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# How do you Archive Tags and Messages in an SQL Database with WinCC Advanced V15?

WinCC (TIA Portal) Advanced / V15 / SQL Database

<https://support.industry.siemens.com/cs/ww/en/view/61886098>

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# 1 Introduction

The entry describes how to use WinCC Runtime Advanced V15 and Microsoft SQL Server 2014 to archive tags and messages in a Microsoft SQL database.

Two configurations are described.

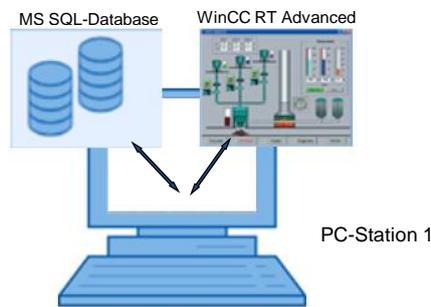
## Configuration 1, "Combined Installation" (Config. 1)

There is one PC station (PC Station1) on which both

- the Microsoft SQL server and
- the WinCC Runtime Advanced run.

The data of the WinCC Runtime Advanced is archived in the Microsoft SQL database.

Figure 1-1



## Configuration 2, "Separate Installation" (Config. 2)

There is one PC station (PC Station1) on which

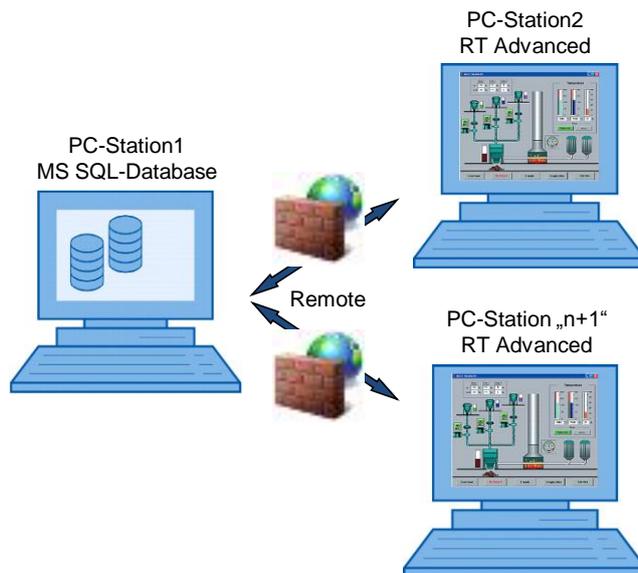
- the Microsoft SQL server runs.

There are other PC stations (PC Station2 to "n+1") on which only

- the WinCC Runtime Advanced runs.

The data of each WinCC Runtime Advanced station is archived in the Microsoft SQL database of "PC-Station1".

Figure 1-2



## 1.1 Configuration Notes

**Note** When "SQL database" is mentioned in the entry, this always refers to the Microsoft SQL Database.

The Microsoft SQL Database is a component of the Microsoft SQL Server 2014.

The entry includes the principal configuration steps for

- Creating an SQL database
- Archiving tags and messages in an SQL database.
  - **Configuration 1:**
  - **Configuration 2:**
- Output of the archived values via a trend display on the Comfort Panel.
- Output of the archived values via an SQL database table.

**Note** There are numerous parameters and possible settings in an SQL database. The entry can only deal with the settings required for this example.

## 1.2 Components Used

When WinCC (TIA Portal) V15 is installed, the Microsoft SQL Server 2014 is also installed. You use the "Microsoft SQL Server Management Studio 17" tool to create and configure the SQL database.

**Note** The "Microsoft SQL Server Management Studio 17" tool is not included in the WinCC (TIA Portal) delivery package. You can download the tool via the Microsoft Support pages (<https://support.microsoft.com>).

## 2 Configuration 1: Access to the SQL Server

The SQL server and the WinCC Runtime Advanced are running together on one PC (PC Station1).

### 2.1 Configure an SQL Database

#### Requirements

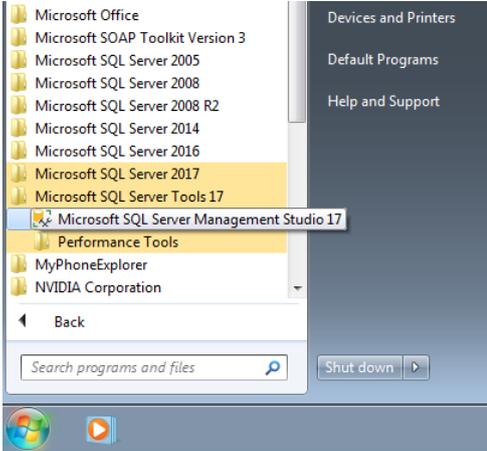
The following components must be installed on the PC.

- WinCC (TIA Portal) V15
- Microsoft SQL Server 2014
- Microsoft SQL Server Management Studio 17

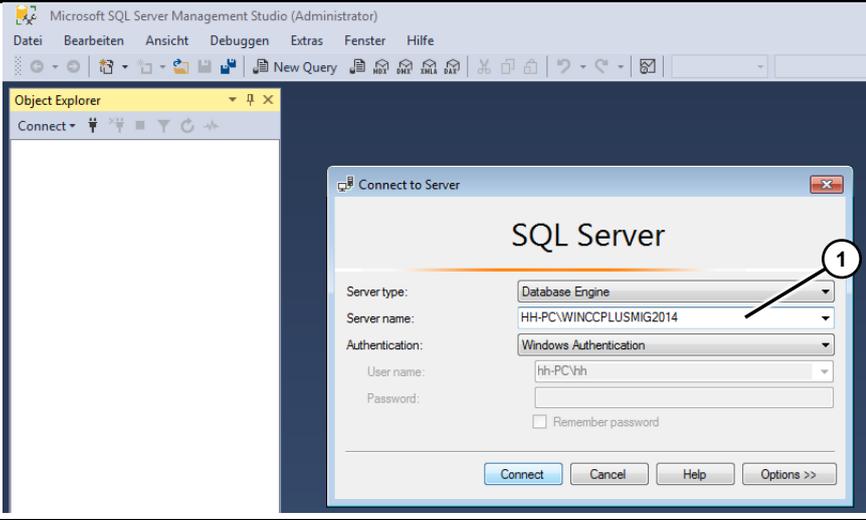
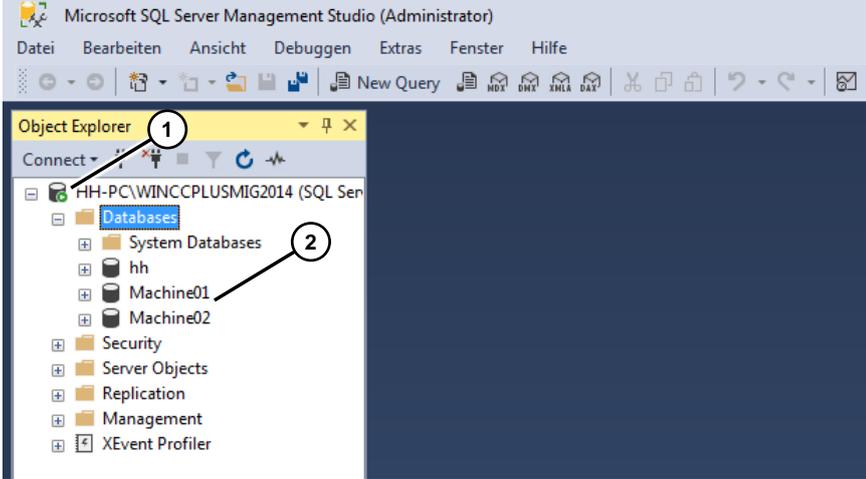
Furthermore you must have administrator rights.

