Engineering, 10,000 PowerTags <b>Note</b> You can also use a broader engineering license for WinCC Unified.
WinCC Unified PC (150) RT V17	1	6AV2154-3DB01-7LA0 (Download) 6AV2154-3DB01-7AA0 (Package)	License for WinCC Unified PC Runtime, 150 PowerTags <b>Note</b> You can also use a broad Runtime license for WinCC Unified.
WinCC Unified Logging Tags (100) V17	1	6AV2157-2DA00-0LB0 (Download) 6AV2157-2DA00-0AB0 (Package)	License for WinCC Unified Logging, 100 Logging Tags <b>Note</b> You can also use a large logging license for WinCC Unified.

The listed components can be purchased (e.g., via the [Siemens Industry Mall](#)).

This application example consists of the following components:

Table 1-3

Components	File name	Note
Documentation	109782859_WinCC_Unified_Logging.pdf	

**Note**

You can learn about the products used in this application example in the courses:

- SITRAIN system course: WinCC Unified & Unified Comfort Panels (Entry ID: [109773211](#))
- SITRAIN advanced course: SIMATIC WinCC Unified for PC systems (Entry ID: [109781323](#))
- SITRAIN entry course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced (Entry ID: [109758624](#))
- SITRAIN advanced course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced (Entry ID: [109758626](#))
- SITRAIN course: SIMATIC WinCC Professional, SCADA in the TIA Portal (Entry ID: [109758618](#))
- SITRAIN course: SIMATIC Visualization Architect, automatic HMI generation (Entry ID: [109758628](#))
- SITRAIN entry course: WinCC V7 (Entry ID: [109758633](#))
- SITRAIN advanced course: WinCC V7 and WinCC Options (Entry ID: [109758660](#))

## 2 Engineering

### 2.1 Project Engineering / Configuration

#### 2.1.1 Configuring Runtime Settings

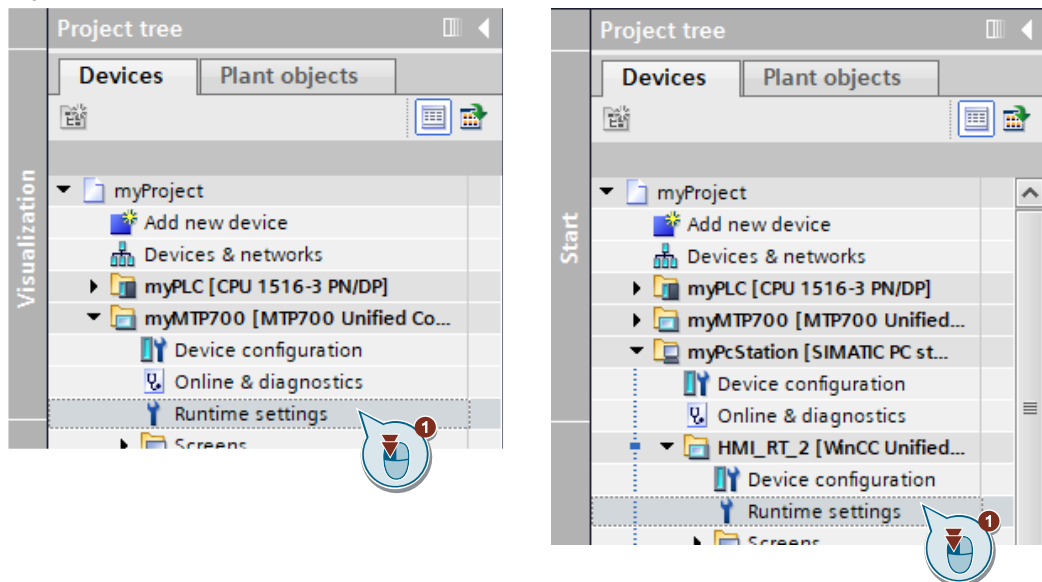
In the Runtime settings, you can define the logging languages in Runtime, as well as the storage locations of the main databases for tag and alarm logging.

##### 2.1.1.1 Enabling Logging Languages

#### Unified Comfort Panel/WinCC Unified Runtime PC

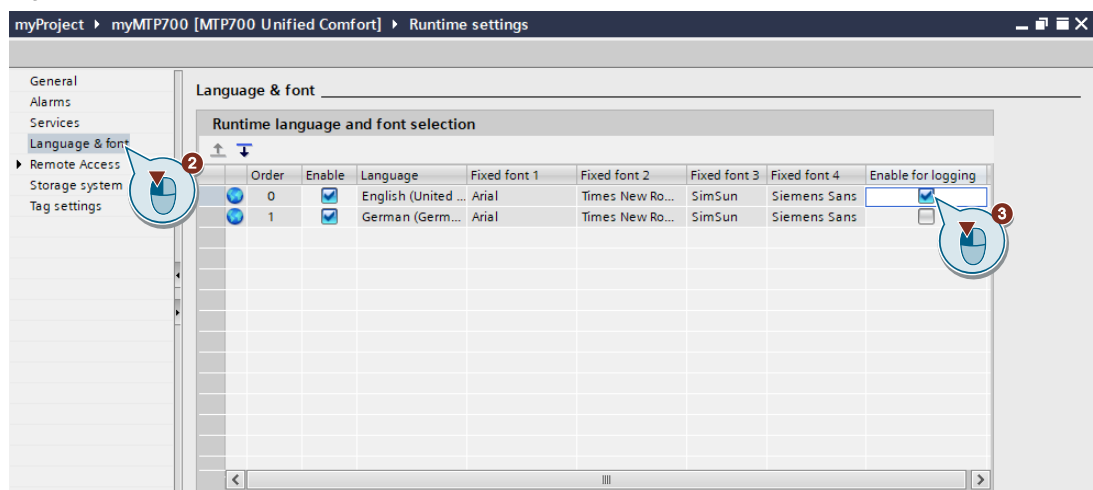
1. Open the Runtime settings of your configuration.  
("Project tree > <device name> > Runtime settings")

Figure 2-1



2. Open the settings for Language and font.  
"Runtime settings > Language & font"
3. Click the "Enable for logging" checkbox to enable the associated Runtime language for logging.

Figure 2-2



**Note****Logging in Runtime language**

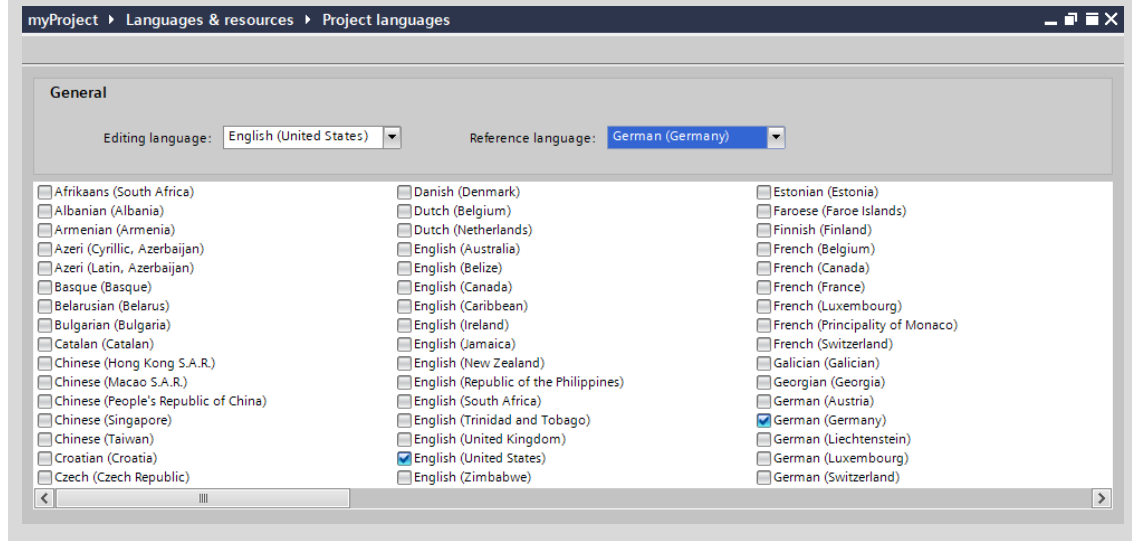
Logging in the Runtime language only takes place if this is also activated. Ensure that the "Enable" checkbox is enabled for the associated Runtime language.

**Availability Language in Runtime Settings**

If a language is missing in the "Runtime languages" table, you must first define it as the project language.

To do this, open the project language editor and add the desired language to your project ("Project Navigation > Languages & resources > Project languages").

Figure 2-3



### 2.1.1.2 Configuring a Database Type

"SQLite" and "SQL Server" are available as database types for WinCC Unified.

#### Unified Comfort Panel

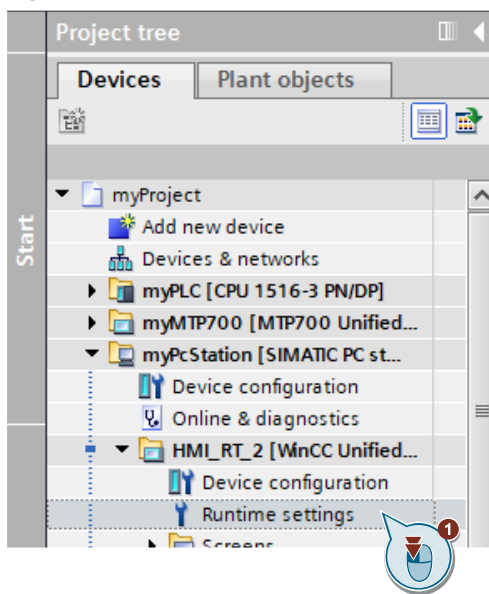
Only the database type "SQLite" is available for the Unified Comfort Panels.

No configuration is necessary because SQLite is set by default and SQL Server is not selectable.

#### WinCC Unified Runtime PC

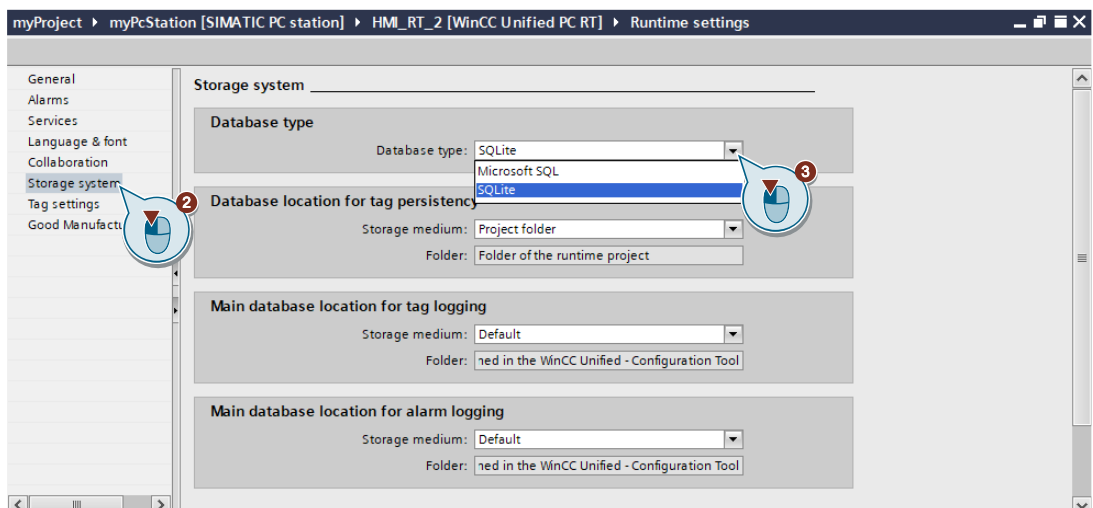
1. Open the Runtime settings of your configuration.  
("Project tree > <device name> > Runtime settings")

Figure 2-4



2. Open the settings for the storage system.  
("Runtime settings > Storage system")
3. Select the database type for the log databases.

Figure 2-5

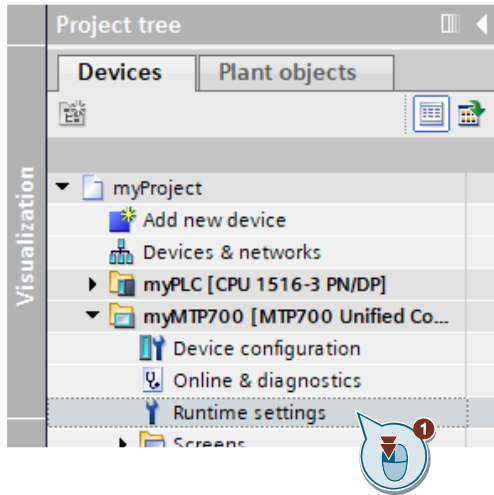


### 2.1.1.3 Configuring Storage Locations for the Main Databases

#### Unified Comfort Panel

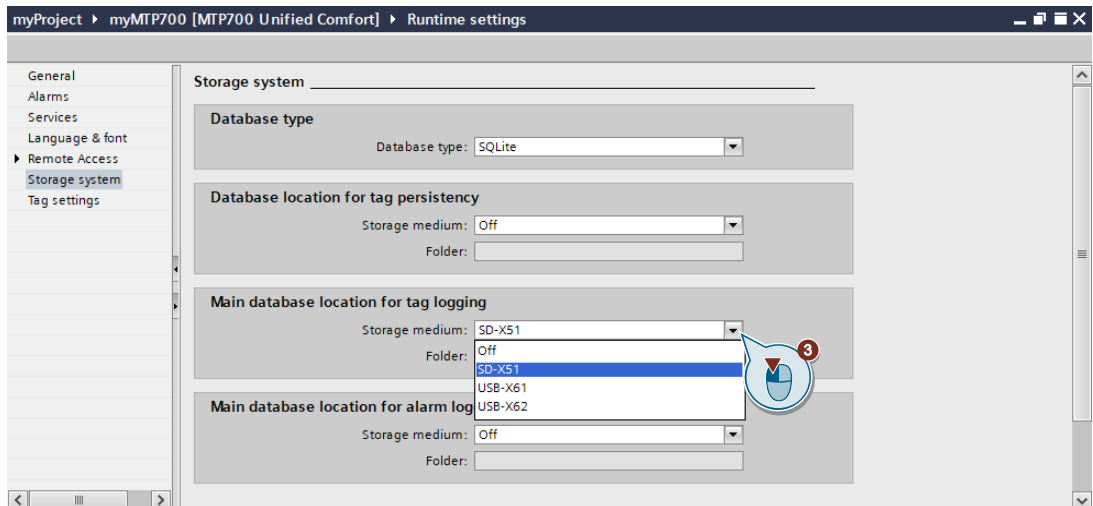
1. Open the Runtime settings of your configuration.  
("Project tree > <device name> > Runtime settings")

Figure 2-6



2. Open the settings for the storage system.  
("Runtime settings > Storage system")
3. Select the storage device for the storage location of the main database for tag logging (e.g., interface "SD-X51").

Figure 2-7

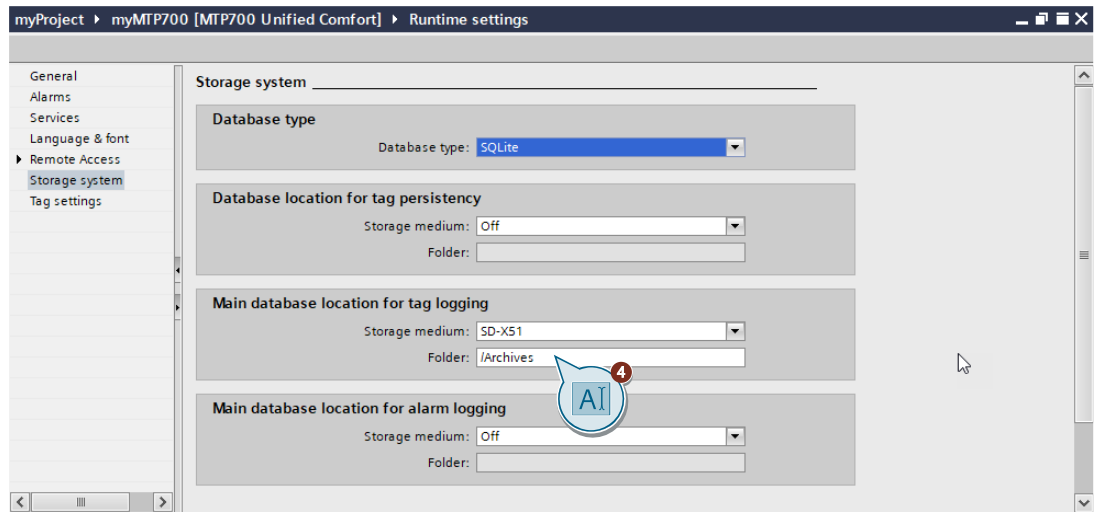


**Note** Ensure that a sufficiently large SD card is inserted in interface "SD-X51" /a sufficiently large USB storage device is inserted in interface "USB-X61"/"USB-X62".



- Optional: Specify a destination folder on the storage device.

Figure 2-8

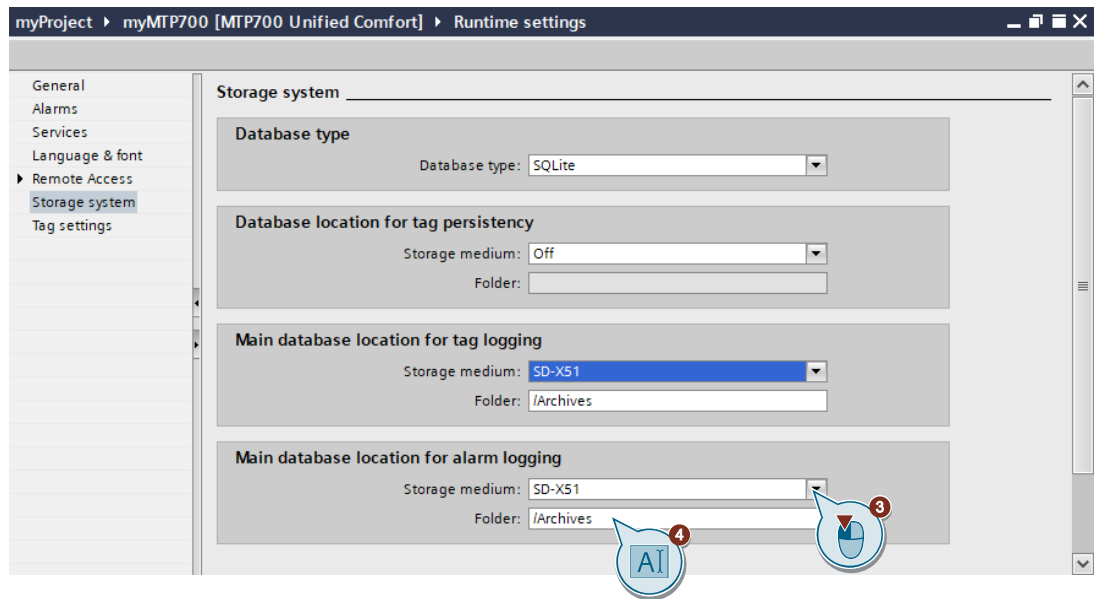


**Note**

If the folder/folder structure does not exist on the storage device, it is created automatically when logging is started.

- Repeat steps 3 and 4 for the location of the main alarm logging database.

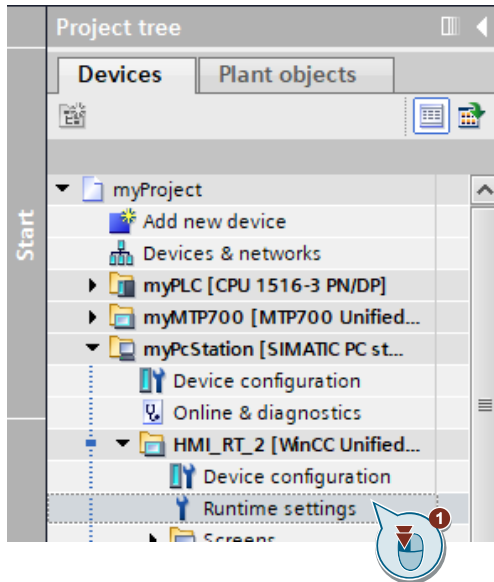
Figure 2-9



### WinCC Unified Runtime PC

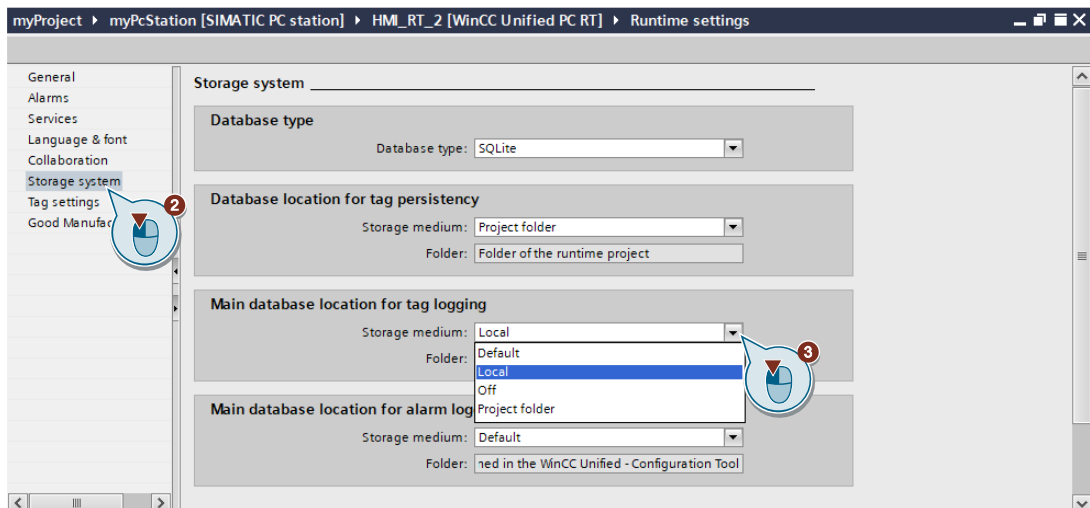
1. Open the Runtime settings of your configuration.  
("Project tree > <device name> > Runtime settings")

Figure 2-10



2. Open the settings for the storage system.  
("Runtime settings > Storage system")
3. Select the storage device for the storage location of the main database for the tag logging (e.g., "Local" off).

Figure 2-11

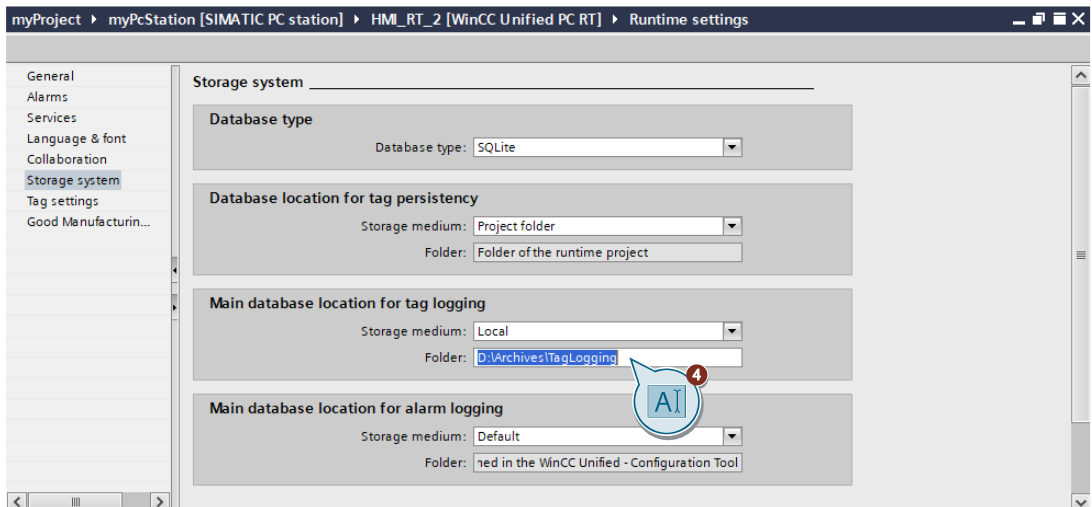


**Note**

Ensure that the selected storage device has sufficient memory size for the created log.

- Specify a destination folder on the storage device.

Figure 2-12

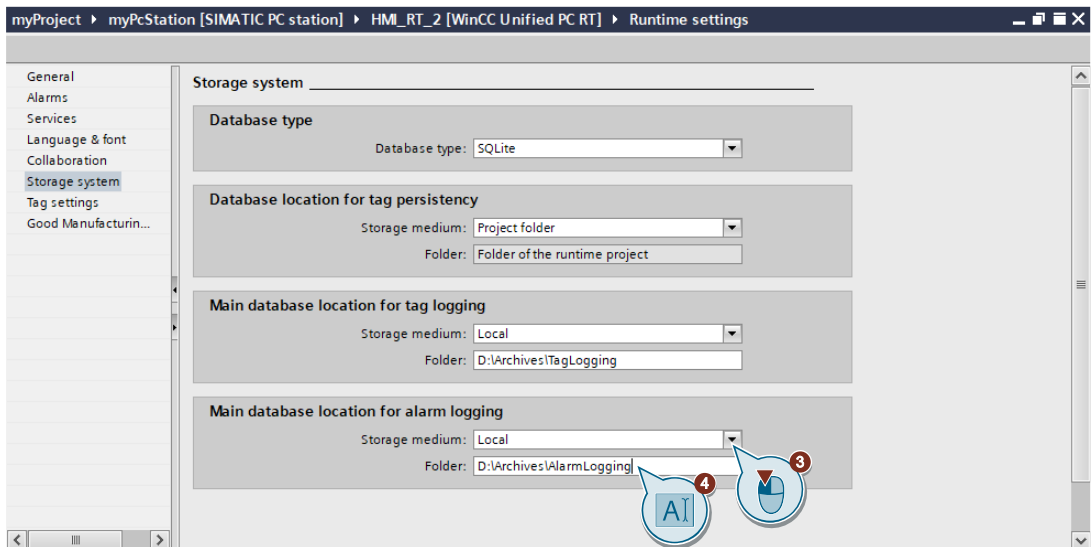


**Note**

If the folder/folder structure does not exist on the storage device, it is automatically created when logging is started

- Repeat steps 3 and 4 for the location of the main alarm logging database.

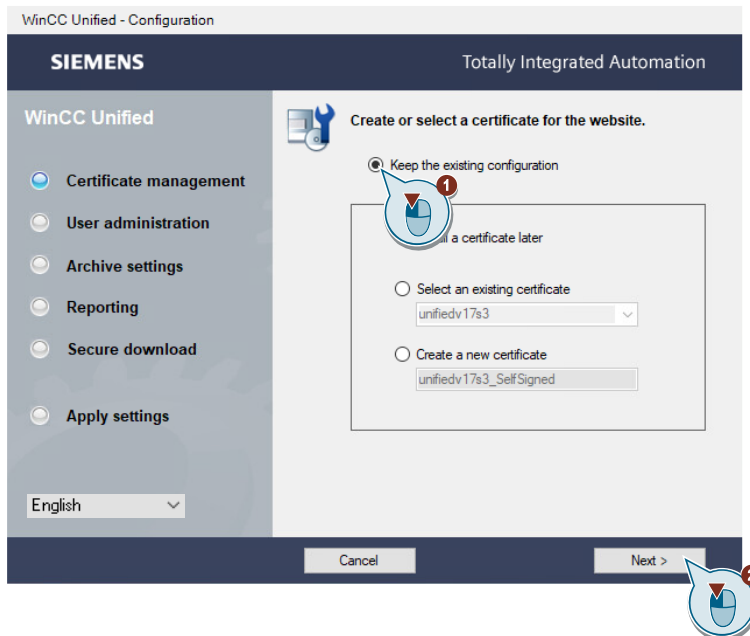
Figure 2-13



## 2.1.2 Configuring Log Settings with "WinCC Unified Configuration"

1. Start the "WinCC Unified Configuration" program.  
(Shortcut "WinCC Unified Configuration" on the desktop/"Windows key > Search" > Search term = "WinCC Unified Configuration")
2. Confirm the existing certificate management settings.