#### Establish a server connection

Table 2-1

No.	Description
1.	<p>Open the "Microsoft SQL Server Management Studio 17" tool.</p> <ul style="list-style-type: none"> <li>• Open the program folder under "Windows Start &gt; All Programs &gt; Microsoft SQL Server Tools 17".</li> <li>• Start the tool via "Microsoft SQL Server Management Studio 17".</li> </ul> <p>"Microsoft SQL Server Management Studio 17" starts.</p>  <p>The screenshot shows a Windows Start menu search interface. The search bar at the top contains the text 'Microsoft SQL Server Management Studio 17'. Below the search bar, a list of search results is displayed. The first result is 'Microsoft SQL Server Management Studio 17', which is highlighted in blue. Other results include 'Microsoft Office', 'Microsoft SOAP Toolkit Version 3', 'Microsoft SQL Server 2005', 'Microsoft SQL Server 2008', 'Microsoft SQL Server 2008 R2', 'Microsoft SQL Server 2014', 'Microsoft SQL Server 2016', 'Microsoft SQL Server 2017', 'Microsoft SQL Server Tools 17', 'Performance Tools', 'MyPhoneExplorer', and 'NVIDIA Corporation'. On the right side of the search results, there are three categories: 'Devices and Printers', 'Default Programs', and 'Help and Support'. At the bottom of the search results, there is a 'Back' button and a search bar with the text 'Search programs and files'. A 'Shut down' button is also visible at the bottom right of the search results.</p>
2.	<p><b>Establish a connection to the server</b></p> <ul style="list-style-type: none"> <li>• Via the drop-down list box you select the server on which the data is to be stored (1).</li> <li>• If multiple servers are installed on the PC, then in the drop-down list box you select the menu "&lt;Browse for more...&gt;".</li> <li>• Under "Database Engine" you select the following server "Computer Name\WINCCPLUSMIG2014". The server you specify here is also used for configuring the data source (ODBC) (<a href="#">link</a>).</li> <li>• Click the "Connect" button.</li> </ul> <p>The connection to the server is set up.</p>

## 2 Configuration 1: Access to the SQL Server

No.	Description
	
3.	<p><b>View of the established server connection</b></p> <p>The green arrow icon (1) indicates that the server connection is active.</p> <p>Now you can access databases already created and have the values displayed (2).</p> <p>How to have values displayed in the SQL database is described below (chapter 4, "<a href="#">Read Out/Display the SQL Database Table</a>").</p> 

### Create a new database

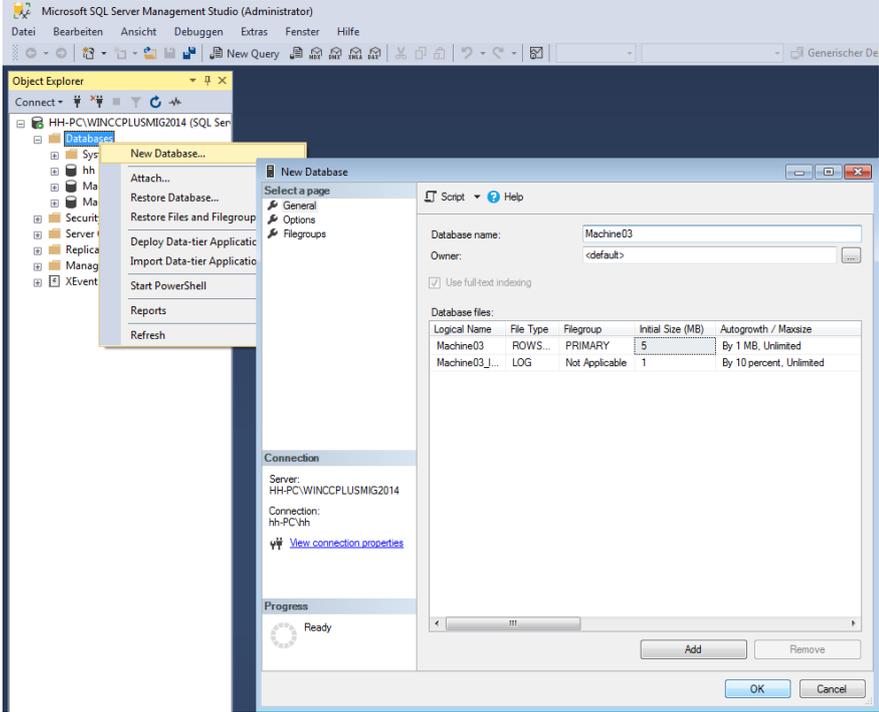
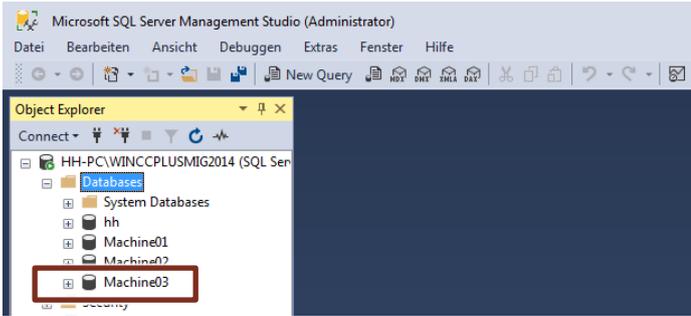
Databases (Machine01, Machine02, for example) have already been created in the previous section "Establish a server connection".

In this section we describe how to create a new database. In this case we create a database named "Machine03".

The name you use here is specified as reference when creating the data source (ODBC) (see the following table).

## 2 Configuration 1: Access to the SQL Server

Table 2-2

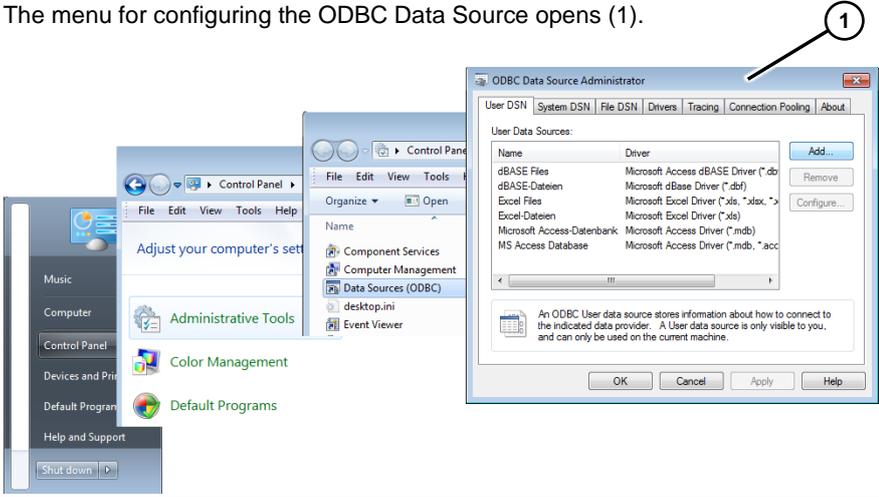
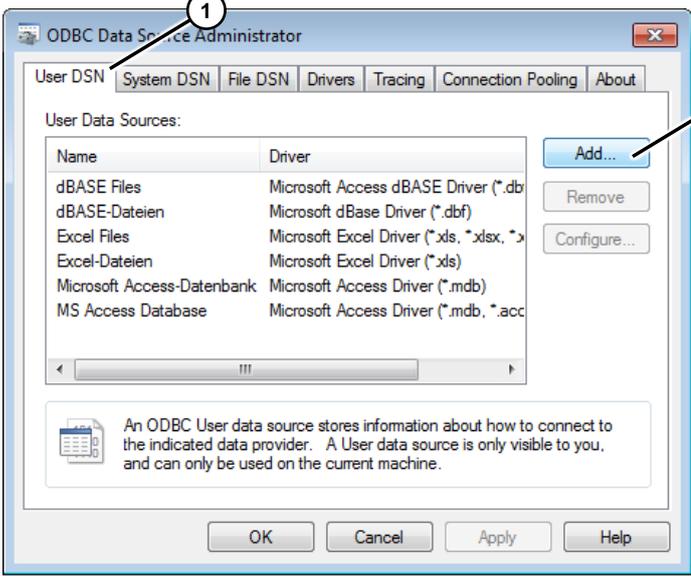
No.	Description
1.	First you execute Steps 1 to 3 in the "Establish a server connection" section, <a href="#">Table 2-1</a> .
2.	<p><b>Create a new database</b></p> <ul style="list-style-type: none"> <li>Right-click the file folder "Databases".</li> <li>In the pop-up menu that opens you select "New Database...".</li> <li>The "New Database" window opens. Enter a name in the window under "Database name:". The name is used subsequently when creating the data source (ODBC) (<a href="#">link</a>).</li> <li>For the menu item "Owner" and all the other parameters the default values have been accepted.</li> <li>Click "OK" to confirm the entries.</li> </ul> 
3.	<p>View of the newly created database "Machine03". This completes the settings at this point.</p> <p><b>Note:</b> In the course of the exercise the tags and messages will be archived in this database.</p> 

## 2.2 Configure the Data Source (ODBC)

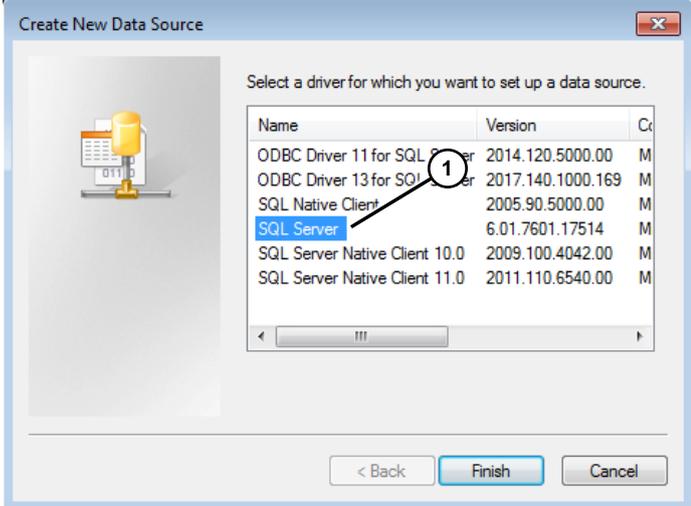
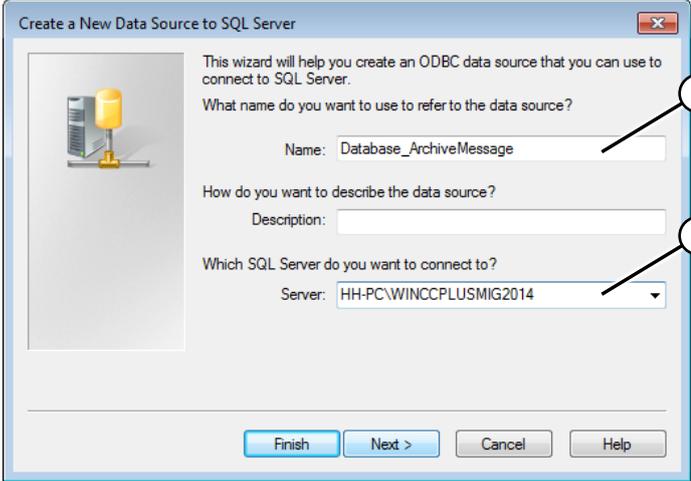
An ODBC data source is used for establishing a connection to a Microsoft SQL Server.

The configuration procedure is given below.

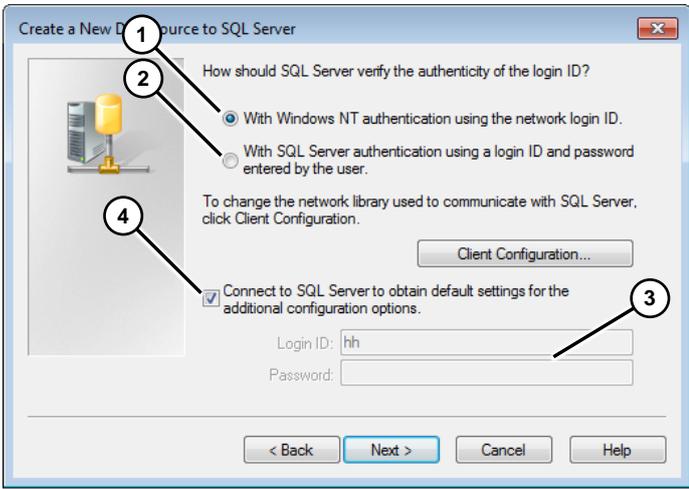
Table 2-3

No.	Description
<p>1.</p> <p><b>Open the data source (ODBC)</b></p> <ul style="list-style-type: none"> <li>Open the Windows Control Panel. Windows Start &gt; Control Panel.</li> <li>Open the "Administration" menu.</li> <li>Open the menu "Data Source (ODBC)" menu.</li> </ul> <p>The menu for configuring the ODBC Data Source opens (1).</p>	
<p>2.</p> <p><b>Create new user data source</b></p> <ul style="list-style-type: none"> <li>In the menu bar you select the "User DSN" tab (1).</li> <li>Click the "Add..." button (2).</li> </ul>	

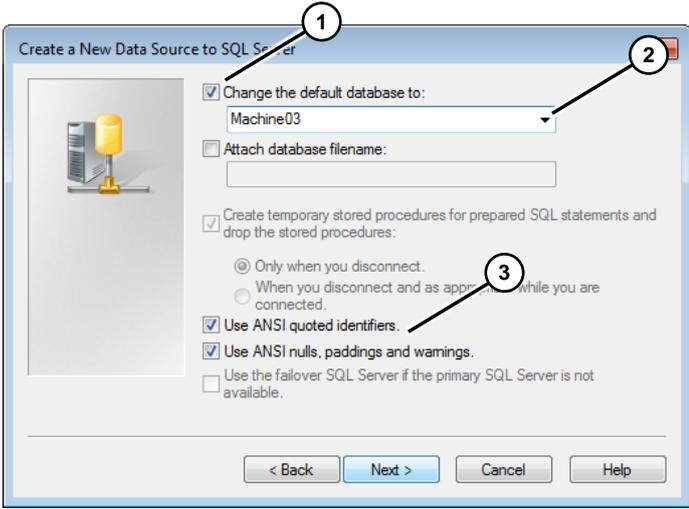
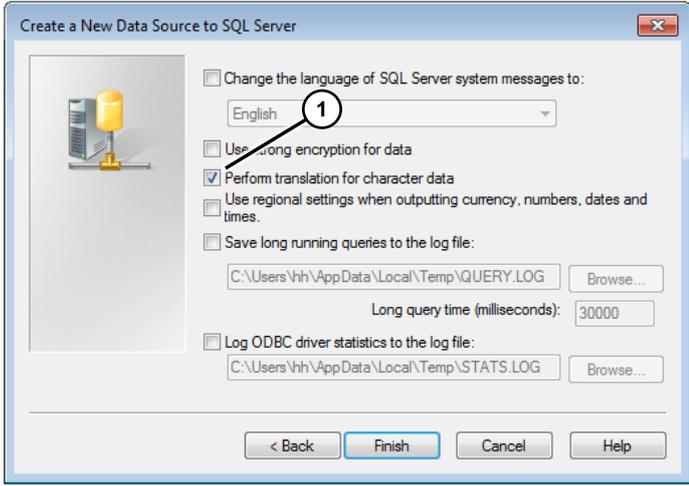
## 2 Configuration 1: Access to the SQL Server

No.	Description
3.	<ul style="list-style-type: none"> <li>Select the driver "SQL Server" (1).</li> <li>Click "Finish".</li> </ul> 
4.	<ul style="list-style-type: none"> <li>Name (1): <ul style="list-style-type: none"> <li>Here you enter the name that you have stored in the PC Runtime configuration in the archives under "Properties &gt; General &gt; Storage location". In this case "Database_ArchiveMessage" (<a href="#">link</a>).</li> </ul> </li> <li>Server (2): <ul style="list-style-type: none"> <li>Via the drop-down list box you select the server that you selected when creating the database server connection. In this case "HH-PC\WINCCPLUSMIG2014" (<a href="#">link</a>).</li> </ul> </li> <li>Click the "Next &gt;" button.</li> </ul> 