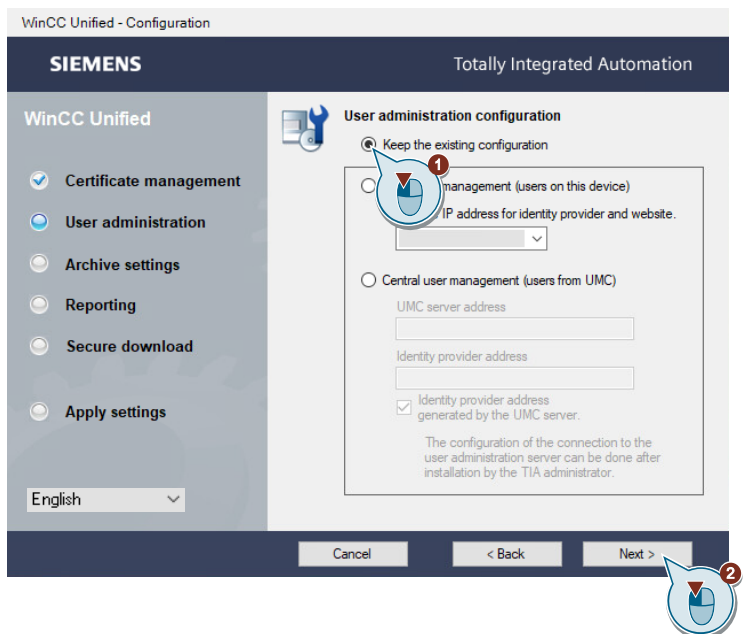
Figure 2-14



- a. To do this, enable the option "Keep the existing configuration" (1).
- b. Confirm the dialog by clicking the "Next" button (2).

3. Confirm the existing User Administrator settings.

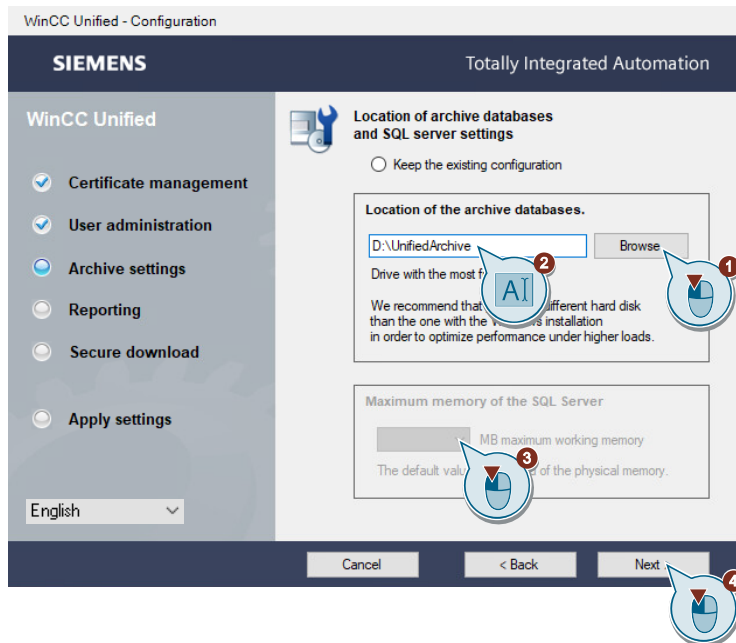
Figure 2-15



- a. Enable the option "Keep the existing configuration" (1).
- b. Confirm the dialog by clicking the "Next" button (2).

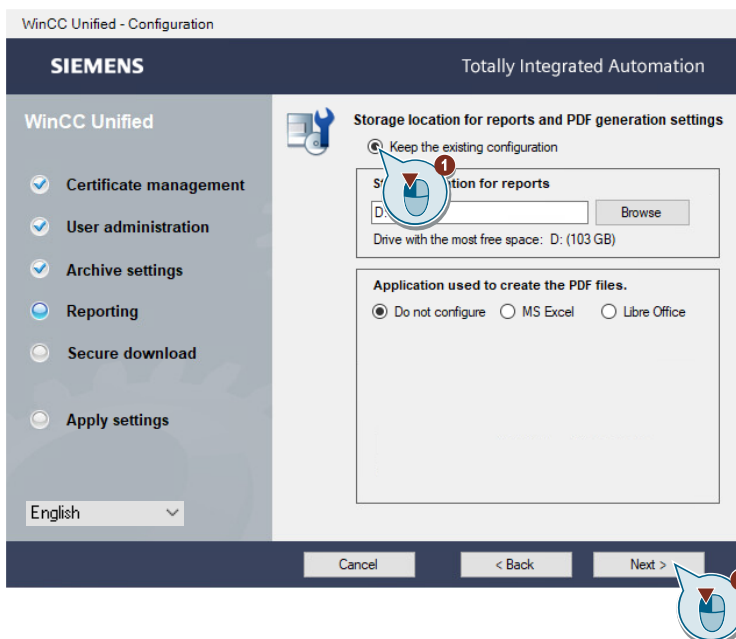
4. Change the storage location for the log databases to an appropriate location (e.g., "C:\UnifiedLog").

Figure 2-16



- a. Click the "Browse" button (1).
  - b. Select the path (2). If the entered path does not exist, the necessary folders are created automatically during configuration.
  - c. Set (3) the maximum memory used (e.g., 4096), for logging in MS SQL Server (3). By default, 1/3 of the existing physical memory is predefined.
  - d. Confirm the log settings entered by clicking the "Next" button (4).
5. Confirm the existing settings for reporting.

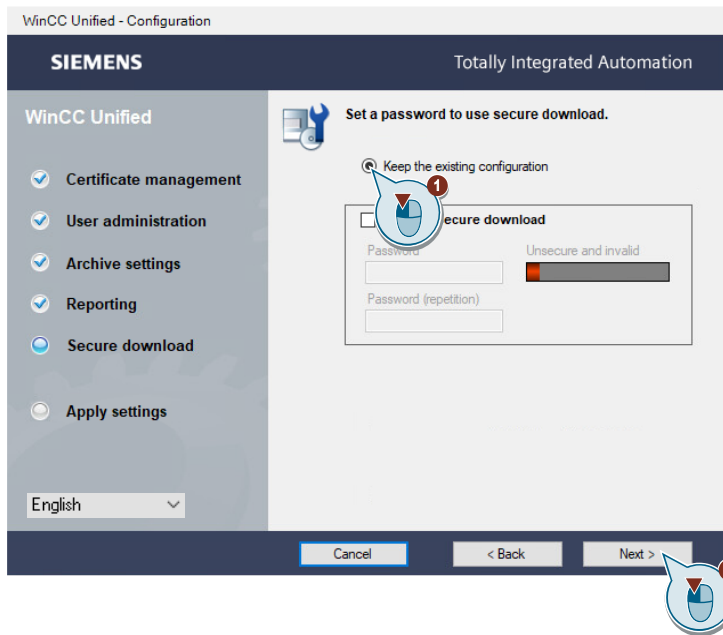
Figure 2-17



- a. Enable the option "Keep the existing configuration" (1).
- b. Confirm the dialog by clicking the "Next" button (2).

6. Confirm the existing settings for encrypted download.

Figure 2-18

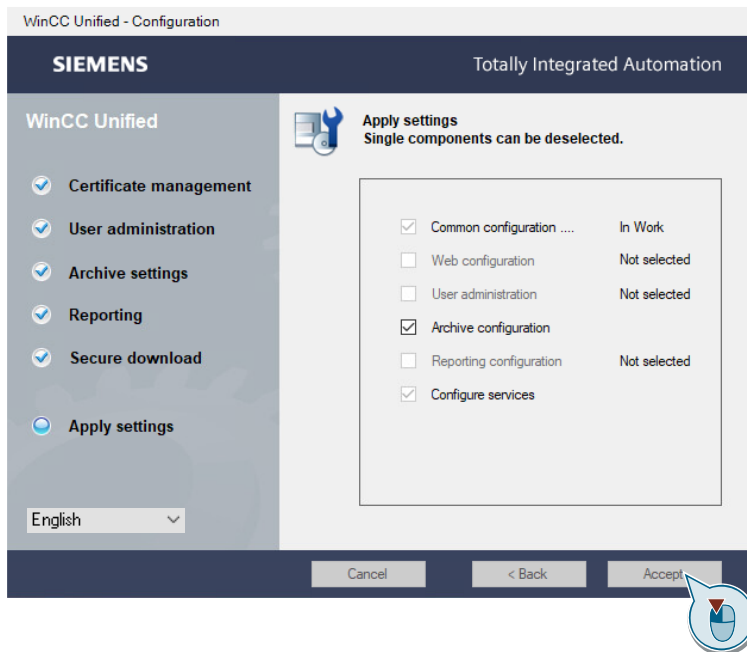


a. To do this, enable the option "Keep the existing configuration" (1).

b. Confirm the dialog by clicking the "Next" button (2).

7. Confirm all configuration settings via the "Accept" button.

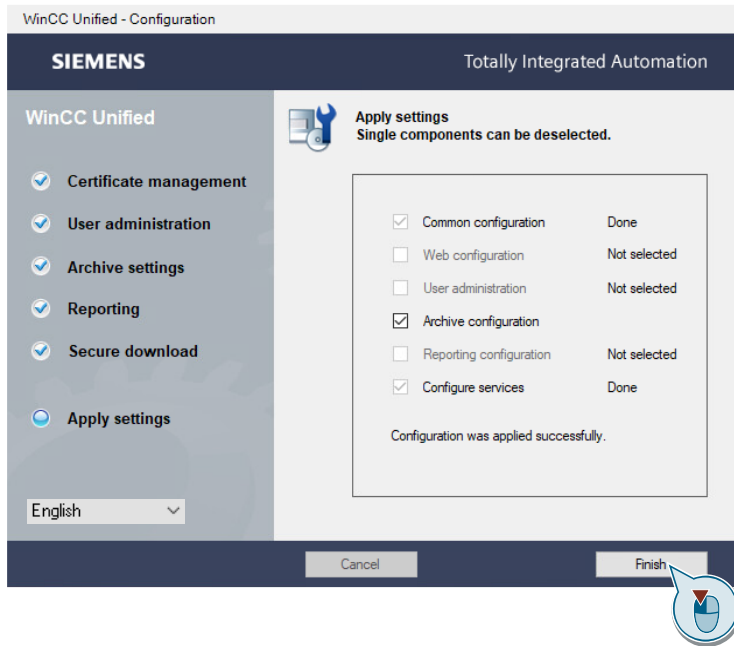
Figure 2-19



The services/settings are configured for the PC station.

8. After the settings have been configured successfully, the status is displayed. Confirm the settings by clicking the "Finish" button.

Figure 2-20

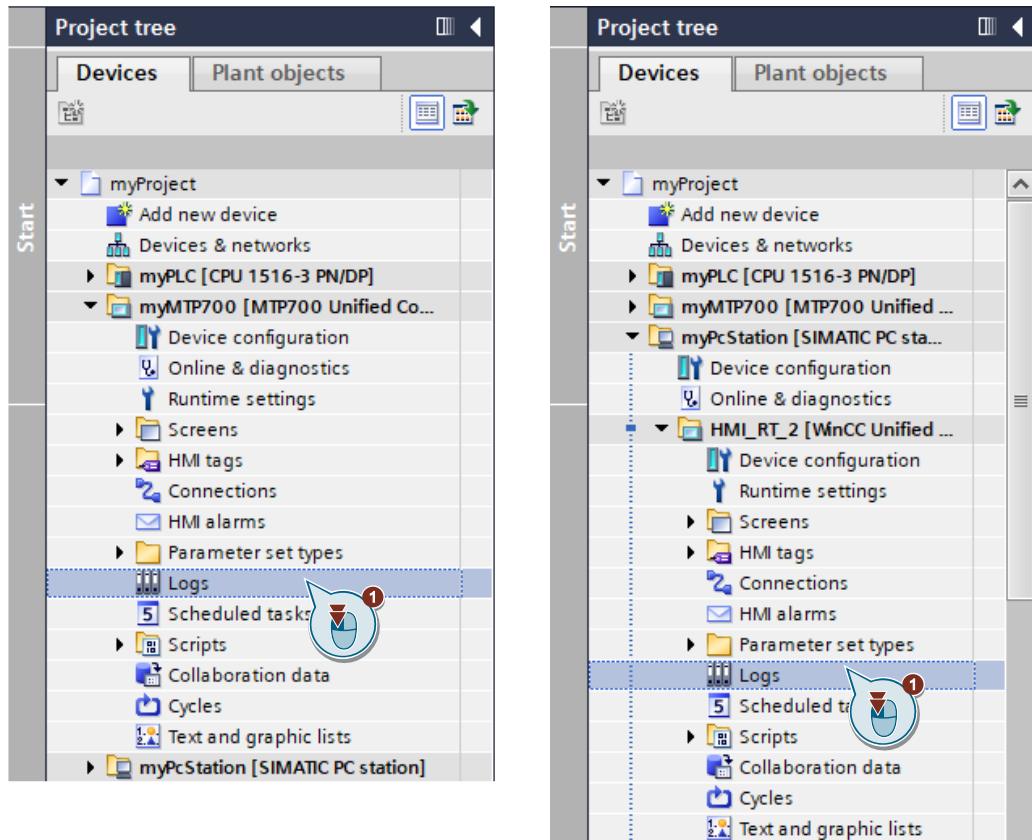


### 2.1.3 Creating a Log

#### 2.1.3.1 Configuring a Tag Log

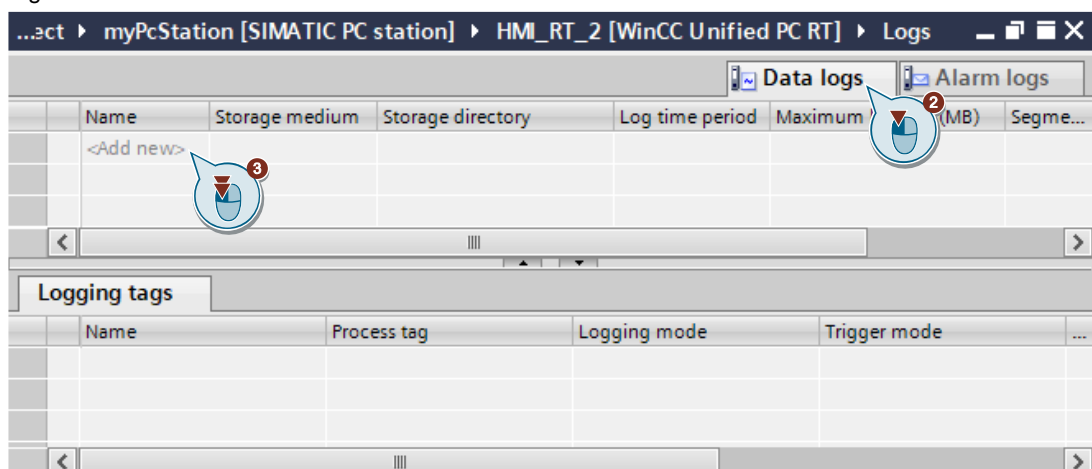
1. Open the log editor of your configuration. ("Project tree > <Device name> > Logs")

Figure 2-21



2. Open the editor for the configuration of a tag log.
3. Add a new tag log.

Figure 2-22





- Rename the log (double-click the <log name>).

Figure 2-23

Name	Storage medium	Storage directory	Log time period	Maximum log size (MB)	Segme...
LogData1	Default	Main database directory	7.00:00:00	1000	1.00:00:00
<Add new>					

### Unified Comfort Panel

- Select the storage device (e.g., SD-X51 (SD card inserted in the interface)) and use it to specify where you want to store your tag log.

Figure 2-24

Name	Storage medium	Storage directory	Log time period	Maximum log size (MB)	Segment time peri...
LogData1	SD-X51		7.00:00:00	1000	1.00:00:00
<Add ne...					

### WinCC Unified Runtime PC

- Select the storage device (e.g., "Standard" (storage location of the main database)) to specify where you want to store your tag log.

Figure 2-25

Name	Storage medium	Storage directory	Log time period	Maximum log size (MB)	Segme...
LogData1	Default	Main database directory	7.00:00:00	1000	1.00:00:00
<Add new>	Default				
	Local				

- Set the log size by the period/maximum log size. ("Log time period" and "Maximum log size (MB)" parameters)

Figure 2-26

Log time period	Maximum log size (MB)	Segment time period	Maximum segment size (...)
7.00:00:00	1000	1.00:00:00	100

- Set the log segment size by the time period/maximum segment size. ("Segment time period" and "Maximum segment size (MB)" parameters)

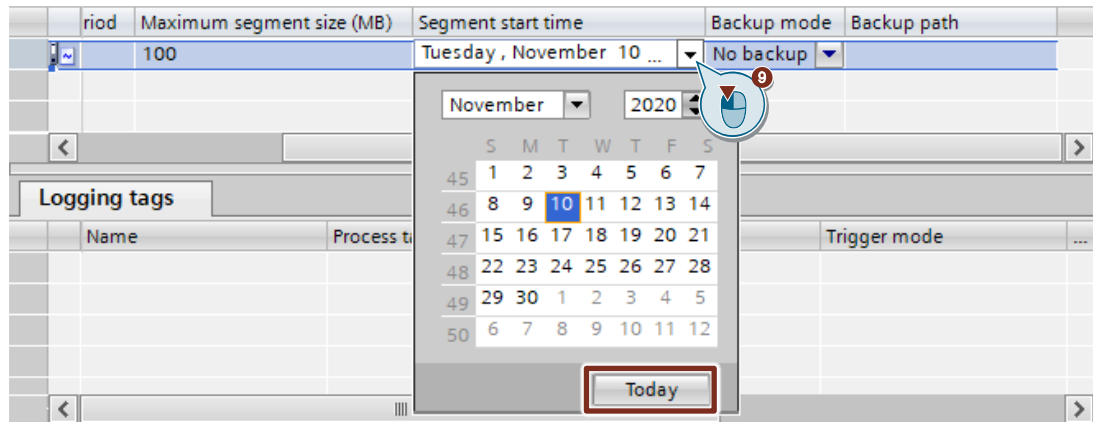
Figure 2-27

Segment time period	Maximum segment size (...)	Segment start time
1.00:00:00	100	Tuesday, November 10, 2020 09 : 46

- 8. Specify the start time for logging.  
("Segment start time" parameter)

Alternatively, you can use the "Today" button to automatically apply the engineering date.

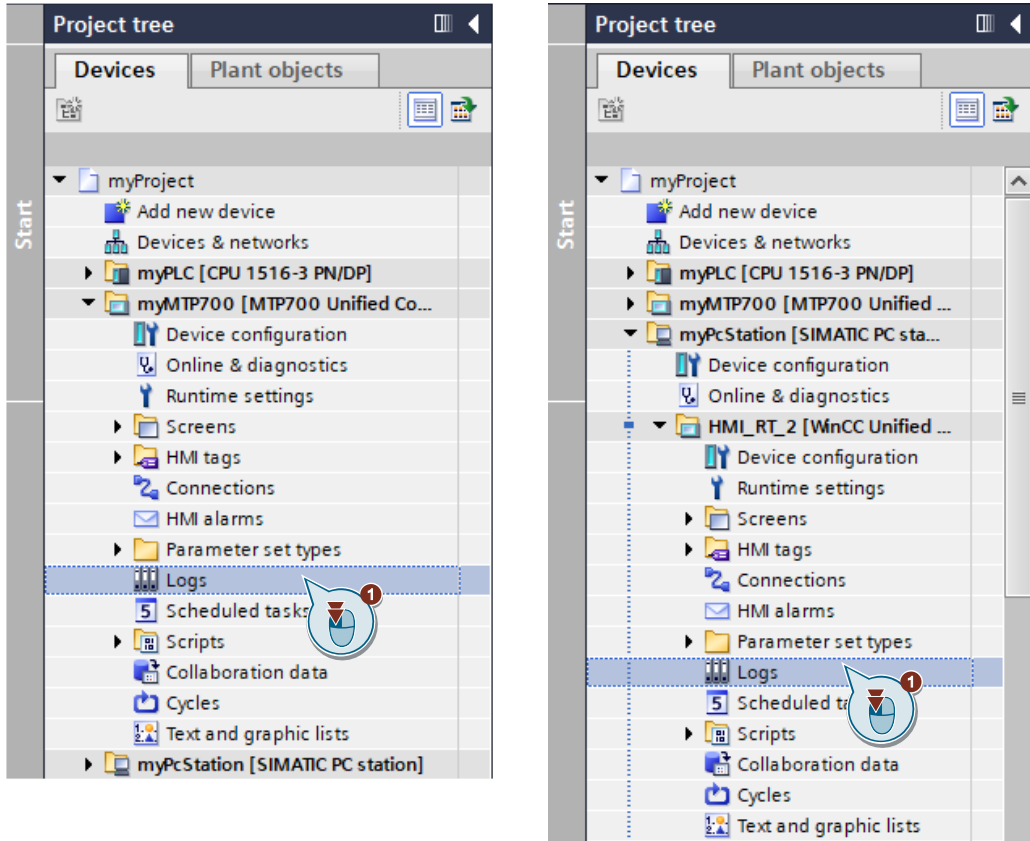
Figure 2-28



### 2.1.3.2 Configuring an Alarm Log

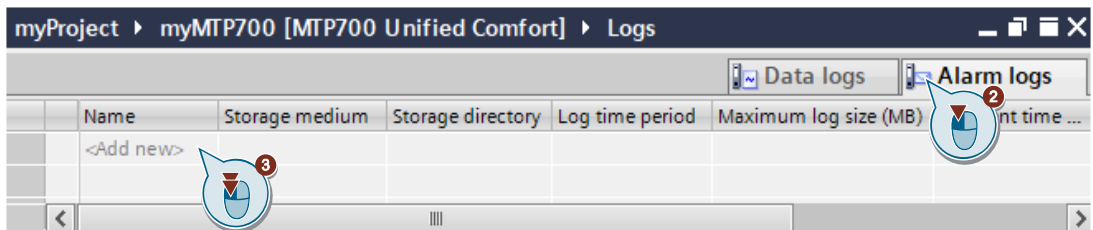
1. Open the log editor of your configuration. ("Project tree > <Device name> > Logs")

Figure 2-29



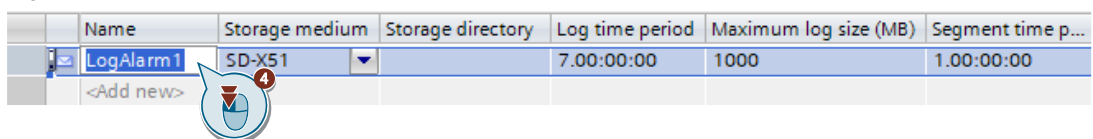
2. Open the editor for the configuration of a tag log.
3. Add a new alarm log.

Figure 2-30



4. Rename the log (double-click the <log name>).

Figure 2-31



### Unified Comfort Panel

5. Select the storage device (e.g., SD-X51 (SD card inserted in the interface)) and use it to specify where you want to store your alarm log.

Figure 2-32

Name	Storage medium	Storage directory	Log time period	Maximum log size (MB)	Segment time p...
LogAlarm1	SD-X51		7.00:00:00	1000	1.00:00:00
<Add new>	<ul style="list-style-type: none"> <li>SD-X51</li> <li>USB-X61</li> <li>USB-X62</li> </ul>				

### WinCC Unified Runtime PC

5. Select the storage device (e.g., "Standard" (storage location of the main database)) to specify where you want to store your alarm log.

Figure 2-33

Name	Storage medium	Storage directory	Log time period	Maximum log size (MB)	Segme...
LogAlarm1	Default	Main database directory	7.00:00:00	1000	1.00:0...
<Add new>	<ul style="list-style-type: none"> <li>Default</li> <li>Local</li> </ul>				

6. Set the log size by the period/maximum log size. ("Log time period" and "Maximum log size (MB)" parameters)

Figure 2-34

Log time period	Maximum log size (MB)	Segment time period	Maximum segment size (MB)	...
7.00:00:00	1000	1.00:00:00	100	Tu...

7. Set the log segment size by the time period/maximum segment size. ("Segment time period" and "Maximum segment size (MB)" parameters)

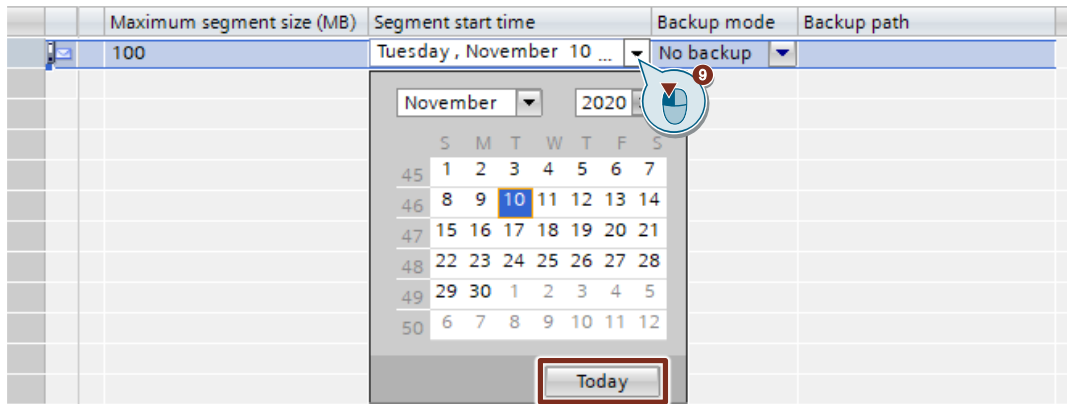
Figure 2-35

Segment time period	Maximum segment size (MB)	Segment start time	...
1.00:00:00	100	Tuesday, November 10, 2020 11:45	...

- 8. Specify the start time for logging.  
("Segment start time" parameter)

Alternatively, you can use the "Today" button to automatically apply the engineering date.

Figure 2-36

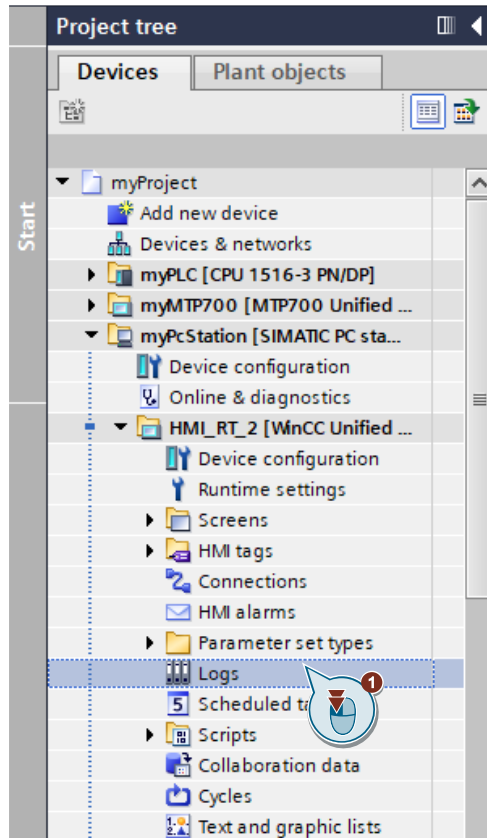


### 2.1.3.3 Configuring a Log Backup

**Note** The backup mode can only be activated if the database type "SQL Server" is configured in the Runtime settings. You can use the backup function for both tag and alarm logs. The process for configuring the database type is described in Section [2.1.1.2](#).

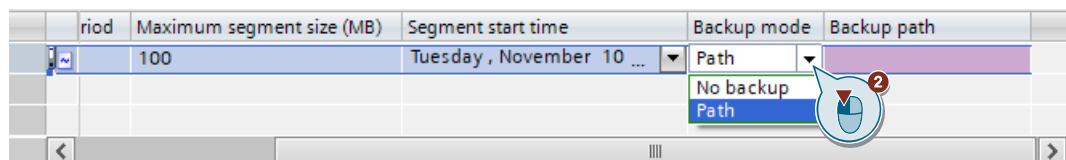
1. Open the log editor of your configuration. ("Project tree > <Device name> > Logs")

Figure 2-37



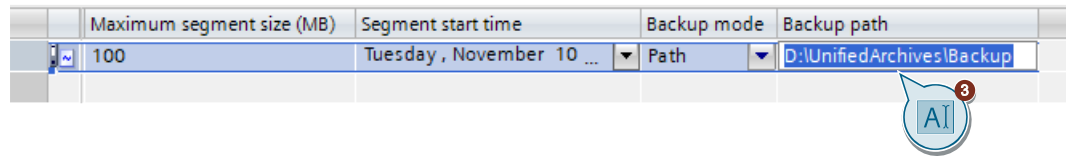
2. Enable the backup mode for the desired log. ("Backup mode" parameter)

Figure 2-38



- Enter the backup path for the log backup. ("Backup path" parameter)

Figure 2-39



- Assign backup path permissions (from WinCC V16 Update 2 to WinCC V17 including updates).  
Run through the "WinCC Unified Configuration" tool a second time with the backup path. See Chapter 2.1.2 "Configuring Archive Settings with "WinCC Unified Configuration".