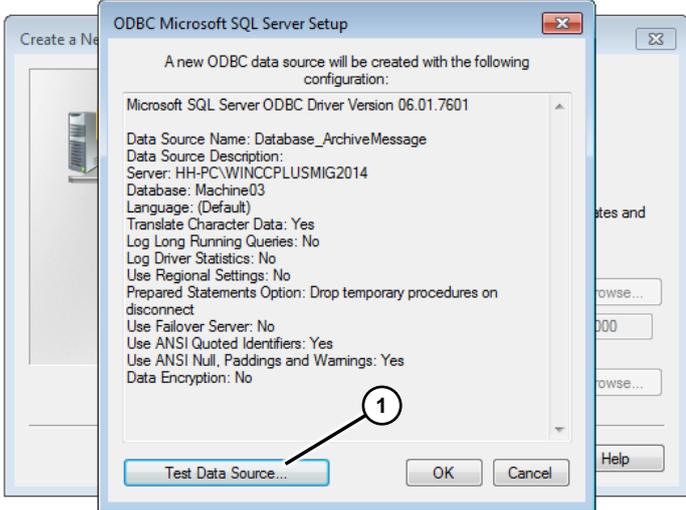
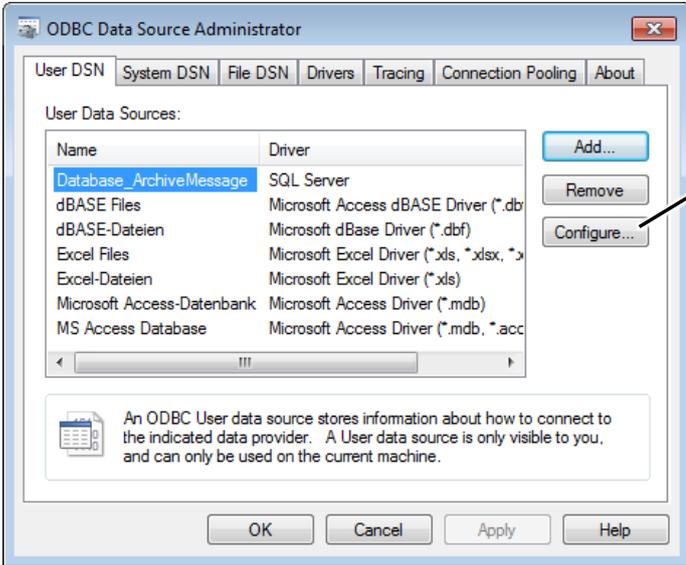
## 2 Configuration 1: Access to the SQL Server

No.	Description
5.	<ul style="list-style-type: none"><li>• "Windows NT authentication" (1) is used in this example. If you select "SQL Server authentication" (2), you can specify the required Login ID and Password in the bottom part of the window (3). You must have stored the data previously under "Security" in the SQL database.</li><li>• Enable the "Connect to..." check box (4).</li><li>• Click the "Next &gt;" button.</li></ul> <p>When you click the "Next &gt;" button, the data source attempts to establish a connection to the SQL server. If this does not work, you get an error message. In this case you should check:</p> <ul style="list-style-type: none"><li>- That the SQL server has started.</li><li>- The server name.</li><li>- The security settings of the SQL database.</li><li>- The user rights of the SQL database.</li></ul> 

## 2 Configuration 1: Access to the SQL Server

No.	Description
6.	<p>When the SQL server connection has been established, the following window is displayed.</p> <ul style="list-style-type: none"> <li>• Enable the "Change the default database to:" option (1).</li> <li>• Via the drop-down list box you select the database to be referred to (2). See the entries here that you stored when creating the SQL server connection. In this case "Machine03" (<a href="#">link</a>). The values of the WinCC Runtime Advanced are archived in this SQL database.</li> <li>• In the screen you enable the two options displayed (3).</li> <li>• Click the "Next &gt;" button.</li> </ul> 
7.	<ul style="list-style-type: none"> <li>• You select the option (1) as shown in the figure.</li> <li>• Click the "Finish" button.</li> </ul> 

## 2 Configuration 1: Access to the SQL Server

No.	Description
8.	<p>You then get a summary of the settings that have been made. You can test the connection via the "Test Data Source..." button.</p> <p>Close the configuration via the "OK" button.</p> 
9.	<p>The 1st menu screen is displayed again.</p> <p>The newly created user data source is displayed. In this case "Database_ArchiveMessage".</p> <p>Via the "Configure..." button you can call and change the settings that have been made (1).</p> <p>For this you first mark the name of the user data source.</p>  <p>This completes the settings for the data source (ODBC). Close the menu with the "OK" button.</p>

Now you can start the WinCC Runtime Advanced. Information about configuring the WinCC Runtime Advanced is available in chapter [5, WinCC \(TIA Portal\)](#).

### 3 Configuration 2: Access to the SQL Server

The SQL server runs on its own PC (PC Station1).

The WinCC Runtime Advanced runs on separate PCs (PC Station2 to "n+1") and accesses the data of the SQL database remotely.

The data of each WinCC Runtime Advanced station is archived in the Microsoft SQL database of "PC Station1".

In order for the PC stations to be able to access the SQL server of "PC Station1" with the WinCC Runtime Advanced, on the "PC Station1" settings have to be made both

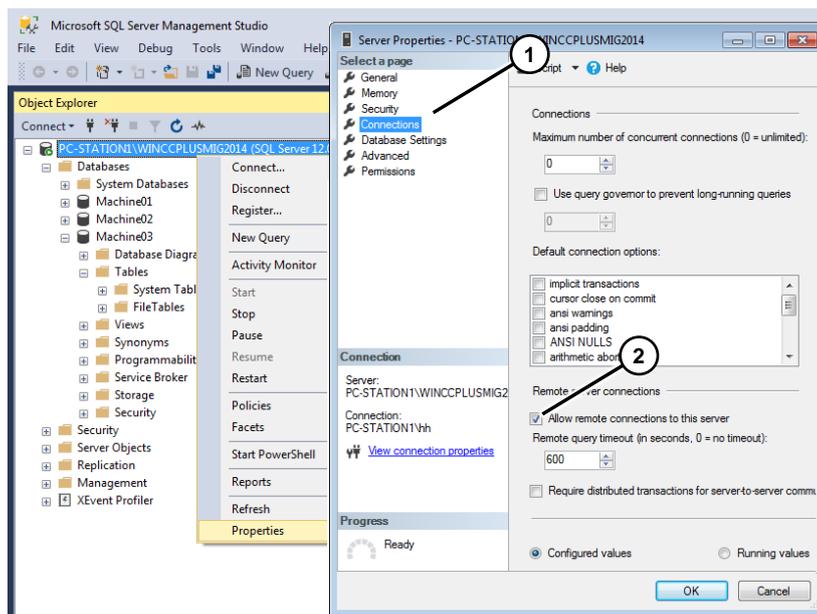
- in the Windows user administration and in the user administration of the SQL server, and
- in the Windows firewall. (Otherwise the firewall would block the incoming connection).

#### 3.1 Configure an SQL Database

##### Establish a server connection

Table 3-1

No.	Description
1.	<p>The configuration corresponds to the settings in section <a href="#">2.1 "Configure an SQL Database"</a>.</p> <p>In this case the name of the server is: "Name of the <b>PC Station1</b>WINCCPLUSMIG2014".</p> <p><b>Other settings</b></p> <ul style="list-style-type: none"> <li>• In the Properties of the SQL server check that the "Allow remote connections to this server" option is enabled.                             <ul style="list-style-type: none"> <li>- Right-click the SQL server and open the Properties. A window opens.</li> <li>- Under "Select a page" you mark the item "Connections" (1).</li> <li>- In the "Remote server connections" section you enable the "Allow remote connections to this server" option (2).</li> </ul> </li> </ul>



## 3.2 SQL Database User Data Management

The settings are to be made on the PC on which the SQL server is installed. In this example the settings are made in the "PC Station1".

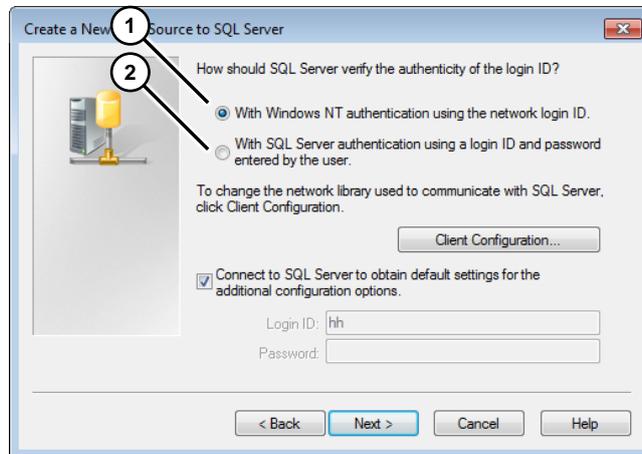
### 3.2.1 General Information

In the later configuration of the data source (ODBC) you can choose whether the SQL server authentication is to be made

- Via the Windows login (1) or
- Via the user administration of the SQL server (2).

The FAQ response describes the "Windows authentication".

Figure 3-1



### Authentication via the Windows login

When authenticating via the Windows login the login data for the SQL server must match the login data of the PC on which the WinCC Runtime Advanced is running.

Example:

You login as follows on the PC Station2 with the WinCC Runtime Advanced.

User name: "User 1"

Password: "100"

In the "PC Station1" you must also create a user in the Window user administration with the name "User 1" and the password "100".

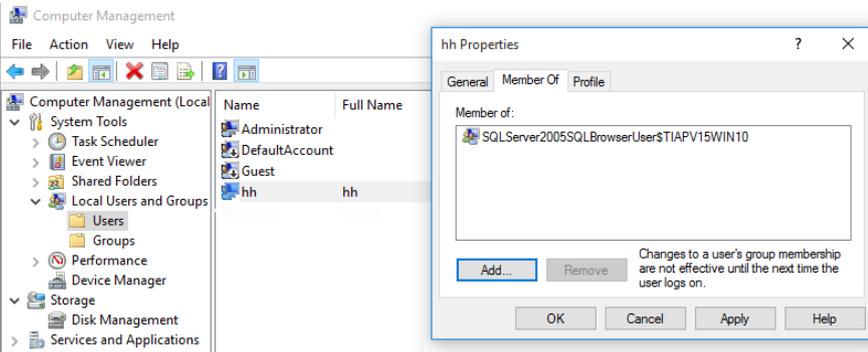
How to assign the user to the SQL database is described in the course of this documentation ([link](#)).

### 3.2.2 Authentication via the Windows Login

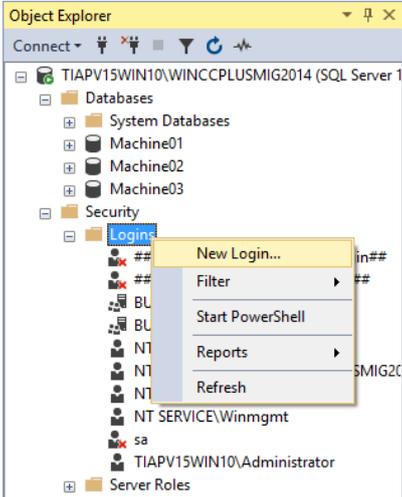
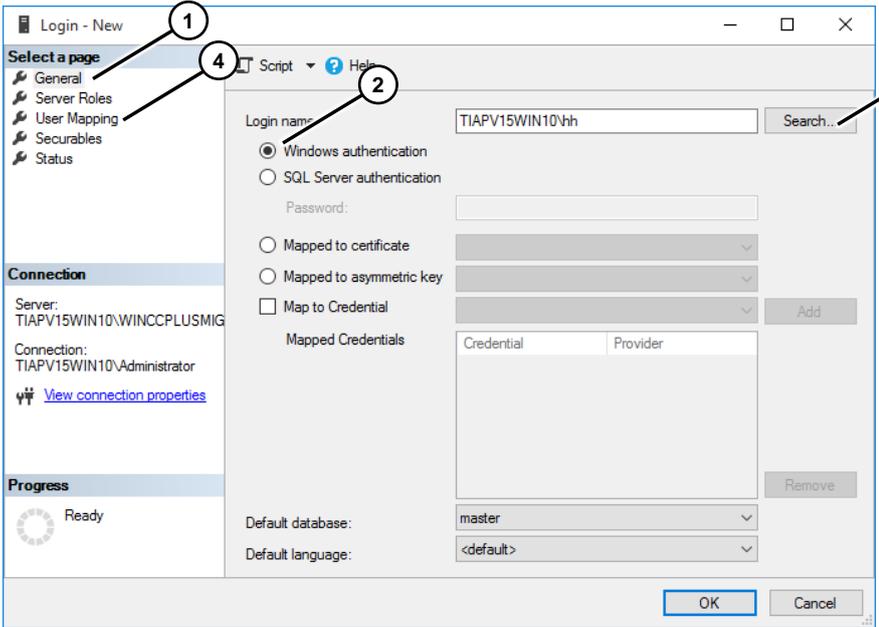
**Notes**

- You must be logged in as administrator on the "PC Station1".
- The SQL database provides numerous settings for access protection etc. At this point one possible method of access protection is presented in an example.

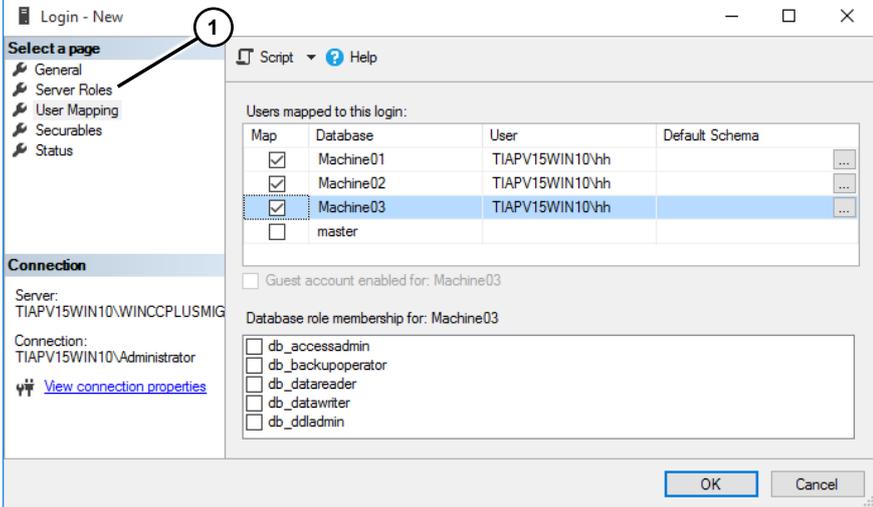
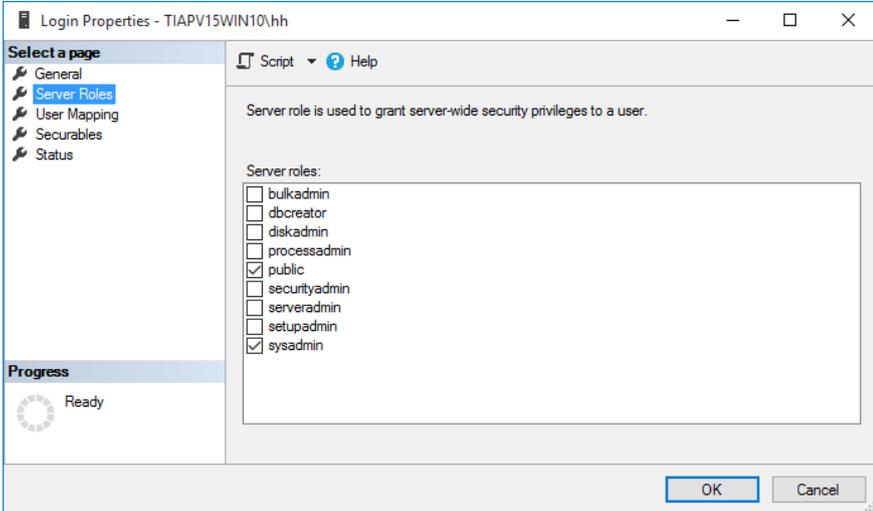
Table 3-2

No.	Description
1.	<p><b>PC Station1, create Windows user</b></p> <p>In the "PC Station1" you create a Windows user. The user must have the same name and password as the user on the "PC Station2" on which the WinCC Runtime Advanced is running.</p> <p>In this example:                      User: hh =&gt; Nickname, (...User1)                      Password: 100</p> <p><b>Note:</b>                      The user must not be assigned to any special group.                      (Create new user under Windows 10).</p> 
2.	<p><b>Note on the created user</b></p> <p>You do not have to be logged in on the PC Station1 with the new "User1" in order to operate the SQL database.</p>

### 3 Configuration 2: Access to the SQL Server

No.	Description
3.	<p><b>PC Station1, SQL database, assign Windows user</b></p> <ul style="list-style-type: none"> <li>In the SQL database you right-click the "Security" folder.</li> <li>In the pop-up menu that opens you select "New Login...". The "Login - New" page opens.</li> </ul> 
4.	<p><b>PC Station1, "Login - New" page</b></p> <ul style="list-style-type: none"> <li>Select the "General" page (1).</li> <li>Enable the radio button "Windows authentication" (2).</li> <li>Click the "Search..." button (3). The "Select User or Group" window opens.</li> <li>Via the window you call the previously created new Windows user. In this case "hh" (TIAV15WIN10\hh).</li> <li>Select the "User Mapping" page (4).</li> </ul> 