### 2.1.3.4 Integrating a Log Backup

A log backup is integrated into Runtime via the "SIMATIC Runtime Manager" tool. The integration with the tool is only possible for a real "WinCC Unified Runtime PC".

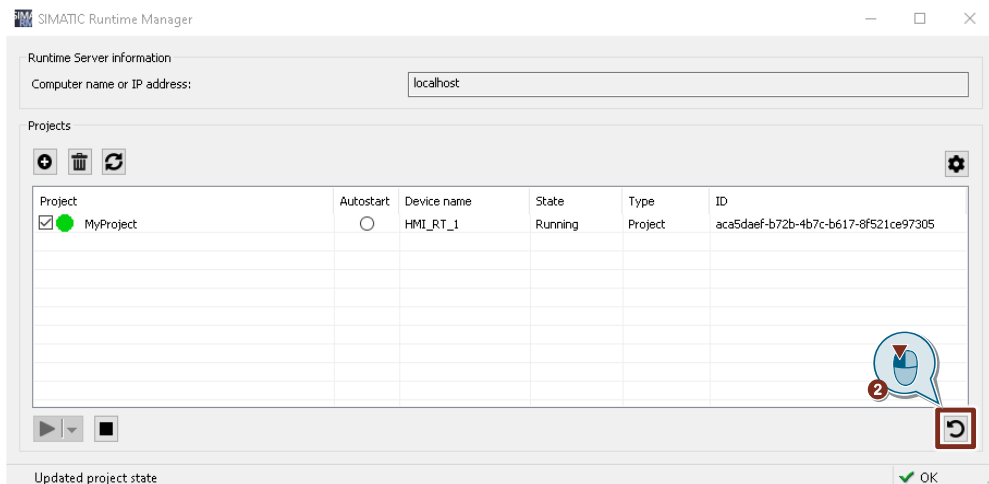
#### Note

To include a log backup, the real "WinCC Unified Runtime PC" must be in the "Running" status.

To include a log backup, proceed as follows:

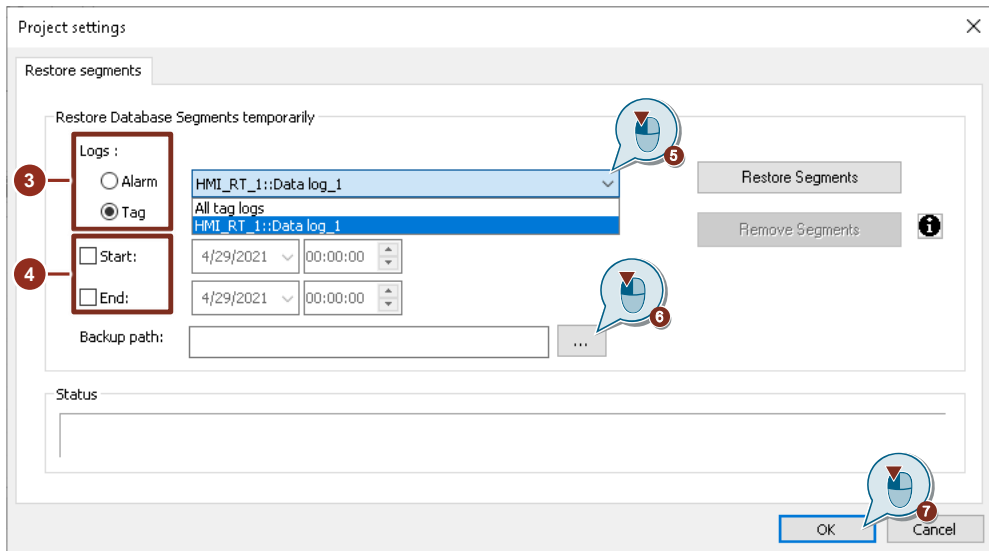
- Open the tool "SIMATIC Runtime Manager" under "`<Installation path>\Siemens\Automation\WinCCUnified\bin\SIMATICRuntimeManager.exe`"
  - Installation path (default): C:\Program Files
- Click the reverse arrow button in the "SIMATIC Runtime Manager" to restore/remove a log segment from a log database.

Figure 2-40



- Select the type of log.
- Select the log segment you want to restore.
- Select start and end time for recovery.
- Select the backup path via the "... " button.
- Confirm the settings by clicking the "OK" button

Figure 2-41





## 2.1.4 Configuring a Log Tag/Alarm

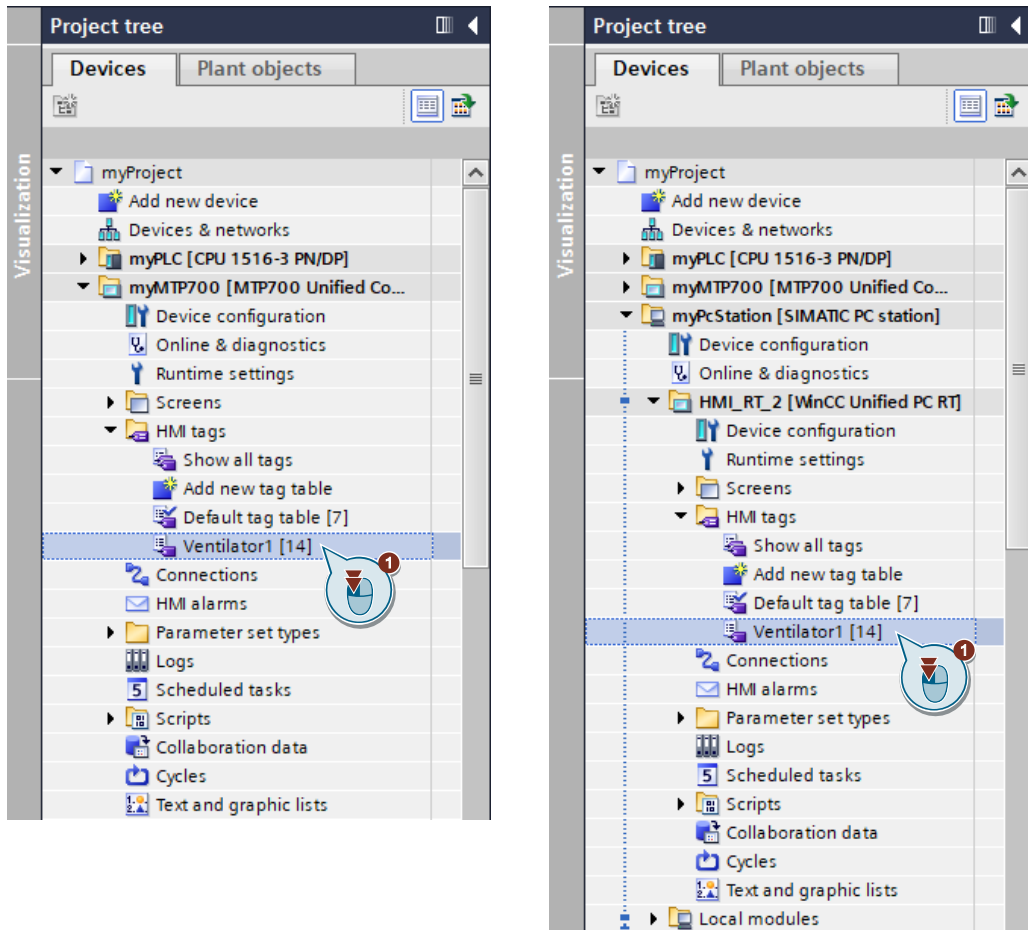
### 2.1.4.1 Configuring a Log Tag

A log tag is configured at the associated HMI tag.

Follow the steps below for the configuration:

1. Open the variable table of the HMI variable to be logged.  
("Project tree > <device name> > HMI tags > <Name of tag table>")

Figure 2-42



2. Select the HMI tag to be logged.

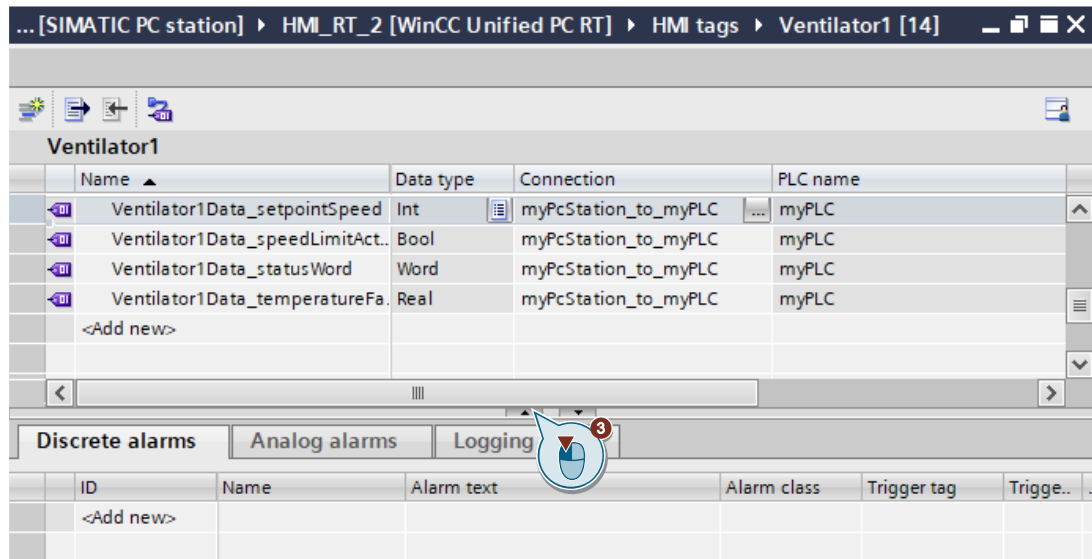
Figure 2-43

... [SIMATIC PC station] > HMI\_RT\_2 [WinCC Unified PC RT] > HMI tags > Ventilator1 [14]

Ventilator1				
	Name ▲	Data type	Connection	PLC name
▶	Ventilator1Data_setpointSpeed	Int	myPcStation_to_myPLC	myPLC
▶	Ventilator1Data_speedLimitAct..	Bool	myPcStation_to_myPLC	myPLC
▶	Ventilator1Data_s_statusWord	Word	myPcStation_to_myPLC	myPLC
▶	Ventilator1Data_temperatureFa.	Real	myPcStation_to_myPLC	myPLC
	<Add new>			

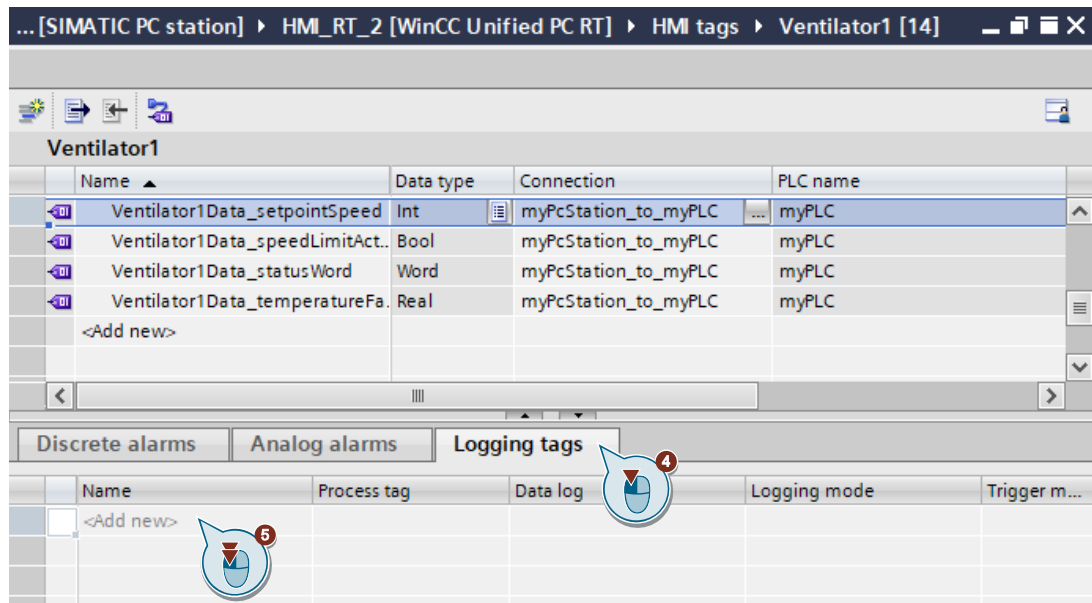
3. Open the editor area for bit and analog alarms, as well as log tags.  
(Click the black arrow pointing upwards)

Figure 2-44



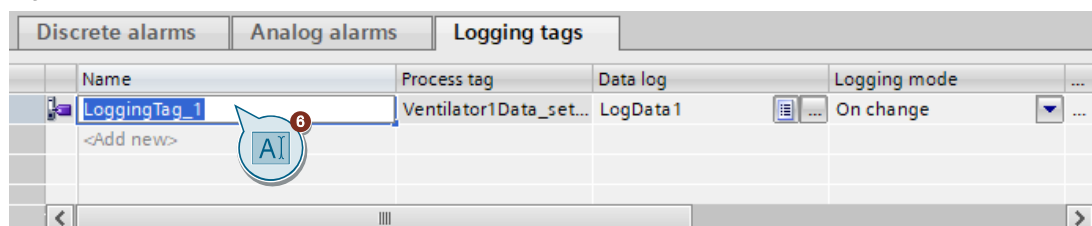
4. Open the editor for log tags.  
(Click the tab "Logging Tags")
5. Create a new log tag.  
(Double-click "<Add new>")

Figure 2-45



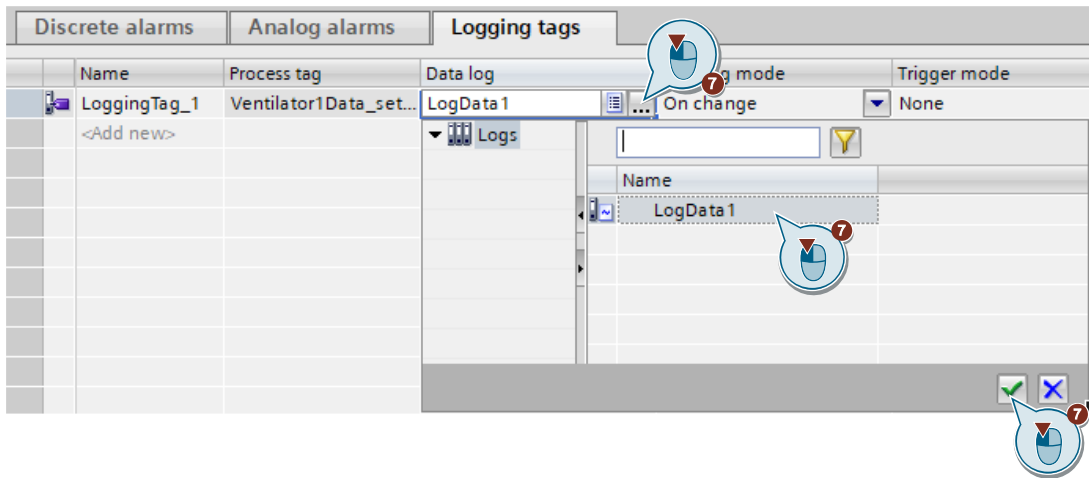
6. Rename the log tag to an appropriate name of your choice.

Figure 2-46



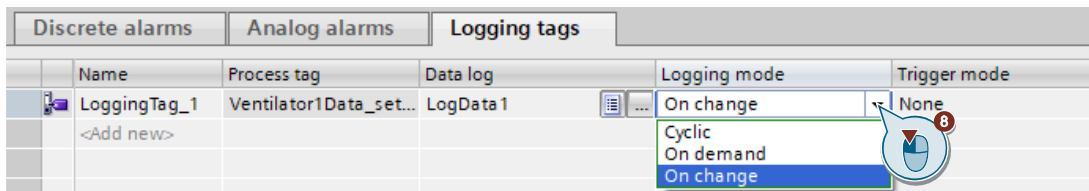
7. Select the desired tag log (e.g., LogData1).

Figure 2-47



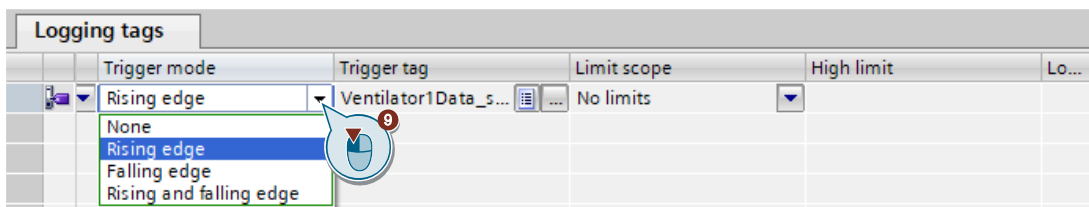
8. Set the logging mode (e.g., "On change").

Figure 2-48



9. Set the trigger tag and mode (e.g., "Rising Edge").

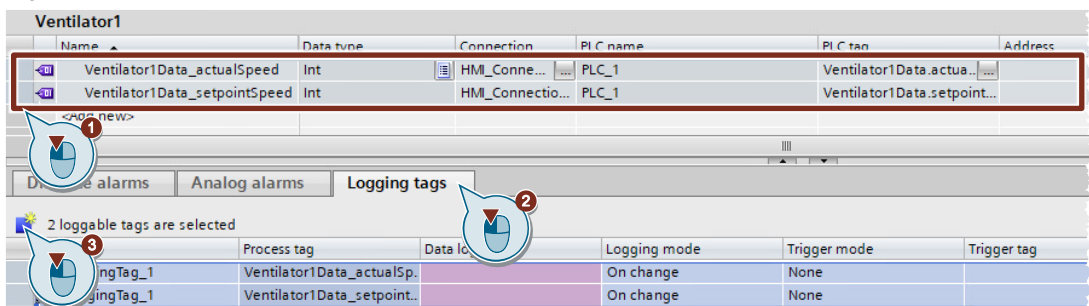
Figure 2-49



### Multi-selection

1. Select the HMI tags for which you want to add a log tag.
2. Open the editor for log tags.  
(Click the tab "Logging Tags")
3. Click the button "Add new logging tag for each selected loggable tag".

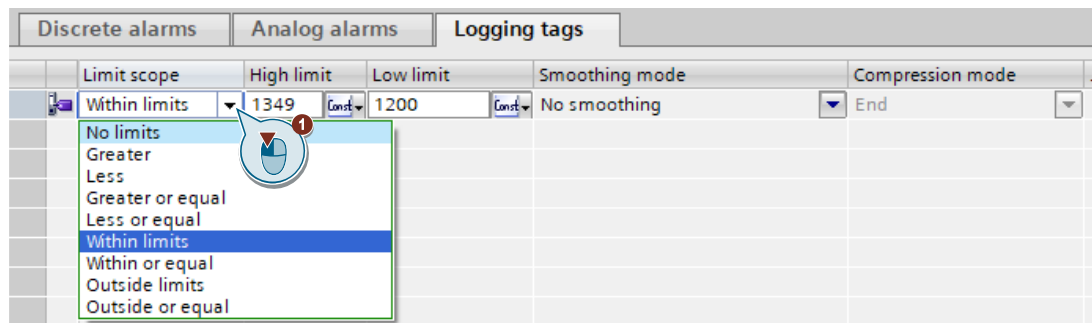
Figure 2-50



### Configuring the Settings for Limit Detection/Smoothing

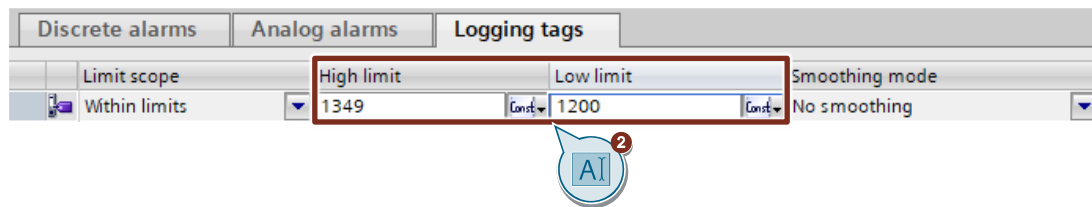
1. Specify the desired limit range in which you want to log the values for the tag.

Figure 2-51



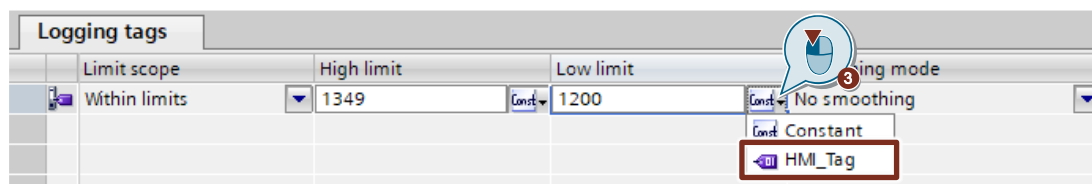
2. Set the limit value(s) depending on the selected limit range.

Figure 2-52



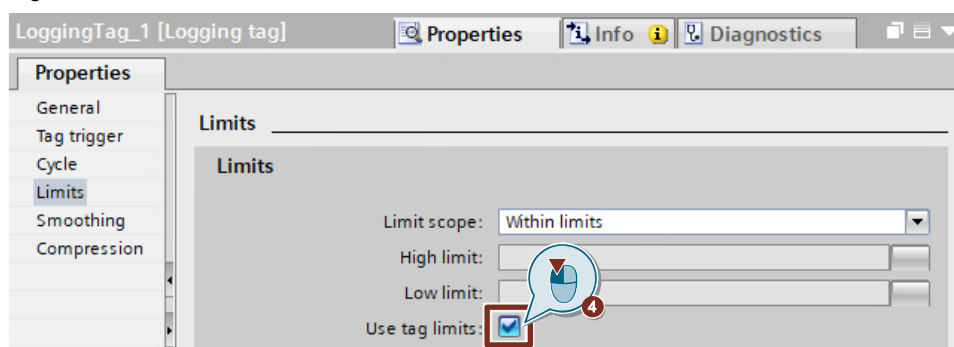
3. Alternatively, you can define the limit values depending on an HMI tag in Runtime. To do this, set the mode to "HMI\_Tag".

Figure 2-53



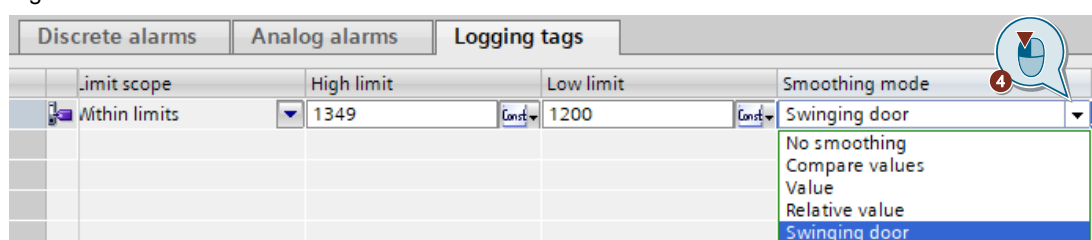
4. Alternatively, you can use the limit values of the trigger tag.

Figure 2-54



5. Set the smoothing mode.

Figure 2-55



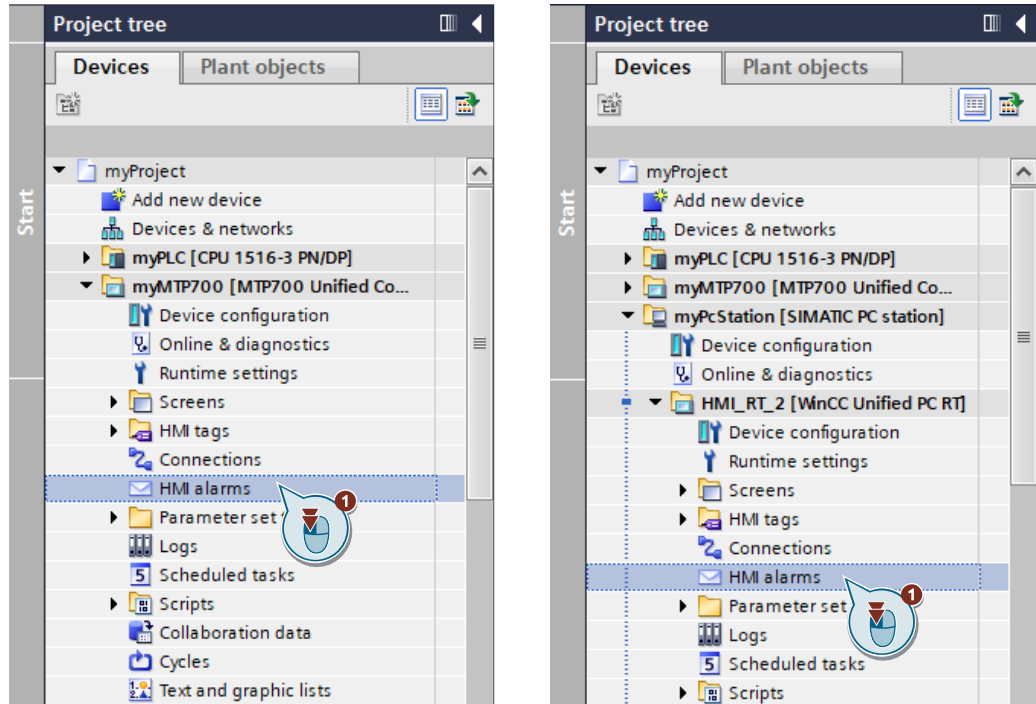
### 2.1.4.2 Configuring a Log Alarm

You create a log alarm by assigning the configured alarm log to the corresponding alarm class of the alarm. Therefore, all alarms of this alarm class are stored with their states in the assigned alarm log.