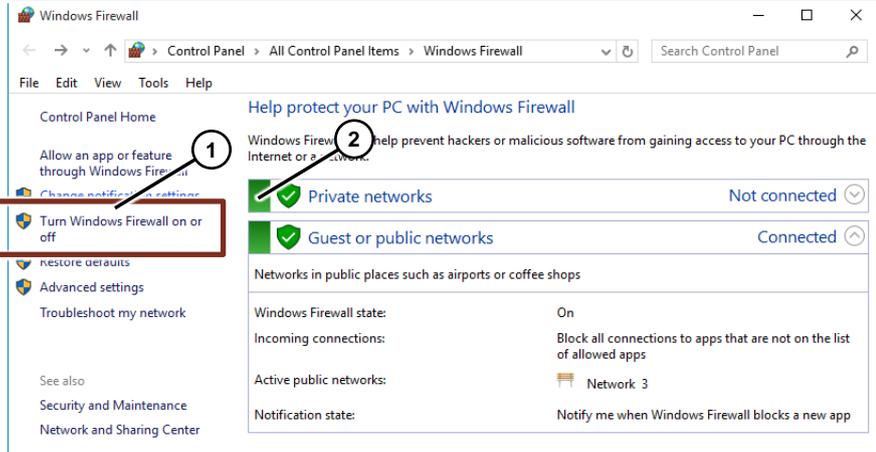
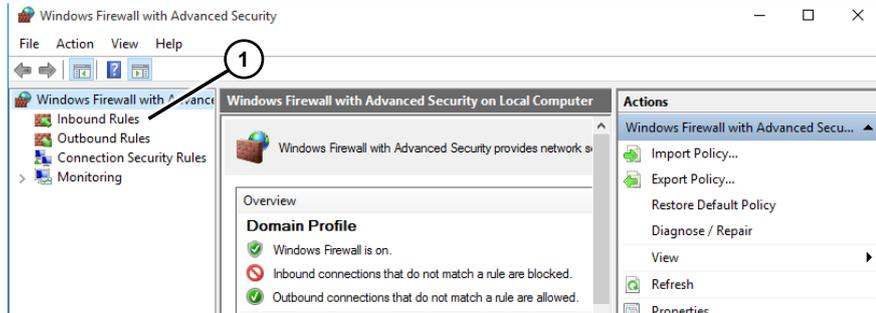
### 3 Configuration 2: Access to the SQL Server

No.	Description
5.	<p><b>"User Mapping" page</b></p> <ul style="list-style-type: none"> <li>Here you define the database which the user "hh" is permitted to access. The final assignment is made in the settings of the data source ODBC (<a href="#">link</a>).</li> <li>Select the "Server Roles" page (1).</li> </ul> 
6.	<p><b>"Server Roles" page</b></p> <ul style="list-style-type: none"> <li>Activate the option boxes "sysadmin" and "public".</li> <li>Click "OK" to confirm the settings.</li> </ul> 
7.	<p>This completes the user settings for Windows authentication. The user "hh" has been assigned automatically to all the databases selected on the "User Mapping" page. If required, you can make further settings under "Name of the database &gt; Security &gt; Users".</p>

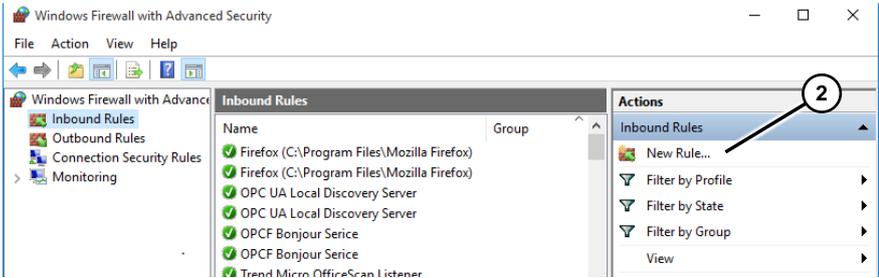
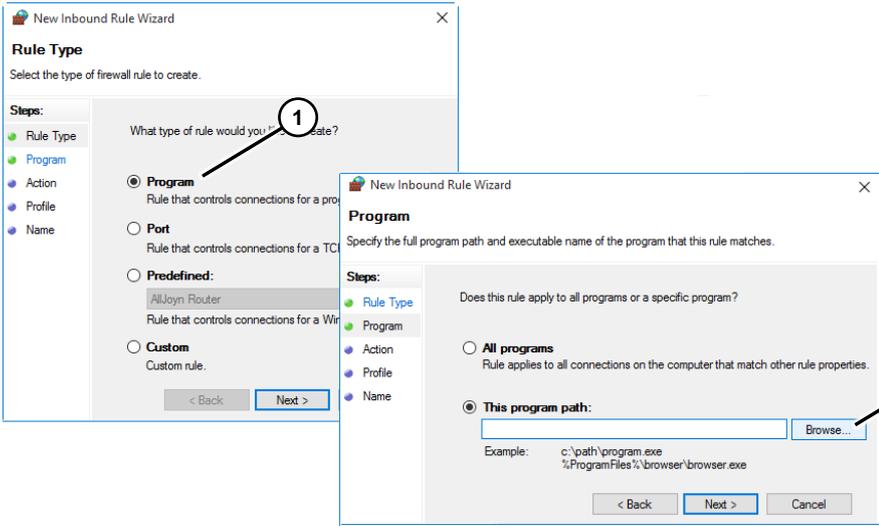
### 3.3 Windows Firewall Settings

The settings are to be made on the PC on which the SQL server is running. In this example on the "PC Station1".

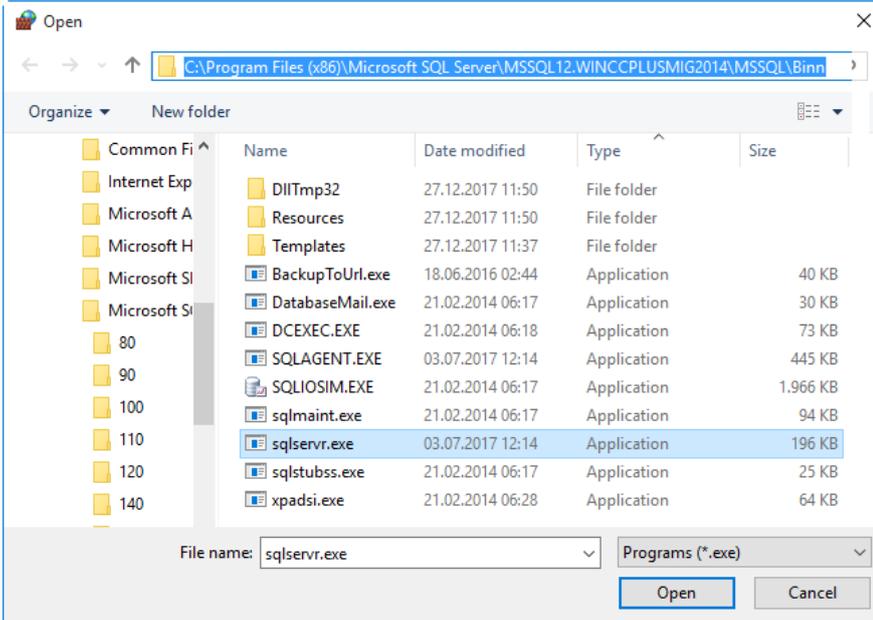
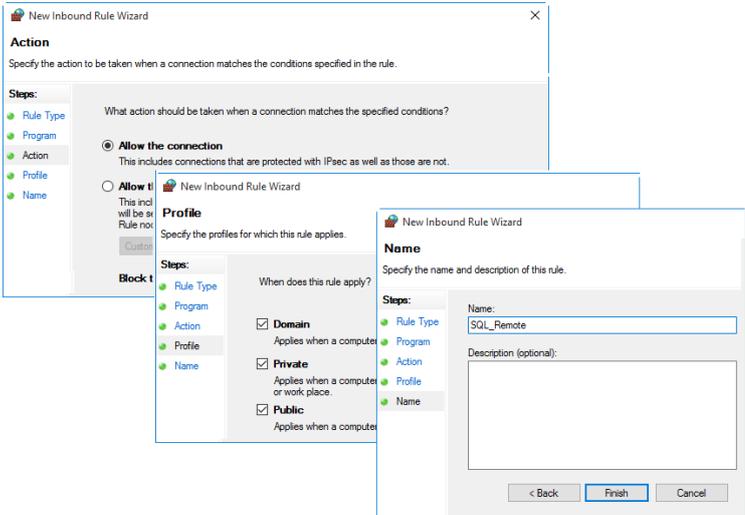
Table 3-3

No.	Description
1.	<p><b>Enable the firewall</b></p> <ul style="list-style-type: none"> <li>• Call the Windows Firewall via "Windows Start &gt; Control Panel &gt; Windows Firewall".</li> <li>• Click the text "Turn Windows Firewall on or off" (1). Another window opens.</li> <li>• Click the "Turn on Windows Firewall" radio button. Acknowledge the entry with "OK". You return this view.</li> </ul> <p><b>Note:</b> The green icon indicates that the firewall is turned on (2).</p> 
2.	<p><b>Add firewall rule</b></p> <p>You have to add a firewall rule to ensure that the incoming connection of the "PC Station2" is not blocked by the Windows Firewall of the "PC Station1". No rule is required if the Windows Firewall is turned off.</p> <ul style="list-style-type: none"> <li>• First open the Windows Firewall again.</li> <li>• Click the text "Advanced Settings". The following screen is displayed.</li> <li>• Click "Inbound Rules" (1). A new window opens.</li> </ul> 

### 3 Configuration 2: Access to the SQL Server

No.	Description
3.	<ul style="list-style-type: none"> <li>In this window you click "New Rule..." (2). The "New Inbound Rule Wizard" window opens. The program file of the SQL server is called via the wizard. This measure ensures that incoming queries to the SQL server are no longer blocked by the Windows Firewall.</li> </ul> 
4.	<p><b>New Inbound Rule Wizard</b></p> <ul style="list-style-type: none"> <li>In the first screen you select the "Program" radio button (1).</li> <li>Then click the "Next &gt;" button.</li> <li>In the second screen you select the "This program path:" radio button and then click "Browse..." (2).</li> </ul> 

### 3 Configuration 2: Access to the SQL Server

No.	Description
5.	<ul style="list-style-type: none"> <li>Navigate to and mark the program file "sqlservr.exe". Make sure that you select the correct file for the SQL database being used. This is particularly important if there are different versions of the SQL server installed on the same PC (see information under "Tip").</li> <li>Click the "Open" button.</li> <li>Then click the "Next &gt;" button.</li> </ul> <p><b>Tip:</b> Use the Windows Search function to make a prior search for the word "sqlserver.exe" on drive "C". If you have installed multiple SQL servers, then make sure you use the file corresponding to the SQL server being used.</p> 
6.	<ul style="list-style-type: none"> <li>In the following screens the displayed default settings have been used.</li> <li>In the last screen you specify a name and close the wizard via the "Finish" button.</li> <li>This completes the settings for the Windows Firewall.</li> </ul> 
7.	Restart the PC or log out and log in again.

### 3.4 Configure (Remote) the Data Source (ODBC)

An ODBC data source is used for establishing a connection to a Microsoft SQL Server.

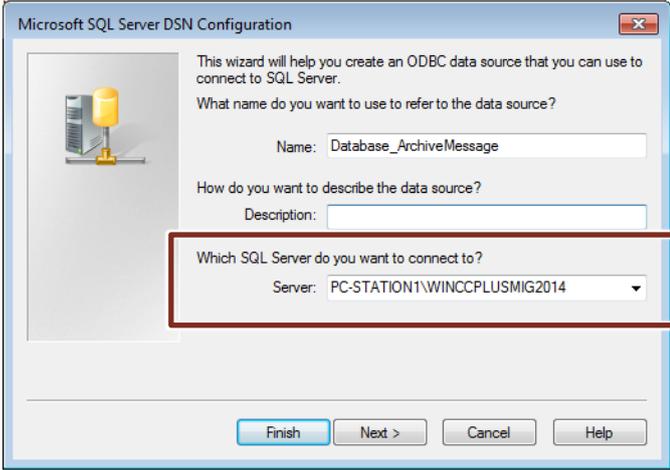
The ODBC data source is configured on the PC on which the RT Advanced is running/installed.

The configuration procedure is given below.

**Note**

If you cannot establish a connection to the remote server, this might be due to the firewall of the operating system. For testing or during commissioning you can try to turn off the firewall where the SQL database is installed. Bear in mind in this case that you might run the risk of allowing access to unauthorized users.

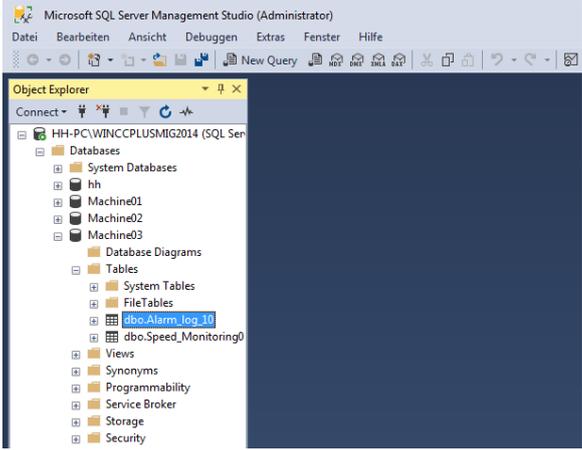
Table 3-4

No.	Description
1.	<p>The configuration corresponds to the settings in section <a href="#">2.2 "Configure the Data Source (ODBC)"</a>.</p> <p>The only difference is in table item No. 4.</p> <p>For the menu item "Server" you now do not select the local server but the server to which you want to have remote access and on which the SQL database is installed.</p> <ul style="list-style-type: none"> <li>Server:                     <ul style="list-style-type: none"> <li>Via the drop-down list box you select the remote server that you selected when creating the database server connection. In this case "PC Station1\WINCCPLUSMIG2014" (<a href="#">link</a>).</li> </ul> </li> <li>Click the "Next &gt;" button.</li> </ul> 

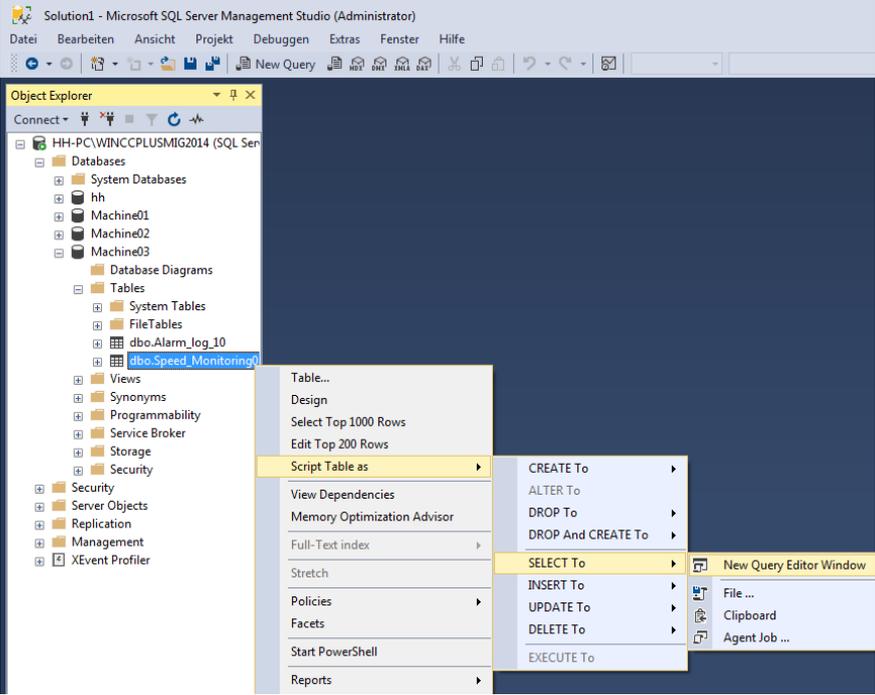
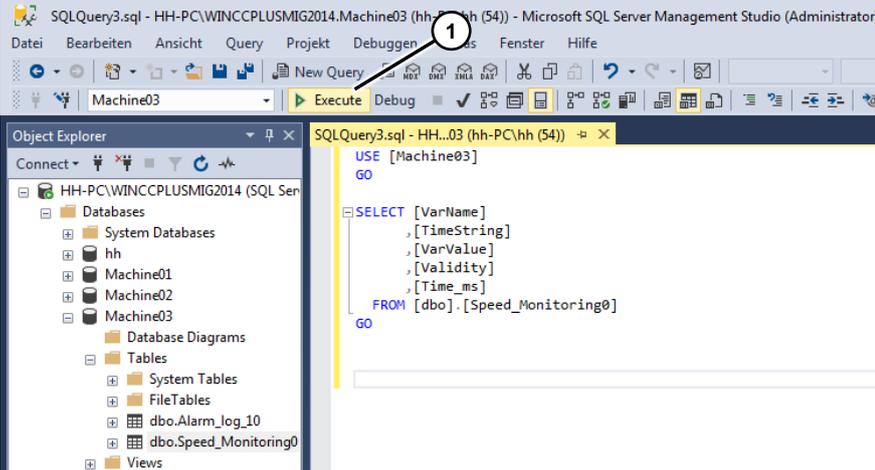
## 4 Read Out/Display the SQL Database Table

The archived tag values of the HMI Runtime Advanced are stored in the assigned database. Proceed as follows to output the archived values via the tool "Microsoft SQL Server Management Studio 17".