Follow the steps below for the configuration:

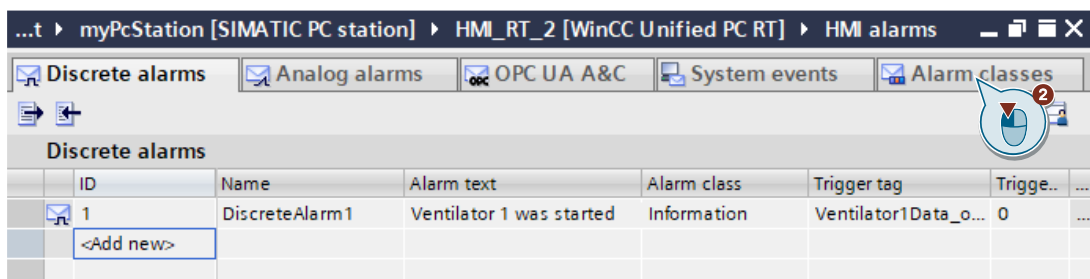
1. Open the HMI alarm editor of your configuration.  
("Project tree > <device name> > HMI alarms")

Figure 2-56



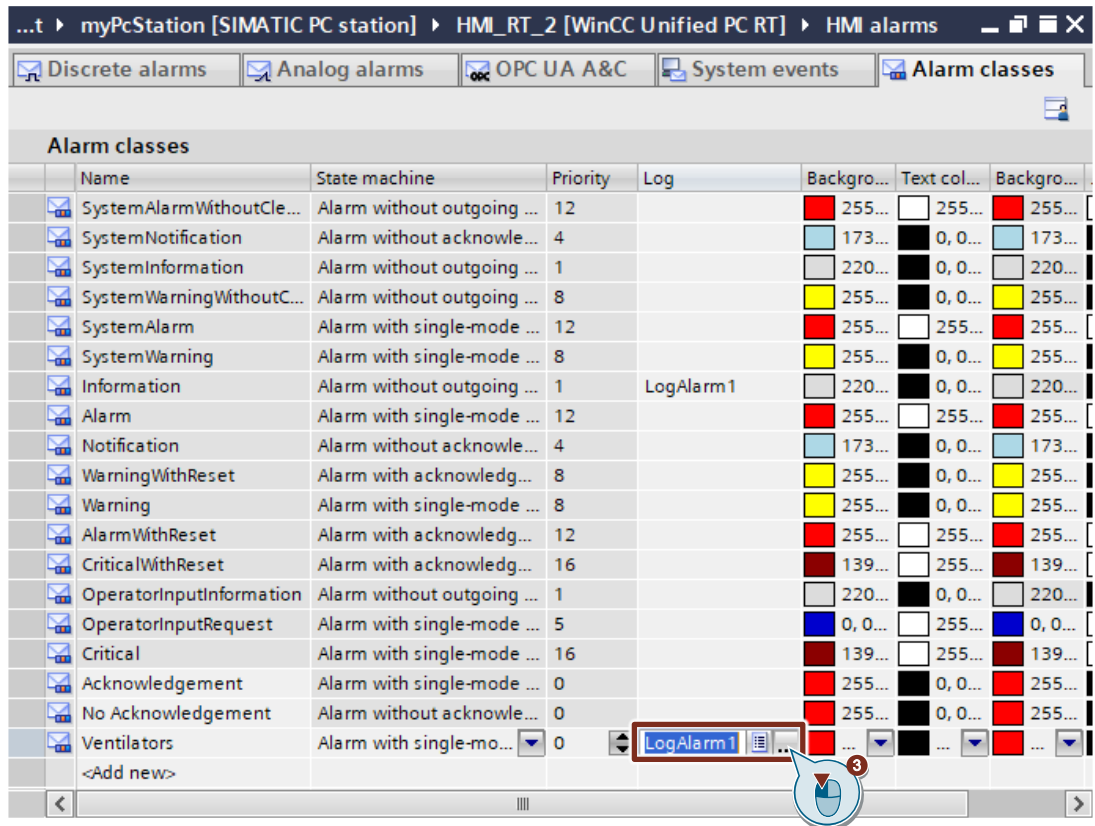
2. Switch the alarm class editor.  
("Alarm classes" tab)

Figure 2-57



- Assign the alarm log from which you want to log the alarms to the alarm classes (e.g., fans).

Figure 2-58



## 2.1.5 Displaying a Log in Runtime

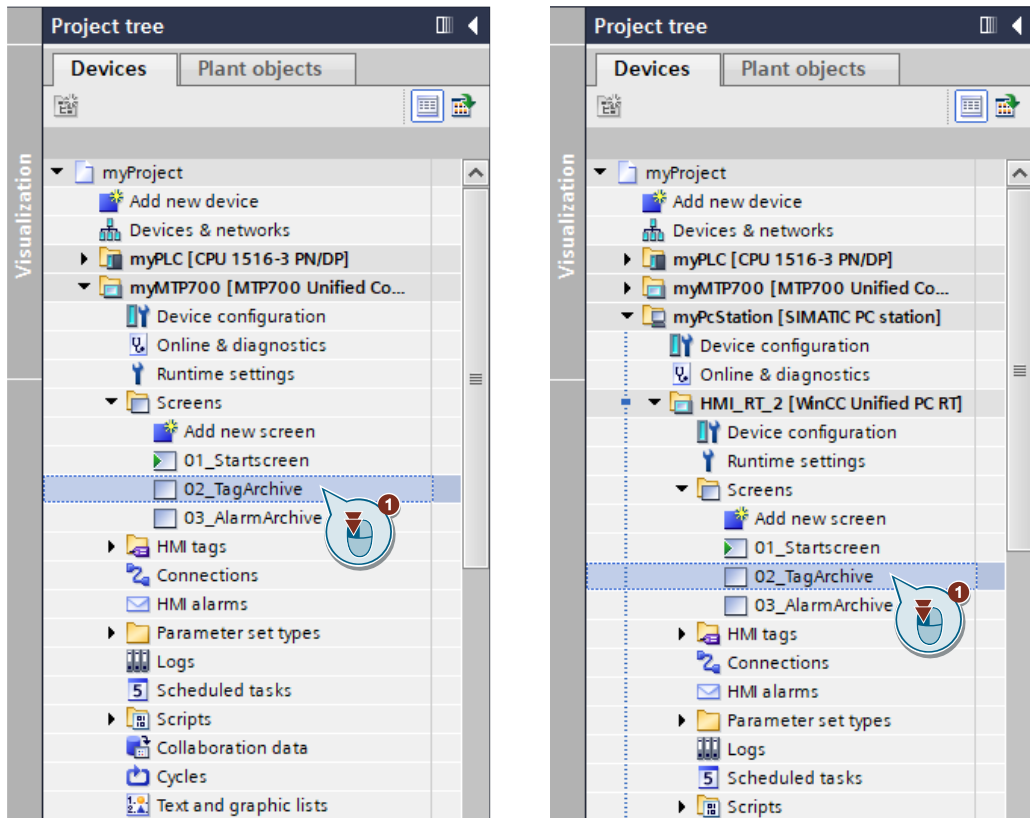
### 2.1.5.1 Displaying a Tag Log

To display a tag log in Runtime, use the "Trend Control".

Follow the steps below for the configuration:

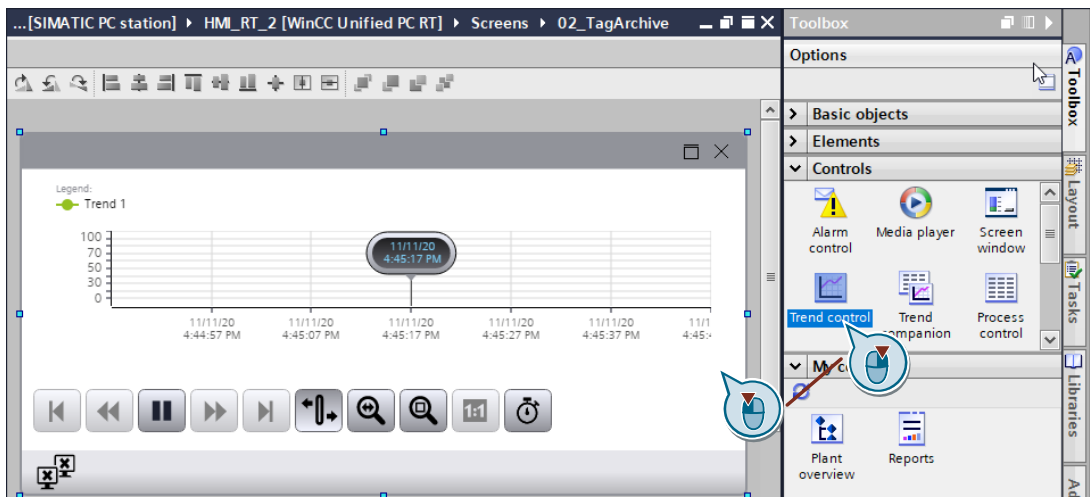
1. Open the screen in which you want to display the tag log.  
("Project tree > <device name> > Screens > <Screen name")

Figure 2-59



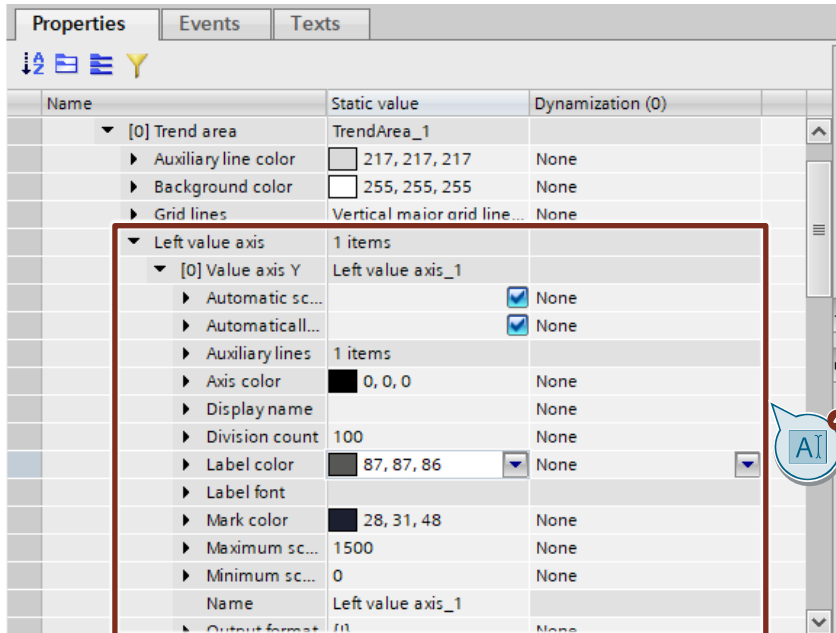
2. Add the "Trend Control" to the screen.

Figure 2-60



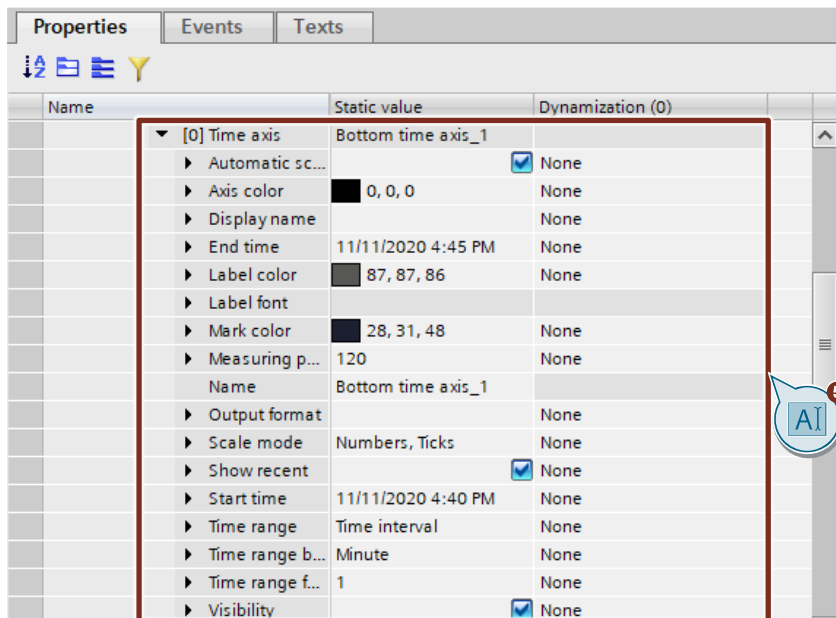
3. Select the Control and open its properties. ("Properties" tab)
4. Configure the left value axis. ("Properties > General > Trend areas > [0] Trend area > Left value axis > [0] Values axis Y")

Figure 2-61



5. Configure the lower time axis. ("Properties > General > Trend areas > [0] Trend area > Time axis bottom > [0] Time axis")

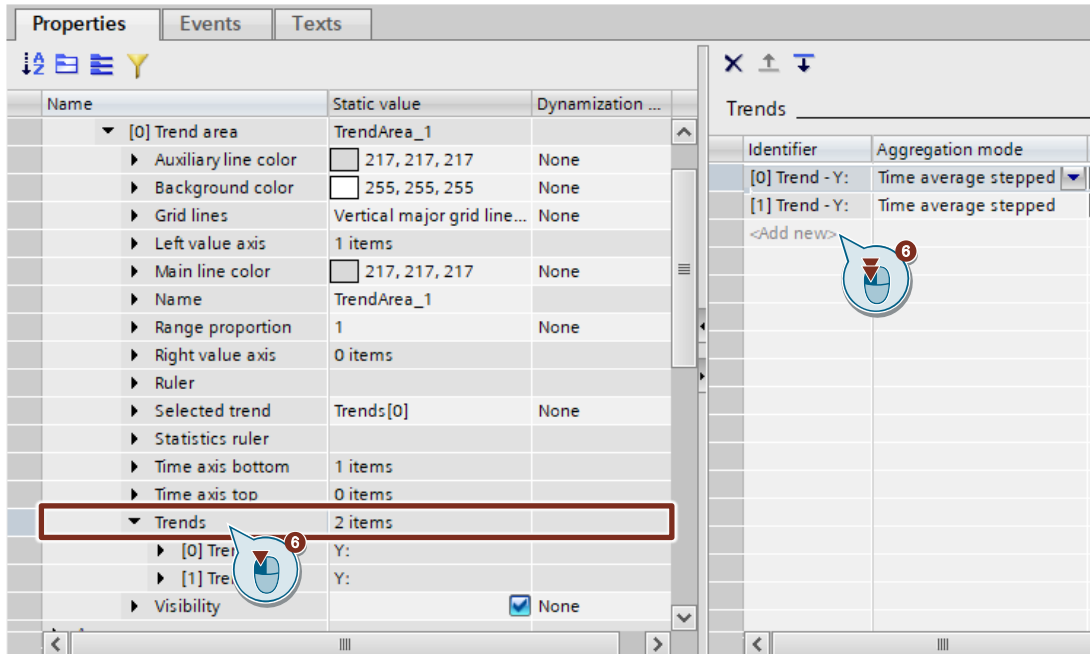
Figure 2-62





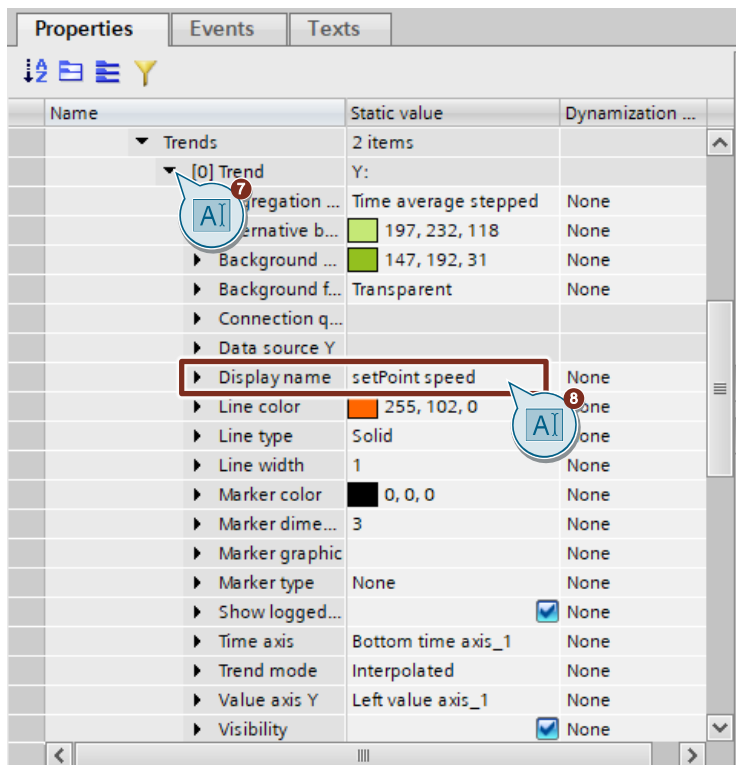
6. Add as many trends as you want to display on log tags to the Trend area.  
("Properties > General > Trend areas > [0] Trend area > Trends > <Add new>")

Figure 2-63



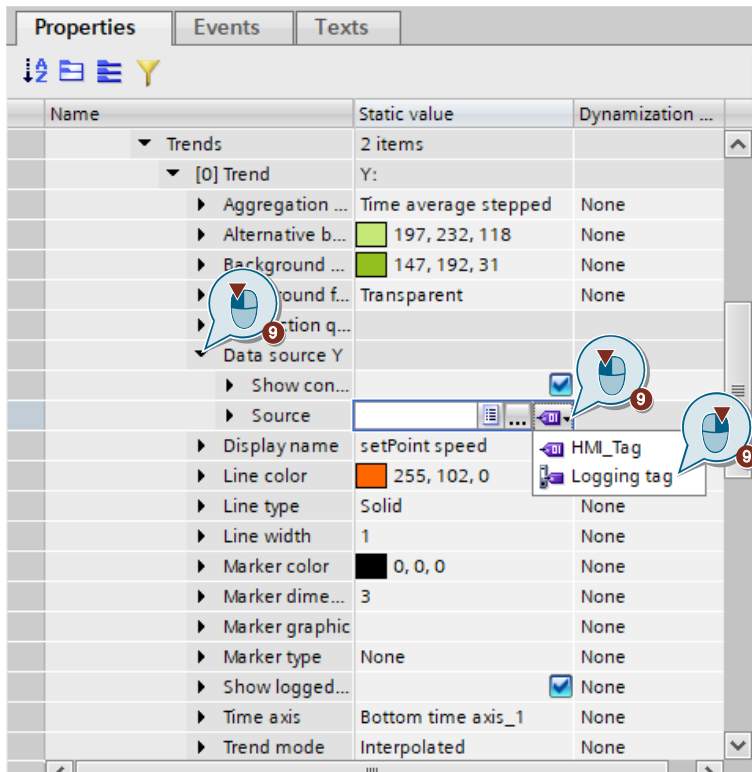
7. Open the settings for the first trend.  
("[0] Trend - :Y")
8. Assign a display name of your choice.  
("[0] Trend > Display name")

Figure 2-64



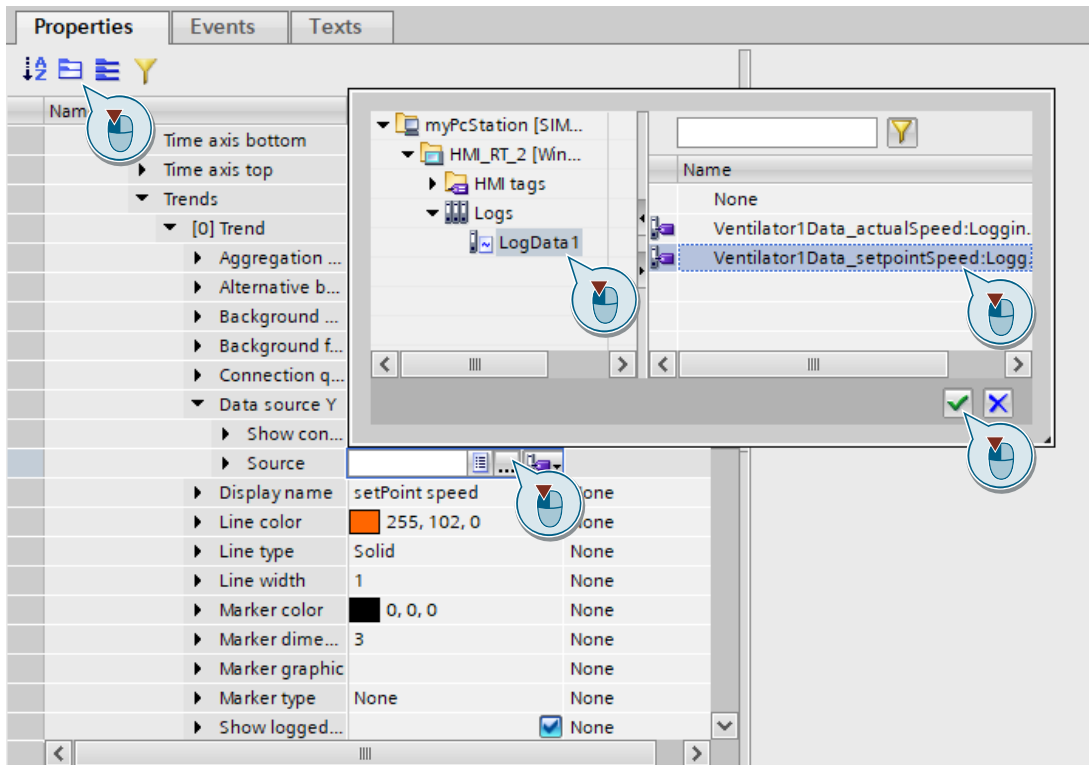
9. Select "Logging tag" as the data source.

Figure 2-65



10. Select the desired log tag as the data source.

Figure 2-66



11. Repeat steps 7 – 10 for the trends added in step 6.

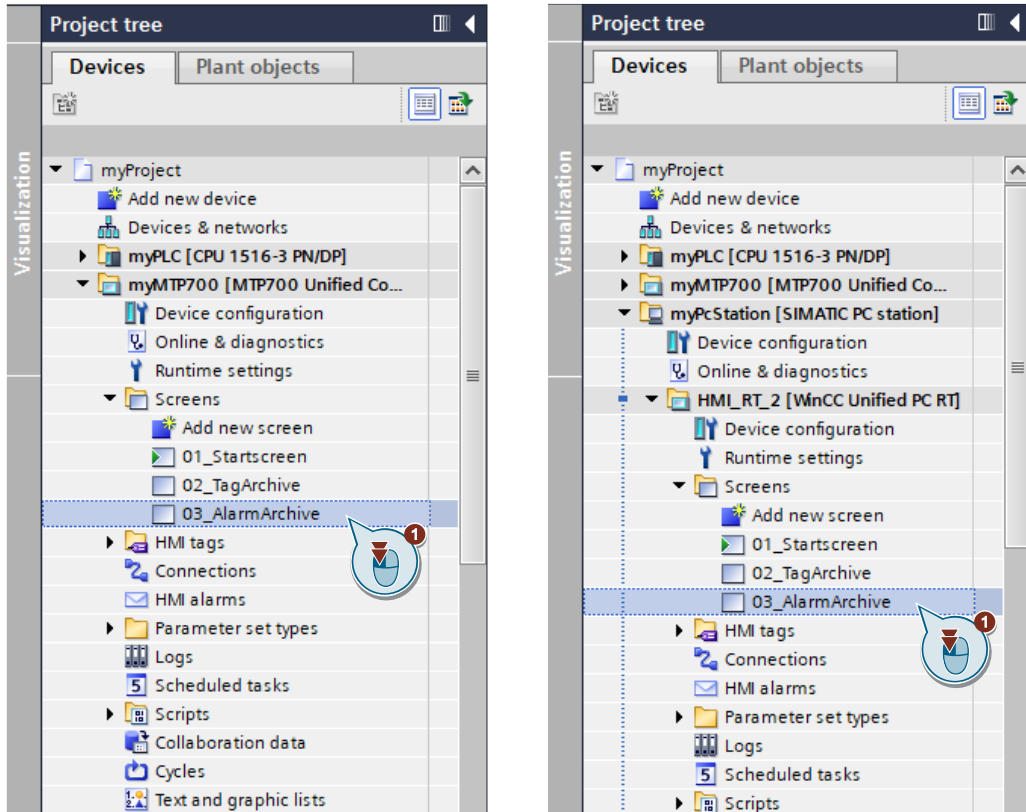
### 2.1.5.2 Displaying the Alarm Log

To display an alarm log in Runtime, use the "Alarm Control".

Follow the steps below for the configuration:

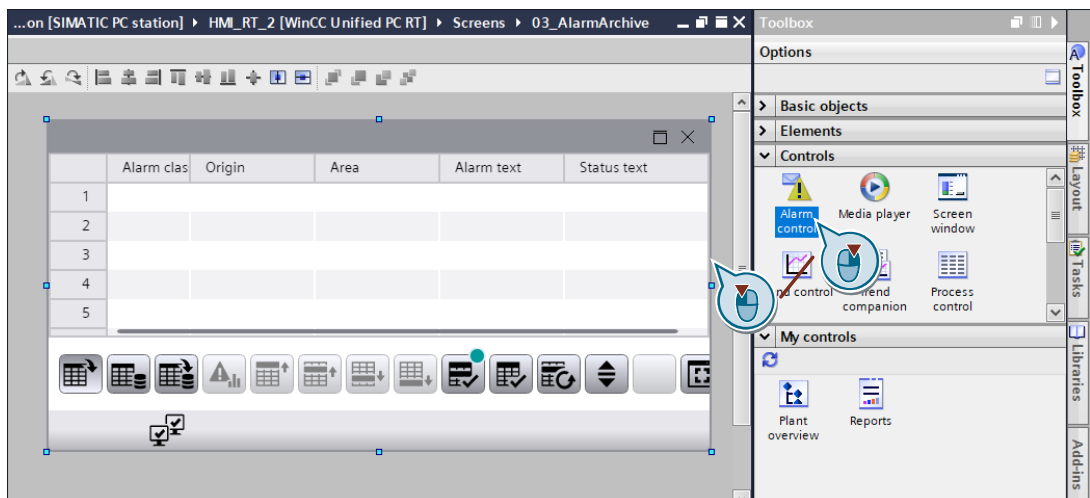
1. Open the screen in which you want to display the alarm log.  
"Project tree > <device name> > Screens > <Screen name>"

Figure 2-67



2. Add the "Alarm Control" to the screen.

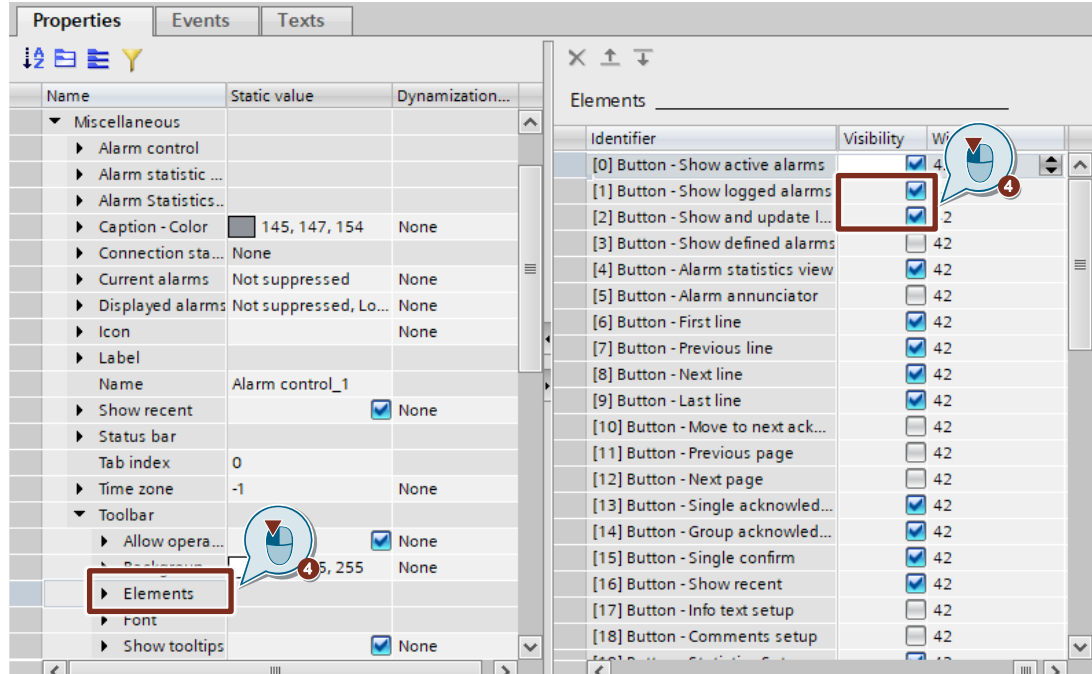
Figure 2-68



3. Select the Control and open its properties.  
("Properties" tab)

4. Enable visibility for the "Show logged alarms" and "Show logged alarms and update" buttons in the toolbar. ("Properties > Miscellaneous > Toolbar > Elements > [1] / [2] Button > Enable")

Figure 2-69

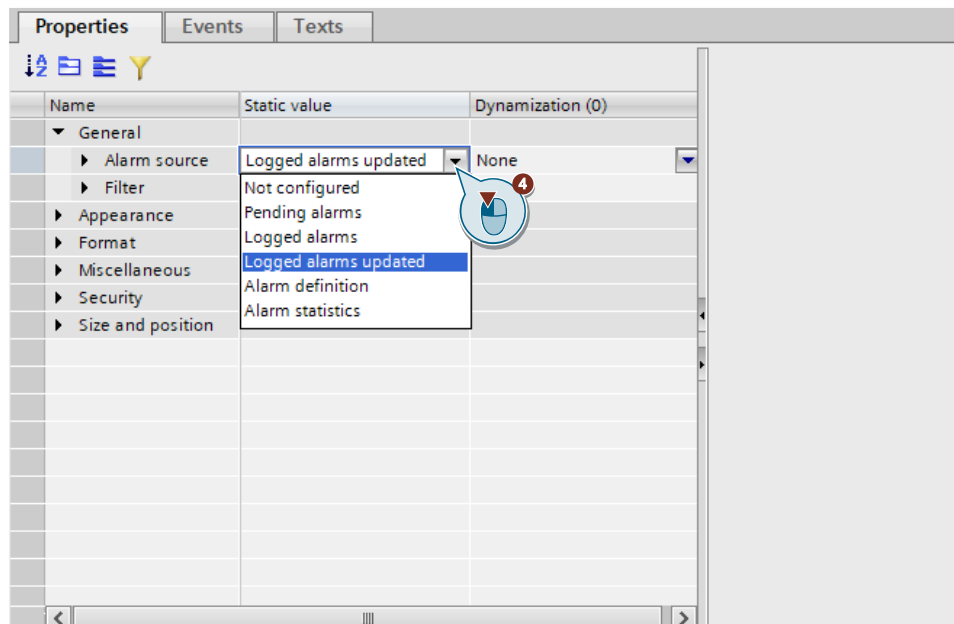


5. Specify for the alarm source that it refers to the logged alarms. ("Properties > General > Alarm source")

You can choose between the following alarm sources:

- "Logged alarms"  
The alarm display shows the logged alarms.
- "Logged alarms updated"  
The alarm display shows the logged alarms, which are updated at specified intervals.