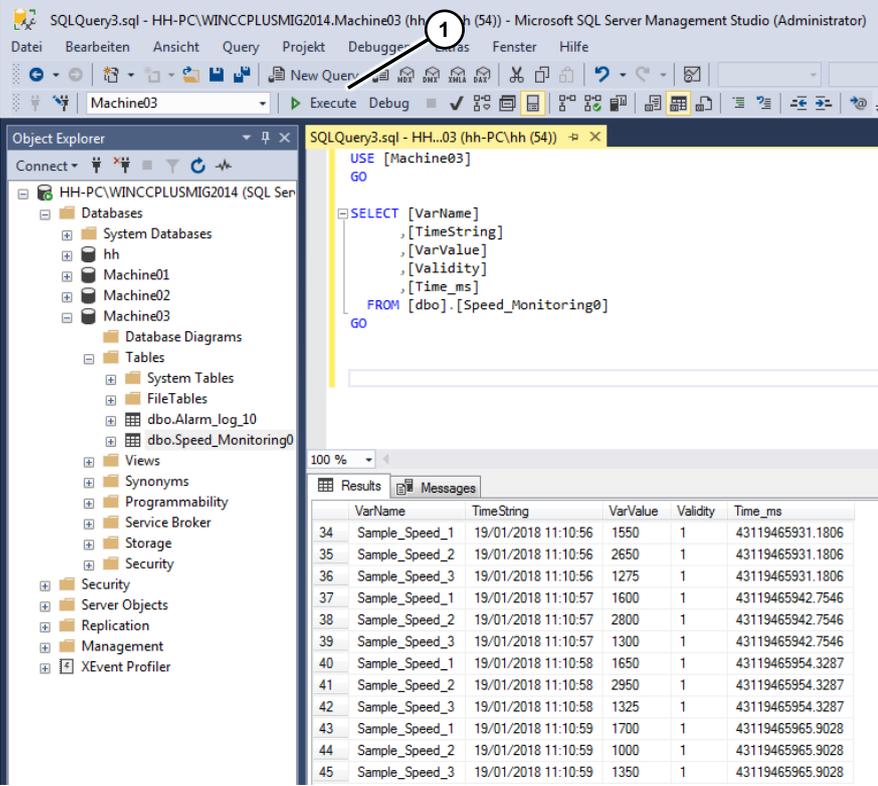
Table 4-1

No.	Description
1.	<ul style="list-style-type: none"> <li>• First perform the steps 1 to 3 as in section <a href="#">2.1 "Configure an SQL Database"</a>.</li> <li>• Select the database whose values you want to have displayed and open the folder tree.</li> <li>• Open the "Tables" file folder. The archive files are displayed in the folder. =&gt; dbo.Archivename</li> </ul> <p>In our example these are "dbo.Alarm_log_10" and "dbo.Speed_Monitoring0".</p> <p><b>Note:</b> The "0" in the file name is generated by the system.</p> 

#### 4 Read Out/Display the SQL Database Table

No.	Description
2.	<ul style="list-style-type: none"> <li>Right-click the archive file.</li> <li>Navigate to the menu item shown in the screen.</li> </ul> 
3.	<p>When you enable the "New Query Editor Windows" function the script shown in the screen is generated automatically. The script includes the function that reads out the values of the selected archive file.</p> <p>Click "Execute" (1) in the toolbar.</p> 

#### 4 Read Out/Display the SQL Database Table

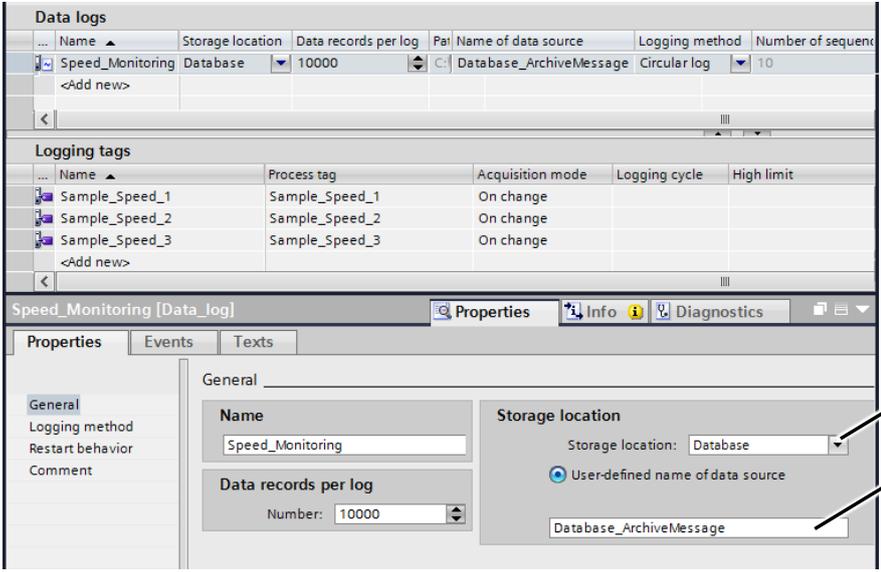
No.	Description
4.	<p>The figure shows the table with the values read out of the archive file after running the "Execute" function.</p> <p>To update the table you click the "Execute" function (1) again in the toolbar.</p> 

# 5 WinCC (TIA Portal)

## 5.1 Archive Configuration

You configure the archives in the usual manner. The only difference is in the specification of the storage location and the data source.

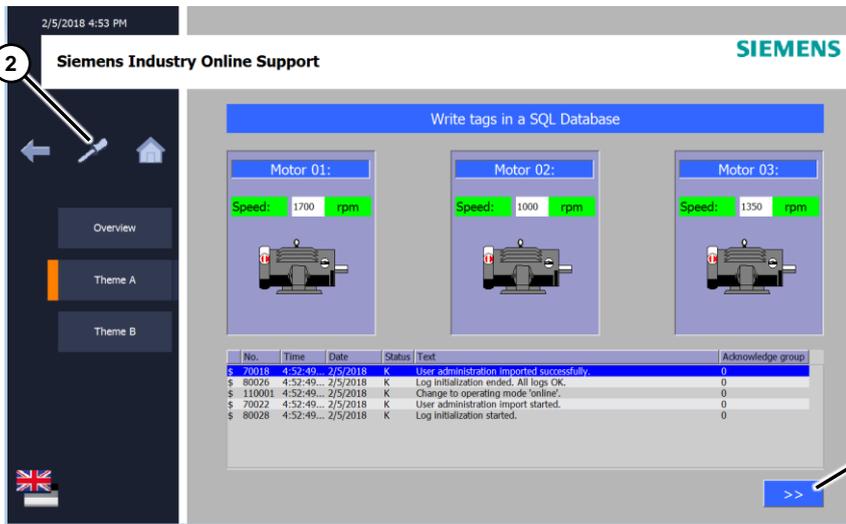
Table 5-1

No.	Description
1.	You call the archive via the project tree and open the Properties. In this example: "Speed_Monitoring".
2.	<p><b>Define the storage location</b></p> <ul style="list-style-type: none"> <li>You define the storage location in the menu "Properties &gt; General". Select the "Database" menu from the drop-down list box (1).</li> <li>Enter the name of the data source (2). This name is used to address the ODBC database with the archived tag names (<a href="#">link</a>).</li> </ul> 
3.	This completes the Special Settings for archiving in the SQL database. If you are using other archives, you can use the same data source name.

## 5.2 Operation of the Sample Application

The sample application is for testing the tag archiving and message archiving.

Table 5-2

No.	Description
1.	<p><b>"Theme A" page</b></p> <p>The "SimulateTag" function is used to assign speed values to the three motors displayed.</p> <p>The simulated values are archived in an SQL database. You call the page with a trend archive via the "&gt;&gt;" button (1).</p> <p>The speed values archived in the database are read out via the trend archive. Via the icon (2) you call the system page to terminate the Runtime.</p> 
2.	<p><b>"Theme B" page</b></p> <p>You use the buttons to simulate fault messages. The simulated messages are archived in an SQL database.</p> 