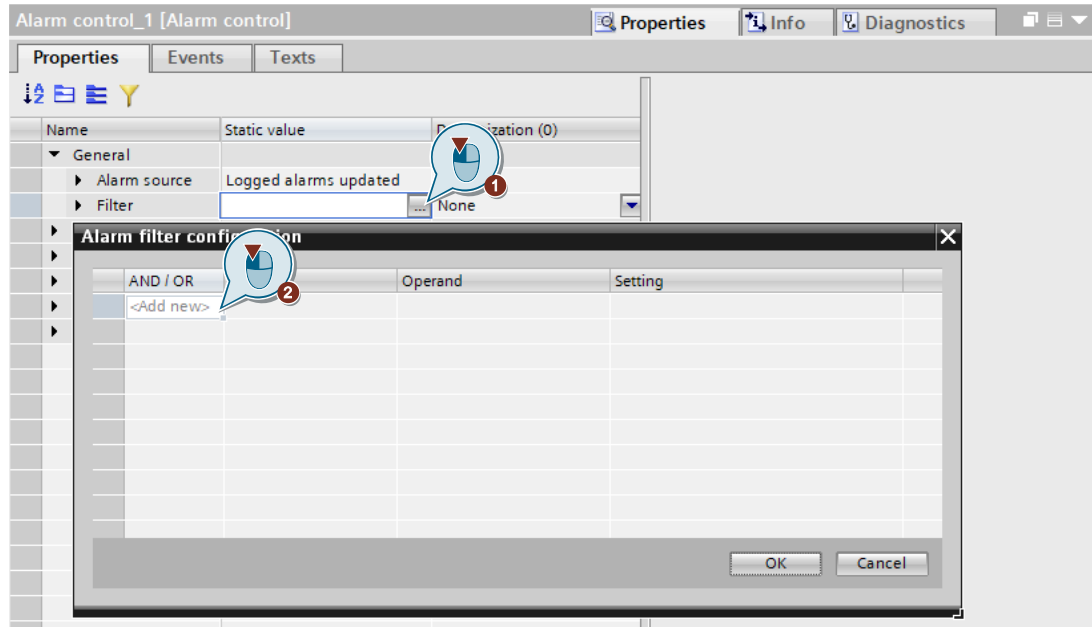
Figure 2-70



### Configuring filters

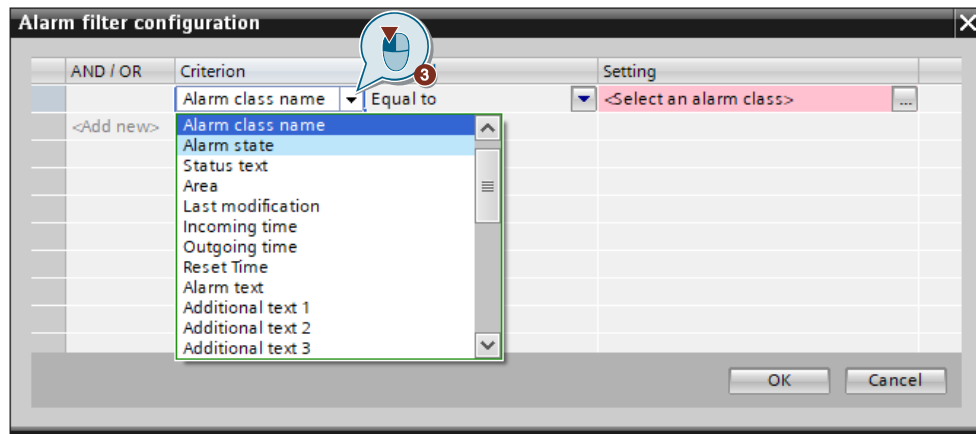
1. Open the filter settings of the Control to display specific alarms/alarm classes.
2. Add a new filter.

Figure 2-71



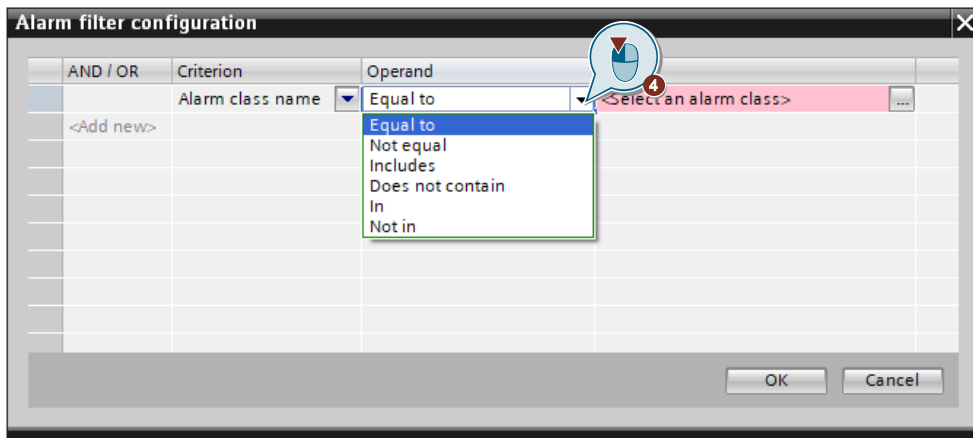
3. Set the filter criterion (e.g., "Alarm class name"). ("Criterion" column)

Figure 2-72



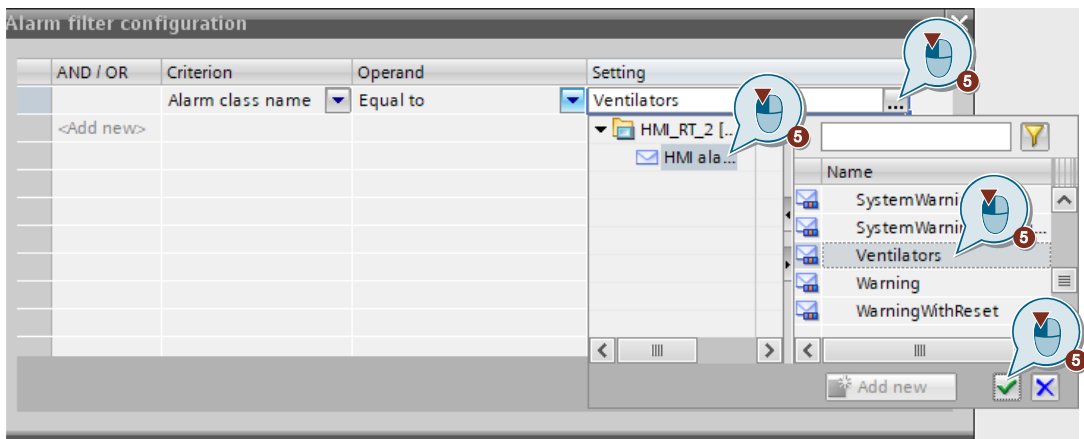
4. Set the condition/operand for checking the filter criterion (e.g., "Equal to"). ("Operand" column)

Figure 2-73



5. Select the setting for the criterion to be checked (e.g., the alarm class). ("Setting" column)

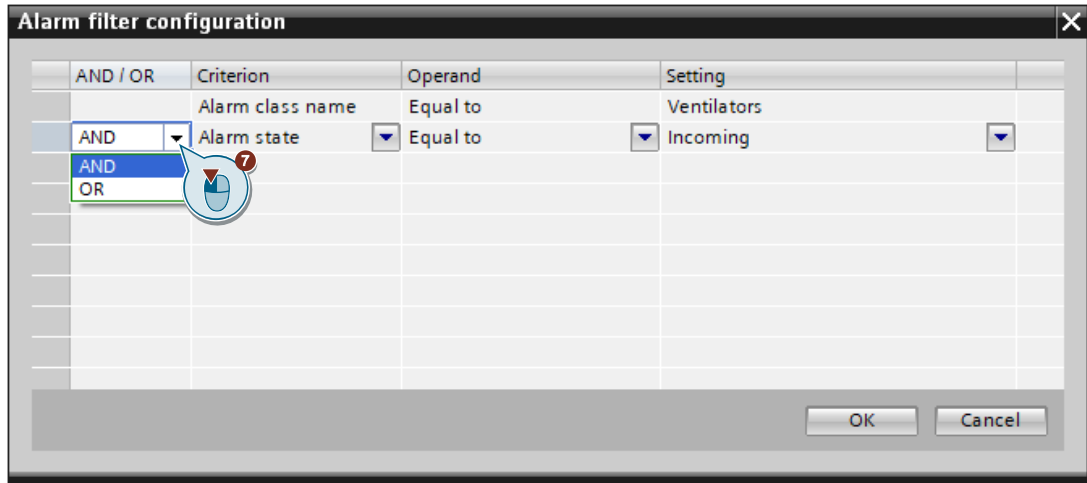
Figure 2-74



6. Repeat steps 2 - 5 if you want to add more filters.

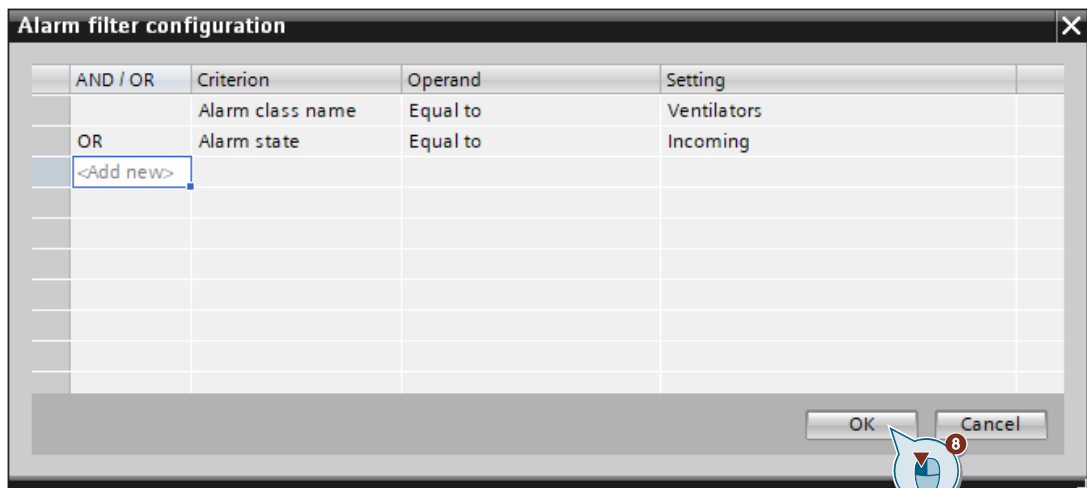
7. If you have configured several filters, a Boolean linking of the individual filters is possible. ("AND / OR" column)
  - OR A criterion linked to OR must be fulfilled
  - AND All criteria linked with AND must be fulfilled

Figure 2-75



8. Confirm the filter settings by clicking "OK".

Figure 2-76



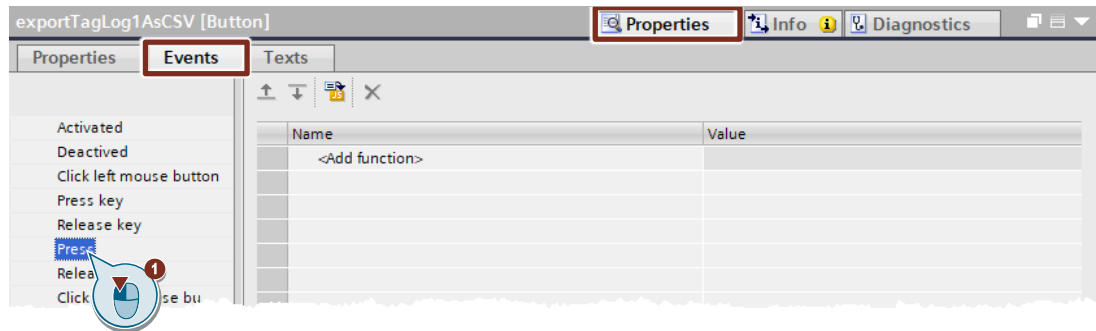
## 2.1.6 Exporting a Log as a \*.csv File

### 2.1.6.1 Using Code Snippets

#### Exporting a tag log

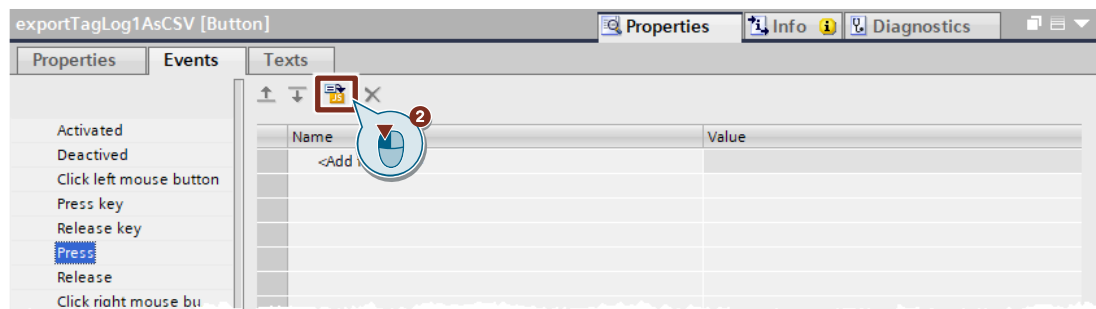
1. Open the desired event for the log export (e.g., "Press" a button).

Figure 2-77



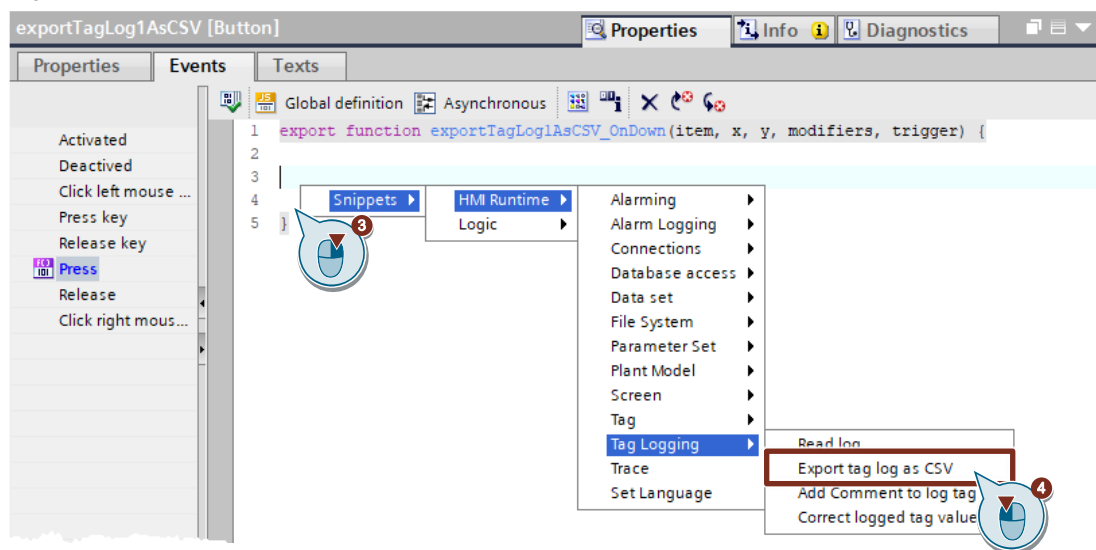
2. Click the button to convert a function list into a JS script in the function list menu bar.

Figure 2-78



3. Open the context menu for the code snippets.
4. In the "HMI Runtime" area under "Tag logging", select the code snippet "Export tag log as CSV".

Figure 2-79



A code block is added to the editor area.



5. Set the file path and name.
6. Set the start and end time for the log export.
7. Set the delimiter for the \*.csv file.

Figure 2-80

```

1 export function exportTagLogAsCSV_OnDown(item, x, y, modifiers, trigger) {
2
3 // Please note, the format of a file path is device and operating system specific.
4 // You need to adapt the given path to your environment.
5 // Example for a Unified Comfort device (Linux OS): /home/user1/data.dat
6 // Example for a Unified PC-based device (MS Windows OS): C:\Users\Public\data.dat
7 let fileName = "D:\\UnifiedArchive\\TagLogFile.csv";
8
9 let start = new Date("2021-03-24T00:00:00Z");
10 let end = new Date("2021-03-24T23:00:00Z");
11
12 let delimiter = ",";

```

8. Define the log tag and the associated data that you want to read out and write to the \*.csv file.

Figure 2-81

```

13 let csvData = "Name" + delimiter + "Timestamp" + delimiter + "Value" + delimiter + "Quality\n";
14 let tag1 = HMIRuntime.TagLogging.LoggedTags("Ventilator1Data.actualSpeed;V1.actualSpeed");
15 HMIRuntime.Trace("tag Name : " + tag1.Name);
16 let tagValue = tag1.Read(start, end, 0);
17 tagValue.then((loggedTagResult) => {
18 let error = loggedTagResult.Error;
19 let tagArray = loggedTagResult.Values;
20
21 for (let loggedTag of tagArray) {
22 csvData += tag1.Name + delimiter + loggedTag.Timestamp + delimiter + loggedTag.Value + delimiter + loggedTag.Quality + "\n";
23 }
24 }

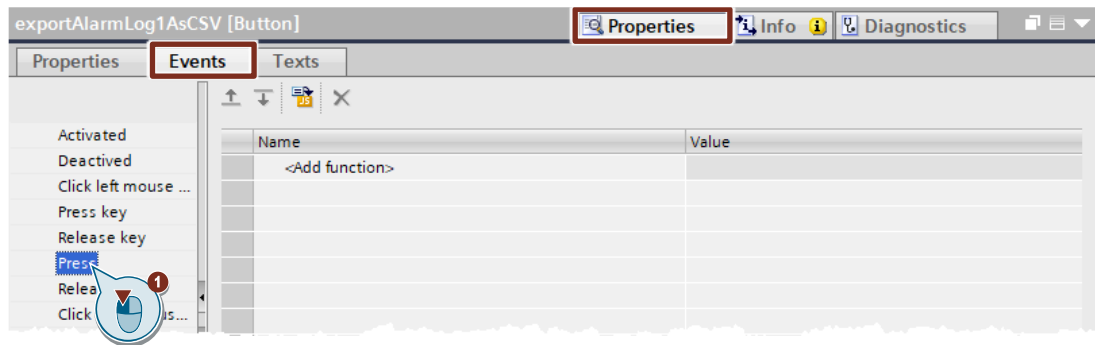
```

9. The script is designed to read out and export a log tag. Extend the code to include more log tags.

### Exporting an alarm log

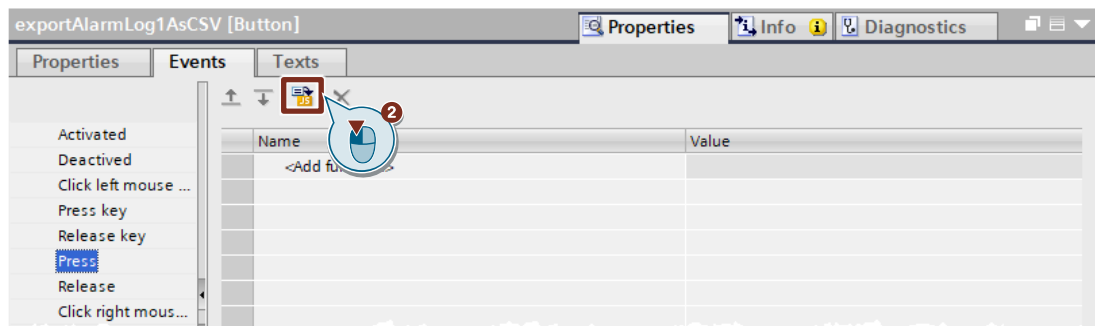
1. Open the desired event of a screen object for log export (e.g., "Press" a button).

Figure 2-82



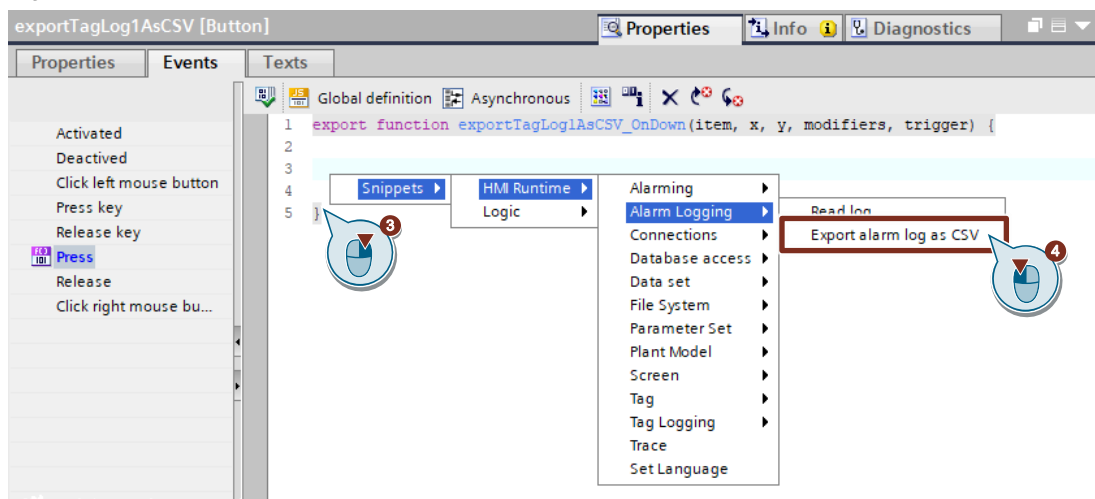
2. Click the button to convert a function list into a JS script in the function list menu bar.

Figure 2-83



3. Open the context menu for the code snippets.
4. In the "HMI Runtime" area under "Alarm logging", select the code snippet "Export alarm log as CSV".

Figure 2-84



A code block is added to the editor area.

5. Set the file path and name.
6. Set the start and end time for the log export.
7. Set the language for the exported log alarm.
8. Set the delimiter for the \*.csv file.

Figure 2-85

```

1 export function exportTagLogIAsCSV_OnDown(item, x, y, modifiers, trigger) {
2
3 // Please note, the format of a file path is device and operating system specific.
4 // You need to adapt the given path to your environment.
5 // Example for a Unified Comfort device (Linux OS): /home/user1/data.dat
6 // Example for a Unified PC-based device (MS Windows OS): C:\User\Public\data.dat
7 let fileName = "D:\\UnifiedArchive\\AlarmLogFile.csv";
8
9 let start = new Date("2021-03-24T00:00:00Z");
10 let end = new Date("2021-03-24T23:00:00Z");
11
12 let languageID = 1033;
13
14 let delimiter = ",";

```

9. Define which data you want to read out and write into the \*.csv file (e.g., "Alarm ID", "Alarm class name", "Alarm status").

Figure 2-86

```

13
14
15 let csvData = "ID" + delimiter + "AlarmClassName" + delimiter + "State\n";
16 let promise = httpRequestRuntime.AlarmLogging.Read(start, end, languageID);
17 promise.then((loggedAlarmStateArray) => {
18 for (let loggedAlarmState of loggedAlarmStateArray) {
19 csvData += loggedAlarmState.ID + delimiter + loggedAlarmState.AlarmClassName + delimiter + loggedAlarmState.State + "\n";
20 }
21 }

```

### Confirmation via Log Export

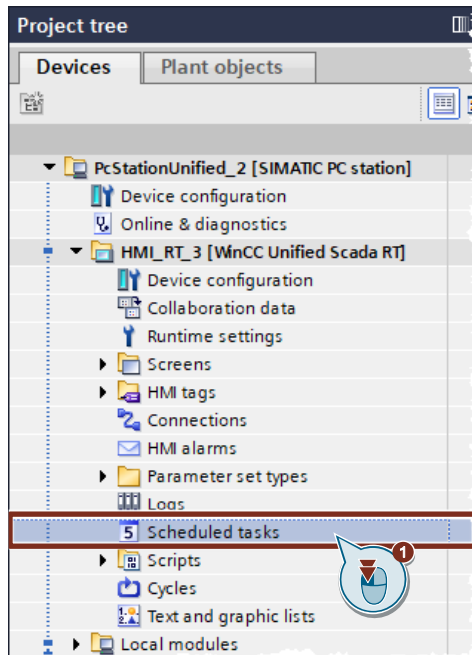
The code snippets for exporting logs use the built-in trace() function of Runtime to output errors or the status of the export. You can view them via the "RTILtraceViewer.exe" tool.

A description of how to use the tool can be found in Section [2.3.1 Using RTIL Trace Viewer](#).

2.1.6.2 Automatic Export

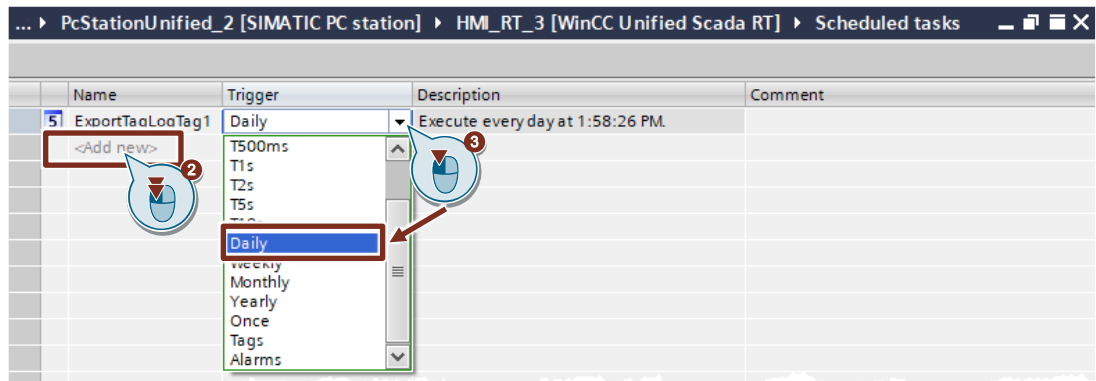
1. Open the task scheduler in the project navigation.

Figure 2-87



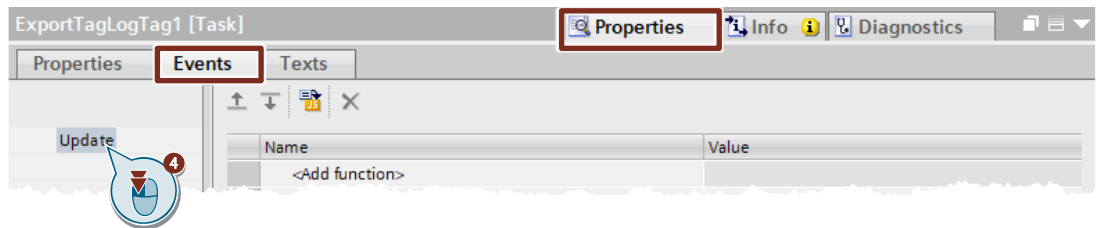
2. Add a new task with a name of your choice.
3. Select a trigger of your choice (e.g., "Daily").

Figure 2-88



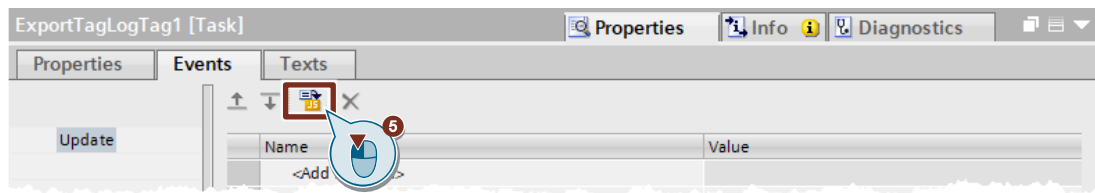
4. Open the "Update" task event.

Figure 2-89



5. Click the button to convert a function list into a JS script in the function list menu bar.

Figure 2-90

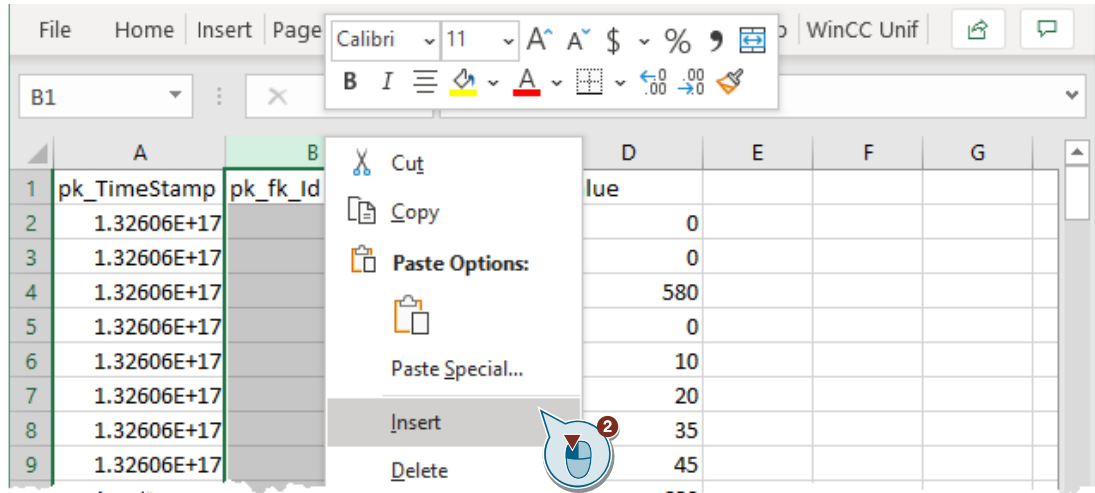


6. Create a script to export a tag/alarm log using the corresponding snippet (see Section [2.1.6.1](#)).

2.1.6.3 Convert a Timestamp in Excel

1. Open the exported log file.
2. Insert a new column.

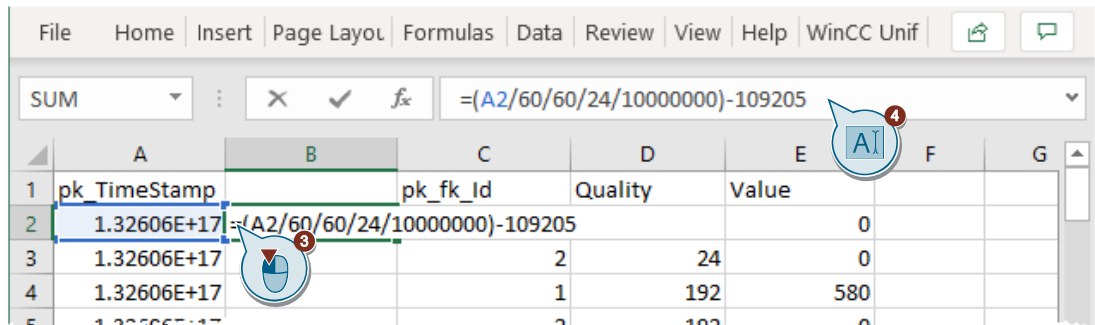
Figure 2-91



3. Select the column next to the first timestamp.
4. Enter the following formula:  

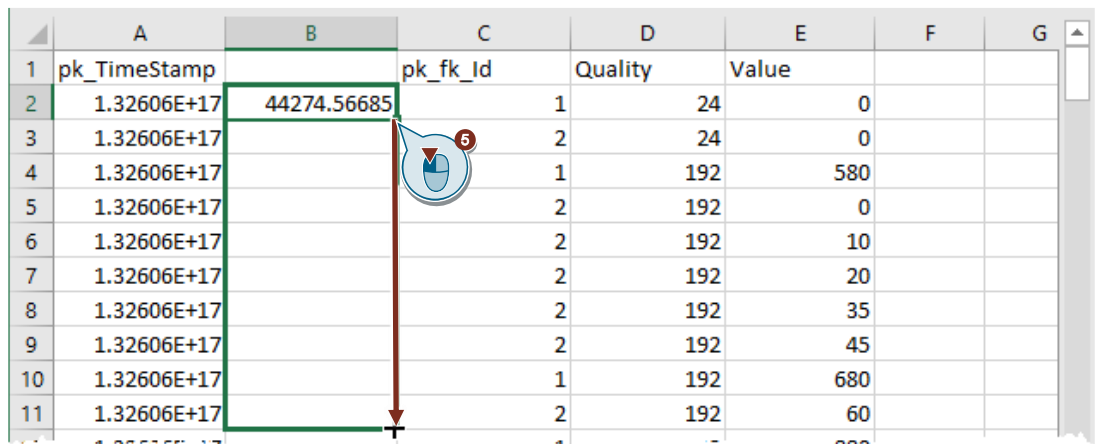
$$= (< \text{Cell name} > / 60 / 60 / 24 / 10000000) - 109205$$

Figure 2-92



5. Copy the formula to the other cells by dragging the green square.

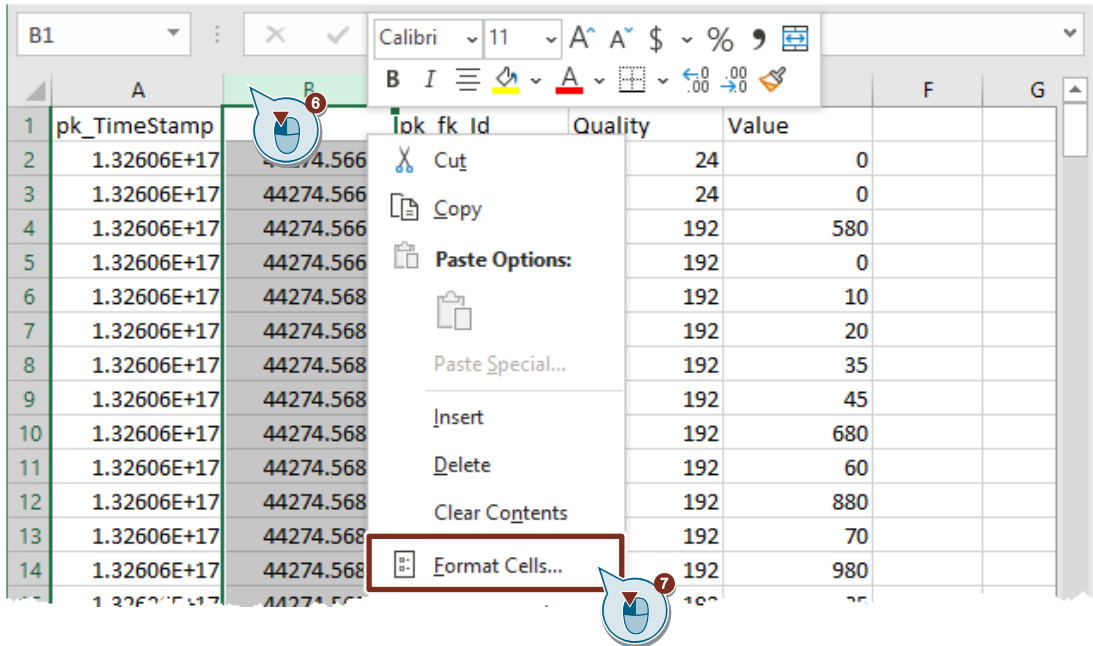
Figure 2-93



6. Select the column.

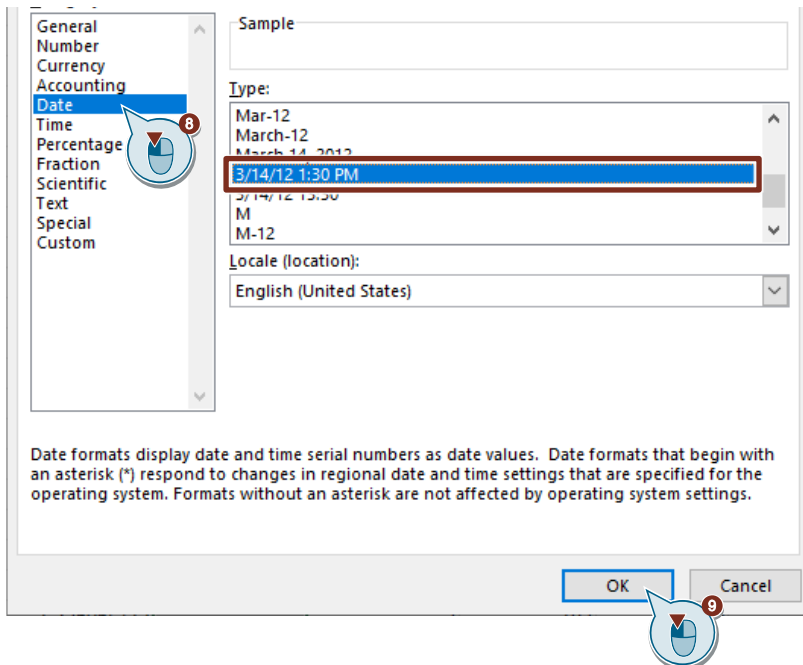
- Open the format settings of the column via the context menu "Format Cells...".

Figure 2-94



- Change the settings in the "Date" category to a date-time type (e.g., 3/14/12 1:30 PM).
- Click "OK" to confirm your input.

Figure 2-95



The timestamp is now displayed as a date-time format in UTC time.

Figure 2-96

	A	B	C	D	E
1	pk_TimeStamp		pk_fk_Id	Quality	Value
2	1.32606E+17	3/19/21 1:36 PM		1	24





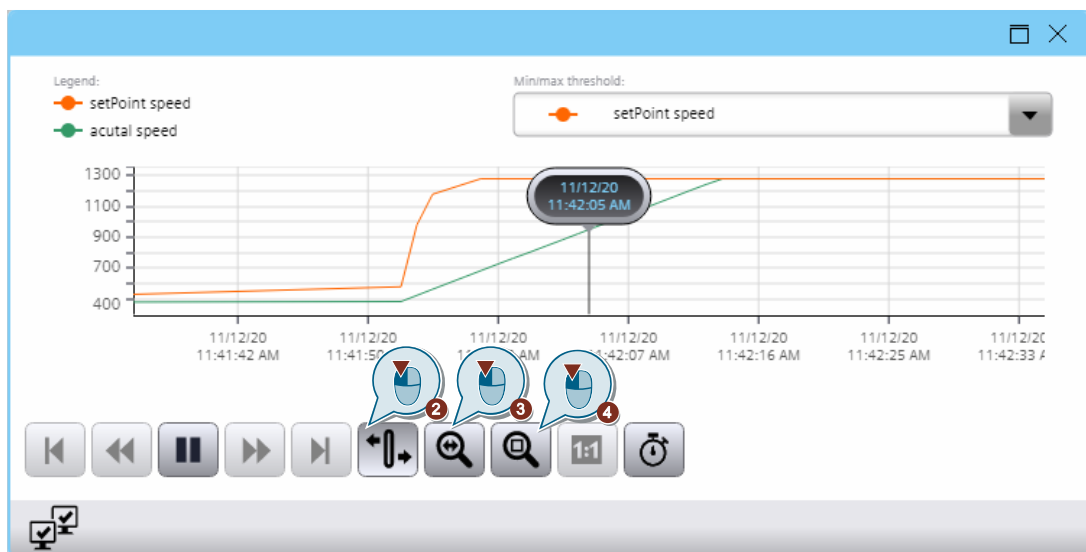
## 2.2 Operation

### 2.2.1 Displaying/Analyzing Log Tags in Trend Control

#### Displaying log tags in Trend Control

1. Open your screen with the Trend Control for the logged tags.
2. Display the ruler via the "Ruler" button.
3. Click the "Zoom areas" icon and then click in the area of the Trend Control that you want to zoom in on.
4. Click the "Original view" button to reset the zoom settings.

Figure 2-97

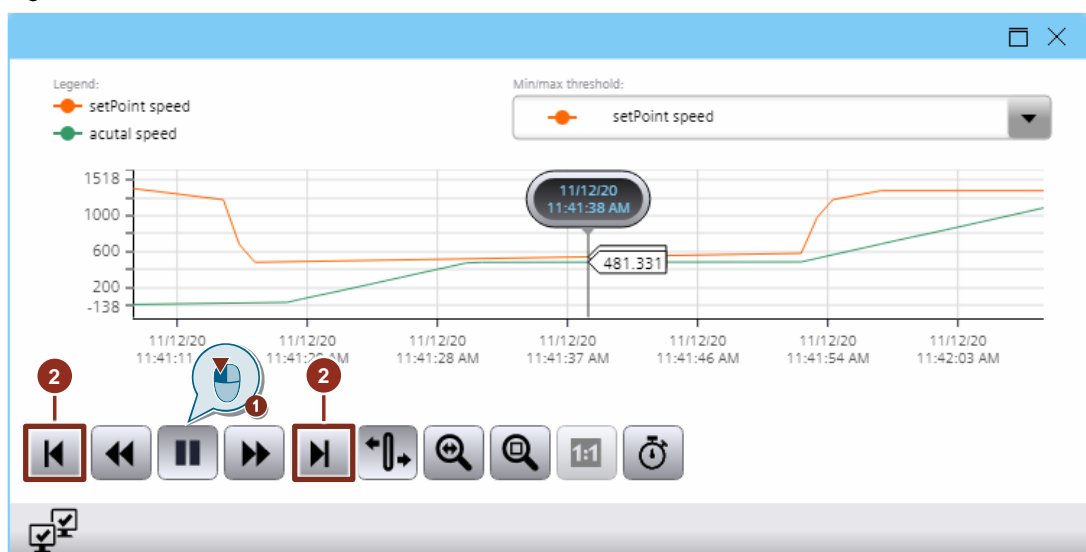


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#### Analyzing log tags in Trend Control

1. Click the "Start stop" button on the toolbar to stop updating the Trend Control.
2. View the change in the first/last data record using the buttons "First trend" and "Last trend".

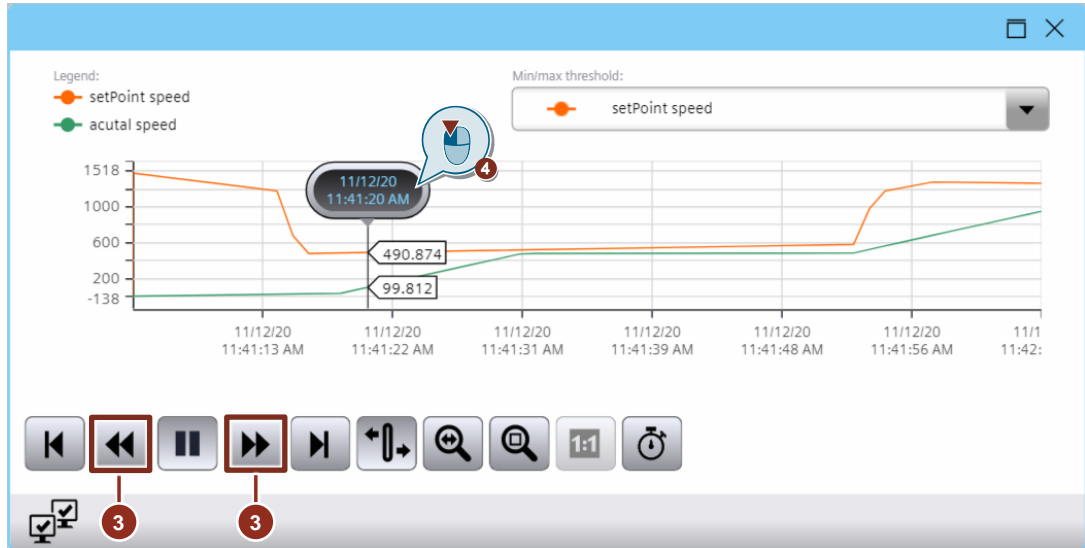
Figure 2-98



3. *Optional:* Switch between the previous/next record using the "Previous Trend" and "Next Trend".
4. Click the ruler, hold down the left mouse button, and move the ruler to the position of your choice.

The current values are displayed next to the ruler, and the current timestamp at which the ruler is located is displayed in the ruler label.

Figure 2-99



## 2.2.2 Loading/Filtering Log Alarms in Alarm Display

### Loading log alarms

1. Open the screen with the alarm display for the logged alarms.
2. Click the "Show logged alarms" button to load the current log alarms

Figure 2-100

	Alarm class	Alarm text	Alarm state	Raise time	Status text
1	Ventilators	Ventilator 1 runs with high sp	Raised	11/12/20 10:38:59 AM	Incoming
2	Ventilators	Ventilator 1 runs with Maximu	Raised	11/12/20 10:38:59 AM	Incoming
3					
4					
5					

### Updating the Alarm Display

If you have selected "logged alarms" as the alarm source in the Control settings, the alarm display is not automatically updated.

Follow these steps to update your alarm display:

1. Click the "Show and update logged alarms" button to update the log alarm.

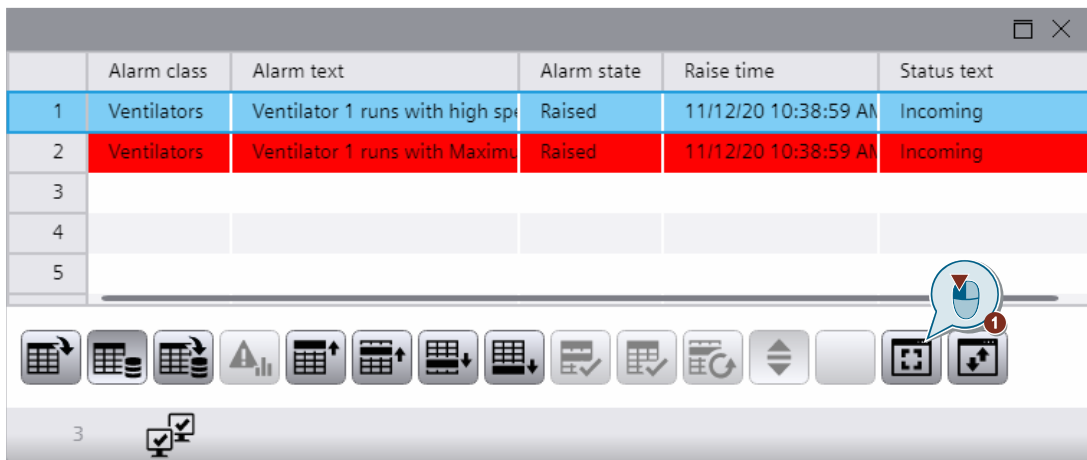
Figure 2-101

	Alarm class	Alarm text	Alarm state	Raise time	Status text
1	Ventilators	Ventilator 1 runs with high sp	Raised	11/12/20 10:38:59 AM	Incoming
2	Ventilators	Ventilator 1 runs with Maximu	Raised	11/12/20 10:38:59 AM	Incoming
3	Ventilators	Ventilator 1 runs with high sp	Raised	11/12/20 10:45:22 AM	Incoming
4	Ventilators	Ventilator 1 runs with Maximu	Raised	11/12/20 10:45:23 AM	Incoming
5					

### Changing/Configuring Filters in Runtime

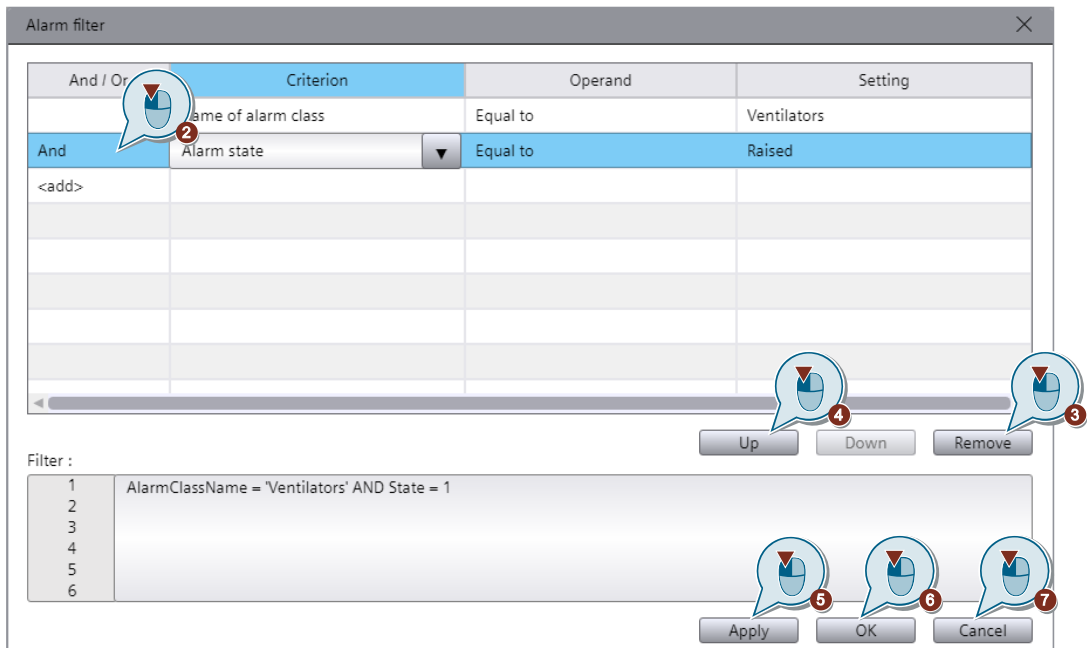
1. Click the "Selection display" button to open the filter settings.

Figure 2-102



2. Select the line of the filter and change the properties.
3. You can delete the settings via the "Remove" button.
4. You can change the order and condition by moving a criterion via the "Up" button.
5. Confirm the filter settings by clicking the "Apply" button.
6. Close the filter dialog by clicking the "OK" button.
7. You can discard the changes by clicking the "Cancel" button.

Figure 2-103



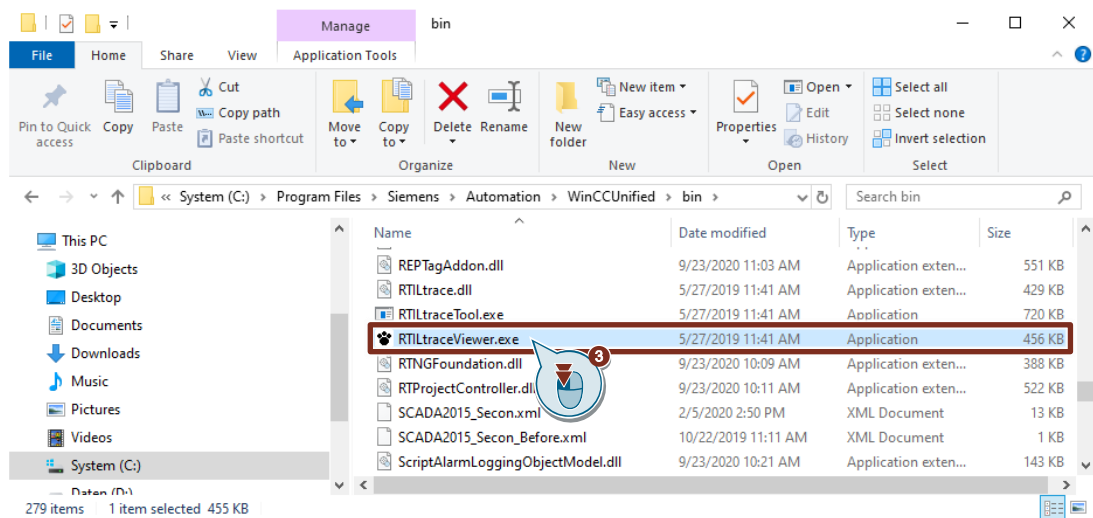
## 2.3 Troubleshooting

### 2.3.1 Using RTIL Trace Viewer

The RTIL Trace Viewer records the activities of Runtime. With this tool, it is possible to track activities of scripts.

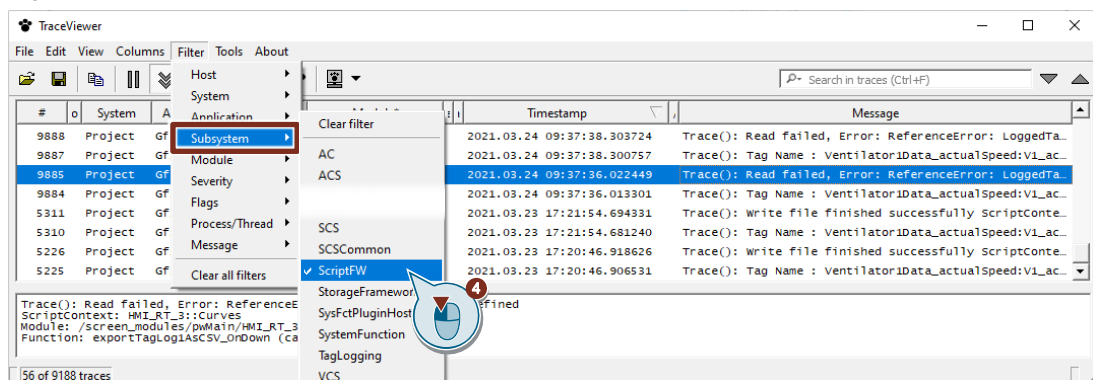
1. Open File Explorer.
2. Open the installation directory of WinCC Unified.
  - Default: C:\Program Files\Siemens\Automation\WinCCUnified
3. Start the RTIL Trace Viewer.
  - Path: <Installation directory>\bin\ RTILtraceViewer.exe

Figure 2-104



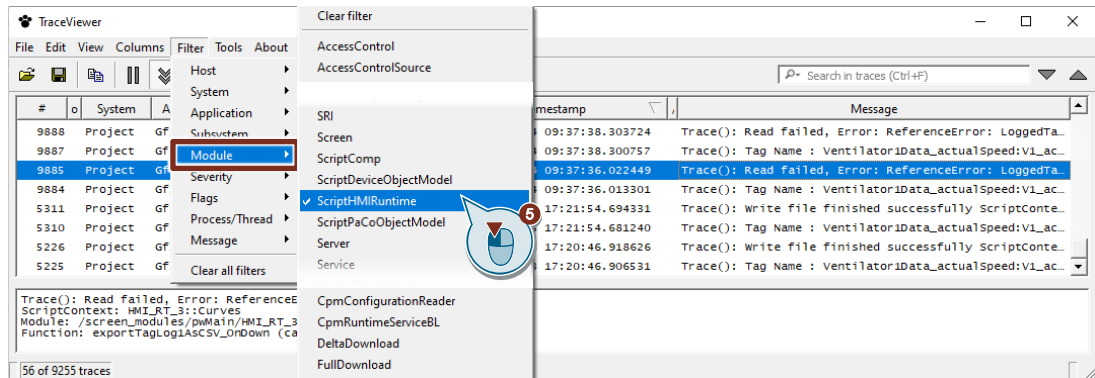
4. Set the filter to the subsystem script engine. ("Menu Bar >> Filter > Subsystem > Script FW")

Figure 2-105



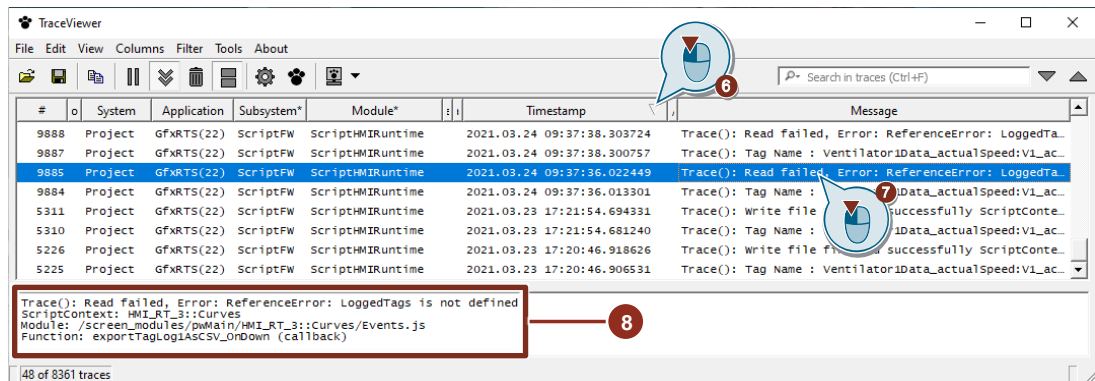
- Set the filter to the "ScriptHMIRuntime" module.  
("Menu Bar >> Filter > Module > ScriptHMIRuntime")

Figure 2-106



- Sort the list in descending order by timestamp.  
(Click column name "Timestamp")
- Open the log export alarm by double-clicking the alarm line to display more information.
- In the detail area below the alarm table, the corresponding alarm text is displayed.

Figure 2-107



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Readme

### How do I use the RTIL Trace Viewer correctly?

A detailed description with examples of how to use the "RTIL Trace Viewer" tool can be found in the application example "SIMATIC WinCC Unified – Tips and Tricks for Script Creation (JavaScript)".

<https://support.industry.siemens.com/cs/ww/en/view/109758536>

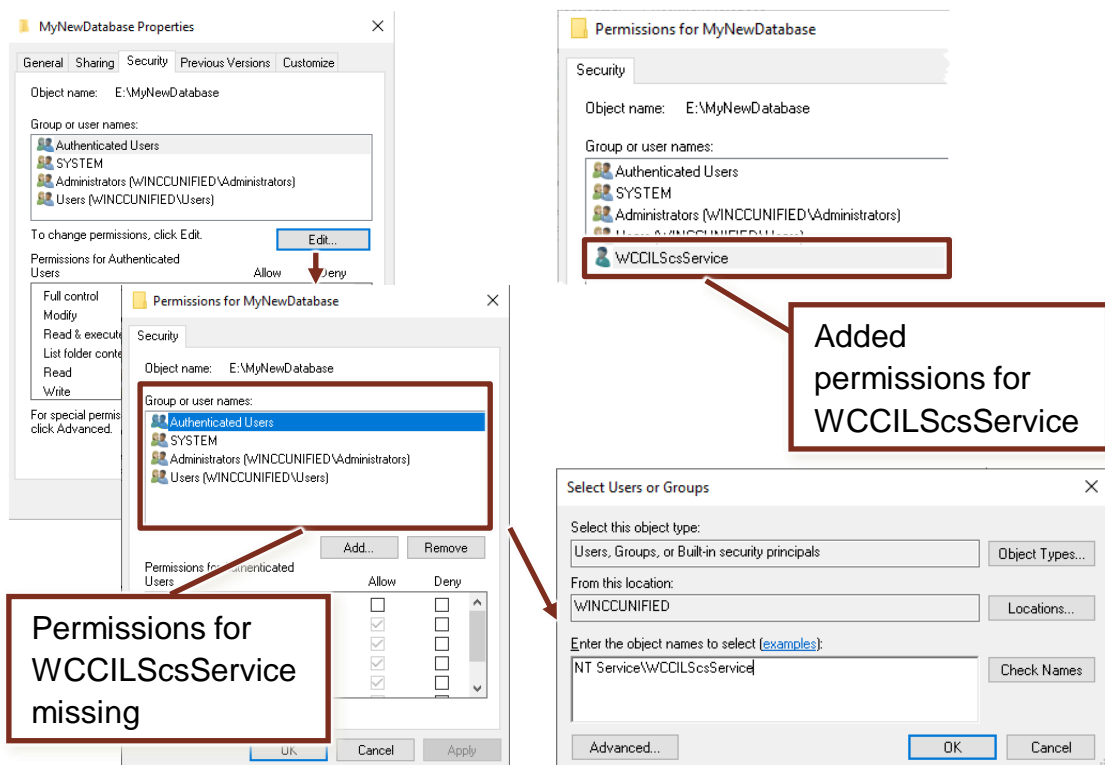
### 2.3.2 Check necessary Permissions for the Log Directory

**Note** This step is only necessary in the event of an error or if you have not configured the log directory using the "WinCC Unified Configuration" tool.

The logging of the WinCC Unified Runtime PC is controlled via the service user "NTService\WCCILScsService".

In order to smooth and ensure error-free logging, the service user requires unrestricted read and write access to the directory in which the log is stored. Therefore, check whether this person has sufficient permissions for your configured log directory (Runtime settings/storage location of the tag/alarm log).

Figure 2-108

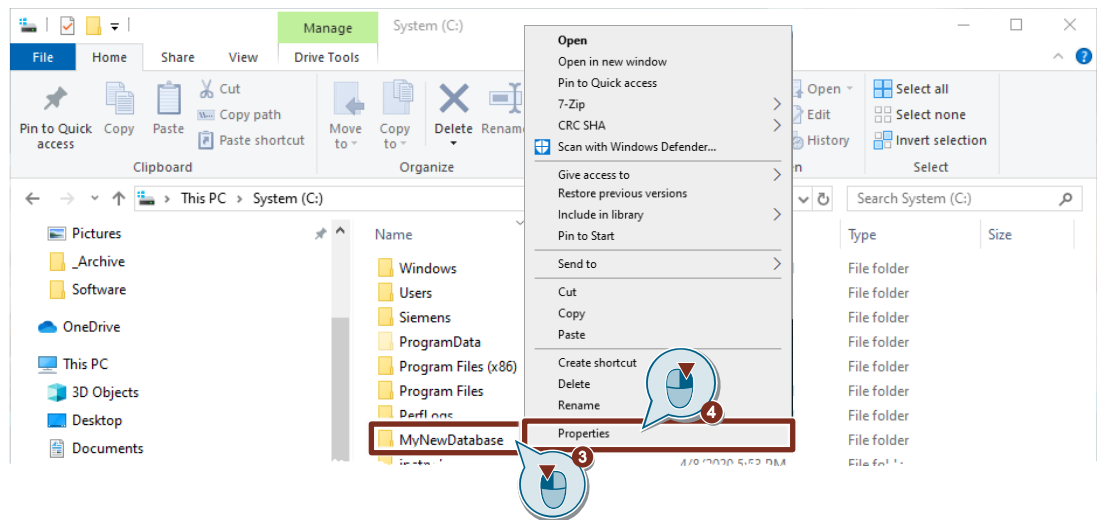


You can assign the read and write permissions for the "WCCILScsService" user with the "WinCC Unified Configuration" tool (Section 2.1.2) or manually assign them to the directory via the properties (following chapter "Manual Assignment of Write Permissions to Log Directory").

## Manual Assignment of Write Permissions to Log Directory

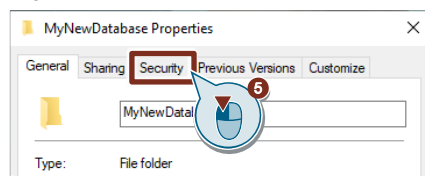
1. Open the parent directory of the desired log directory using the File Explorer (e.g., C:\)
2. Create a new folder for the log directory (e.g., myNewDatabase, ("Context menu > Add new folder"))
3. Open the corresponding shortcut menu (right-click the folder name).
4. Open the properties of the folder. ("Context menu > Properties")

Figure 2-109



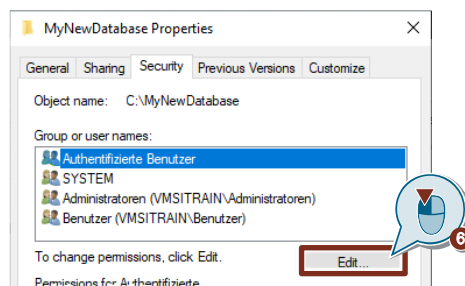
5. Click the "Security" tab.

Figure 2-110



6. Click the "Edit..." button.  
A dialog box for managing permissions opens.

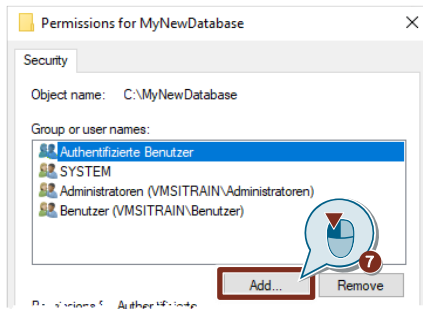
Figure 2-111





7. Click the "Add..." button to add a new permission for a group/user.

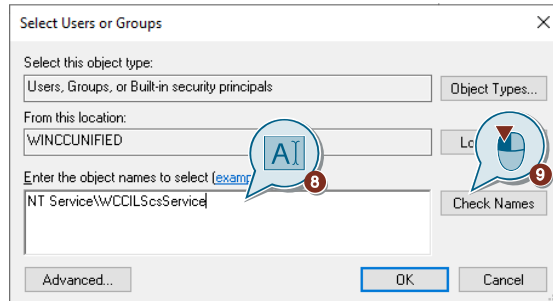
Figure 2-112



A dialog box opens for selecting users or groups.

8. Enter the service user "NTService\WCCILScsService".
9. Check the name for correctness using the "Check Names" button.

Figure 2-113



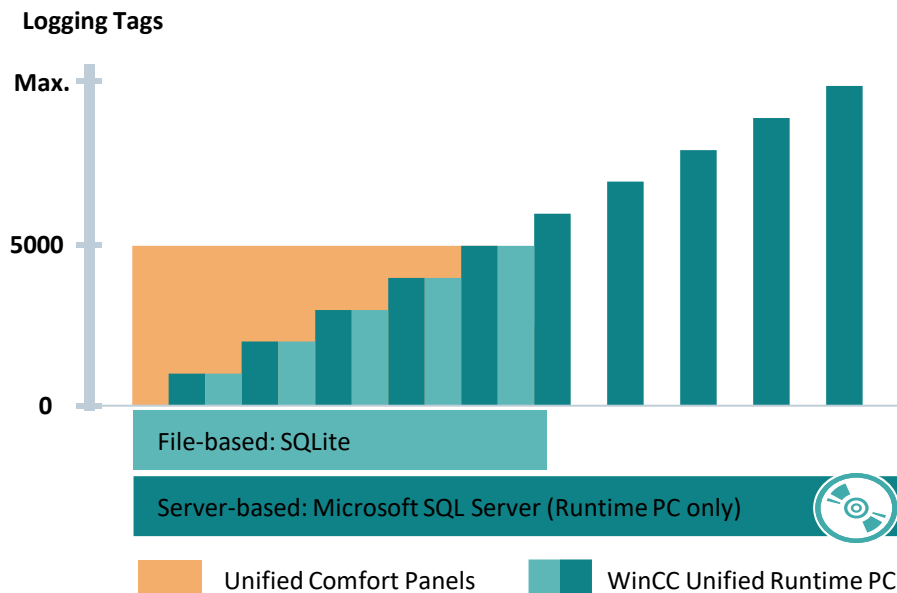
10. Click "OK" to confirm your input.

## 3 Useful Information

### 3.1 Fundamentals

#### 3.1.1 Licensing

Figure 3-1



The licensing depends on the requirements.

#### Licenses

No additional license for logging is required for the Unified Comfort Panels. You can only save the log in the database format "SQLite".

In the WinCC Unified Runtime PC, it is possible to save the log in the database formats "SQLite" and "Microsoft SQL Server". For "Microsoft SQL Server", you must purchase the SCADA option with the associated "WinCC Unified Database Storage" license.

For licensing of the logging tags, one (or more) "WinCC Unified Logging Tags" licenses is also needed.

Use the Automation License Manager (ALM) to transfer the licenses to the target system via a license server or storage device.

#### Number of logging tags

The number of logging tags can be increased by 100; 500; 1,000; 5,000; 10,000; 30,000 by purchasing additional licenses. The "Logging Tags" licenses are additive.

With SQLite, you can implement a maximum of 5000 logging tags. Microsoft SQL Server, on the other hand, is scalable to the maximum number of PowerTags.

### 3.1.2 Log/Log Segment Size

#### 3.1.2.1 Overview

The size of the log depends on the type of log (tag or alarm log) and the selected settings. In the log settings, the maximum log segment, the log size, and the time period can be defined.

The maximum log segment and log size is limited to the maximum available space of the storage device on which it is stored.

#### Calculation of log size

The size of a log is the sum of the storage requirements of all log segments together.

$$Size\ log_{total} = \sum_{1}^n Size\ log\ segment_n$$

$n = \text{Number of segments}$

The size of a log segment results from the number of entries and their size as well as the offset, which is stored for each log segment.

$$Size\ log\ segment = Offset_{segment} + \sum_{1}^m Size\ entry_m$$

$m = \text{number of entries}$

#### Calculation of segment size

**Note**

For SQLite, the segment size of a log is always an integer multiple of 4 MB. So, if you configure a segment size of 7 MB, the actual segment size is 8 MB.

For MS SQL, the smallest segment size of the log is 3 MB.

#### Offset of log segment

The offset for a segment results from additionally stored information on the property parameters, such as the max. segment size. Depending on the database type, more (Microsoft SQL Server) or less (SQLite) additional information is stored for the segment. Therefore, this is also different in size.

#### Size of log entries

The size of a data entry is determined by the logging settings and the data type of the log tag. The size of the log entry is determined by the logging settings and the properties of the alarm to be logged, such as the length of the alarm text.

### 3.1.2.2 Tag logging

During tag logging, the individual tag values are written with a timestamp to the current log segment.

#### Offset per log segment

Depending on the database type, the following values result for the offset per log segment when logging tags.

- SQLite: ~ 0.5 MB
- Microsoft SQL Server: ~ 5.0 MB

#### Log tag entry size

The size of the entry of a log tag is largely determined by the data type. Depending on the data type, the following memory requirements result:

- 32bit value; e.g., Bool, Int, LReal, etc. ~ 80 bytes/entry
- 64bit value; e.g., LInt, DateTime, LTime, etc. ~ 106 bytes/entry
- Text value (arbitrary length); e.g., WString, WChar: ~ 586 bytes/entry

### 3.1.2.3 Alarm Logging

During alarm logging, the individual alarms with a timestamp and alarm text are written to the current log segment. Depending on the logging languages configured in the Runtime settings, the alarm texts are logged in different languages.

#### Offset per log segment

Depending on the database type, the following sizes result in the offset per archive segment when logging alarms.

- SQLite: not significant
- Microsoft SQL Server: ~ 3.5 MB

#### Log alarm entry size

Figure 3-2



The size of a log alarm entry is largely determined by a fixed size per alarm entry, a size per language entry, and the number of languages to be logged, as well as the size of the stored alarm texts.

The size can be estimated as follows:

$$\begin{aligned}
 \text{Size Message entry}_{\text{segment}} &= \text{basic size entry} \\
 &+ (\text{Size Language entry} * \text{Number of logging languages} - 1) \\
 &+ \text{size of all alarm texts}
 \end{aligned}$$

#### Entry base size

The base size defines the size of an alarm entry without alarm text. The size depends on the database type and is fixed:

- SQLite: ~ 0.3 MB
- Microsoft SQL Server: ~ 2 MB

#### Size of language entry and number of logging languages

For each additional logging language, a log entry expands by the size of a language entry. The total size is therefore dependent on the number of logging languages and the size of a language entry.

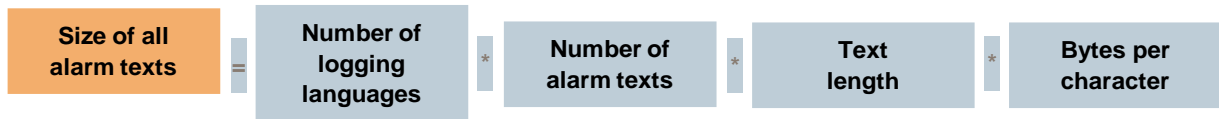
The total size is only taken into account if an alarm is logged in more than one language.

The size of the language entry depends on the database type and is:

- SQLite: ~ 0.1 MB
- Microsoft SQL Server: ~ 0.2 MB

### Size of all alarm texts

Figure 3-3



The size resulting from the alarm texts is calculated from the number of logging languages, the number of alarm texts, the number of characters in the alarm text, and the number of bytes per character.

The size can be estimated as follows:

$$\begin{aligned} \text{Size of all alarm texts of an entry} \\ &= \text{number of logging languages} * \text{number of alarm texts} * \text{text length} \\ &\quad * \text{bytes per character} \end{aligned}$$

#### Number of logging languages

This parameter includes the numerical number of logging languages activated in the Runtime settings.

#### Number of alarm texts

This parameter includes the numerical number of configured alarm and additional texts.

#### Text length

This parameter includes the number of characters of an alarm/additional text.

The text length can vary between the individual alarm/additional texts, as well as the texts in the individual logging languages. For simplification, the text with the most characters can be used for the rollover calculation.

A separate calculation of text length depending on language and type of text is also possible.

#### Bytes per character

This parameter includes the number of bytes per character. This depends on the language and the database type. Rule:

- SQLite: ~ 1 byte
- Microsoft SQL Server: ~ 2 bytes

Symbols may require more memory.

### 3.1.3 SQLite vs. Microsoft SQL Server

Table 3-1

Name	SQLite	Microsoft SQL Server
Primary database model	Relational DBMS	Relational DBMS
Developer, launch year	Dwayne Richard Hipp, 2000	Microsoft, 1989
License	Open source	Commercial
Implementation language	C	C++
Server operating systems	Serverless	Microsoft, Linux
Official website	<a href="http://www.SQLite.org">www.SQLite.org</a>	<a href="http://www.microsoft.com/en-us/SQL-server">www.microsoft.com/en-us/SQL-server</a>
Server-side scripts	No	Transact SQL, .NET languages, R, Python and Java (with SQL Server 2019)
Authorization concept	No	User authorization concept according to SQL standard
Availability	Comfort Unified Panels WinCC Unified Runtime PC	WinCC Unified Runtime PC
Logging Tags	Up to 5,000	Max. PowerTags

### 3.1.4 Performance Features

Table 3-2

Name	Unified Comfort 7-12"	Unified Comfort 15-22"
Number of logs	50	50
Number of log tags, SQLite	5000	5000
Number of log tags, Microsoft SQL	-	-
Number of entries per log (incl. all log segments)	500,000	500,000

Table 3-3

Name	WinCC Unified Runtime PC
Number of logs	1000
Number of log tags, SQLite	5000
Number of log tags, Microsoft SQL	Max. number of PowerTags (depending on "Logging Tags" license)
Number of entries per log (incl. all log segments)	500,000
Number of entries per second	30,000

## 3.2 Tips & Tricks for Log Configuration

### 3.2.1 General

The logging is limited by the read/write speed and the size of the storage device. Therefore, select a suitable storage device.

#### Influence writing cycle

Depending on the logging mode, each log has its own write cycle. Therefore, it is recommended to store logs on different storage devices depending on the write cycle.

Additionally, separate slow and fast logging and store them separately on different storage devices.

For fast logging, SSD hard disks are best, for slow logging you can also use HDD hard disks.

#### Required memory

The storage requirements of a log can be estimated via the configuration of the log and the projected data points. This allows the maximum size of a log segment/log size to be determined and, therefore, the necessary storage requirements. How to estimate the size of a log segment/log is described in Section [3.1.2](#).

#### Prevent data loss

In the event of power failures, a UPS is recommended for the PC station, as failure to close and disconnect the database correctly may result in data loss, or in the worst case, destruction of the database.

If a storage device is removed without first stopping logging, this also leads to data loss, or in the worst case to the destruction of the database.

The in-memory buffer of WinCC Unified is 8 MB if the storage device is temporarily not available.

#### Availability data

If the configured size or the defined period of a segment is reached, the old segment data is deleted. This affects what data is available for analysis in Runtime.



### 3.2.2 Configuration

- Fast values trigger/cycle-dependent in own logs
  - Separate logs for different write cycles, so each log has its own write cycle  
→ Allows performance to be achieved
  - Logs with high write cycles fill faster, so segments are backed up and deleted sooner.  
→ For mixed values, the slow values are also no longer available for immediate display.  
→ If the user wants to retrieve this data, segments from the Backup can be restored.
- Separate slow values from fast values
  - Logs with longer write cycles grow more slowly, so the logged data is available in Runtime for a longer time. They are backed up and deleted less often.

### 3.2.3 Log/Log Segment Size

For the size of logs and log segments, the following applies:

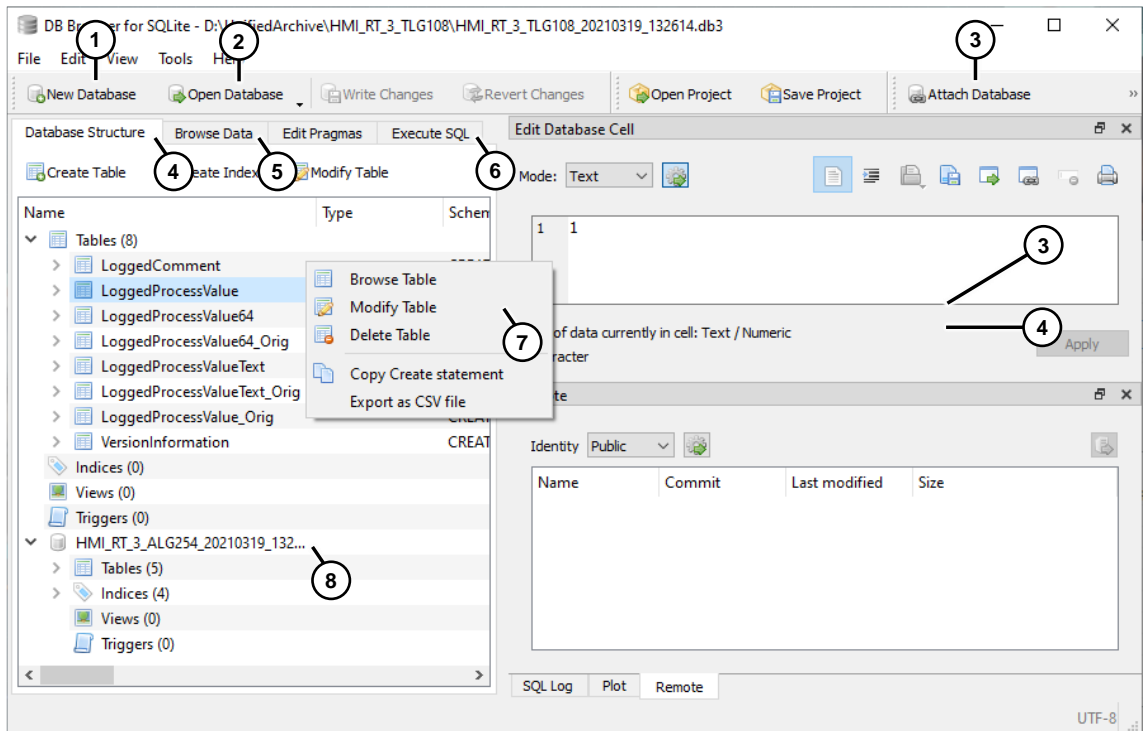
- Larger segments are backed up less frequently, but require more time to back up.  
→ Logged data is available in Runtime for a longer time.
- A maximum of 5000 segments can be active (online) during system runtime.
- With SQLite, the limit for log and segment size is limited by the underlying file system.
- For a database, the memory requirement should be at least the configured size of the database + 1x segment size (to allow for active backup).
- The free available space on an HDD should be at least 3x the segment size.

### 3.3 Access via "DB Browser for SQLite"

#### 3.3.1 Overview

With the program "DB Browser for SQLite" it is possible to view, evaluate, modify and extend the existing logs of the database type "SQLite" and to export them as \*.csv file independently of the WinCC Unified Runtime.

Figure 3-4



- ① Create new database

④ Database Structure View

⑦ Context menu table
- ② Open existing database

⑤ Data view

⑧ Added databases
- ③ Add database

⑥ Execute SQL commands

#### 3.3.2 Download

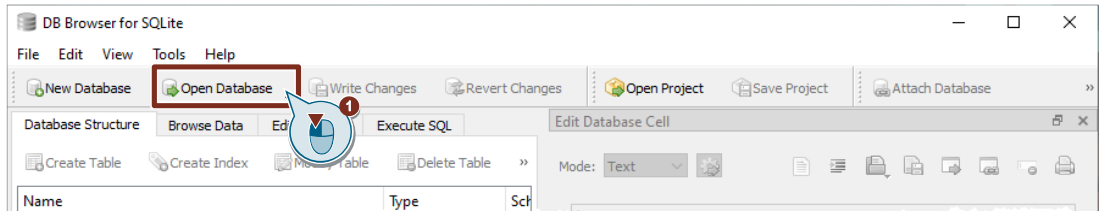
The "DB Browser for SQLite" program is not supplied with WinCC Unified Engineering/Runtime. You can download the current version free of charge from the following website:  
<https://SQLitebrowser.org/>

### 3.3.3 Log Access

#### Open log database

1. Open the desired archive database via the "Open Database" button.

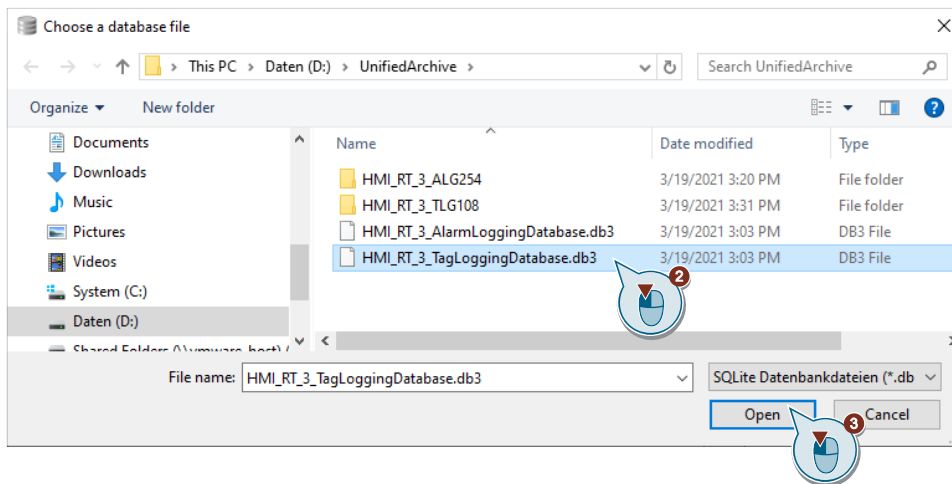
Figure 3-5



A dialog box opens for selecting the database.

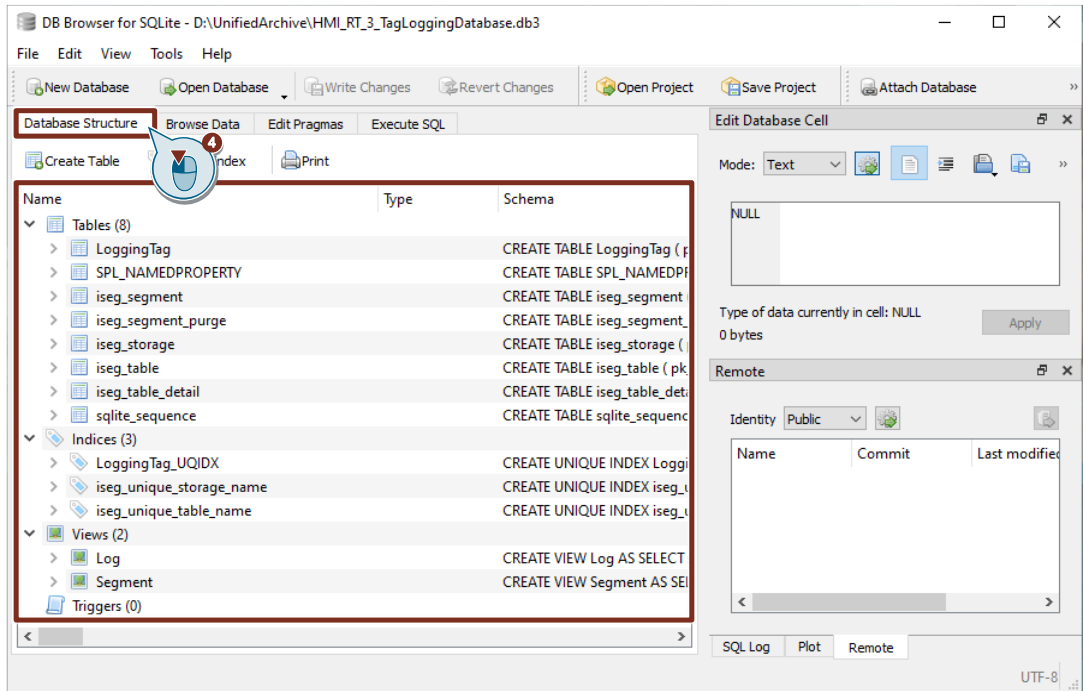
2. Select the desired tag/alarm log.
3. Confirm your selection by clicking the "Open" button.

Figure 3-6



- The selected database is displayed with its associated tables and indexes in the Database Structure View.

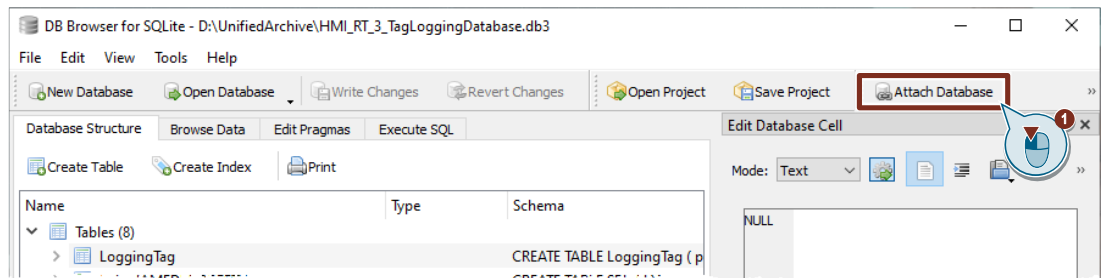
Figure 3-7



### Add log database

1. Use the "Attach Database" button to add a database of a tag/alarm log.

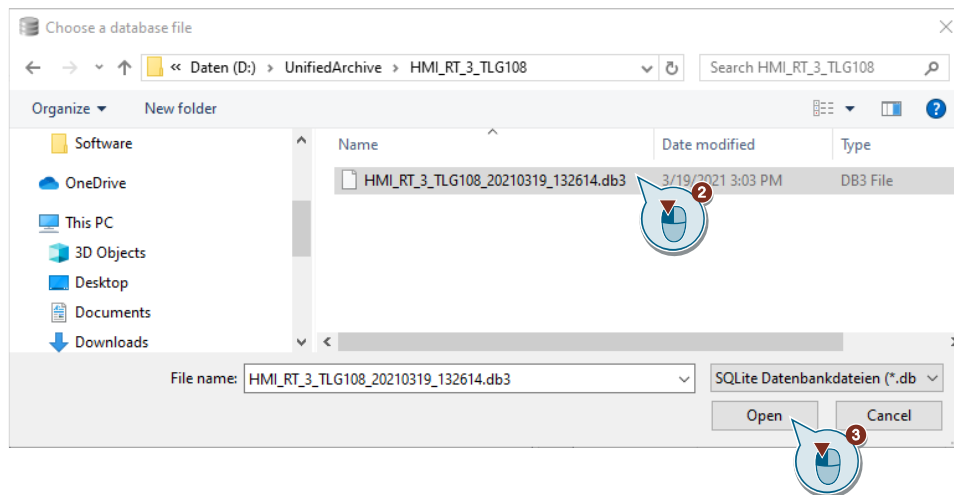
Figure 3-8



A dialog box opens for selecting the database.

2. Select the desired tag/alarm log.
3. Confirm your selection by clicking the "Open" button.

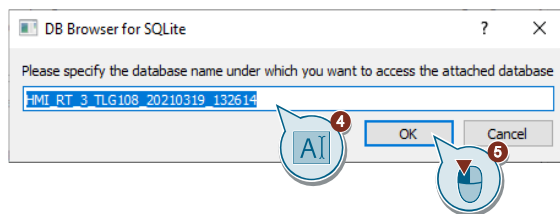
Figure 3-9



A dialog box for assigning names is displayed.

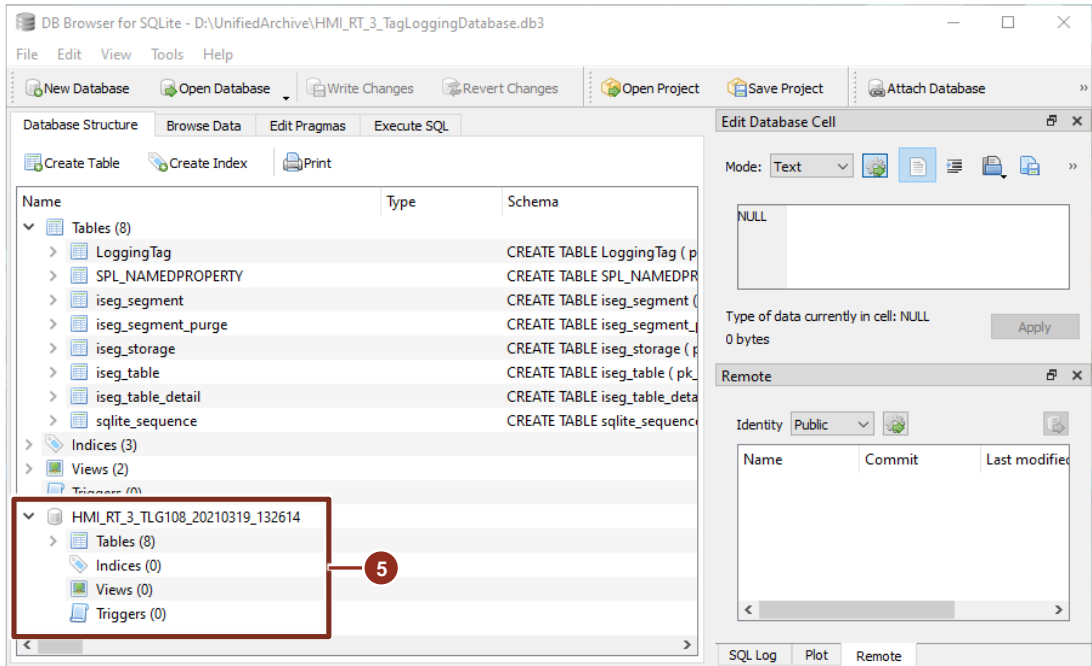
4. Assign a name or keep the existing name of the database.
5. Click "OK" to confirm your input.

Figure 3-10



- The selected database is added to the open database and displayed in the Database Tree view.

Figure 3-11

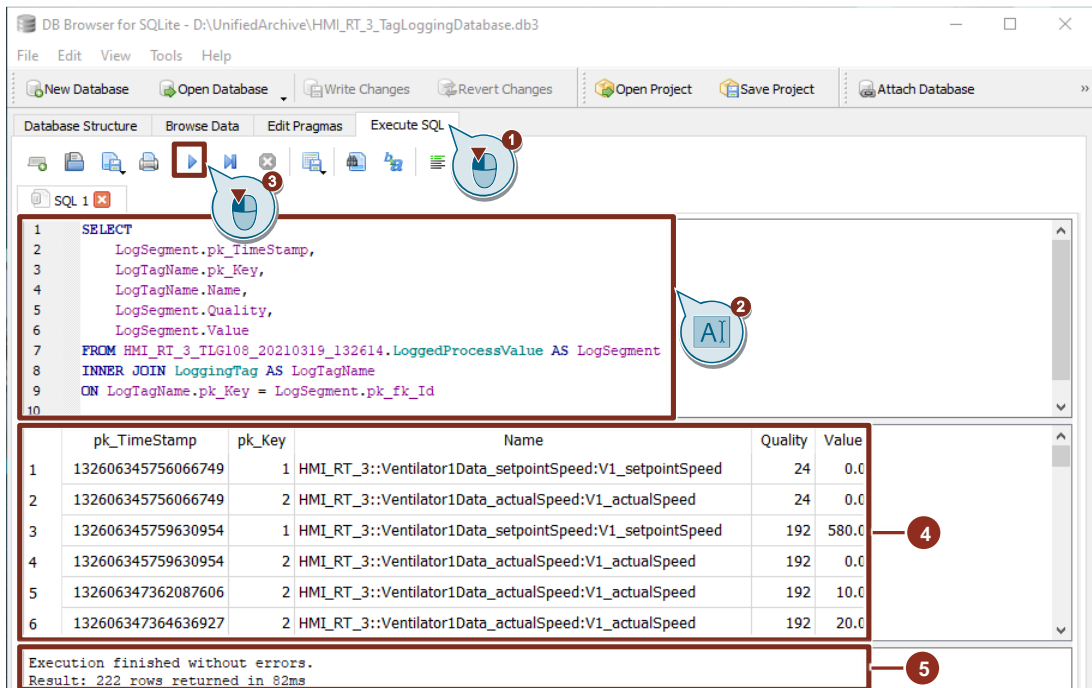


### 3.3.4 SQL Queries and Export of a \*.csv File

With SQL queries, you can individually link tables and data and then export them.

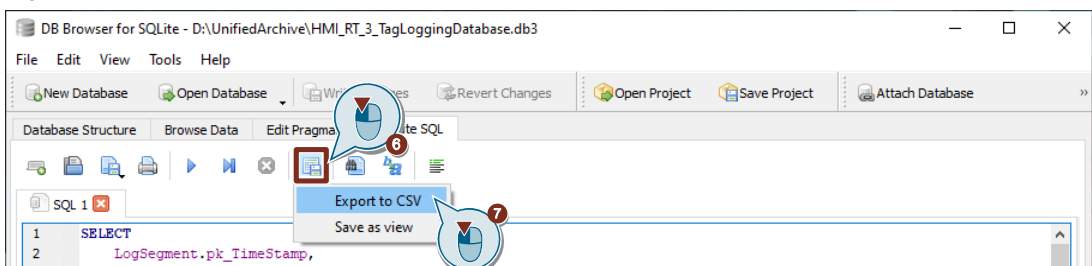
1. Switch to the input area for SQL queries via the "Execute SQL" tab.
2. Enter the desired SQL query in the input area.  
→ Examples can be found in the Section [3.3.5](#).
3. Execute the SQL query via the "Start" button.
4. The result is displayed below the query.
5. You can find the status of the SQL query under the results area. In case of faulty SQL queries, the error code is displayed there.

Figure 3-12



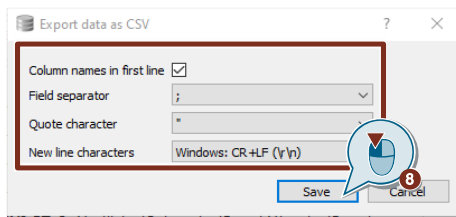
6. Open the memory settings via the corresponding button in the menu bar.
7. Click "Export to CSV" to save the result as a \*.csv file.

Figure 3-13



- Specify the settings for the export and confirm the entry using the "Save" button.

Figure 3-14





### 3.3.5 Examples of SQL Queries

#### 3.3.5.1 SQL Query for Joining Tables "LoggedProcessValue" and "LoggingTag"

With this SQL query, you can connect the specified data from the table "LoggedProcessValue" of a log segment (database for tag log) with the data from the table "LoggingTag" (main database tag logging) .

Data from table "LoggedProcessValue":

- LogSegment.pk\_TimeStamp
- LogSegment.Quality
- LogSegment.Value

Data from table "LoggingTag":

- LogTagName.pk\_Key
- LogTagName.Name

#### SQL query

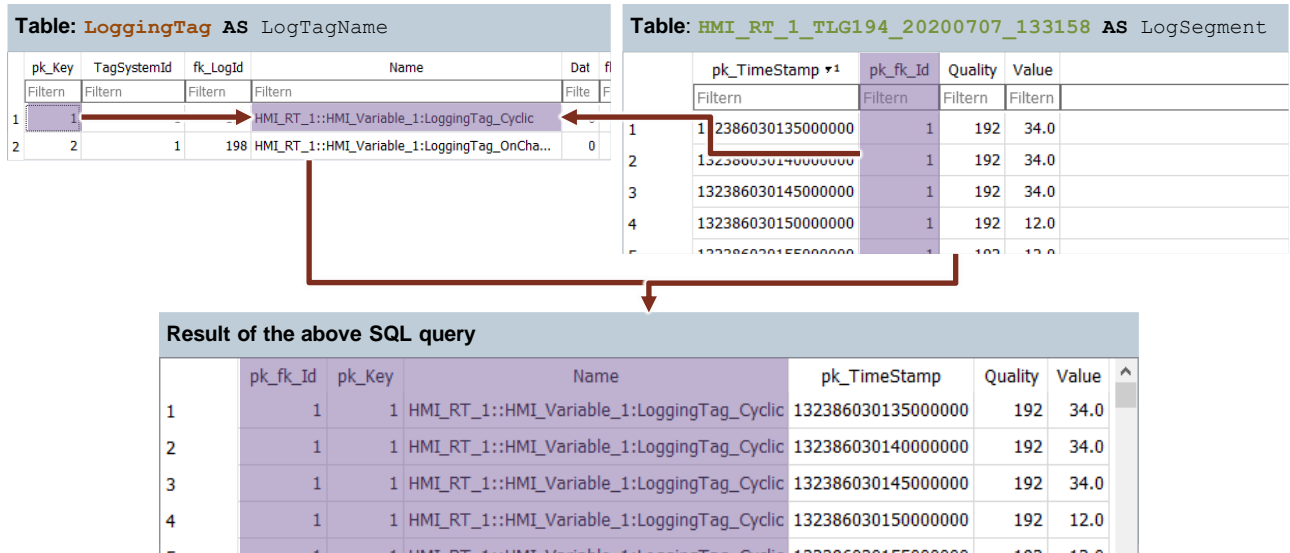
```
SELECT
    LogSegment.pk_TimeStamp,
    LogTagName.pk_Key,
    LogTagName.Name,
    LogSegment.Quality,
    LogSegment.Value
FROM <Name of log segment>.LoggedProcessValue AS LogSegment
INNER JOIN LoggingTag AS LogTagName
ON LogTagName.pk_Key = LogSegment.pk_fk_Id
```

**Result in DB Browser**

The query is exemplified by the following log segment:

- Log segment: HMI\_RT\_1\_TLG194\_20200707\_133158

Figure 3-15



### 3.3.5.2 SQL Query to Display Readable Timestamp and Quality Code

With this SQL query, you can connect the specified data from the table "LoggedProcessValue" of a log segment (tag log database) with the data from the table "LoggingTag" (main tag log database).

The query also contains a conversion of the timestamp into local time (PC system) and the quality code into hex format.

Data from table "LoggedProcessValue":

- LogSegment.pk\_TimeStamp
- LogSegment.Quality
- LogSegment.Value

Data from table "LoggingTag":

- LogTagName.pk\_Key
- LogTagName.Name

#### SQL query

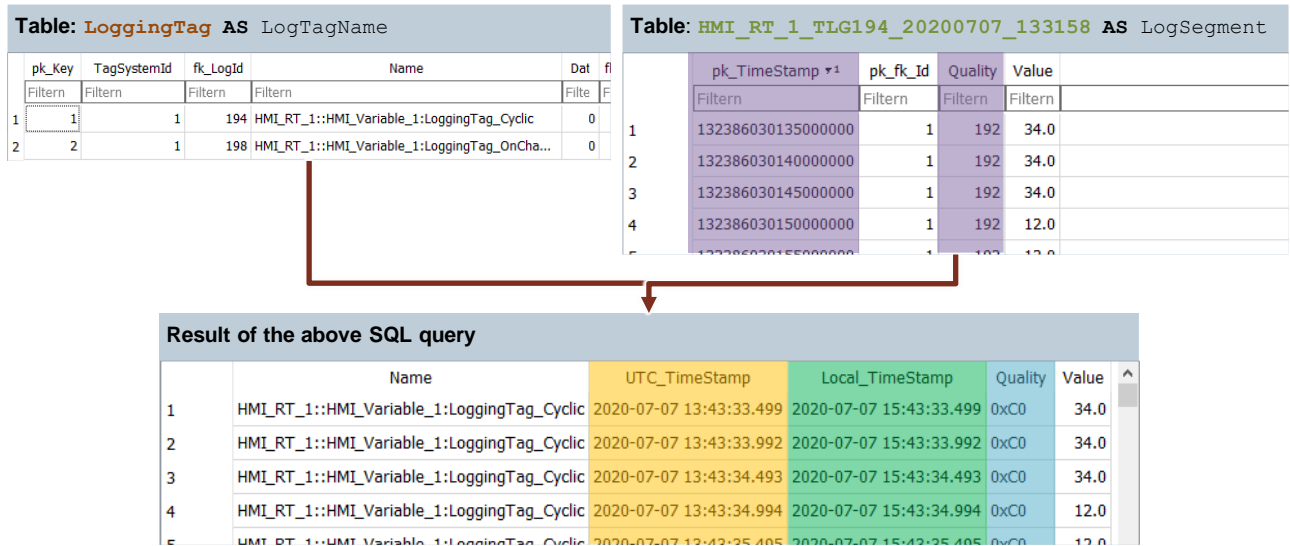
```
SELECT
    LogTagName.Name,
    strftime('%Y-%m-%d %H:%M:%f', ((("pk_TimeStamp"/86400/1.0E+7) -
    134774)*86400), 'unixepoch') AS UTC_TimeStamp,
    strftime('%Y-%m-%d %H:%M:%f', ((("pk_TimeStamp"/86400/1.0E+7) -
    134774)*86400), 'unixepoch', 'localtime') AS Local_TimeStamp,
    printf('0x%X', LogSegment.Quality ) AS QualityCode,
    LogSegment.value,
FROM <Name of log segment>.LoggedProcessValue AS LogSegment
INNER JOIN LoggingTag AS LogTagName
ON LogTagName.pk_Key = LogSegment.pk_fk_Id
```

**Result in DB Browser**

The query is exemplified by the following log segment:

- Log segment: HMI\_RT\_1\_TLG194\_20200707\_133158

Figure 3-16

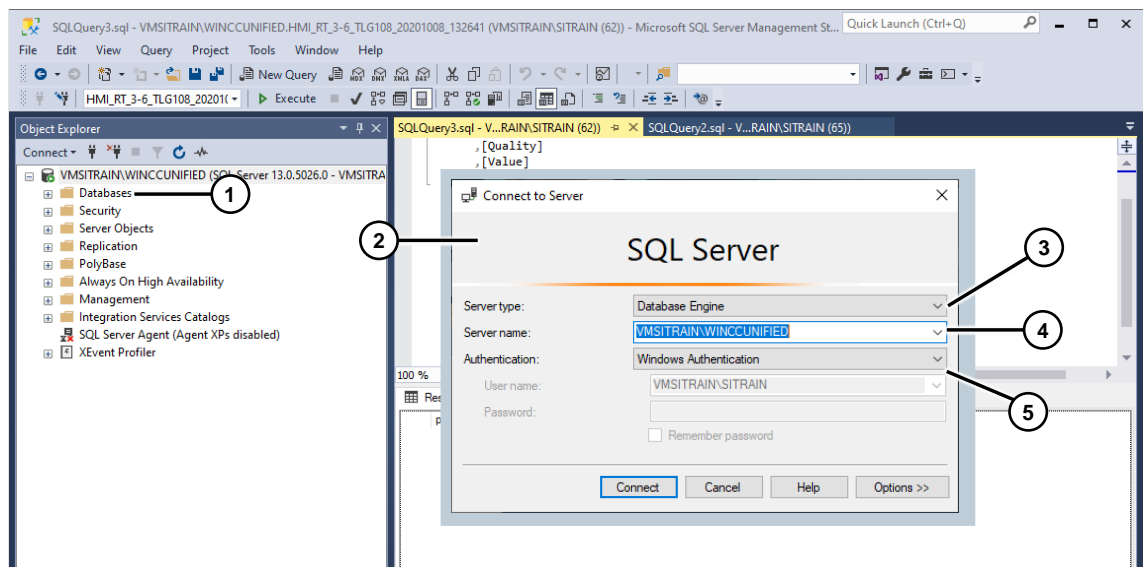


### 3.4 Access via the "Microsoft SQL Server Management Studio"

#### 3.4.1 Overview

With the program "Microsoft SQL Server Management Studio (SSMS)", it is possible to view and evaluate existing logs of the database type "Microsoft SQL Server" independently of the WinCC Unified Runtime.

Figure 3-17



- ① Databases
- ② Login dialog
- ③ Server type
- ④ Server name
- ⑤ Authentication parameters

#### 3.4.2 Download

The "Microsoft SQL Server Management Studio" program is not supplied with WinCC Unified Engineering/Runtime or the SCADA option "Database Option".

You can download the current version free of charge from the Microsoft website:

<https://docs.microsoft.com/en-us/SQL/ssms/download-SQL-server-management-studio-ssms?view=SQL-server-ver15>

### 3.4.3 Log Access

After start of the "Microsoft SQL Server Management Studio" program, the following parameters must be entered:

- Server type  
→ Select "Database Engine" as the server type in order to view the log databases of WinCC Unified.
- Server name  
→ The server name is:            <computer name>WINCCUNIFIED
- Authentication parameters
  - Type  
→ Select Windows Authentication in order to connect to the database with the current Windows user.
  - Username  
→ The username is:            <computer name>\<current user>
  - Password  
After successful login, the databases can be opened and viewed from the navigation bar on the left.

## 4 Appendix

### 4.1 Service and support

#### Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

[support.industry.siemens.com](https://support.industry.siemens.com)

#### Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

Please send queries to Technical Support via Web form:

[support.industry.siemens.com/cs/my/src](https://support.industry.siemens.com/cs/my/src)

#### SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

[siemens.com/sitrain](https://siemens.com/sitrain)

#### Note

You can learn about the products used in this application example in the courses:

- SITRAIN system course: WinCC Unified & Unified Comfort Panels (Entry ID: [109773211](#))
- SITRAIN advanced course: SIMATIC WinCC Unified for PC systems (Entry ID: [109781323](#))
- SITRAIN entry course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced (Entry ID: [109758624](#))
- SITRAIN advanced course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced (Entry ID: [109758626](#))
- SITRAIN course: SIMATIC WinCC Professional, SCADA in the TIA Portal (Entry ID: [109758618](#))
- SITRAIN course: SIMATIC Visualization Architect, automatic HMI generation (entry ID: [109758628](#))
- SITRAIN entry course: WinCC V7 (Article ID: [109758633](#))
- SITRAIN advanced course: WinCC V7 and WinCC Options (Article ID: [109758660](#))

### Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

[support.industry.siemens.com/cs/sc](https://support.industry.siemens.com/cs/sc)

### Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android:

[support.industry.siemens.com/cs/ww/en/sc/2067](https://support.industry.siemens.com/cs/ww/en/sc/2067)

## 4.2 Industry Mall

Abbildung 4-1



The Siemens Industry Mall is the platform on which the entire siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location:

[mall.industry.siemens.com](https://mall.industry.siemens.com)



## 4.3 Links and literature

Table 4-1

No.	Subject
\1\	Siemens Industry Online Support <a href="https://support.industry.siemens.com">https://support.industry.siemens.com</a>
\2\	Link to the entry page of the application example <a href="https://support.industry.siemens.com/cs/ww/en/view/109782859">https://support.industry.siemens.com/cs/ww/en/view/109782859</a>
\3\	Manual "SIMATIC HMI WinCC Unified WinCC Engineering V17 - WinCC Unified" <a href="https://support.industry.siemens.com/cs/ww/en/view/109794204">https://support.industry.siemens.com/cs/ww/en/view/109794204</a>
\4\	Topic page "WinCC Unified and Unified Comfort Panels" <a href="https://support.industry.siemens.com/cs/ww/en/view/109777887">https://support.industry.siemens.com/cs/ww/en/view/109777887</a>
\5\	Manual SIMATIC HMI WinCC Unified Getting Started <a href="https://support.industry.siemens.com/cs/ww/en/view/109783212">https://support.industry.siemens.com/cs/ww/en/view/109783212</a>
\6\	Download "DB Browser for SQLite" <a href="https://SQLitebrowser.org/">https://SQLitebrowser.org/</a>
\7\	Download "Microsoft SQL Server Management Studio" <a href="https://docs.microsoft.com/en-us/SQL/ssms/download-SQL-server-management-studio-ssms?view=SQL-server-ver15">https://docs.microsoft.com/en-us/SQL/ssms/download-SQL-server-management-studio-ssms?view=SQL-server-ver15</a>
\8\	Link to website "SQLite" <a href="http://www.SQLite.org">www.SQLite.org</a>
\9\	Link to website "Microsoft SQL Server" <a href="http://www.microsoft.com/en-us/SQL-server">www.microsoft.com/en-us/SQL-server</a>
\10\	Application Example "SIMATIC WinCC Unified - Tips and Tricks for Scripting (JavaScript)". <a href="https://support.industry.siemens.com/cs/ww/en/view/109758536">https://support.industry.siemens.com/cs/ww/en/view/109758536</a>
\11\	Demo project for SIMATIC WinCC Unified and SIMATIC HMI Unified Comfort Panels <a href="https://support.industry.siemens.com/cs/ww/en/view/109776633">https://support.industry.siemens.com/cs/ww/en/view/109776633</a>
\12\	Guide for switching from Comfort Panels to Unified Comfort Panels <a href="https://support.industry.siemens.com/cs/ww/en/view/109768002">https://support.industry.siemens.com/cs/ww/en/view/109768002</a>
\13\	Filtering alarms and alarms in SIMATIC WinCC Unified <a href="https://support.industry.siemens.com/cs/ww/en/view/109760056">https://support.industry.siemens.com/cs/ww/en/view/109760056</a>
\14\	SIMATIC WinCC Unified - Tips and tricks for scripting <a href="https://support.industry.siemens.com/cs/ww/en/view/109758536">https://support.industry.siemens.com/cs/ww/en/view/109758536</a>
\15\	SITRAIN System Course: WinCC Unified & Unified Comfort Panels <a href="https://support.industry.siemens.com/cs/ww/en/view/109773211">https://support.industry.siemens.com/cs/ww/en/view/109773211</a>
\16\	SITRAIN advanced course: SIMATIC WinCC Unified for PC systems <a href="https://support.industry.siemens.com/cs/ww/en/view/109781323">https://support.industry.siemens.com/cs/ww/en/view/109781323</a>
\17\	SITRAIN entry course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced <a href="https://support.industry.siemens.com/cs/ww/en/view/109758624">https://support.industry.siemens.com/cs/ww/en/view/109758624</a>
\18\	SITRAIN advanced course: SIMATIC WinCC (TIA Portal) machine-oriented for Comfort Panels and WinCC Runtime Advanced <a href="https://support.industry.siemens.com/cs/ww/en/view/109758626">https://support.industry.siemens.com/cs/ww/en/view/109758626</a>
\19\	SITRAIN course: SIMATIC WinCC Professional, SCADA in the TIA Portal <a href="https://support.industry.siemens.com/cs/ww/en/view/109758618">https://support.industry.siemens.com/cs/ww/en/view/109758618</a>
\20\	SITRAIN course: SIMATIC Visualization Architect, automatic HMI generation <a href="https://support.industry.siemens.com/cs/ww/en/view/109758628">https://support.industry.siemens.com/cs/ww/en/view/109758628</a>
\21\	SITRAIN entry course: WinCC V7 <a href="https://support.industry.siemens.com/cs/ww/en/view/109758633">https://support.industry.siemens.com/cs/ww/en/view/109758633</a>
\22\	SITRAIN advanced course: WinCC V7 and WinCC options <a href="https://support.industry.siemens.com/cs/ww/en/view/109758660">https://support.industry.siemens.com/cs/ww/en/view/109758660</a>

## 4.4 Change documentation

Table 4-2

Version	Date	Change
V1.0	06/2021	First version
V1.0	12/2021	Chapter 2.1.3.3: from V16 upd. 2 additional step 4 necessary